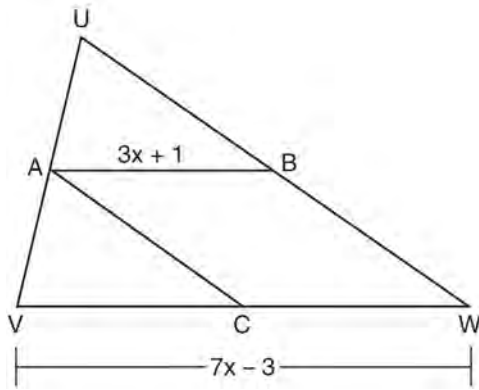# JMAP
REGENTS AT RANDOM

NY Geometry Regents Exam Questions
from Fall 2008-August 2015

www.jmap.org

Geometry Regents at Random

1 In the diagram of $\triangle UVW$ below, A is the midpoint of $\overline{UV}$, B is the midpoint of $\overline{UW}$, C is the midpoint of $\overline{VW}$, and $\overline{AB}$ and $\overline{AC}$ are drawn.


If $VW = 7x - 3$ and $AB = 3x + 1$, what is the length of $\overline{VC}$?
1) 5
2) 13
3) 16
4) 32

2 For which measures of the sides of $\triangle ABC$ is angle B the largest angle of the triangle?
1) $AB = 2, BC = 6, AC = 7$
2) $AB = 6, BC = 12, AC = 8$
3) $AB = 16, BC = 9, AC = 10$
4) $AB = 18, BC = 14, AC = 5$

3 In a coordinate plane, the locus of points 5 units from the x-axis is the
1) lines $x = 5$ and $x = -5$
2) lines $y = 5$ and $y = -5$
3) line $x = 5$, only
4) line $y = 5$, only

4 The sum of the interior angles of a regular polygon is $540°$. Determine and state the number of degrees in one interior angle of the polygon.

5 If $\triangle MNP \cong \triangle VWX$ and $\overline{PM}$ is the shortest side of $\triangle MNP$, what is the shortest side of $\triangle VWX$?
1) $\overline{XV}$
2) $\overline{WX}$
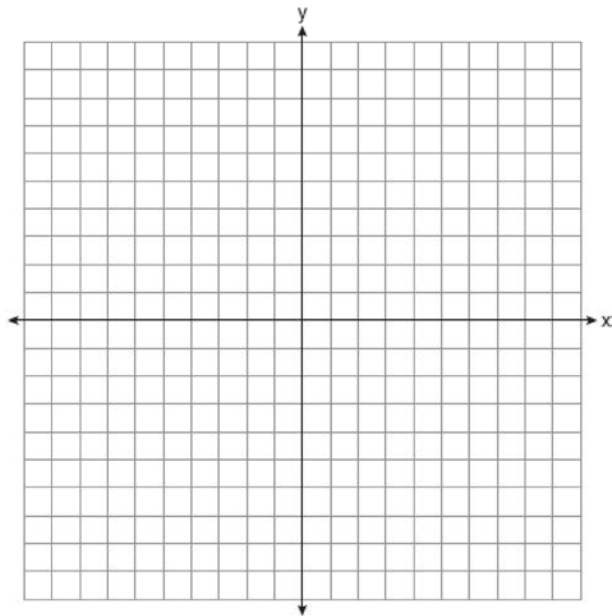3) $\overline{VW}$
4) $\overline{NP}$

6 Triangle ABC shown below is a right triangle with altitude $\overline{AD}$ drawn to the hypotenuse $\overline{BC}$.
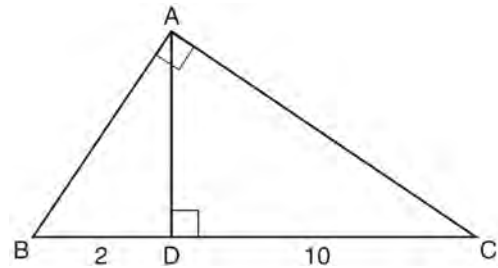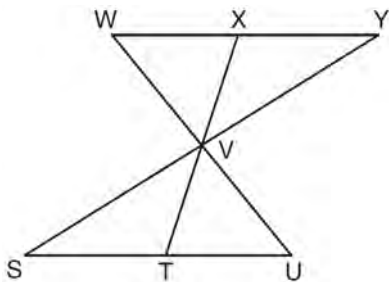

If $BD = 2$ and $DC = 10$, what is the length of $\overline{AB}$?
1) $2\sqrt{2}$
2) $2\sqrt{5}$
3) $2\sqrt{6}$
4) $2\sqrt{30}$

7 Write an equation of a circle whose center is $(-3, 2)$ and whose diameter is 10.

8 Triangle ABC has coordinates $A(-2,1)$, $B(3,1)$, and $C(0,-3)$. On the set of axes below, graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation of 2.

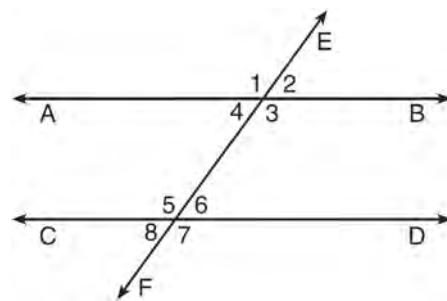9 In the diagram below, $\triangle XYV \cong \triangle TSV$.

Which statement can *not* be proven?
1) $\angle XVY \cong \angle TVS$
2) $\angle VYX \cong \angle VUT$
3) $\overline{XY} \cong \overline{TS}$
4) $\overline{YV} \cong \overline{SV}$

10 Secants $\overline{JKL}$ and $\overline{JMN}$ are drawn to circle O from an external point, J. If $JK = 8$, $LK = 4$, and $JM = 6$, what is the length of $\overline{JN}$?
1) 16
2) 12
3) 10
4) 8

11 Transversal $\overleftrightarrow{EF}$ intersects $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$, as shown in the diagram below.
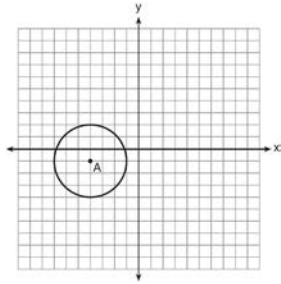

Which statement could always be used to prove $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$?
1) $\angle 2 \cong \angle 4$
2) $\angle 7 \cong \angle 8$
3) $\angle 3$ and $\angle 6$ are supplementary
4) $\angle 1$ and $\angle 5$ are supplementary

12 The coordinates of point P are $(7,1)$. What are the coordinates of the image of P after $R_{90°}$ about the origin?
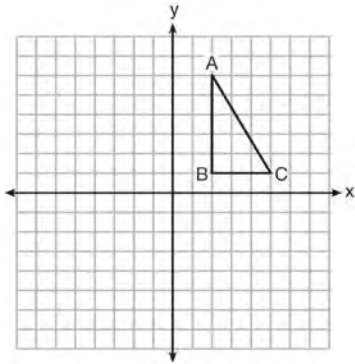1) $(1,7)$
2) $(-7,-1)$
3) $(1,-7)$
4) $(-1,7)$

13 Which equation represents circle A shown in the diagram below?

1) $(x-4)^2 + (y-1)^2 = 3$
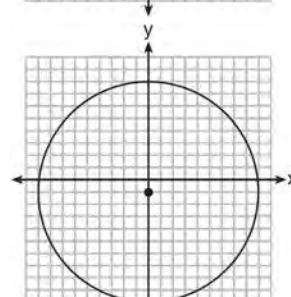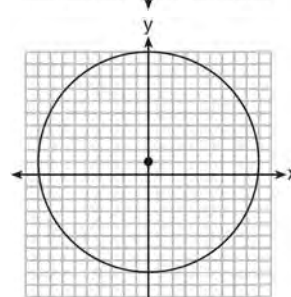2) $(x+4)^2 + (y+1)^2 = 3$
3) $(x-4)^2 + (y-1)^2 = 9$
4) $(x+4)^2 + (y+1)^2 = 9$

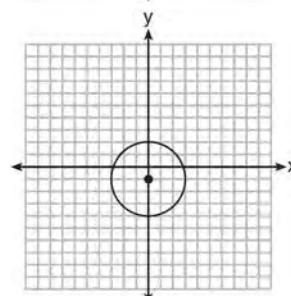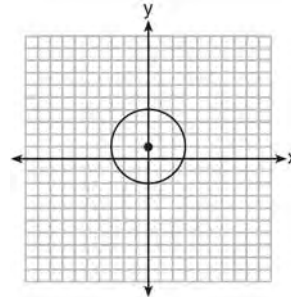14 Right triangle ABC is shown in the graph below.

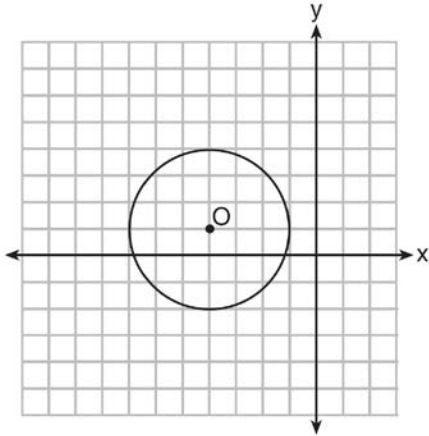After a reflection over the y-axis, the image of $\triangle ABC$ is $\triangle A'B'C'$. Which statement is *not* true?

1) $\overline{BC} \cong \overline{B'C'}$
2) $\overline{A'B'} \perp \overline{B'C'}$
3) $AB = A'B'$
4) $\overline{AC} \parallel \overline{A'C'}$

15 Which graph represents a circle whose equation is $x^2 + (y-1)^2 = 9$?

1)

2)

3)

4)

3

16 What is the equation of circle O shown in the diagram below?

1) $(x+4)^2 + (y-1)^2 = 3$
2) $(x-4)^2 + (y+1)^2 = 3$
3) $(x+4)^2 + (y-1)^2 = 9$
4) $(x-4)^2 + (y+1)^2 = 9$

17 In triangles ABC and DEF, $AB = 4$, $AC = 5$, $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$. Which method could be used to prove $\triangle ABC \sim \triangle DEF$?
1) AA
2) SAS
3) SSS
4) ASA

18 What is the slope of a line perpendicular to the line whose equation is $3x - 7y + 14 = 0$?
1) $\dfrac{3}{7}$
2) $-\dfrac{7}{3}$
3) 3
4) $-\dfrac{1}{3}$

19 What are the coordinates of the center and the length of the radius of the circle whose equation is $(x+1)^2 + (y-5)^2 = 16$?
1) $(1,-5)$ and 16
2) $(-1,5)$ and 16
3) $(1,-5)$ and 4
4) $(-1,5)$ and 4

20 If $\triangle ABC$ and its image, $\triangle A'B'C'$, are graphed on a set of axes, $\triangle ABC \cong \triangle A'B'C'$ under each transformation *except*
1) D_2
2) $R_{90°}$
3) $r_{y=x}$
4) $T_{(-2,3)}$

21 What is the equation of a line passing through the point $(6,1)$ and parallel to the line whose equation is $3x = 2y + 4$?
1) $y = -\dfrac{2}{3}x + 5$
2) $y = -\dfrac{2}{3}x - 3$
3) $y = \dfrac{3}{2}x - 8$
4) $y = \dfrac{3}{2}x - 5$

22 What is the equation of the circle with its center at $(-1,2)$ and that passes through the point $(1,2)$?
1) $(x+1)^2 + (y-2)^2 = 4$
2) $(x-1)^2 + (y+2)^2 = 4$
3) $(x+1)^2 + (y-2)^2 = 2$
4) $(x-1)^2 + (y+2)^2 = 2$

23 A right circular cone has an altitude of 10 ft and the diameter of the base is 6 ft as shown in the diagram below. Determine and state the lateral area of the cone, to the *nearest tenth of a square foot*.


10 ft

6 ft
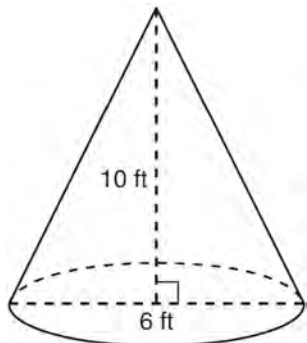
24 Using a compass and straightedge, construct an equilateral triangle with $\overline{AB}$ as a side. Using this triangle, construct a 30° angle with its vertex at A. [Leave all construction marks.]

A ——————————————— B

25 The three medians of a triangle intersect at a point. Which measurements could represent the segments of one of the medians?
1) 2 and 3
2) 3 and 4.5
3) 3 and 6
4) 3 and 9

26 In the diagram of circle O below, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$ are drawn.
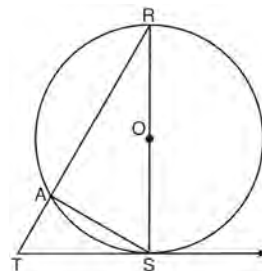

Complete the following proof to show $(RS)^2 = RA \cdot RT$

Statements	Reasons
1. circle O, diameter $\overline{RS}$, chord $\overline{AS}$, tangent $\overrightarrow{TS}$, and secant $\overline{TAR}$	1. Given
2. $\overline{RS} \perp \overrightarrow{TS}$	2. _____
3. $\angle RST$ is a right angle	3. $\perp$ lines form right angles
4. $\angle RAS$ is a right angle	4. _____
5. $\angle RST \cong \angle RAS$	5. _____
6. $\angle R \cong \angle R$	6. Reflexive property
7. $\triangle RST \sim \triangle RAS$	7. _____
8. $\frac{RS}{RA} = \frac{RT}{RS}$	8. _____
9. $(RS)^2 = RA \cdot RT$	9. _____

27 If distinct planes $\mathcal{R}$ and $\mathcal{S}$ are both perpendicular to line ℓ, which statement must always be true?
1) Plane $\mathcal{R}$ is parallel to plane $\mathcal{S}$.
2) Plane $\mathcal{R}$ is perpendicular to plane $\mathcal{S}$.
3) Planes $\mathcal{R}$ and $\mathcal{S}$ and line ℓ are all parallel.
4) The intersection of planes $\mathcal{R}$ and $\mathcal{S}$ is perpendicular to line ℓ.

28 In the diagram of $\triangle MAH$ below, $\overline{MH} \cong \overline{AH}$ and medians $\overline{AB}$ and $\overline{MT}$ are drawn.
Prove: $\angle MBA \cong \angle ATM$
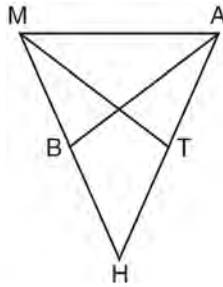
29 Given: $\triangle ABD$, $\overline{BC}$ is the perpendicular bisector of $\overline{AD}$
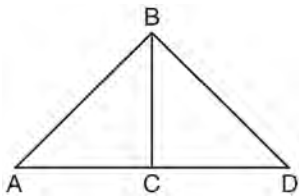
Which statement can *not* always be proven?
1) $\overline{AC} \cong \overline{DC}$
2) $\overline{BC} \cong \overline{CD}$
3) $\angle ACB \cong \angle DCB$
4) $\triangle ABC \cong \triangle DBC$

30 Triangle *RST* is similar to $\triangle XYZ$ with $RS = 3$ inches and $XY = 2$ inches. If the area of $\triangle RST$ is 27 square inches, determine and state the area of $\triangle XYZ$, in square inches.
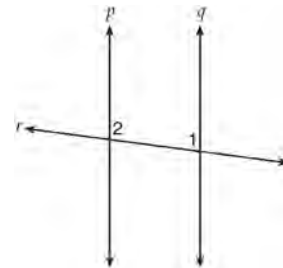
31 Triangle *ABC* has vertices $A(6,6)$, $B(9,0)$, and $C(3,-3)$. State and label the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation of $D_{\frac{1}{3}}$.

32 As shown in the diagram of rectangle *ABCD* below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*.
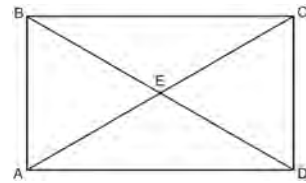
If $AE = x + 2$ and $BD = 4x - 16$, then the length of $\overline{AC}$ is
1) 6
2) 10
3) 12
4) 24

33 Lines *p* and *q* are intersected by line *r*, as shown below.

If $m\angle 1 = 7x - 36$ and $m\angle 2 = 5x + 12$, for which value of *x* would $p \parallel q$?
1) 17
2) 24
3) 83
4) 97

34 Plane $\mathcal{A}$ and plane $\mathcal{B}$ are two distinct planes that are both perpendicular to line ℓ. Which statement about planes $\mathcal{A}$ and $\mathcal{B}$ is true?
1) Planes $\mathcal{A}$ and $\mathcal{B}$ have a common edge, which forms a line.
2) Planes $\mathcal{A}$ and $\mathcal{B}$ are perpendicular to each other.
3) Planes $\mathcal{A}$ and $\mathcal{B}$ intersect each other at exactly one point.
4) Planes $\mathcal{A}$ and $\mathcal{B}$ are parallel to each other.

35 In the diagram below of circle O, chord $\overline{AB}$ is parallel to chord $\overline{CD}$.
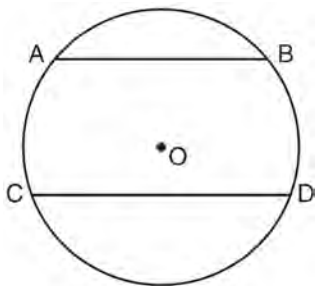

A correct justification for $m\overarc{AC} = m\overarc{BD}$ in circle O is
1) parallel chords intercept congruent arcs
2) congruent chords intercept congruent arcs
3) if two chords are parallel, then they are congruent
4) if two chords are equidistant from the center, then the arcs they intercept are congruent

36 The vertex angle of an isosceles triangle measures 15 degrees more than one of its base angles. How many degrees are there in a base angle of the triangle?
1) 50
2) 55
3) 65
4) 70

37 In the diagram of $\triangle BCD$ shown below, $\overline{BA}$ is drawn from vertex B to point A on $\overline{DC}$, such that $\overline{BC} \cong \overline{BA}$.
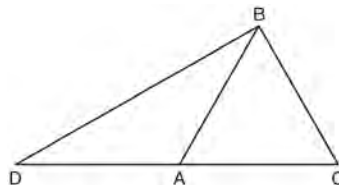
In $\triangle DAB$, $m\angle D = x$, $m\angle DAB = 5x - 30$, and $m\angle DBA = 3x - 60$. In $\triangle ABC$, $AB = 6y - 8$ and $BC = 4y - 2$. [Only algebraic solutions can receive full credit.] Find $m\angle D$. Find $m\angle BAC$. Find the length of $\overline{BC}$. Find the length of $\overline{DC}$.

38 The equation of a line is $y = \frac{2}{3}x + 5$. What is an equation of the line that is perpendicular to the given line and that passes through the point $(4,2)$?
1) $y = \frac{2}{3}x - \frac{2}{3}$
2) $y = \frac{3}{2}x - 4$
3) $y = -\frac{3}{2}x + 7$
4) $y = -\frac{3}{2}x + 8$

7

39 In $\triangle ABC$ shown below, L is the midpoint of $\overline{BC}$, M is the midpoint of $\overline{AB}$, and N is the midpoint of $\overline{AC}$.
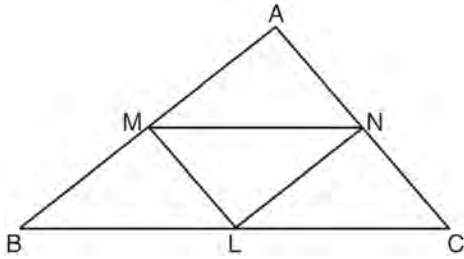

If $MN = 8$, $ML = 5$, and $NL = 6$, the perimeter of trapezoid $BMNC$ is
1)   35
2)   31
3)   28
4)   26

40 In the diagram below, under which transformation is $\triangle X'Y'Z'$ the image of $\triangle XYZ$?
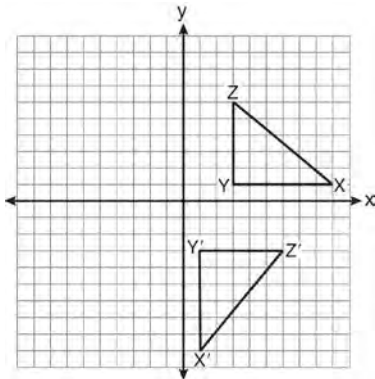
1)   dilation
2)   reflection
3)   rotation
4)   translation

41 On the set of axes below, graph the locus of points 5 units from the point $(3,-2)$. On the same set of axes, graph the locus of points equidistant from the points $(0,-6)$ and $(2,-4)$. State the coordinates of all points that satisfy *both* conditions.
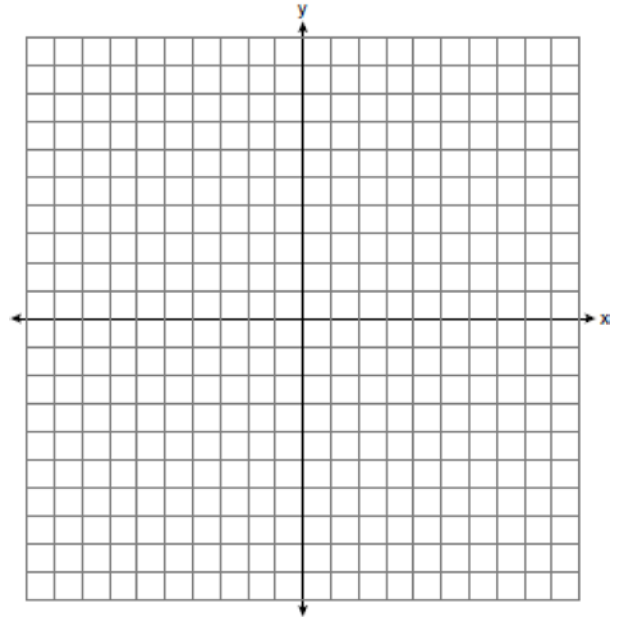
42 In the diagram below, point K is in plane $\mathcal{P}$.
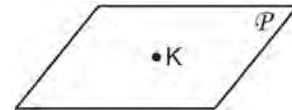
How many lines can be drawn through K, perpendicular to plane $\mathcal{P}$?
1)   1
2)   2
3)   0
4)   an infinite number

8

43 Which equation represents the circle whose center is $(-5,3)$ and that passes through the point $(-1,3)$?

1) $(x+1)^2 + (y-3)^2 = 16$
2) $(x-1)^2 + (y+3)^2 = 16$
3) $(x+5)^2 + (y-3)^2 = 16$
4) $(x-5)^2 + (y+3)^2 = 16$

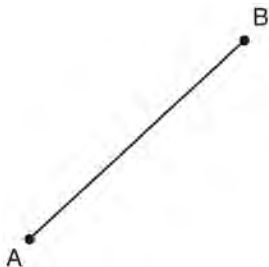44 If the vertices of $\triangle ABC$ are $A(-2,4)$, $B(-2,8)$, and $C(-5,6)$, then $\triangle ABC$ is classified as

1) right
2) scalene
3) isosceles
4) equilateral

45 Using a compass and straightedge, construct the perpendicular bisector of $\overline{AB}$. [Leave all construction marks.]

46 The solution of the system of equations $y = x^2 - 2$ and $y = x$ is

1) $(1,1)$ and $(-2,-2)$
2) $(2,2)$ and $(-1,-1)$
3) $(1,1)$ and $(2,2)$
4) $(-2,-2)$ and $(-1,-1)$

47 Point A is on line m. How many distinct planes will be perpendicular to line m and pass through point A?

1) one
2) two
3) zero
4) infinite

48 Which quadrilateral does *not* always have congruent diagonals?

1) isosceles trapezoid
2) rectangle
3) rhombus
4) square

49 In right triangle ABC below, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$. If $CD = 6$ and the ratio of $\overline{AD}$ to AB is 1:5, determine and state the length of $\overline{BD}$. [Only an algebraic solution can receive full credit.]
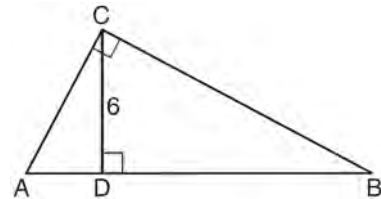
50 Triangle PQT with $\overline{RS} \parallel \overline{QT}$ is shown below.
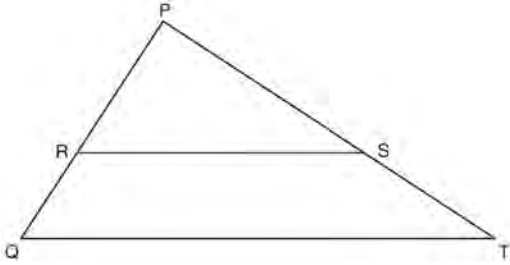
If $PR = 12$, $RQ = 8$, and $PS = 21$, what is the length of $\overline{PT}$?
1) 14
2) 17
3) 35
4) 38

51 In the diagram below of quadrilateral $ABCD$, E and F are points on $\overline{AB}$ and $\overline{CD}$, respectively, $\overline{BE} \cong \overline{DF}$, and $\overline{AE} \cong \overline{CF}$.

Which conclusion can be proven?
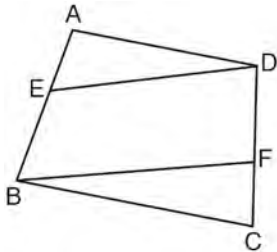1) $\overline{ED} \cong \overline{FB}$
2) $\overline{AB} \cong \overline{CD}$
3) $\angle A \cong \angle C$
4) $\angle AED \cong \angle CFB$

52 As shown in the diagram below, $\overline{CD}$ is a median of $\triangle ABC$.
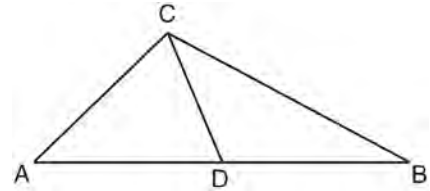
Which statement is *always* true?
1) $\overline{AD} \cong \overline{DB}$
2) $\overline{AC} \cong \overline{AD}$
3) $\angle ACD \cong \angle CDB$
4) $\angle BCD \cong \angle ACD$

53 The coordinates of the vertices of parallelogram $SWAN$ are $S(2,-2)$, $W(-2,-4)$, $A(-4,6)$, and $N(0,8)$. State and label the coordinates of parallelogram $S''W''A''N''$, the image of $SWAN$ after the transformation $T_{4,-2} \circ D_{\frac{1}{2}}$. [The use of the set of axes below is optional.]

10
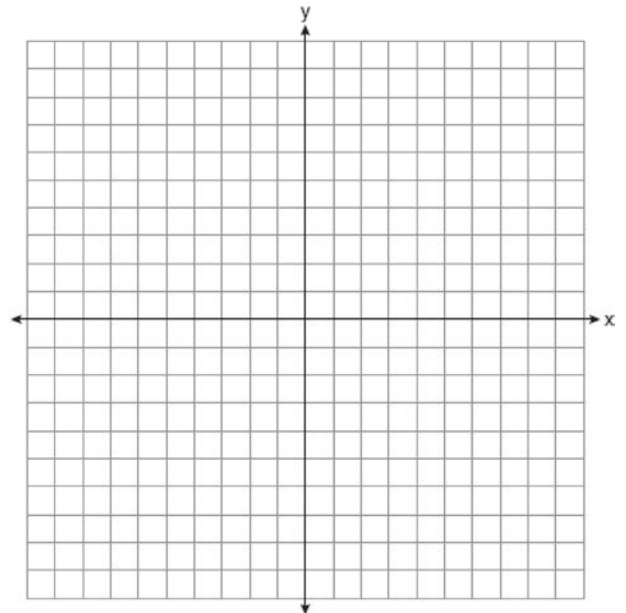
54 Use a compass and straightedge to divide line segment AB below into four congruent parts. [Leave all construction marks.]

A •————————————————• B

55 On the ray drawn below, using a compass and straightedge, construct an equilateral triangle with a vertex at R. The length of a side of the triangle must be equal to a length of the diagonal of rectangle $ABCD$.
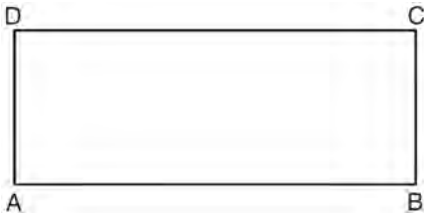
56 Given: $\triangle ABC$, $\overline{BD}$ bisects $\angle ABC$, $\overline{BD} \perp \overline{AC}$
   Prove: $\overline{AB} \cong \overline{CB}$
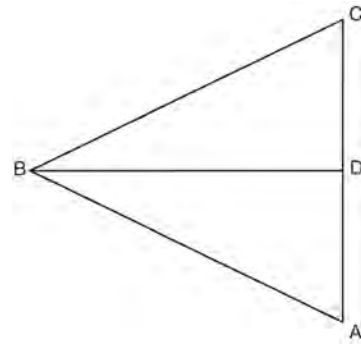
57 In circle O shown in the diagram below, chords $\overline{AB}$ and $\overline{CD}$ are parallel.
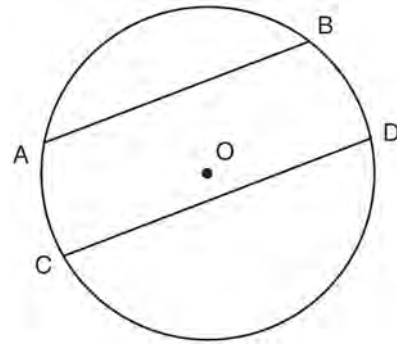
If $m\widehat{AB} = 104$ and $m\widehat{CD} = 168$, what is $m\widehat{BD}$?
1) 38
2) 44
3) 88
4) 96

58 In the diagram below, parallelogram $ABCD$ has vertices $A(1,3)$, $B(5,7)$, $C(10,7)$, and $D(6,3)$. Diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.

(Not drawn to scale)
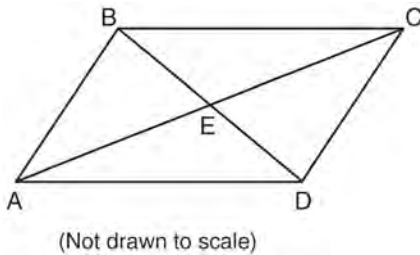
What are the coordinates of point E?
1) $(0.5,2)$
2) $(4.5,2)$
3) $(5.5,5)$
4) $(7.5,7)$

59 What is the difference between the sum of the measures of the interior angles of a regular pentagon and the sum of the measures of the exterior angles of a regular pentagon?
1) 36
2) 72
3) 108
4) 180

60 Line segment AB is a diameter of circle O whose center has coordinates $(6,8)$. What are the coordinates of point B if the coordinates of point A are $(4,2)$?
1) $(1,3)$
2) $(5,5)$
3) $(8,14)$
4) $(10,10)$

61 The diagram below shows $\triangle ABD$, with $\overrightarrow{ABC}$, $\overline{BE} \perp \overline{AD}$, and $\angle EBD \cong \angle CBD$.
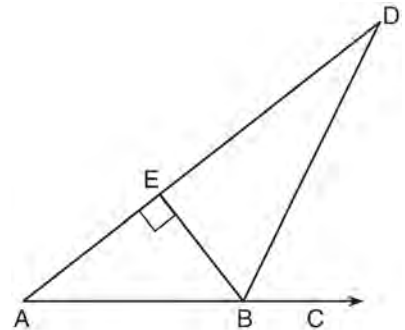
If $m\angle ABE = 52$, what is $m\angle D$?
1) 26
2) 38
3) 52
4) 64

62 Trapezoid $QRST$ is graphed on the set of axes below.
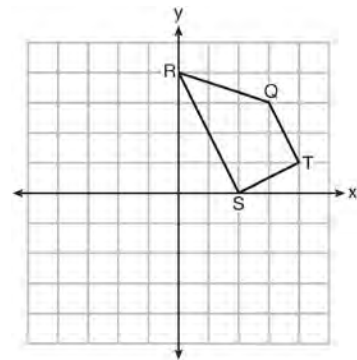
Under which transformation will there be *no* invariant points?
1) $r_{y=0}$
2) $r_{x=0}$
3) $r_{(0,0)}$
4) $r_{y=x}$

63 Which set of numbers could *not* represent the lengths of the sides of a right triangle?
1) $\{1, 3, \sqrt{10}\}$
2) $\{2, 3, 4\}$
3) $\{3, 4, 5\}$
4) $\{8, 15, 17\}$

64 The diagram below shows the construction of line m, parallel to line ℓ, through point P.
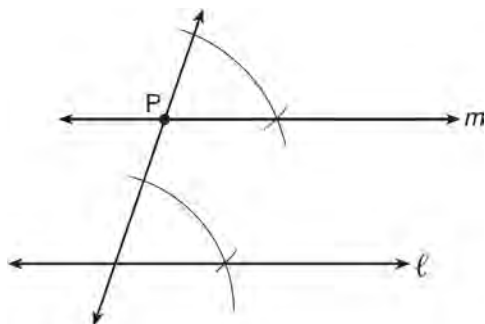
Which theorem was used to justify this construction?
1) If two lines are cut by a transversal and the alternate interior angles are congruent, the lines are parallel.
2) If two lines are cut by a transversal and the interior angles on the same side are supplementary, the lines are parallel.
3) If two lines are perpendicular to the same line, they are parallel.
4) If two lines are cut by a transversal and the corresponding angles are congruent, they are parallel.

65 Determine, in degrees, the measure of each interior angle of a regular octagon.

66 In a park, two straight paths intersect. The city wants to install lampposts that are both equidistant from each path and also 15 feet from the intersection of the paths. How many lampposts are needed?
1) 1
2) 2
3) 3
4) 4

67 The coordinates of the vertices of $\triangle ABC$ are $A(-6, 5)$, $B(-4, 8)$, and $C(1, 6)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$ after the composition of transformations $T_{(4,-5)} \circ r_{y\text{-axis}}$. [The use of the set of axes below is optional.]

13
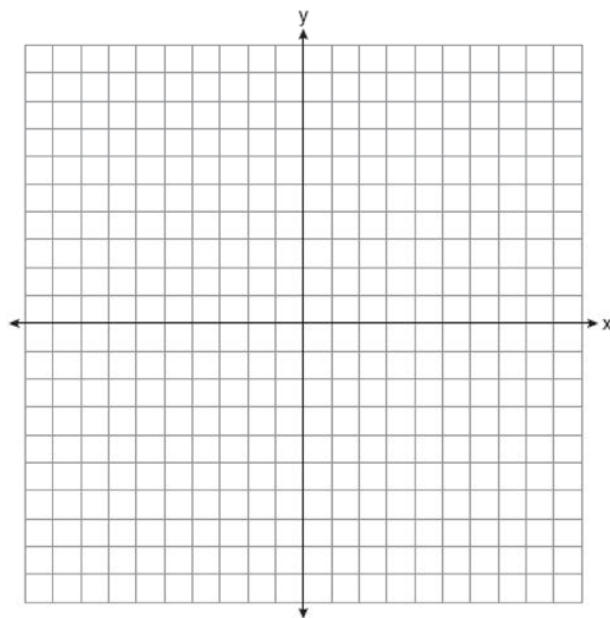
68 In the diagram below, $\overline{QM}$ is a median of triangle PQR and point C is the centroid of triangle PQR.
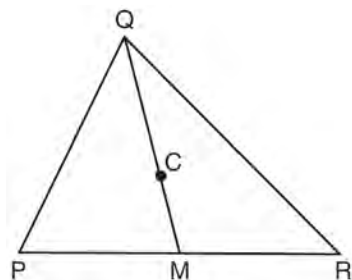
If $QC = 5x$ and $CM = x + 12$, determine and state the length of $\overline{QM}$.

69 The equation of a circle is $(x - 3)^2 + y^2 = 8$. The coordinates of its center and the length of its radius are
1) $(-3, 0)$ and 4
2) $(3, 0)$ and 4
3) $(-3, 0)$ and $2\sqrt{2}$
4) $(3, 0)$ and $2\sqrt{2}$

70 After the transformation $r_{y = x}$, the image of $\triangle ABC$ is $\triangle A'B'C'$. If $AB = 2x + 13$ and $A'B' = 9x - 8$, find the value of x.

71 Given the statement: One is a prime number. What is the negation and the truth value of the negation?
1) One is not a prime number; true
2) One is not a prime number; false
3) One is a composite number; true
4) One is a composite number; false

72 The vertices of quadrilateral $JKLM$ have coordinates $J(-3, 1)$, $K(1, -5)$, $L(7, -2)$, and $M(3, 4)$. Prove that $JKLM$ is a parallelogram. Prove that $JKLM$ is *not* a rhombus. [The use of the set of axes below is optional.]
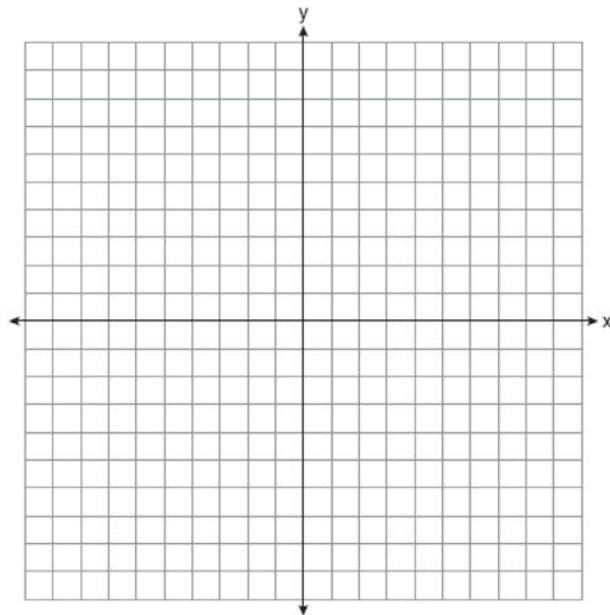
73 If $\triangle RST \sim \triangle ABC$, $m\angle A = x^2 - 8x$, $m\angle C = 4x - 5$, and $m\angle R = 5x + 30$, find $m\angle C$. [Only an algebraic solution can receive full credit.]

74 What is the slope of the line perpendicular to the line represented by the equation $2x + 4y = 12$?
1) -2
2) 2
3) $-\dfrac{1}{2}$
4) $\dfrac{1}{2}$

75 In the diagram below, under which transformation is $\triangle A'B'C'$ the image of $\triangle ABC$?

1) D_2
2) $r_{x\text{-axis}}$
3) $r_{y\text{-axis}}$
4) $(x,y) \rightarrow (x-2,y)$

76 Quadrilateral $ABCD$ with vertices $A(-7,4)$, $B(-3,6)$, $C(3,0)$, and $D(1,-8)$ is graphed on the set of axes below. Quadrilateral $MNPQ$ is formed by joining M, N, P, and Q, the midpoints of $\overline{AB}$, $\overline{B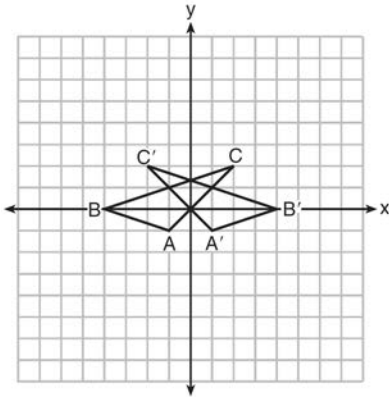C}$, $\overline{CD}$, and $\overline{AD}$, respectively. Prove that quadrilateral $MNPQ$ is a parallelogram. Prove that quadrilateral $MNPQ$ is *not* a rhombus.
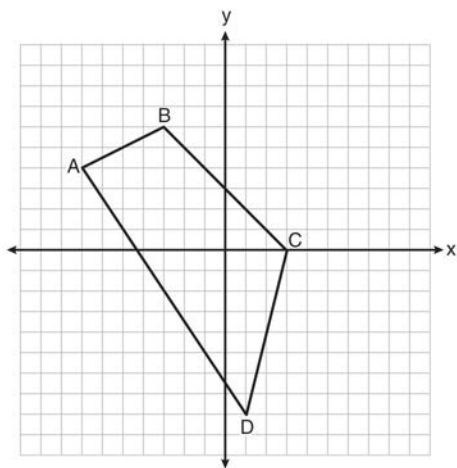
77 A student wrote the following equations:
$$3y + 6 = 2x$$
$$2y - 3x = 6$$
The lines represented by these equations are
1) parallel
2) the same line
3) perpendicular
4) intersecting, but *not* perpendicular

78 As shown in the diagram below, $\overline{BO}$ and tangents $\overline{BA}$ and $\overline{BC}$ are drawn from external point B to circle O. Radii $\overline{OA}$ and $\overline{OC}$ are drawn.
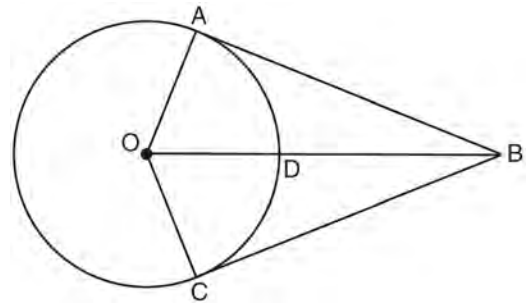
If $OA = 7$ and $DB = 18$, determine and state the length of $\overline{AB}$.

79 Which set of equations represents two circles that have the same center?
1) $x^2 + (y+4)^2 = 16$ and $(x+4)^2 + y^2 = 16$
2) $(x+3)^2 + (y-3)^2 = 16$ and $(x-3)^2 + (y+3)^2 = 25$
3) $(x-7)^2 + (y-2)^2 = 16$ and $(x+7)^2 + (y+2)^2 = 25$
4) $(x-2)^2 + (y-5)^2 = 16$ and $(x-2)^2 + (y-5)^2 = 25$

15

80 In the diagram of trapezoid $ABCD$ below, $\overline{AB} \parallel \overline{DC}$, $\overline{AD} \cong \overline{BC}$, $m\angle A = 4x + 20$, and $m\angle C = 3x - 15$.
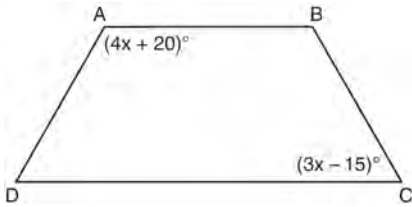
What is $m\angle D$?
1) 25
2) 35
3) 60
4) 90

81 In the diagram below, circles A and B are tangent at point C and $\overline{AB}$ is drawn. Sketch all common tangent lines.
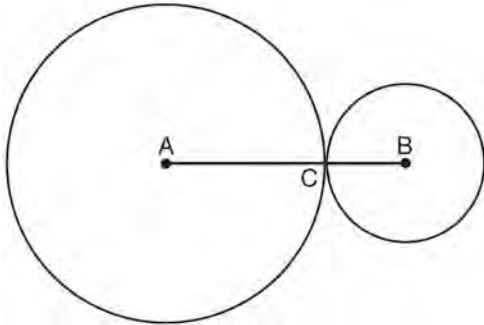
82 In $\triangle ABC$, $m\angle A = x^2 + 12$, $m\angle B = 11x + 5$, and $m\angle C = 13x - 17$. Determine the longest side of $\triangle ABC$.

83 Which diagram shows the construction of a $45°$ angle?

1)

2)

3)

4)
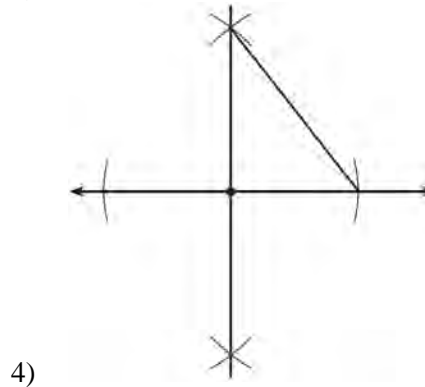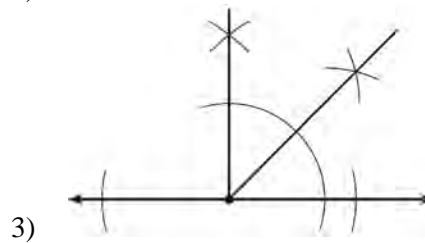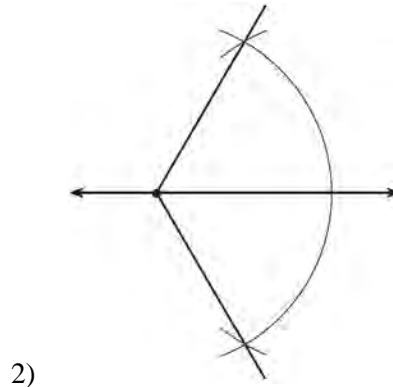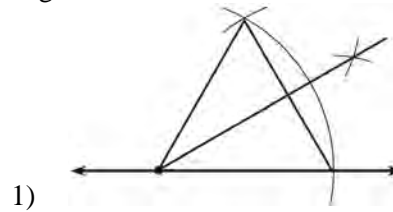
84 Line ℓ passes through the point $(5,3)$ and is parallel to line k whose equation is $5x + y = 6$. An equation of line ℓ is

1) $y = \dfrac{1}{5}x + 2$

2) $y = -5x + 28$

3) $y = \dfrac{1}{5}x - 2$

4) $y = -5x - 28$

85 In the diagram below, $\overline{AB}$ and $\overline{CD}$ are bases of trapezoid $ABCD$.

(Not drawn to scale)

If $m\angle B = 123$ and $m\angle D = 75$, what is $m\angle C$?
1) 57
2) 75
3) 105
4) 123

86 The midpoint of $\overline{AB}$ is $M(4,2)$. If the coordinates of A are $(6,-4)$, what are the coordinates of B?
1) $(1,-3)$
2) $(2,8)$
3) $(5,-1)$
4) $(14,0)$

87 What is an equation of the circle with center $(-5,4)$ and a radius of 7?
1) $(x-5)^2 + (y+4)^2 = 14$
2) $(x-5)^2 + (y+4)^2 = 49$
3) $(x+5)^2 + (y-4)^2 = 14$
4) $(x+5)^2 + (y-4)^2 = 49$

88 In the diagram of $\triangle PQR$ shown below, $\overline{PR}$ is extended to S, $m\angle P = 110$, $m\angle Q = 4x$, and $m\angle QRS = x^2 + 5x$.
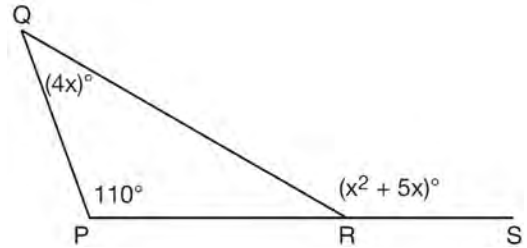
What is $m\angle Q$?
1) 44
2) 40
3) 11
4) 10

89 Plane $\mathcal{P}$ is parallel to plane Q. If plane $\mathcal{P}$ is perpendicular to line ℓ, then plane Q
1) contains line ℓ
2) is parallel to line ℓ
3) is perpendicular to line ℓ
4) intersects, but is not perpendicular to line ℓ

17

90 Using a compass and straightedge, construct the bisector of ∠MJH. [Leave all construction marks.]

92 In the diagram below of △ABC, $\overline{DE}$ and $\overline{DF}$ are midsegments.

(Not drawn to scale)
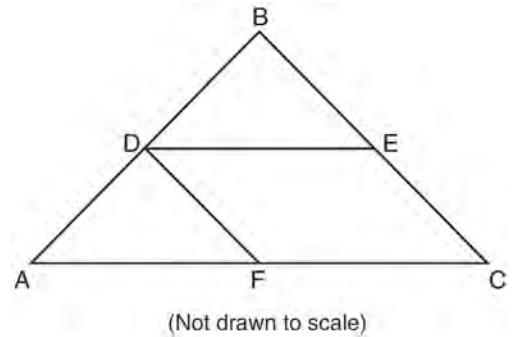
If DE = 9, and BC = 17, determine and state the perimeter of quadrilateral FDEC.

91 Quadrilateral MATH has coordinates M(−6,−3), A(−1,−3), T(−2,−1), and H(−4,−1). The image of quadrilateral MATH after the composition $r_{x\text{-axis}} \circ T_{7,5}$ is quadrilateral M″A″T″H″. State and label the coordinates of M″A″T″H″. [The use of the set of axes below is optional.]

93 Write an equation of the line that is the perpendicular bisector of the line segment having endpoints (3,−1) and (3,5). [The use of the grid below is optional]
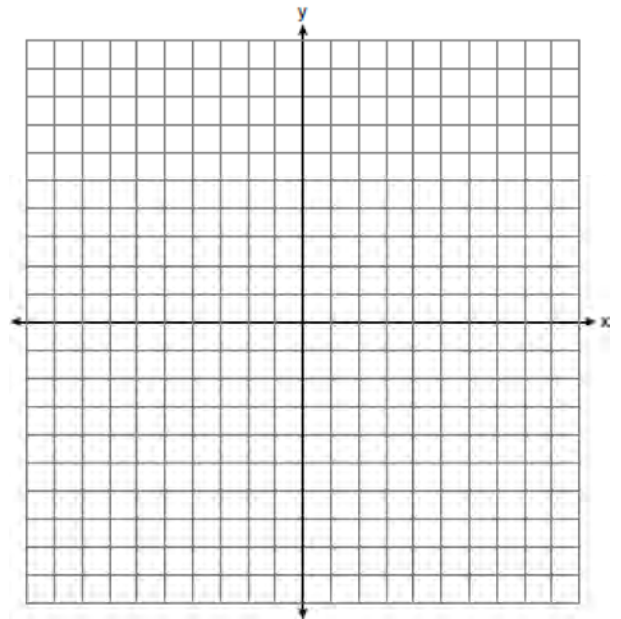
94 In $\triangle ABC$, m$\angle A = 60$, m$\angle B = 80$, and m$\angle C = 40$. Which inequality is true?
1) $AB > BC$
2) $AC > BC$
3) $AC < BA$
4) $BC < BA$

95 The image of $\triangle ABC$ under a translation is $\triangle A'B'C'$. Under this translation, $B(3,-2)$ maps onto $B'(1,-1)$. Using this translation, the coordinates of image A' are $(-2,2)$. Determine and state the coordinates of point A.

96 Triangle ABC has the coordinates $A(1,2)$, $B(5,2)$, and $C(5,5)$. Triangle ABC is rotated $180°$ about the origin to form triangle $A'B'C'$. Triangle $A'B'C'$ is
1) acute
2) isosceles
3) obtuse
4) right

97 Which set of numbers could represent the lengths of the sides of a right triangle?
1) $\{2,3,4\}$
2) $\{5,9,13\}$
3) $\{7,7,12\}$
4) $\{8,15,17\}$

98 What is the length of $\overline{RS}$ with $R(-2,3)$ and $S(4,5)$?
1) $2\sqrt{2}$
2) 40
3) $2\sqrt{10}$
4) $2\sqrt{17}$

99 In the diagram below of circle O, $\overline{PAC}$ and $\overline{PBD}$ are secants.
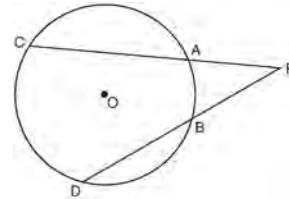
If m$\overarc{CD} = 70$ and m$\overarc{AB} = 20$, what is the degree measure of $\angle P$?
1) 25
2) 35
3) 45
4) 50

100 Triangle ABC is shown in the diagram below.
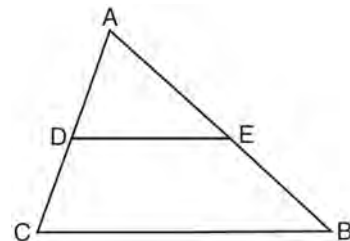
If $\overline{DE}$ joins the midpoints of $\overline{ADC}$ and $\overline{AEB}$, which statement is *not* true?
1) $DE = \frac{1}{2} CB$
2) $\overline{DE} \parallel \overline{CB}$
3) $\dfrac{AD}{DC} = \dfrac{DE}{CB}$
4) $\triangle ABC \sim \triangle AED$

101 In the diagram of the circle shown below, chords $\overline{AC}$ and $\overline{BD}$ intersect at Q, and chords $\overline{AE}$ and $\overline{BD}$ are parallel.
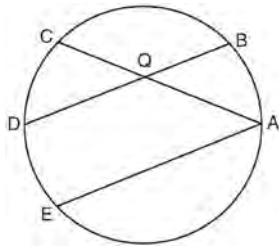
Which statement must always be true?

1) $\overparen{AB} \cong \overparen{CD}$
2) $\overparen{DE} \cong \overparen{CD}$
3) $\overparen{AB} \cong \overparen{DE}$
4) $\overparen{BD} \cong \overparen{AE}$

102 As shown in the diagram below, $\overline{AS}$ is a diagonal of trapezoid $STAR$, $\overline{RA} \parallel \overline{ST}$, m$\angle ATS = 48$, m$\angle RSA = 47$, and m$\angle ARS = 68$.
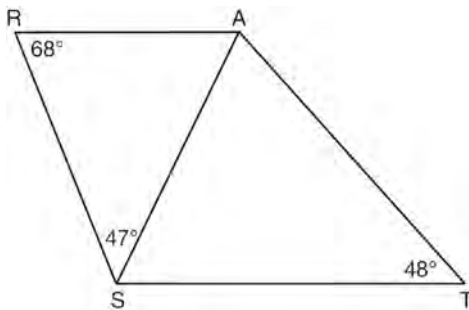
Determine and state the longest side of $\triangle SAT$.

103 The coordinates of two vertices of square $ABCD$ are $A(2,1)$ and $B(4,4)$. Determine the slope of side $\overline{BC}$.

104 Which numbers could represent the lengths of the sides of a triangle?

1) 5,9,14
2) 7,7,15
3) 1,2,4
4) 3,6,8

105 In the diagram below, $\overline{AC}$ and $\overline{BC}$ are tangent to circle O at A and B, respectively, from external point C.
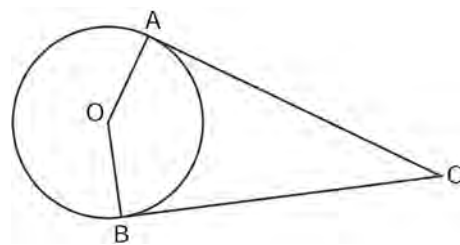
If m$\angle ACB = 38$, what is m$\angle AOB$?

1) 71
2) 104
3) 142
4) 161

106 In the diagram of $\triangle ABC$ below, medians $\overline{AD}$ and $\overline{BE}$ intersect at point F.
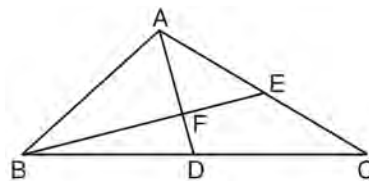
If $AF = 6$, what is the length of $\overline{FD}$?

1) 6
2) 2
3) 3
4) 9

20

107 In the diagram below, diameter $\overline{AB}$ bisects chord $\overline{CD}$ at point E in circle F.
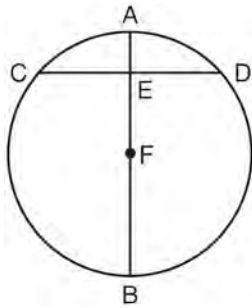
If $AE = 2$ and $FB = 17$, then the length of $\overline{CE}$ is
1) 7
2) 8
3) 15
4) 16

108 Circle O is represented by the equation $(x+3)^2 + (y-5)^2 = 48$. The coordinates of the center and the length of the radius of circle O are
1) $(-3,5)$ and $4\sqrt{3}$
2) $(-3,5)$ and 24
3) $(3,-5)$ and $4\sqrt{3}$
4) $(3,-5)$ and 24

109 In the diagram of $\overline{WXYZ}$ below, $\overline{WY} \cong \overline{XZ}$.

Which reasons can be used to prove $\overline{WX} \cong \overline{YZ}$?
1) reflexive property and addition postulate
2) reflexive property and subtraction postulate
3) transitive property and addition postulate
4) transitive property and subtraction postulate

110 Which graph represents the graph of the equation $(x-1)^2 + y^2 = 4$?

1)

2)

3)

4)
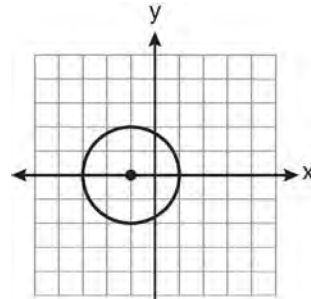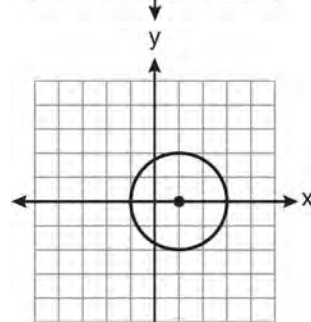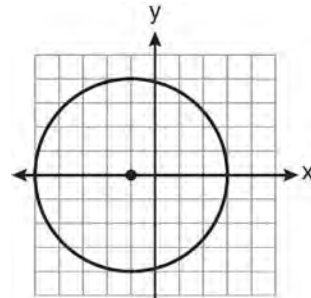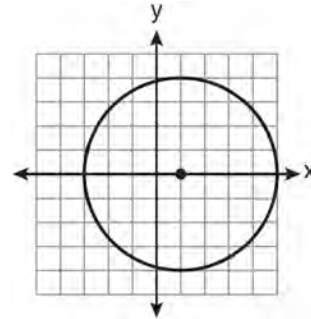
111 A right circular cylinder with a height of 5 cm has a base with a diameter of 6 cm. Find the lateral area of the cylinder to the *nearest hundredth of a square centimeter*. Find the volume of the cylinder to the *nearest hundredth of a cubic centimeter*.

112 Triangle *ABC* is similar to triangle *DEF*. The lengths of the sides of $\triangle ABC$ are 5, 8, and 11. What is the length of the shortest side of $\triangle DEF$ if its perimeter is 60?
1) 10
2) 12.5
3) 20
4) 27.5

113 In $\triangle FGH$, m$\angle F$ = m$\angle H$, $GF = x + 40$, $HF = 3x - 20$, and $GH = 2x + 20$. The length of $\overline{GH}$ is
1) 20
2) 40
3) 60
4) 80

114 What is the converse of "If an angle measures 90 degrees, then it is a right angle"?
1) If an angle is a right angle, then it measures 90 degrees.
2) An angle is a right angle if it measures 90 degrees.
3) If an angle is not a right angle, then it does not measure 90 degrees.
4) If an angle does not measure 90 degrees, then it is not a right angle.

115 If $\triangle ABC \cong \triangle JKL \cong \triangle RST$, then $\overline{BC}$ must be congruent to
1) $\overline{JL}$
2) $\overline{JK}$
3) $\overline{ST}$
4) $\overline{RS}$

116 As shown in the diagram below, $\overline{FD}$ and $\overline{CB}$ intersect at point *A* and $\overline{ET}$ is perpendicular to both $\overline{FD}$ and $\overline{CB}$ at *A*.
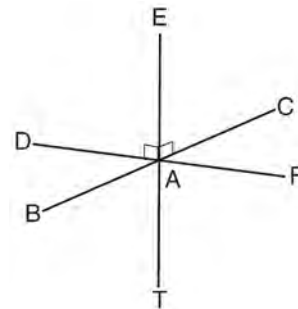
Which statement is *not* true?
1) $\overline{ET}$ is perpendicular to plane *BAD*.
2) $\overline{ET}$ is perpendicular to plane *FAB*.
3) $\overline{ET}$ is perpendicular to plane *CAD*.
4) $\overline{ET}$ is perpendicular to plane *BAT*.

117 How many points in the coordinate plane are 3 units from the origin and also equidistant from both the *x*-axis and the *y*-axis?
1) 1
2) 2
3) 8
4) 4

118 Circle O with $\angle AOC$ and $\angle ABC$ is shown in the diagram below.
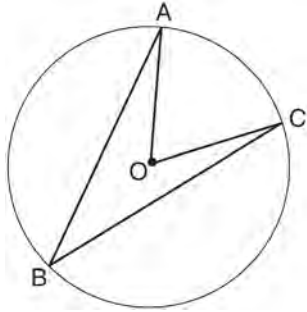
What is the ratio of m$\angle AOC$ to m$\angle ABC$?
1) $1:1$
2) $2:1$
3) $3:1$
4) $1:2$

119 When the system of equations $y+2 = (x-4)^2$ and $2x+y-6 = 0$ is solved graphically, the solution is
1) $(-4,-2)$ and $(-2,2)$
2) $(4,-2)$ and $(2,2)$
3) $(-4,2)$ and $(-6,6)$
4) $(4,2)$ and $(6,6)$

120 What is the equation of a line passing through the point $(4,-1)$ and parallel to the line whose equation is $2y-x = 8$?
1) $y = \frac{1}{2}x - 3$
2) $y = \frac{1}{2}x - 1$
3) $y = -2x + 7$
4) $y = -2x + 2$

121 A circle has the equation $(x-3)^2 + (y+4)^2 = 10$. Find the coordinates of the center of the circle and the length of the circle's radius.

122 Circle O is graphed on the set of axes below. Which equation represents circle O?
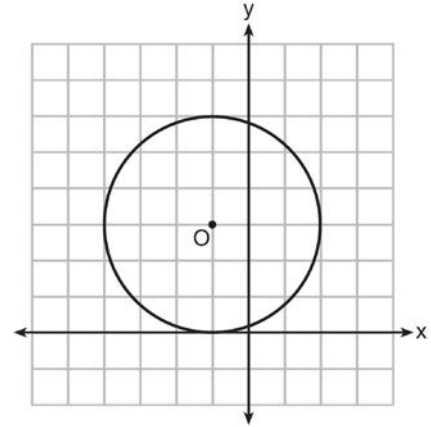
1) $(x+1)^2 + (y-3)^2 = 9$
2) $(x-1)^2 + (y+3)^2 = 9$
3) $(x+1)^2 + (y-3)^2 = 6$
4) $(x-1)^2 + (y+3)^2 = 6$

123 What are the coordinates of A', the image of $A(-3,4)$, after a rotation of 180° about the origin?
1) $(4,-3)$
2) $(-4,-3)$
3) $(3,4)$
4) $(3,-4)$

23

124 The equations $x^2 + y^2 = 25$ and $y = 5$ are graphed on a set of axes. What is the solution of this system?
1) (0,0)
2) (5,0)
3) (0,5)
4) (5,5)

125 The bases of a right triangular prism are $\triangle ABC$ and $\triangle DEF$. Angles A and D are right angles, $AB = 6$, $AC = 8$, and $AD = 12$. What is the length of edge $\overline{BE}$?
1) 10
2) 12
3) 14
4) 16

126 The volume of a sphere is approximately 44.6022 cubic centimeters. What is the radius of the sphere, to the *nearest tenth of a centimeter*?
1) 2.2
2) 3.3
3) 4.4
4) 4.7

127 The image of rhombus *VWXY* preserves which properties under the transformation $T_{2,-3}$?
1) parallelism, only
2) orientation, only
3) both parallelism and orientation
4) neither parallelism nor orientation

128 A rectangular prism has a base with a length of 25, a width of 9, and a height of 12. A second prism has a square base with a side of 15. If the volumes of the two prisms are equal, what is the height of the second prism?
1) 6
2) 8
3) 12
4) 15

129 Given: $\overline{MT}$ and $\overline{HA}$ intersect at B, $\overline{MA} \parallel \overline{HT}$, and $\overline{MT}$ bisects $\overline{HA}$.
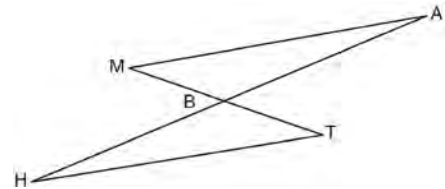
Prove: $\overline{MA} \cong \overline{HT}$

130 A right prism has a square base with an area of 12 square meters. The volume of the prism is 84 cubic meters. Determine and state the height of the prism, in meters.

131 A regular polygon has an exterior angle that measures 45°. How many sides does the polygon have?
1) 10
2) 8
3) 6
4) 4

132 Which statement has the same truth value as the statement "If a quadrilateral is a square, then it is a rectangle"?
1) If a quadrilateral is a rectangle, then it is a square.
2) If a quadrilateral is a rectangle, then it is not a square.
3) If a quadrilateral is not a square, then it is not a rectangle.
4) If a quadrilateral is not a rectangle, then it is not a square.

133 In the diagram below, quadrilateral $ABCD$ has vertices $A(-5,1)$, $B(6,-1)$, $C(3,5)$, and $D(-2,7)$.
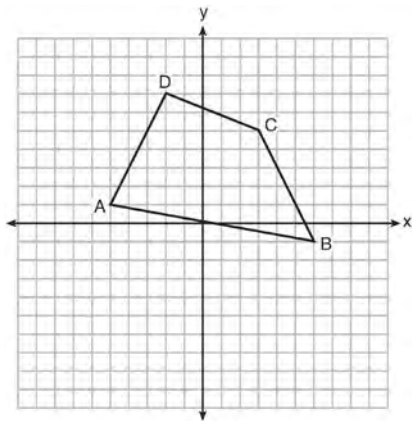
What are the coordinates of the midpoint of diagonal $\overline{AC}$?
1) $(-1,3)$
2) $(1,3)$
3) $(1,4)$
4) $(2,3)$

134 A right circular cylinder has a height of 7 inches and the base has a diameter of 6 inches. Determine the lateral area, in square inches, of the cylinder in terms of π.

135 What is the perimeter of a square whose diagonal is $3\sqrt{2}$?
1) 18
2) 12
3) 9
4) 6

136 The sides of a triangle are 8, 12, and 15. The longest side of a similar triangle is 18. What is the ratio of the perimeter of the smaller triangle to the perimeter of the larger triangle?
1) $2:3$
2) $4:9$
3) $5:6$
4) $25:36$

137 In the diagram of $\triangle ABC$ below, $\overline{AB}$ is extended to point D.
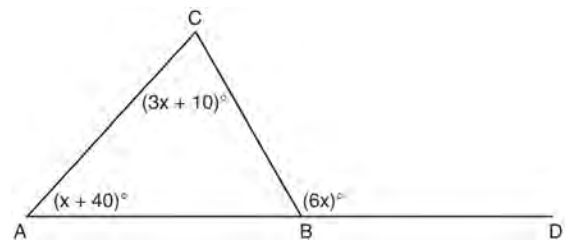
If $m\angle CAB = x + 40$, $m\angle ACB = 3x + 10$, $m\angle CBD = 6x$, what is $m\angle CAB$?
1) 13
2) 25
3) 53
4) 65

138 Two prisms with equal altitudes have equal volumes. The base of one prism is a square with a side length of 5 inches. The base of the second prism is a rectangle with a side length of 10 inches. Determine and state, in inches, the measure of the width of the rectangle.

139 In circle O shown below, chords $\overline{AB}$ and $\overline{CD}$ and radius $\overline{OA}$ are drawn, such that $\overline{AB} \cong \overline{CD}$, $\overline{OE} \perp \overline{AB}$, $\overline{OF} \perp \overline{CD}$, $OF = 16$, $CF = y + 10$, and $CD = 4y - 20$.
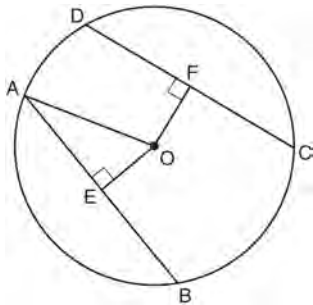
Determine the length of $\overline{DF}$. Determine the length of $\overline{OA}$.

140 In circle O, diameter $\overline{AB}$ intersects chord $\overline{CD}$ at E. If $CE = ED$, then $\angle CEA$ is which type of angle?
1) straight
2) obtuse
3) acute
4) right

141 In the diagram of $\triangle ABC$ below, $\overline{DE} \parallel \overline{BC}$, $AD = 3$, $DB = 2$, and $DE = 6$.
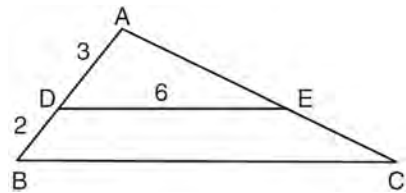
What is the length of $\overline{BC}$?
1) 12
2) 10
3) 8
4) 4

142 On the set of axes below, graph the locus of points 4 units from the x-axis and equidistant from the points whose coordinates are $(-2,0)$ and $(8,0)$. Mark with an **X** all points that satisfy *both* conditions.
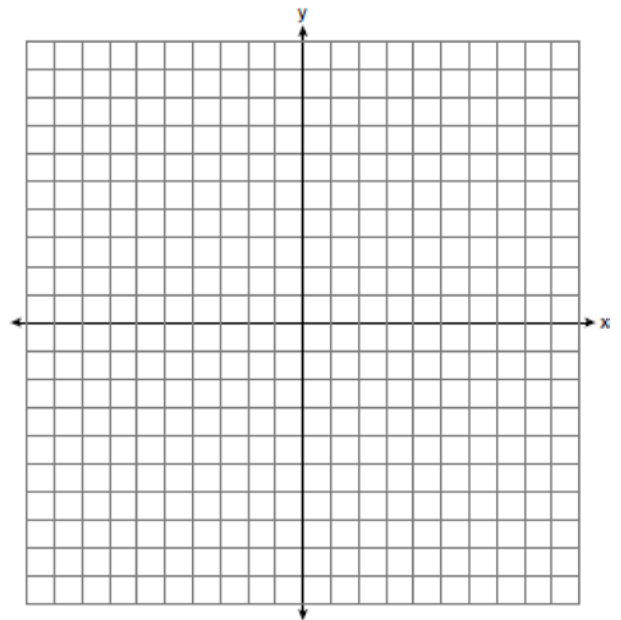
143 In $\triangle ABC$, D is the midpoint of $\overline{AB}$ and E is the midpoint of $\overline{BC}$. If $AC = 3x - 15$ and $DE = 6$, what is the value of x?
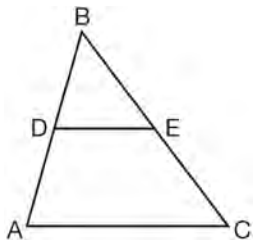
1) 6
2) 7
3) 9
4) 12

144 In the diagram below of right triangle ABC, an altitude is drawn to the hypotenuse $\overline{AB}$.
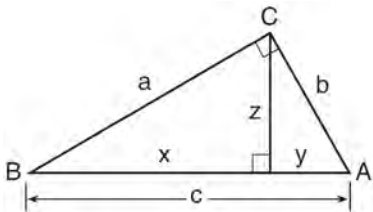
Which proportion would always represent a correct relationship of the segments?

1) $\dfrac{c}{z} = \dfrac{z}{y}$

2) $\dfrac{c}{a} = \dfrac{a}{y}$

3) $\dfrac{x}{z} = \dfrac{z}{y}$

4) $\dfrac{y}{b} = \dfrac{b}{x}$

145 Find, in simplest radical form, the length of the line segment with endpoints whose coordinates are $(-1,4)$ and $(3,-2)$.

146 In the diagram below, $\overline{AC}$ and $\overline{AD}$ are tangent to circle B at points C and D, respectively, and $\overline{BC}$, $\overline{BD}$, and $\overline{BA}$ are drawn.
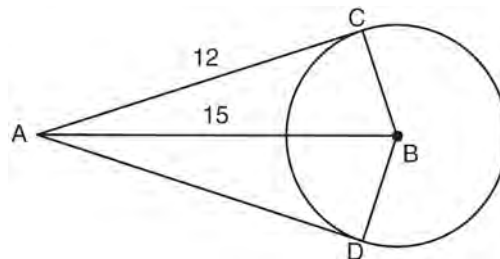
If $AC = 12$ and $AB = 15$, what is the length of $\overline{BD}$?
1) 5.5
2) 9
3) 12
4) 18

147 In the diagram below of right triangle ABC, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$.
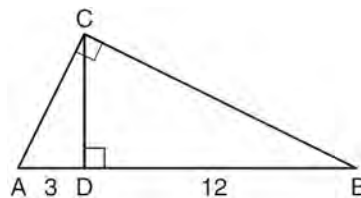
If $AD = 3$ and $DB = 12$, what is the length of altitude $\overline{CD}$?
1) 6
2) $6\sqrt{5}$
3) 3
4) $3\sqrt{5}$

148 In the diagram below, transversal $\overleftrightarrow{TU}$ intersects $\overleftrightarrow{PQ}$ and $\overleftrightarrow{RS}$ at V and W, respectively.
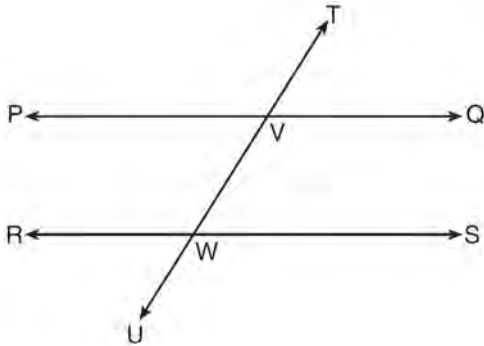
If $m\angle TVQ = 5x - 22$ and $m\angle VWS = 3x + 10$, for which value of x is $\overleftrightarrow{PQ} \parallel \overleftrightarrow{RS}$?

1) 6
2) 16
3) 24
4) 28

149 In $\triangle CAT$, $m\angle C = 65$, $m\angle A = 40$, and B is a point on side $\overline{CA}$, such that $\overline{TB} \perp \overline{CA}$. Which line segment is shortest?

1) $\overline{CT}$
2) $\overline{BC}$
3) $\overline{TB}$
4) $\overline{AT}$

150 In $\triangle ABC$, $m\angle A = 3x + 1$, $m\angle B = 4x - 17$, and $m\angle C = 5x - 20$. Which type of triangle is $\triangle ABC$?

1) right
2) scalene
3) isosceles
4) equilateral

151 A tree, T, is 6 meters from a row of corn, c, as represented in the diagram below. A farmer wants to place a scarecrow 2 meters from the row of corn and also 5 meters from the tree. Sketch both loci. Indicate, with an **X**, all possible locations for the scarecrow.
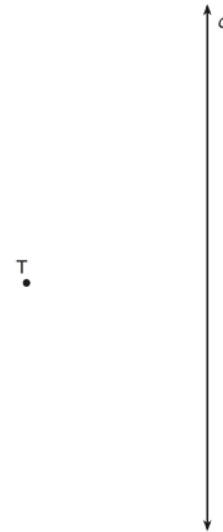
152 In trapezoid $RSTV$ with bases $\overline{RS}$ and $\overline{VT}$, diagonals $\overline{RT}$ and $\overline{SV}$ intersect at Q.
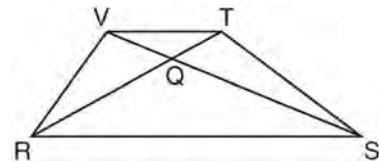
If trapezoid $RSTV$ is *not* isosceles, which triangle is equal in area to $\triangle RSV$?

1) $\triangle RQV$
2) $\triangle RST$
3) $\triangle RVT$
4) $\triangle SVT$

28

153 On the set of axes below, sketch the locus of points 2 units from the *x*-axis and sketch the locus of points 6 units from the point $(0,4)$. Label with an **X** all points that satisfy both conditions.
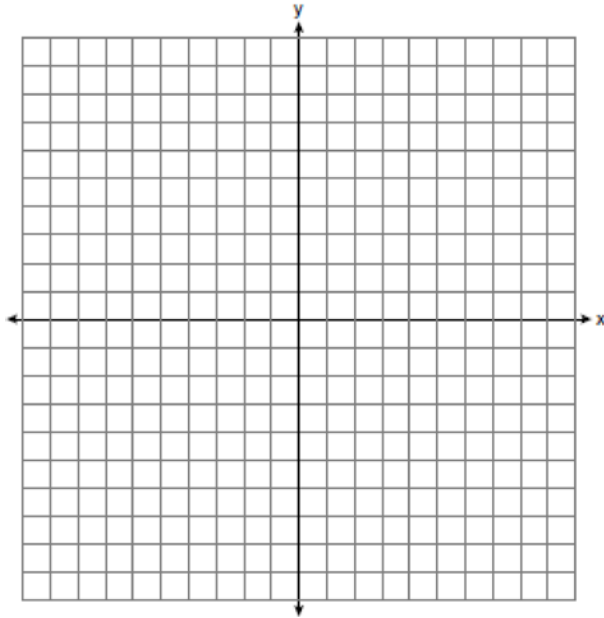
155 The endpoints of $\overline{AB}$ are $A(3,-4)$ and $B(7,2)$. Determine and state the length of $\overline{AB}$ in simplest radical form.

156 On the set of axes below, graph the locus of points 4 units from $(0,1)$ and the locus of points 3 units from the origin. Label with an **X** *any* points that satisfy *both* conditions.
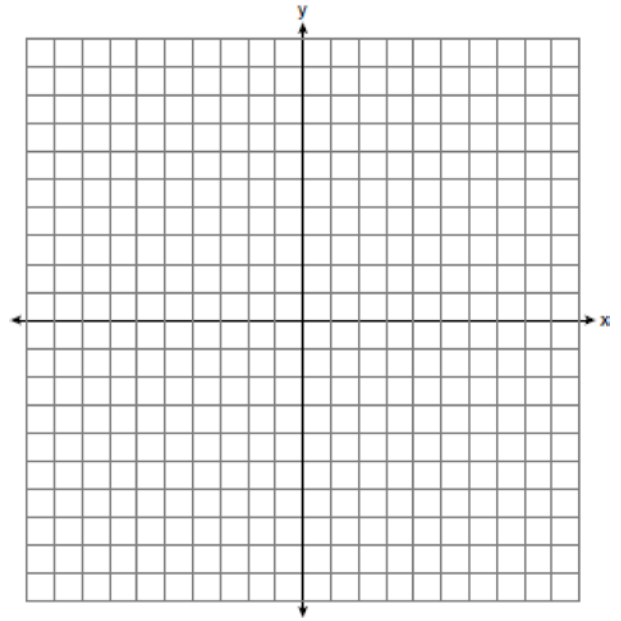
154 Trapezoid *TRAP*, with median $\overline{MQ}$, is shown in the diagram below. Solve algebraically for *x* and *y*.
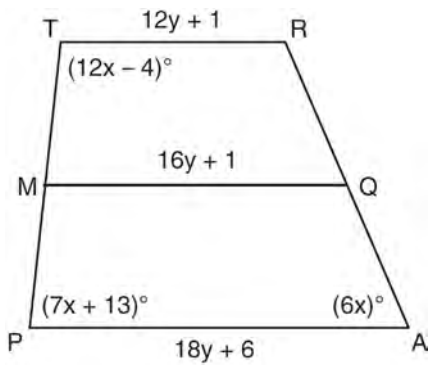
157 Line segment *AB* has endpoint *A* located at the origin. Line segment *AB* is longest when the coordinates of *B* are
1) $(3,7)$
2) $(2,-8)$
3) $(-6,4)$
4) $(-5,-5)$

29

158 Which graph could be used to find the solution to the following system of equations?

$$y = (x+3)^2 - 1$$

$$x + y = 2$$
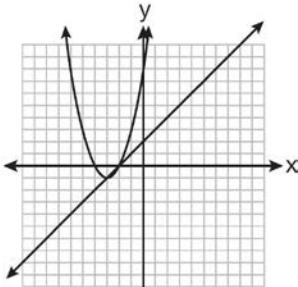
1)
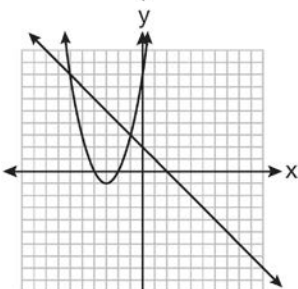
2)
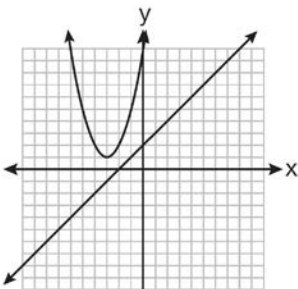
3)
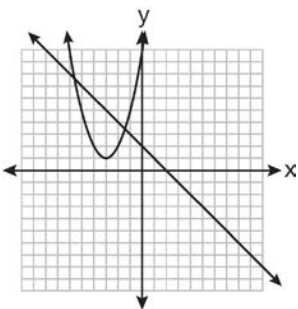
4)

159 The equation of a circle is $(x-2)^2 + (y+5)^2 = 32$. What are the coordinates of the center of this circle and the length of its radius?
1) $(-2,5)$ and 16
2) $(2,-5)$ and 16
3) $(-2,5)$ and $4\sqrt{2}$
4) $(2,-5)$ and $4\sqrt{2}$

160 What is the perimeter of a rhombus whose diagonals are 16 and 30?
1)   92
2)   68
3)   60
4)   17

161 The diagram below shows rectangle $ABCD$ with points E and F on side $\overline{AB}$. Segments CE and DF intersect at G, and $\angle ADG \cong \angle BCG$. Prove: $\overline{AE} \cong \overline{BF}$
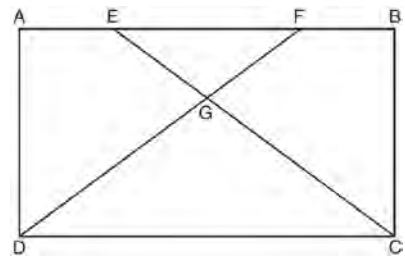
162 What is the measure of the largest exterior angle that any regular polygon can have?
1)   60°
2)   90°
3)   120°
4)   360°

163 What is an equation of the line that passes through $(-9,12)$ and is perpendicular to the line whose equation is $y = \frac{1}{3}x + 6$?

1) $y = \frac{1}{3}x + 15$

2) $y = -3x - 15$

3) $y = \frac{1}{3}x - 13$

4) $y = -3x + 27$

164 The diameter of the base of a right circular cylinder is 6 cm and its height is 15 cm. In square centimeters, the lateral area of the cylinder is

1) 180π

2) 135π

3) 90π

4) 45π

165 What is the solution of the system of equations $y - x = 5$ and $y = x^2 + 5$?

1) $(0,5)$ and $(1,6)$

2) $(0,5)$ and $(-1,6)$

3) $(2,9)$ and $(-1,4)$

4) $(-2,9)$ and $(-1,4)$

166 Which compound statement is true?

1) A square has four sides or a hexagon has eight sides.

2) A square has four sides and a hexagon has eight sides.

3) If a square has four sides, then a hexagon has eight sides.

4) A square has four sides if and only if a hexagon has eight sides.

167 In rhombus $ABCD$, with diagonals $\overline{AC}$ and $\overline{DB}$, $AD = 10$.
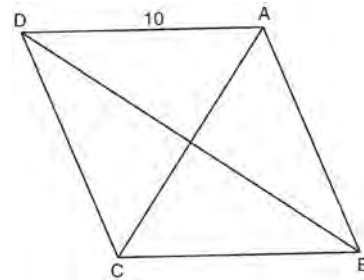
If the length of diagonal $\overline{AC}$ is 12, what is the length of $\overline{DB}$?

1) 8

2) 16

3) $\sqrt{44}$

4) $\sqrt{136}$

168 In $\triangle ABC$, $\angle A \cong \angle B$ and $\angle C$ is an obtuse angle. Which statement is true?

1) $\overline{AC} \cong \overline{AB}$ and $\overline{BC}$ is the longest side.

2) $\overline{AC} \cong \overline{BC}$ and $\overline{AB}$ is the longest side.

3) $\overline{AC} \cong \overline{AB}$ and $\overline{BC}$ is the shortest side.

4) $\overline{AC} \cong \overline{BC}$ and $\overline{AB}$ is the shortest side.

169 If the surface area of a sphere is 144π square centimeters, what is the length of the diameter of the sphere, in centimeters?

1) 36

2) 18

3) 12

4) 6

170 What is the equation for circle O shown in the graph below?
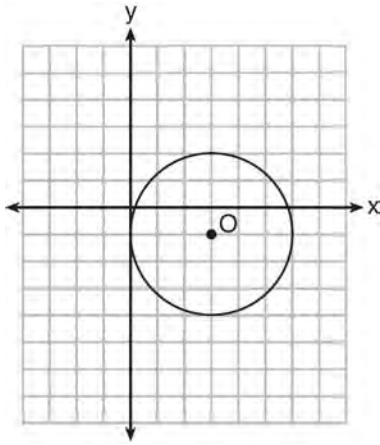
1) $(x-3)^2 + (y+1)^2 = 6$
2) $(x+3)^2 + (y-1)^2 = 6$
3) $(x-3)^2 + (y+1)^2 = 9$
4) $(x+3)^2 + (y-1)^2 = 9$

171 In the diagram below of circle O, diameter $\overline{AB}$ and chord $\overline{CD}$ intersect at E.
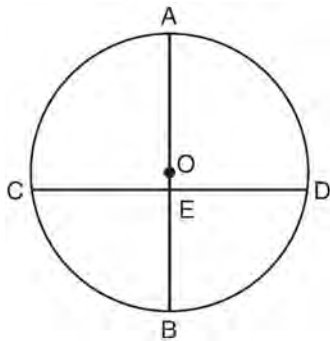
If $\overline{AB} \perp \overline{CD}$, which statement is always true?
1) $\overset{\frown}{AC} \cong \overset{\frown}{BD}$
2) $\overset{\frown}{BD} \cong \overset{\frown}{DA}$
3) $\overset{\frown}{AD} \cong \overset{\frown}{BC}$
4) $\overset{\frown}{CB} \cong \overset{\frown}{BD}$

172 The diameter of a sphere is 5 inches. Determine and state the surface area of the sphere, to the *nearest hundredth of a square inch*.

173 How many points are 5 units from a line and also equidistant from two points on the line?
1) 1
2) 2
3) 3
4) 0

174 Peach Street and Cherry Street are parallel. Apple Street intersects them, as shown in the diagram below.
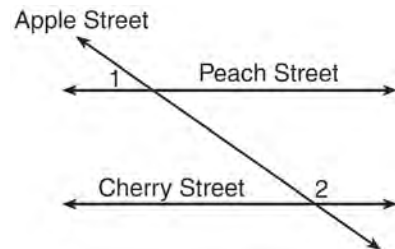
If $m\angle 1 = 2x + 36$ and $m\angle 2 = 7x - 9$, what is $m\angle 1$?
1) 9
2) 17
3) 54
4) 70

175 The coordinates of the endpoints of the diameter of a circle are $(2,0)$ and $(2,-8)$. What is the equation of the circle?
1) $(x-2)^2 + (y+4)^2 = 16$
2) $(x+2)^2 + (y-4)^2 = 16$
3) $(x-2)^2 + (y+4)^2 = 8$
4) $(x+2)^2 + (y-4)^2 = 8$

176 The measure of an interior angle of a regular polygon is 120°. How many sides does the polygon have?
1) 5
2) 6
3) 3
4) 4

177 What are the coordinates of the center of a circle if the endpoints of its diameter are $A(8,-4)$ and $B(-3,2)$?
1) $(2.5,1)$
2) $(2.5,-1)$
3) $(5.5,-3)$
4) $(5.5,3)$

178 As shown below, the medians of $\triangle ABC$ intersect at D.
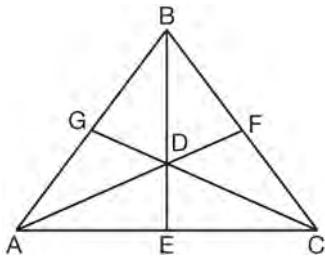
If the length of $\overline{BE}$ is 12, what is the length of $\overline{BD}$?
1) 8
2) 9
3) 3
4) 4

179 In the diagram below, $\triangle AEC \cong \triangle BED$.
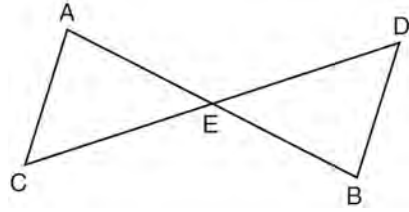
Which statement is *not* always true?
1) $\overline{AC} \cong \overline{BD}$
2) $\overline{CE} \cong \overline{DE}$
3) $\angle EAC \cong \angle EBD$
4) $\angle ACE \cong \angle DBE$

180 In right triangle ABC shown in the diagram below, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $CD = 12$, and $AD = 3$.
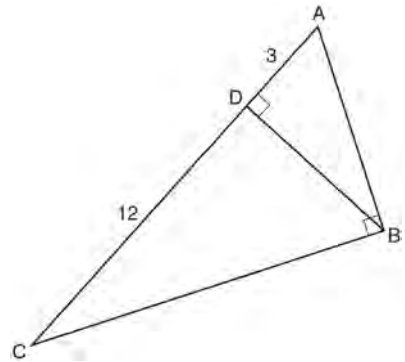
What is the length of $\overline{AB}$?
1) $5\sqrt{3}$
2) 6
3) $3\sqrt{5}$
4) 9

33

181 The graph below shows $\triangle A'B'C'$, the image of $\triangle ABC$ after it was reflected over the y-axis. Graph and label $\triangle ABC$, the pre-image of $\triangle A'B'C'$. Graph and label $\triangle A''B''C''$, the image of $\triangle A'B'C'$ after it is reflected through the origin. State a single transformation that will map $\triangle ABC$ onto $\triangle A''B''C''$.
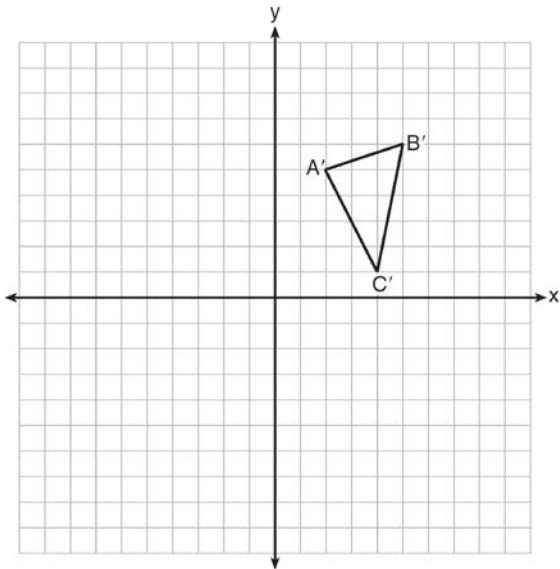
182 The diagram below shows the construction of an equilateral triangle.
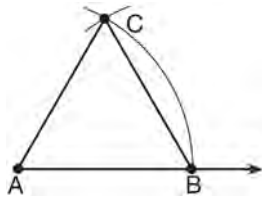
Which statement justifies this construction?
1) $\angle A + \angle B + \angle C = 180$
2) $m\angle A = m\angle B = m\angle C$
3) $AB = AC = BC$
4) $AB + BC > AC$

183 State whether the lines represented by the equations $y = \dfrac{1}{2}x - 1$ and $y + 4 = -\dfrac{1}{2}(x - 2)$ are parallel, perpendicular, or neither. Explain your answer.

184 A rectangular prism is shown in the diagram below.
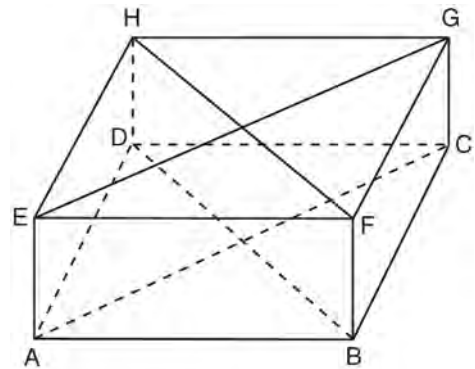
Which pair of line segments would always be both congruent and parallel?
1) $\overline{AC}$ and $\overline{FB}$
2) $\overline{FB}$ and $\overline{DB}$
3) $\overline{HF}$ and $\overline{AC}$
4) $\overline{DB}$ and $\overline{HF}$

185 The measures of the angles of a triangle are in the ratio $2:3:4$. In degrees, the measure of the *largest* angle of the triangle is
1) 20
2) 40
3) 80
4) 100

186 Triangle *ABC* has vertices *A*(0,0), *B*(6,8), and *C*(8,4). Which equation represents the perpendicular bisector of $\overline{BC}$?
1) $y = 2x - 6$
2) $y = -2x + 4$
3) $y = \frac{1}{2}x + \frac{5}{2}$
4) $y = -\frac{1}{2}x + \frac{19}{2}$

187 In $\triangle ABC$, an exterior angle at *C* measures 50°. If m∠*A* > 30. which inequality must be true?
1) m∠*B* < 20
2) m∠*B* > 20
3) m∠*BCA* < 130
4) m∠*BCA* > 130

188 A rectangular right prism is shown in the diagram below.
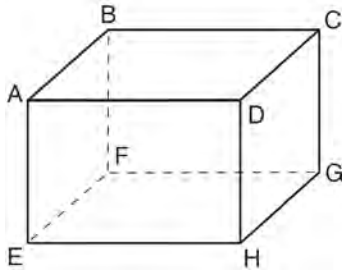
Which pair of edges are *not* coplanar?
1) $\overline{BF}$ and $\overline{CG}$
2) $\overline{BF}$ and $\overline{DH}$
3) $\overline{EF}$ and $\overline{CD}$
4) $\overline{EF}$ and $\overline{BC}$

189 In circle *R* shown below, diameter $\overline{DE}$ is perpendicular to chord $\overline{ST}$ at point *L*.
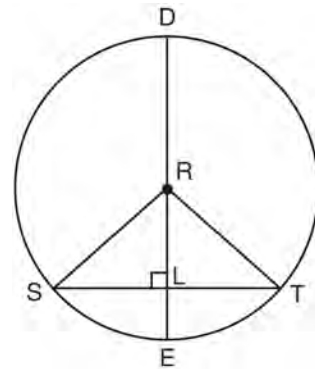
Which statement is *not* always true?
1) $\overline{SL} \cong \overline{TL}$
2) $\overline{RS} = \overline{DR}$
3) $\overline{RL} \cong \overline{LE}$
4) $(DL)(LE) = (SL)(LT)$

190 A regular pyramid has a height of 12 centimeters and a square base. If the volume of the pyramid is 256 cubic centimeters, how many centimeters are in the length of one side of its base?
1) 8
2) 16
3) 32
4) 64

191 What are the truth values of the statement "Two is prime" and its negation?
1) The statement is false and its negation is true.
2) The statement is false and its negation is false.
3) The statement is true and its negation is true.
4) The statement is true and its negation is false.

192 Chords $\overline{AB}$ and $\overline{CD}$ intersect at point E in a circle with center at O. If $AE = 8$, $AB = 20$, and $DE = 16$, what is the length of $\overline{CE}$?
1) 6
2) 9
3) 10
4) 12

193 Which equation represents circle O shown in the graph below?
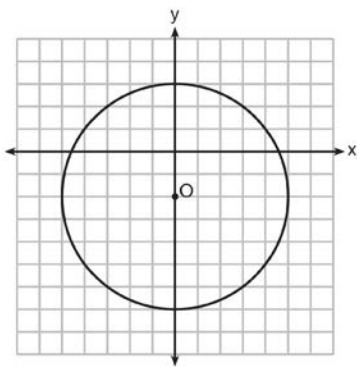
1) $x^2 + (y-2)^2 = 10$
2) $x^2 + (y+2)^2 = 10$
3) $x^2 + (y-2)^2 = 25$
4) $x^2 + (y+2)^2 = 25$

194 The coordinates of the endpoints of $\overline{BC}$ are $B(5,1)$ and $C(-3,-2)$. Under the transformation R_{90}, the image of $\overline{BC}$ is $\overline{B'C'}$. State the coordinates of points B' and C'.

195 In right triangle ABC shown below, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.
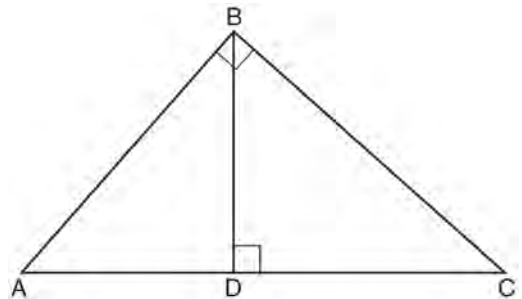
If $AD = 8$ and $DC = 10$, determine and state the length of $\overline{AB}$.

196 In the diagram below, four pairs of triangles are shown. Congruent corresponding parts are labeled in each pair.
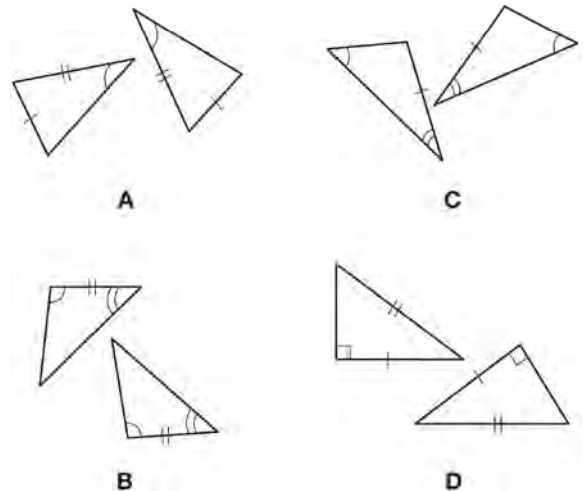
Using only the information given in the diagrams, which pair of triangles can *not* be proven congruent?
1) A
2) B
3) C
4) D

197 Line *m* and point *P* are shown in the graph below.
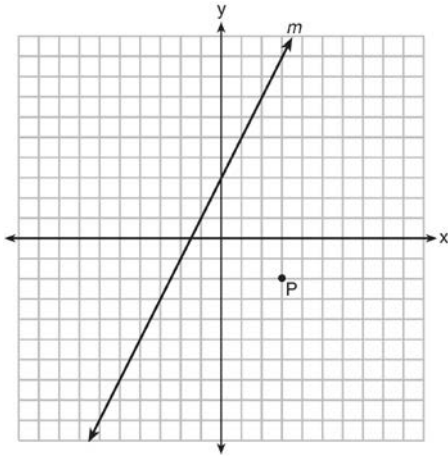
Which equation represents the line passing through *P* and parallel to line *m*?
1) $y - 3 = 2(x + 2)$
2) $y + 2 = 2(x - 3)$
3) $y - 3 = -\frac{1}{2}(x + 2)$
4) $y + 2 = -\frac{1}{2}(x - 3)$

198 As shown in the diagram below, quadrilateral *DEFG* is inscribed in a circle and m∠*D* = 86.
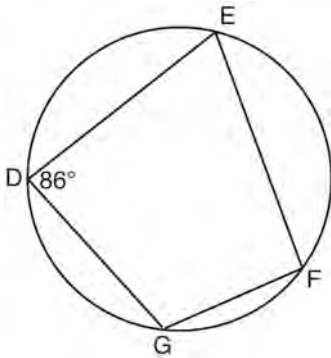
Determine and state m$\overset{\frown}{GFE}$. Determine and state m∠*F*.

199 As shown in the diagram below, a landscaper uses a cylindrical lawn roller on a lawn. The roller has a radius of 9 inches and a width of 42 inches.

To the *nearest square inch*, the area the roller covers in one complete rotation is
1) 2,374
2) 2,375
3) 10,682
4) 10,688

200 Lines *m* and *n* are in plane 𝒜. What is the converse of the statement "If lines *m* and *n* are parallel, then lines *m* and *n* do not intersect"?
1) If lines *m* and *n* are not parallel, then lines *m* and *n* intersect.
2) If lines *m* and *n* are not parallel, then lines *m* and *n* do not intersect
3) If lines *m* and *n* intersect, then lines *m* and *n* are not parallel.
4) If lines *m* and *n* do not intersect, then lines *m* and *n* are parallel.

201 Two intersecting lines are shown in the diagram below. Sketch the locus of points that are equidistant from the two lines. Sketch the locus of points that are a given distance, *d*, from the point of intersection of the given lines. State the number of points that satisfy both conditions.
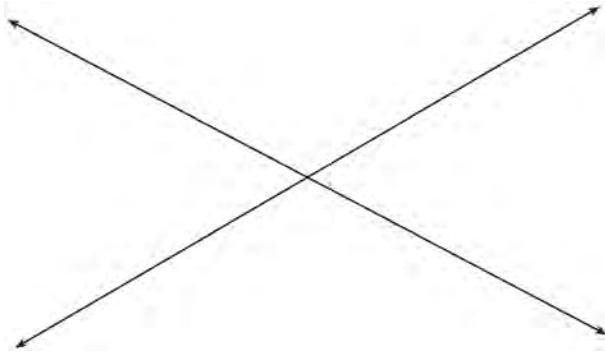
202 If line ℓ is perpendicular to distinct planes $\mathcal{P}$ and Q, then planes $\mathcal{P}$ and Q
1)   are parallel
2)   contain line ℓ
3)   are perpendicular
4)   intersect, but are *not* perpendicular

203 Two prisms have equal heights and equal volumes. The base of one is a pentagon and the base of the other is a square. If the area of the pentagonal base is 36 square inches, how many inches are in the length of each side of the square base?
1)   6
2)   9
3)   24
4)   36

204 As shown in the diagram below, a right pyramid has a square base, *ABCD*, and $\overline{EF}$ is the slant height.
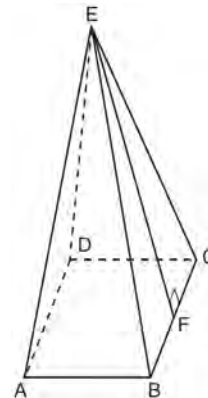
Which statement is *not* true?
1) $\overline{EA} \cong \overline{EC}$
2) $\overline{EB} \cong \overline{EF}$
3) $\triangle AEB \cong \triangle BEC$
4) $\triangle CED$ is isosceles

205 In parallelogram *QRST*, diagonal $\overline{QS}$ is drawn. Which statement must always be true?
1) $\triangle QRS$ is an isosceles triangle.
2) $\triangle STQ$ is an acute triangle.
3) $\triangle STQ \cong \triangle QRS$
4) $\overline{QS} \cong \overline{QT}$

206 Points $A(5,3)$ and $B(7,6)$ lie on $\overleftrightarrow{AB}$. Points $C(6,4)$ and $D(9,0)$ lie on $\overleftrightarrow{CD}$. Which statement is true?
1) $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$
2) $\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$
3) $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ are the same line.
4) $\overleftrightarrow{AB}$ and $\overleftrightarrow{CD}$ intersect, but are not perpendicular.

207 Which graph represents a circle whose equation is $x^2 + (y-2)^2 = 4$?

1)

2)

3)

4)
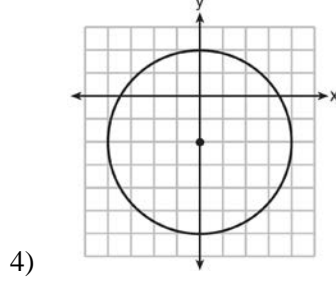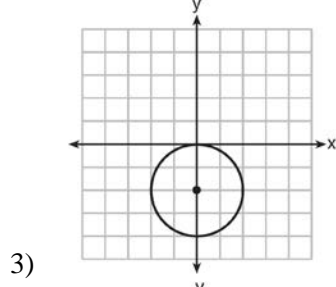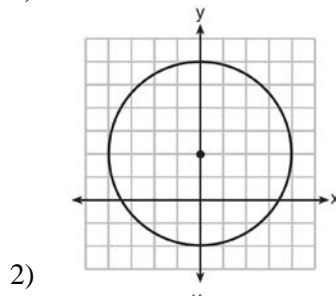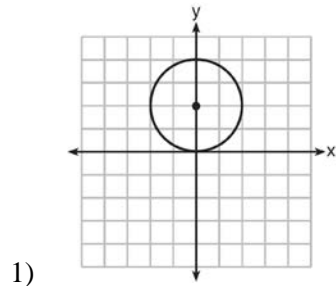
208 When the system of equations $y + 2x = x^2$ and $y = x$ is graphed on a set of axes, what is the total number of points of intersection?
1) 1
2) 2
3) 3
4) 0

209 The equation of a line is $3y + 2x = 12$. What is the slope of the line perpendicular to the given line?
1) $\dfrac{2}{3}$
2) $\dfrac{3}{2}$
3) $-\dfrac{2}{3}$
4) $-\dfrac{3}{2}$

210 In the diagram below, $\overleftrightarrow{RCBT}$ and $\triangle ABC$ are shown with $m\angle A = 60$ and $m\angle ABT = 125$.
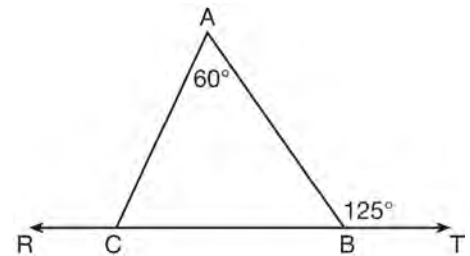
What is $m\angle ACR$?
1) 125
2) 115
3) 65
4) 55

211 The equations of lines k, p, and m are given below:
$$k: x + 2y = 6$$
$$p: 6x + 3y = 12$$
$$m: -x + 2y = 10$$
Which statement is true?
1) $p \perp m$
2) $m \perp k$
3) $k \parallel p$
4) $m \parallel k$

212 Using a compass and straightedge, construct a line perpendicular to line ℓ through point P. [Leave all construction marks.]

214 Which equation represents a line that is parallel to the line whose equation is $3x - 2y = 7$?

1) $y = -\dfrac{3}{2}x + 5$

2) $y = -\dfrac{2}{3}x + 4$

3) $y = \dfrac{3}{2}x - 5$

4) $y = \dfrac{2}{3}x - 4$

215 Triangle ABC has vertices $A(5,1)$, $B(1,4)$ and $C(1,1)$. State and label the coordinates of the vertices of $\triangle A''B''C''$, the image of $\triangle ABC$, following the composite transformation $T_{1,-1} \circ D_2$. [The use of the set of axes below is optional.]
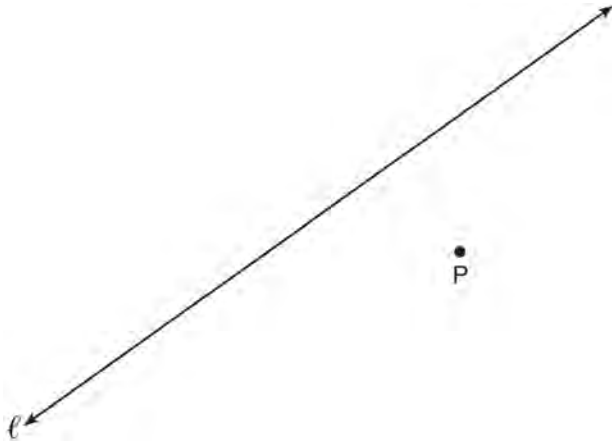
213 What is an equation of circle O shown in the graph below?
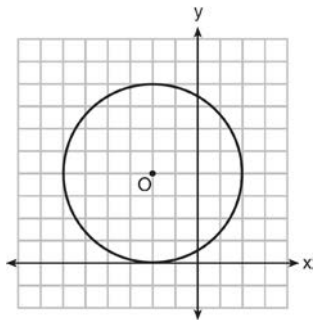
1) $(x-2)^2 + (y+4)^2 = 4$
2) $(x-2)^2 + (y+4)^2 = 16$
3) $(x+2)^2 + (y-4)^2 = 4$
4) $(x+2)^2 + (y-4)^2 = 16$
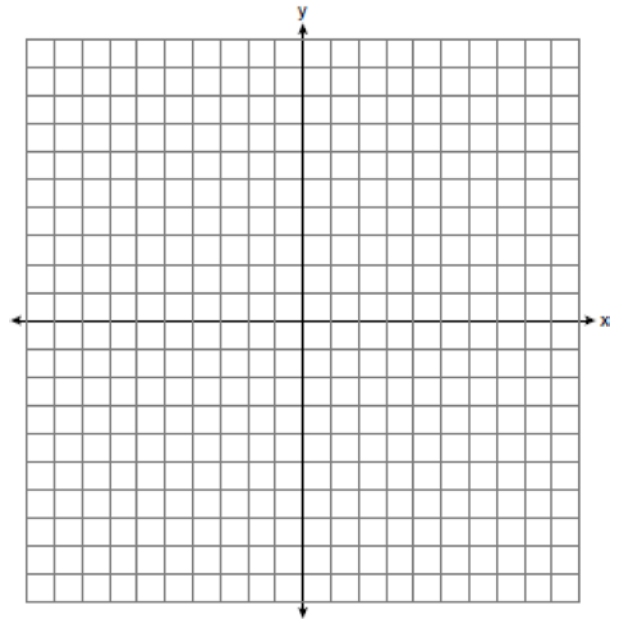
216 As shown in the diagram below, when right triangle *DAB* is reflected over the *x*-axis, its image is triangle *DCB*.
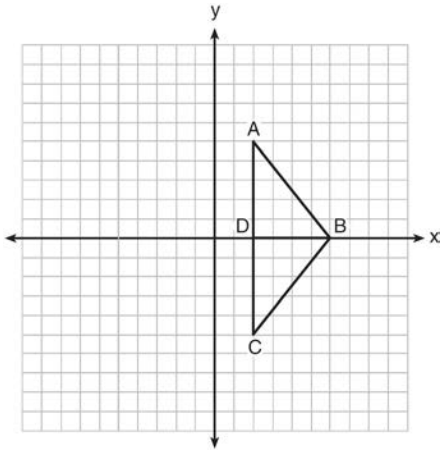
Which statement justifies why $\overline{AB} \cong \overline{CB}$?
1) Distance is preserved under reflection.
2) Orientation is preserved under reflection.
3) Points on the line of reflection remain invariant.
4) Right angles remain congruent under reflection.

217 Consider the relationship between the two statements below.

$$\text{If } \sqrt{16+9} \neq 4+3, \text{ then } 5 \neq 4+3$$

$$\text{If } \sqrt{16+9} = 4+3, \text{ then } 5 = 4+3$$

These statements are
1) inverses
2) converses
3) contrapositives
4) biconditionals

218 Triangle *ABC* has vertices at $A(3,0)$, $B(9,-5)$, and $C(7,-8)$. Find the length of $\overline{AC}$ in simplest radical form.

219 In the diagram of circle *O* below, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overset{\frown}{CD} = 110$.
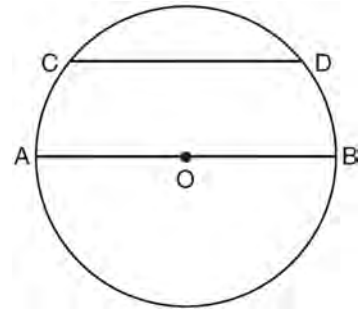
What is $m\overset{\frown}{DB}$?
1) 35
2) 55
3) 70
4) 110

220 Quadrilateral *ABCD* is graphed on the set of axes below.
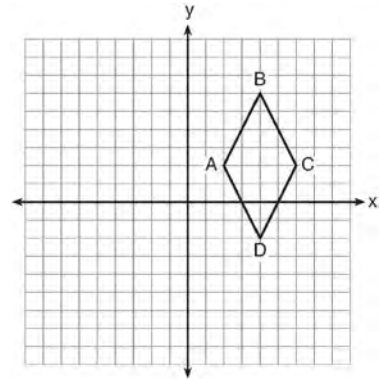
Which quadrilateral best classifies *ABCD*?
1) trapezoid
2) rectangle
3) rhombus
4) square

41

221 Based on the construction below, which conclusion is *not* always true?
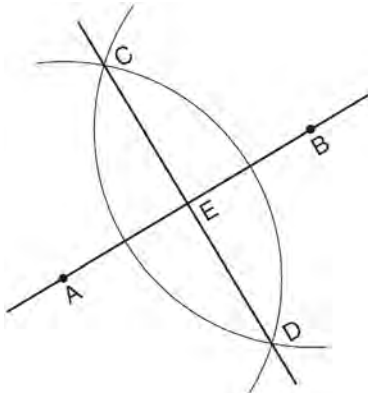
1) $\overline{AB} \perp \overline{CD}$
2) $AB = CD$
3) $AE = EB$
4) $CE = DE$

222 How many common tangent lines can be drawn to the circles shown below?
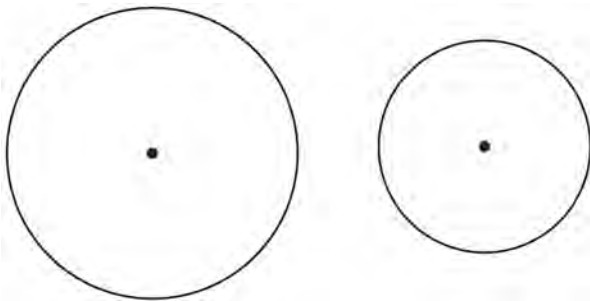
1) 1
2) 2
3) 3
4) 4

223 Square *ABCD* has vertices $A(-2,-3)$, $B(4,-1)$, $C(2,5)$, and $D(-4,3)$. What is the length of a side of the square?

1) $2\sqrt{5}$
2) $2\sqrt{10}$
3) $4\sqrt{5}$
4) $10\sqrt{2}$

224 In quadrilateral *ABCD*, the diagonals bisect its angles. If the diagonals are *not* congruent, quadrilateral *ABCD* must be a
1) square
2) rectangle
3) rhombus
4) trapezoid

225 In the diagram below of quadrilateral *ABCD*, diagonals $\overline{AEC}$ and $\overline{BED}$ are perpendicular at *E*.
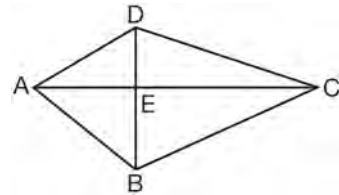
Which statement is always true based on the given information?
1) $\overline{DE} \cong \overline{EB}$
2) $\overline{AD} \cong \overline{AB}$
3) $\angle DAC \cong \angle BAC$
4) $\angle AED \cong \angle CED$

226 In $\triangle ABC$, the measure of angle *A* is fifteen less than twice the measure of angle *B*. The measure of angle *C* equals the sum of the measures of angle *A* and angle *B*. Determine the measure of angle *B*.

Geometry Regents at Random
Answer Section

1 ANS: 3   PTS: 2   REF: 081320ge   STA: G.G.42
   TOP: Midsegments

2 ANS: 1   PTS: 2   REF: 011416ge   STA: G.G.34
   TOP: Angle Side Relationship

3 ANS: 2   PTS: 2   REF: 081316ge   STA: G.G.23
   TOP: Locus

4 ANS:

$$(n-2)180 = 540. \ \frac{540}{5} = 108$$
$$n - 2 = 3$$
$$n = 5$$

   PTS: 2   REF: 081434ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

5 ANS: 1   PTS: 2   REF: 011301ge   STA: G.G.29
   TOP: Triangle Congruency

6 ANS: 3

$$x^2 = 2(2 + 10)$$
$$x^2 = 24$$
$$x = \sqrt{24} = \sqrt{4}\sqrt{6} = 2\sqrt{6}$$

   PTS: 2   REF: 081326ge   STA: G.G.47   TOP: Similarity
   KEY: leg

7 ANS:

If $r = 5$, then $r^2 = 25$. $(x + 3)^2 + (y - 2)^2 = 25$

   PTS: 2   REF: 011332ge   STA: G.G.71   TOP: Equations of Circles

8 ANS:
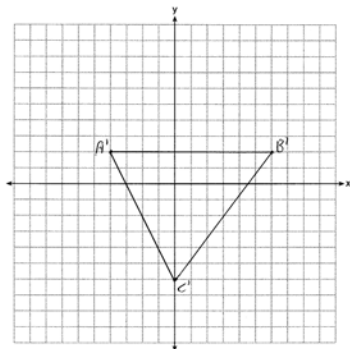
   PTS: 2   REF: 081429ge   STA: G.G.58   TOP: Dilations

9 ANS: 2
(1) is true because of vertical angles. (3) and (4) are true because CPCTC.

PTS: 2   REF: 061302ge   STA: G.G.29   TOP: Triangle Congruency

10 ANS: 1
$12(8) = x(6)$

$96 = 6x$

$16 = x$

PTS: 2   REF: 061328ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: two secants

11 ANS: 3   PTS: 2   REF: 061320ge   STA: G.G.35
TOP: Parallel Lines and Transversals

12 ANS: 4   PTS: 2   REF: 011421ge   STA: G.G.54
TOP: Rotations

13 ANS: 4   PTS: 2   REF: 011323ge   STA: G.G.72
TOP: Equations of Circles

14 ANS: 4   PTS: 2   REF: 081408ge   STA: G.G.55
TOP: Properties of Transformations

15 ANS: 1   PTS: 2   REF: 061325ge   STA: G.G.74
TOP: Graphing Circles

16 ANS: 3   PTS: 2   REF: 081312ge   STA: G.G.72
TOP: Equations of Circles

17 ANS: 2   PTS: 2   REF: 061324ge   STA: G.G.44
TOP: Similarity Proofs

18 ANS: 2

$m = \dfrac{-A}{B} = \dfrac{-3}{-7} = \dfrac{3}{7}\ m_\perp = -\dfrac{7}{3}$

PTS: 2   REF: 081414ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

19 ANS: 4   PTS: 2   REF: 011403ge   STA: G.G.73
TOP: Equations of Circles

20 ANS: 1   PTS: 2   REF: 011405ge   STA: G.G.59
TOP: Properties of Transformations

21 ANS: 3

$2y = 3x - 4.\quad 1 = \dfrac{3}{2}(6) + b$

$y = \dfrac{3}{2}x - 2\quad 1 = 9 + b$

$\qquad\qquad\ -8 = b$

PTS: 2   REF: 061316ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

22 ANS: 1   PTS: 2   REF: 011423ge   STA: G.G.71
TOP: Equations of Circles

23 ANS:

$l = \sqrt{10^2 + 3^2} = \sqrt{109}$ $L = \pi r l = \pi(3)(\sqrt{109}) \approx 98.4$

PTS: 4   REF: 081436ge   STA: G.G.15   TOP: Volume and Lateral Area

24 ANS:
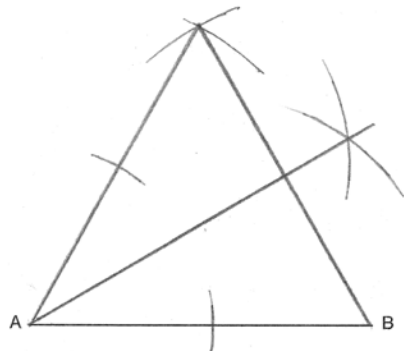
PTS: 4   REF: 061437ge   STA: G.G.17   TOP: Constructions

25 ANS: 3   PTS: 2   REF: 061424ge   STA: G.G.43

TOP: Centroid

26 ANS:

2. The diameter of a circle is ⊥ to a tangent at the point of tangency. 4. An angle inscribed in a semicircle is a right angle. 5. All right angles are congruent. 7. AA. 8. Corresponding sides of congruent triangles are in proportion. 9. The product of the means equals the product of the extremes.

PTS: 6   REF: 011438ge   STA: G.G.27   TOP: Circle Proofs

27 ANS: 1   PTS: 2   REF: 011404ge   STA: G.G.9

TOP: Planes

28 ANS:

$\triangle MAH$, $\overline{MH} \cong \overline{AH}$ and medians $\overline{AB}$ and $\overline{MT}$ are given. $\overline{MA} \cong \overline{AM}$ (reflexive property). $\triangle MAH$ is an isosceles triangle (definition of isosceles triangle). $\angle AMB \cong \angle MAT$ (isosceles triangle theorem). B is the midpoint of $\overline{MH}$ and T is the midpoint of $\overline{AH}$ (definition of median). $m\overline{MB} = \frac{1}{2} m\overline{MH}$ and $m\overline{AT} = \frac{1}{2} m\overline{AH}$ (definition of midpoint). $\overline{MB} \cong \overline{AT}$ (multiplication postulate). $\triangle MBA \cong \triangle ATM$ (SAS). $\angle MBA \cong \angle ATM$ (CPCTC).

PTS: 6   REF: 061338ge   STA: G.G.27   TOP: Triangle Proofs

29 ANS: 2   PTS: 2   REF: 081301ge   STA: G.G.24

TOP: Statements

30 ANS:

$$\left(\frac{3}{2}\right)^2 = \frac{27}{A}$$

$$\frac{9}{4} = \frac{27}{A}$$

$$9A = 108$$

$$A = 12$$

PTS: 2   REF: 061434ge   STA: G.G.45   TOP: Similarity
KEY: perimeter and area

31 ANS:
$A'(2,2), B'(3,0), C(1,-1)$

PTS: 2   REF: 081329ge   STA: G.G.58   TOP: Dilations

32 ANS: 4
$2x - 8 = x + 2.$ $AE = 10 + 2 = 12.$ $AC = 2(AE) = 2(12) = 24$

$$x = 10$$

PTS: 2   REF: 011327ge   STA: G.G.39   TOP: Special Parallelograms

33 ANS: 1
$$7x - 36 + 5x + 12 = 180$$

$$12x - 24 = 180$$

$$12x = 204$$

$$x = 17$$

PTS: 2   REF: 011422ge   STA: G.G.35   TOP: Parallel Lines and Transversals

34 ANS: 4   PTS: 2   REF: 011306ge   STA: G.G.9
TOP: Planes

35 ANS: 1
Parallel lines intercept congruent arcs.

PTS: 2   REF: 081413ge   STA: G.G.52   TOP: Chords and Secants

36 ANS: 2
$$x + x + x + 15 = 180$$

$$3x + 15 = 180$$

$$3x = 165$$

$$x = 15$$

PTS: 2   REF: 061407ge   STA: G.G.31   TOP: Isosceles Triangle Theorem

37 ANS:

$$x + 3x - 60 + 5x - 30 = 180 \qquad 5(30) - 30 = 120 \qquad 6y - 8 = 4y - 2 \quad \overline{DC} = 10 + 10 = 20$$

$$9x - 90 = 180 \qquad m\angle BAC = 180 - 120 = 60 \qquad 2y = 6$$

$$9x = 270 \qquad\qquad y = 3$$

$$x = 30 = m\angle D \qquad\qquad 4(3) - 2 = 10 = \overline{BC}$$
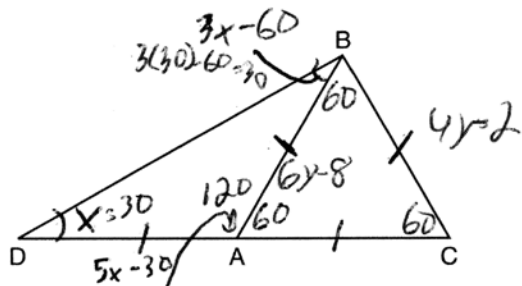
PTS: 3   REF: 011435ge   STA: G.G.31   TOP: Isosceles Triangle Theorem

38 ANS: 4

$$m = \frac{2}{3} \quad . \quad 2 = -\frac{3}{2}(4) + b$$

$$m_\perp = -\frac{3}{2} \quad 2 = -6 + b$$

$$8 = b$$

PTS: 2   REF: 011319ge   STA: G.G.64   TOP: Parallel and Perpendicular Lines

39 ANS: 1
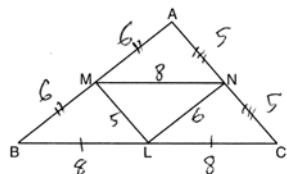
PTS: 2   REF: 011413ge   STA: G.G.42   TOP: Midsegments

40 ANS: 3   PTS: 2   REF: 081405ge   STA: G.G.56
    TOP: Identifying Transformations

41 ANS:
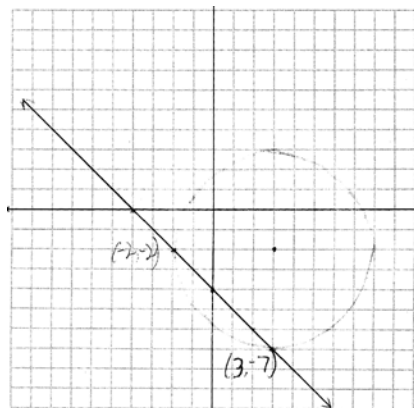
$(x-3)^2 + (y+2)^2 = 25$ $m = \dfrac{-6--4}{0-2} = \dfrac{-2}{-2} = 1$ $M\left(\dfrac{0+2}{2}, \dfrac{-6+-4}{2}\right) = M(1,-5)$

$$m_\perp = -1$$

$-5 = (-1)(1) + b$

$-4 = b$

$y = -x - 4$

PTS: 6   REF: 081438ge   STA: G.G.23   TOP: Locus

42 ANS: 1   PTS: 2   REF: 061418ge   STA: G.G.3
    TOP: Planes

43 ANS: 3   PTS: 2   REF: 061306ge   STA: G.G.71
    TOP: Equations of Circles

44 ANS: 3

$AB = 8 - 4 = 4.$ $BC = \sqrt{(-2-(-5))^2 + (8-6)^2} = \sqrt{13}$. $AC = \sqrt{(-2-(-5))^2 + (4-6)^2} = \sqrt{13}$

PTS: 2   REF: 011328ge   STA: G.G.69   TOP: Triangles in the Coordinate Plane

45 ANS:
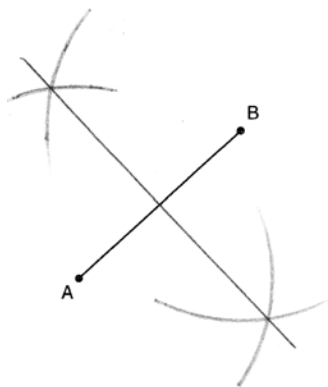
PTS: 2   REF: 011430ge   STA: G.G.18   TOP: Constructions

46 ANS: 2

$$x^2 - 2 = x$$

$$x^2 - x - 2 = 0$$

$$(x - 2)(x + 1) = 0$$

$$x = 2, -1$$

PTS: 2 REF: 011409ge STA: G.G.70 TOP: Quadratic-Linear Systems

47 ANS: 1 PTS: 2 REF: 061310ge STA: G.G.2
TOP: Planes

48 ANS: 3 PTS: 2 REF: 011425ge STA: G.G.39
TOP: Special Parallelograms

49 ANS:

$$4x \cdot x = 6^2$$

$$4x^2 = 36$$

$$x^2 = 9$$

$$x = 3$$

$$\overline{BD} = 4(3) = 12$$

PTS: 4 REF: 011437ge STA: G.G.47 TOP: Similarity
KEY: altitude

50 ANS: 3

$$\frac{12}{8} = \frac{21}{x} \quad 21 + 14 = 35$$

$$12x = 168$$

$$x = 14$$

PTS: 2 REF: 061426ge STA: G.G.46 TOP: Side Splitter Theorem

51 ANS: 2 PTS: 2 REF: 011411ge STA: G.G.27
TOP: Quadrilateral Proofs

52 ANS: 1 PTS: 2 REF: 011303ge STA: G.G.24
TOP: Statements

53 ANS:
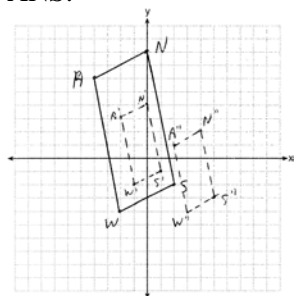
$S''(5,-3)$, $W''(3,-4)$, $A''(2,1)$, and $N''(4,2)$

PTS: 4   REF: 061335ge   STA: G.G.58   TOP: Compositions of Transformations
KEY: grids

54 ANS:
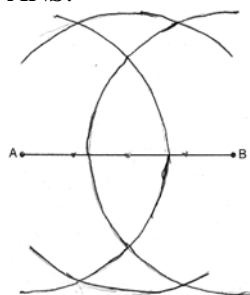
PTS: 4   REF: 081437ge   STA: G.G.18   TOP: Constructions

55 ANS:
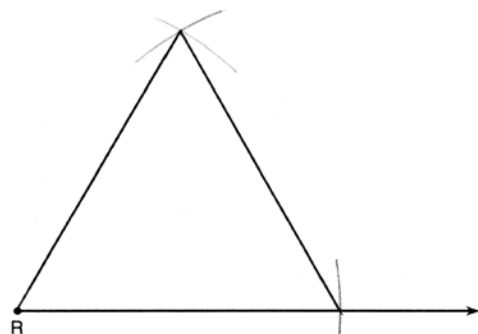
PTS: 2   REF: 061332ge   STA: G.G.20   TOP: Constructions

56 ANS:

$\triangle ABC$, $\overline{BD}$ bisects $\angle ABC$, $\overline{BD} \perp \overline{AC}$ (Given). $\angle CBD \cong \angle ABD$ (Definition of angle bisector). $\overline{BD} \cong \overline{BD}$ (Reflexive property). $\angle CDB$ and $\angle ADB$ are right angles (Definition of perpendicular). $\angle CDB \cong \angle ADB$ (All right angles are congruent). $\triangle CDB \cong \triangle ADB$ (SAS). $\overline{AB} \cong \overline{CB}$ (CPCTC).

PTS: 4   REF: 081335ge   STA: G.G.27   TOP: Triangle Proofs

57 ANS: 2

Parallel chords intercept congruent arcs. $\dfrac{360 - (104 + 168)}{2} = 44$

PTS: 2   REF: 011302ge   STA: G.G.52   TOP: Chords and Secants

58 ANS: 3

$$M_x = \frac{1+10}{2} = \frac{11}{2} = 5.5 \quad M_y = \frac{3+7}{2} = \frac{10}{2} = 5.$$

PTS: 2   REF: 081407ge   STA: G.G.66   TOP: Midpoint
KEY: graph

59 ANS: 4

$$(n-2)180 - n\left(\frac{(n-2)180}{n}\right) = 180n - 360 - 180n + 180n - 360 = 180n - 720.$$

$$180(5) - 720 = 180$$

PTS: 2   REF: 081322ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

60 ANS: 3

$$6 = \frac{4+x}{2}. \qquad 8 = \frac{2+y}{2}.$$

$$4 + x = 12 \qquad 2 + y = 16$$

$$x = 8 \qquad\quad y = 14$$

PTS: 2   REF: 011305ge   STA: G.G.66   TOP: Midpoint

61 ANS: 1

$$\frac{180 - 52}{2} = 64. \quad 180 - (90 + 64) = 26$$

PTS: 2   REF: 011314ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

62 ANS: 3   PTS: 2   REF: 011427ge   STA: G.G.56
TOP: Identifying Transformations

63 ANS: 2

$$2^2 + 3^2 \neq 4^2$$

PTS: 2   REF: 011316ge   STA: G.G.48   TOP: Pythagorean Theorem

64 ANS: 4   PTS: 2   REF: 081313ge   STA: G.G.19
TOP: Constructions

65 ANS:

$$(n-2)180 = (8-2)180 = 1080. \quad \frac{1080}{8} = 135.$$

PTS: 2   REF: 061330ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

66 ANS: 4   PTS: 2   REF: 061303ge   STA: G.G.22
TOP: Locus

67 ANS:
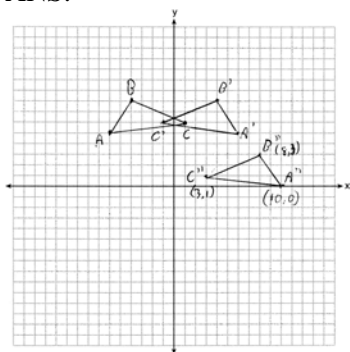
    PTS: 3   REF: 011436ge   STA: G.G.58   TOP: Compositions of Transformations
    KEY: grids

68 ANS:

$5x = 2(x + 12)$ $QM = 5(8) + (8) + 12 = 60$

$5x = 2x + 24$

$3x = 24$

$x = 8$

    PTS: 2   REF: 081433ge   STA: G.G.43   TOP: Centroid

69 ANS: 4   PTS: 2   REF: 061422ge   STA: G.G.73
    TOP: Equations of Circles

70 ANS:

Distance is preserved after the reflection. $2x + 13 = 9x - 8$

$$21 = 7x$$

$$3 = x$$

    PTS: 2   REF: 011329ge   STA: G.G.55   TOP: Properties of Transformations

71 ANS: 1   PTS: 2   REF: 081303ge   STA: G.G.24
    TOP: Negations

72 ANS:

$m_{\overline{JM}} = \dfrac{1-4}{-3-3} = \dfrac{-3}{-6} = \dfrac{1}{2}$ Since both opposite sides have equal slopes and are parallel, *JKLM* is a parallelogram.

$m_{=\overline{ML}} = \dfrac{4--2}{3-7} = \dfrac{6}{-4} = -\dfrac{3}{2}$

$m_{\overline{LK}} = \dfrac{-2--5}{7-1} = \dfrac{3}{6} = \dfrac{1}{2}$

$m_{\overline{KJ}} = \dfrac{-5-1}{1--3} = \dfrac{-6}{4} = -\dfrac{3}{2}$

$\overline{JM} = \sqrt{(-3-3)^2 + (1-4)^2} = \sqrt{45}$. $\overline{JM}$ is not congruent to $\overline{ML}$, so *JKLM* is not a rhombus since not all sides

$\overline{ML} = \sqrt{(7-3)^2 + (-2-4)^2} = \sqrt{52}$

are congruent.

PTS: 6   REF: 061438ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

73 ANS:

$x^2 - 8x = 5x + 30$. $m\angle C = 4(15) - 5 = 55$

$x^2 - 13x - 30 = 0$

$(x-15)(x+2) = 0$

$x = 15$

PTS: 4   REF: 061337ge   STA: G.G.45   TOP: Similarity
KEY: basic

74 ANS: 2

The slope of $2x + 4y = 12$ is $m = \dfrac{-A}{B} = \dfrac{-2}{4} = -\dfrac{1}{2}$. $m_{\perp} = 2.$

PTS: 2   REF: 011310ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

75 ANS: 3   PTS: 2   REF: 011304ge   STA: G.G.61
TOP: Analytical Representations of Transformations

76 ANS:

$M\left(\dfrac{-7+-3}{2}, \dfrac{4+6}{2}\right) = M(-5,5)$. $m\overline{_{MN}} = \dfrac{5-3}{-5-0} = \dfrac{2}{-5}$. Since both opposite sides have equal slopes and are

$N\left(\dfrac{-3+3}{2}, \dfrac{6+0}{2}\right) = N(0,3)$ $m\overline{_{PQ}} = \dfrac{-4--2}{2--3} = \dfrac{-2}{5}$

$P\left(\dfrac{3+1}{2}, \dfrac{0+-8}{2}\right) = P(2,-4)$ $m\overline{_{NA}} = \dfrac{3--4}{0-2} = \dfrac{7}{-2}$

$Q\left(\dfrac{-7+1}{2}, \dfrac{4+-8}{2}\right) = Q(-3,-2)$ $m\overline{_{QM}} = \dfrac{-2-5}{-3--5} = \dfrac{-7}{2}$

parallel, *MNPQ* is a parallelogram. $\overline{MN} = \sqrt{(-5-0)^2 + (5-3)^2} = \sqrt{29}$. $\overline{MN}$ is not congruent to $\overline{NP}$, so *MNPQ*

$$NA = \sqrt{(0-2)^2 + (3--4)^2} = \sqrt{53}$$
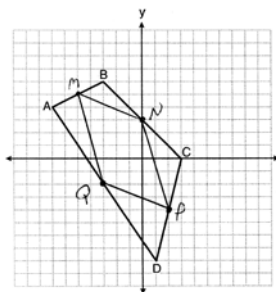
is not a rhombus since not all sides are congruent.

PTS: 6   REF: 081338ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

77 ANS: 4

$3y + 6 = 2x$ $2y - 3x = 6$

$3y = 2x - 6$ $2y = 3x + 6$

$y = \dfrac{2}{3}x - 2$ $y = \dfrac{3}{2}x + 3$

$m = \dfrac{2}{3}$ $m = \dfrac{3}{2}$

PTS: 2   REF: 081315ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

78 ANS:

$x^2 + 7^2 = 25^2$

$x^2 + 49 = 625$

$x^2 = 576$

$x = 24$

PTS: 2   REF: 061433ge   STA: G.G.50   TOP: Tangents
KEY: point of tangency

79 ANS: 4   PTS: 2   REF: 061319ge   STA: G.G.73
TOP: Equations of Circles

80 ANS: 3

$2(4x + 20) + 2(3x - 15) = 360.$ $\angle D = 3(25) - 15 = 60$

$$8x + 40 + 6x - 30 = 360$$

$$14x + 10 = 360$$

$$14x = 350$$

$$x = 25$$

PTS: 2　　　　REF: 011321ge　　STA: G.G.40　　TOP: Trapezoids

81 ANS:
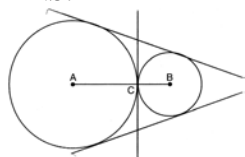
PTS: 2　　　　REF: 011330ge　　STA: G.G.50　　TOP: Tangents
KEY: common tangency

82 ANS:

$x^2 + 12 + 11x + 5 + 13x - 17 = 180.$ $m\angle A = 6^2 + 12 = 48$. $\angle B$ is the largest angle, so $\overline{AC}$ in the longest side.

$$x^2 + 24x - 180 = 0 \qquad m\angle B = 11(6) + 5 = 71$$

$$(x + 30)(x - 6) = 0 \qquad m\angle C = 13(6) - 7 = 61$$

$$x = 6$$

PTS: 4　　　　REF: 011337ge　　STA: G.G.34　　TOP: Angle Side Relationship

83 ANS: 3　　　PTS: 2　　　　REF: 011402ge　　STA: G.G.17
TOP: Constructions

84 ANS: 2

$m = \dfrac{-A}{B} = \dfrac{-5}{1} = -5$　$y = mx + b$

$$3 = -5(5) + b$$

$$28 = b$$

PTS: 2　　　　REF: 011410ge　　STA: G.G.65　　TOP: Parallel and Perpendicular Lines

85 ANS: 1
$180 - 123 = 57$

PTS: 2　　　　REF: 061419ge　　STA: G.G.40　　TOP: Trapezoids

86 ANS: 2

$\dfrac{6 + x}{2} = 4.$ $\dfrac{-4 + y}{2} = 2$

$\quad x = 2 \qquad y = 8$

PTS: 2　　　　REF: 011401ge　　STA: G.G.66　　TOP: Midpoint

87 ANS: 4   PTS: 2   REF: 081305ge   STA: G.G.71
    TOP: Equations of Circles
88 ANS: 2

$$x^2 + 5x = 4x + 110 \quad m\angle Q = 4(10) = 40$$

$$x^2 + x - 110 = 0$$

$$(x + 11)(x - 10) = 0$$

$$10 = x$$

    PTS: 2   REF: 061425ge   STA: G.G.32   TOP: Exterior Angle Theorem
89 ANS: 3   PTS: 2   REF: 061401ge   STA: G.G.9
    TOP: Planes
90 ANS:
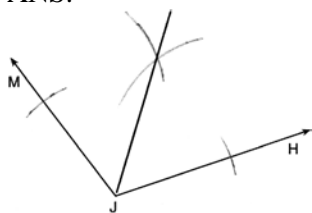
    PTS: 2   REF: 081330ge   STA: G.G.17   TOP: Constructions
91 ANS:
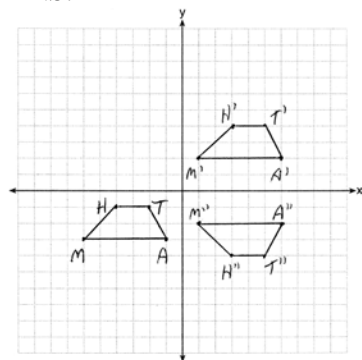
$$M''(1,-2), A''(6,-2), T''(5,-4), H''(3,-4)$$

    PTS: 4   REF: 081336ge   STA: G.G.58   TOP: Compositions of Transformations
    KEY: grids
92 ANS:
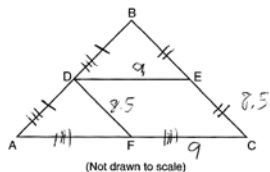
$$8.5 + 9 + 8.5 + 9 = 35$$

    PTS: 2   REF: 081430ge   STA: G.G.42   TOP: Midsegments

93 ANS:

$$M = \left(\frac{3+3}{2} , \frac{-1+5}{2} \right) = (3,2). \quad y = 2.$$
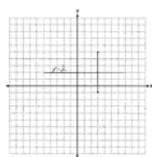
PTS: 2   REF: 011334ge   STA: G.G.68   TOP: Perpendicular Bisector

94 ANS: 2   PTS: 2   REF: 061321ge   STA: G.G.34
TOP: Angle Side Relationship

95 ANS:
$T_{-2,1} \ A(0,1)$

PTS: 2   REF: 081431ge   STA: G.G.54   TOP: Translations

96 ANS: 4
Distance is preserved after a rotation.

PTS: 2   REF: 081304ge   STA: G.G.55   TOP: Properties of Transformations

97 ANS: 4
$8^2 + 15^2 = 17^2$

PTS: 2   REF: 081418ge   STA: G.G.48   TOP: Pythagorean Theorem

98 ANS: 3
$$d = \sqrt{(-2-4)^2 + (3-5)^2} = \sqrt{36+4} = \sqrt{40} = 2\sqrt{10}$$

PTS: 2   REF: 061411ge   STA: G.G.67   TOP: Distance
KEY: general

99 ANS: 1
$$\frac{70-20}{2} = 25$$

PTS: 2   REF: 011325ge   STA: G.G.51   TOP: Arcs Determined by Angles
KEY: outside circle

100 ANS: 3   PTS: 2   REF: 011311ge   STA: G.G.42
TOP: Midsegments

101 ANS: 3
Parallel lines intercept congruent arcs.

PTS: 2   REF: 061409ge   STA: G.G.52   TOP: Chords and Secants

102 ANS:

$\overline{ST}$
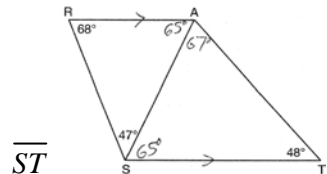
PTS: 2   REF: 061430ge   STA: G.G.34   TOP: Angle Side Relationship

103 ANS:

$m_{\overline{AB}} = \dfrac{4-1}{4-2} = \dfrac{3}{2}.\ \ m_{\overline{BC}} = -\dfrac{2}{3}$

PTS: 4   REF: 061334ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

104 ANS: 4
$3+6>8$

PTS: 2   REF: 061416ge   STA: G.G.33   TOP: Triangle Inequality Theorem

105 ANS: 3
$180 - 38 = 142$

PTS: 2   REF: 011419ge   STA: G.G.50   TOP: Tangents
KEY: two tangents

106 ANS: 3
The centroid divides each median into segments whose lengths are in the ratio 2 : 1.

PTS: 2   REF: 081307ge   STA: G.G.43   TOP: Centroid

107 ANS: 2
$\sqrt{17^2 - 15^2} = \sqrt{289 - 225} = \sqrt{64} = 8$

PTS: 2   REF: 011424ge   STA: G.G.49   TOP: Chords

108 ANS: 1
$r^2 = 48$

$r = \sqrt{48} = \sqrt{16} \cdot \sqrt{3} = 4\sqrt{3}$

PTS: 2   REF: 081412ge   STA: G.G.73   TOP: Equations of Circles

109 ANS: 2   PTS: 2   REF: 061427ge   STA: G.G.27
TOP: Line Proofs

110 ANS: 2   PTS: 2   REF: 081425ge   STA: G.G.74
TOP: Graphing Circles

111 ANS:
$L = 2\pi rh = 2\pi \cdot 3 \cdot 5 \approx 94.25.\ \ V = \pi r^2 h = \pi(3)^2(5) \approx 141.37$

PTS: 4   REF: 011335ge   STA: G.G.14   TOP: Volume and Lateral Area

112 ANS: 2

Perimeter of $\triangle DEF$ is $5+8+11 = 24$. $\dfrac{5}{24} = \dfrac{x}{60}$

$$24x = 300$$

$$x = 12.5$$

PTS: 2   REF: 011307ge   STA: G.G.45   TOP: Similarity
KEY: perimeter and area

113 ANS: 3
$x + 40 = 2x + 20$ $GH = 2(20) + 20 = 60$

$20 = x$

PTS: 2   REF: 081416ge   STA: G.G.31   TOP: Isosceles Triangle Theorem
114 ANS: 1   PTS: 2   REF: 061314ge   STA: G.G.26
TOP: Converse and Biconditional
115 ANS: 3   PTS: 2   REF: 081309ge   STA: G.G.29
TOP: Triangle Congruency
116 ANS: 4   PTS: 2   REF: 011315ge   STA: G.G.1
TOP: Planes
117 ANS: 4   PTS: 2   REF: 011407ge   STA: G.G.23
TOP: Locus
118 ANS: 2   PTS: 2   REF: 061322ge   STA: G.G.51
TOP: Arcs Determined by Angles   KEY: inscribed
119 ANS: 2

$(x - 4)^2 - 2 = -2x + 6.$ $y = -2(4) + 6 = -2$

$x^2 - 8x + 16 - 2 = -2x + 6$ $y = -2(2) + 6 = 2$

$x^2 - 6x + 8 = 0$

$(x - 4)(x - 2) = 0$

$x = 4, 2$

PTS: 2   REF: 081319ge   STA: G.G.70   TOP: Quadratic-Linear Systems
120 ANS: 1

$m = \dfrac{-A}{B} = \dfrac{1}{2}$ $-1 = \dfrac{1}{2}(4) + b$

$-1 = 2 + b$

$-3 = b$

PTS: 2   REF: 061420ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines
121 ANS:
center: $(3, -4)$; radius: $\sqrt{10}$

PTS: 2   REF: 081333ge   STA: G.G.73   TOP: Equations of Circles
122 ANS: 1   PTS: 2   REF: 061408ge   STA: G.G.72
TOP: Equations of Circles
123 ANS: 4
$(x, y) \rightarrow (-x, -y)$

PTS: 2   REF: 061304ge   STA: G.G.54   TOP: Rotations

124 ANS: 3

$$x^2 + 5^2 = 25$$

$$x = 0$$

PTS: 2 REF: 011312ge STA: G.G.70 TOP: Quadratic-Linear Systems

125 ANS: 2 PTS: 2 REF: 081311ge STA: G.G.10
TOP: Solids

126 ANS: 1

$$V = \frac{4}{3}\pi r^3$$

$$44.6022 = \frac{4}{3}\pi r^3$$

$$10.648 \approx r^3$$

$$2.2 \approx r$$

PTS: 2 REF: 061317ge STA: G.G.16 TOP: Volume and Surface Area

127 ANS: 3 PTS: 2 REF: 061421ge STA: G.G.55
TOP: Properties of Transformations

128 ANS: 3

$$25 \times 9 \times 12 = 15^2 h$$

$$2700 = 15^2 h$$

$$12 = h$$

PTS: 2 REF: 061323ge STA: G.G.11 TOP: Volume

129 ANS:

$\overline{MT}$ and $\overline{HA}$ intersect at B, $\overline{MA} \parallel \overline{HT}$, and $\overline{MT}$ bisects $\overline{HA}$ (Given). $\angle MBA \cong \angle TBH$ (Vertical Angles). $\angle A \cong \angle H$ (Alternate Interior Angles). $\overline{BH} \cong \overline{BA}$ (The bisection of a line segment creates two congruent segments). $\triangle MAB \cong \triangle THB$ (ASA). $\overline{MA} \cong \overline{HT}$ (CPCTC).

PTS: 4 REF: 081435ge STA: G.G.27 TOP: Triangle Proofs

130 ANS:

$$Bh = V$$

$$12h = 84$$

$$h = 7$$

PTS: 2 REF: 011432ge STA: G.G.12 TOP: Volume

131 ANS: 2

$$180 - \frac{(n-2)180}{n} = 45$$

$$180n - 180n + 360 = 45n$$

$$360 = 45n$$

$$n = 8$$

PTS: 2   REF: 061413ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

132 ANS: 4   PTS: 2   REF: 061423ge   STA: G.G.25
TOP: Compound Statements   KEY: conditional

133 ANS: 1

$$M_x = \frac{-5+3}{2} = \frac{-2}{2} = -1. \ M_y = \frac{1+5}{2} = \frac{6}{2} = 3.$$

PTS: 2   REF: 061402ge   STA: G.G.66   TOP: Midpoint

134 ANS:

$$L = 2\pi rh = 2\pi \cdot 3 \cdot 7 = 42\pi$$

PTS: 2   REF: 061329ge   STA: G.G.14   TOP: Volume and Lateral Area

135 ANS: 2

$$s^2 + s^2 = (3\sqrt{2})^2$$

$$2s^2 = 18$$

$$s^2 = 9$$

$$s = 3$$

PTS: 2   REF: 011420ge   STA: G.G.39   TOP: Special Parallelograms

136 ANS: 3

$$\frac{15}{18} = \frac{5}{6}$$

PTS: 2   REF: 081317ge   STA: G.G.45   TOP: Similarity
KEY: perimeter and area

137 ANS: 4

$$6x = x + 40 + 3x + 10. \ \text{m}\angle CAB = 25 + 40 = 65$$

$$6x = 4x + 50$$

$$2x = 50$$

$$x = 25$$

PTS: 2   REF: 081310ge   STA: G.G.32   TOP: Exterior Angle Theorem

138 ANS:

$5 \cdot 5 = 10w$

$25 = 10w$

$2.5 = w$

PTS: 2   REF: 061432ge   STA: G.G.11   TOP: Volume

139 ANS:

$2(y + 10) = 4y - 20.$ $\overline{DF} = y + 10 = 20 + 10 = 30.$ $\overline{OA} = \overline{OD} = \sqrt{16^2 + 30^2} = 34$

$2y + 20 = 4y - 20$

$40 = 2y$

$20 = y$

PTS: 4   REF: 061336ge   STA: G.G.49   TOP: Chords

140 ANS: 4   PTS: 2   REF: 081308ge   STA: G.G.49

TOP: Chords

141 ANS: 2

$\dfrac{3}{6} = \dfrac{5}{x}$
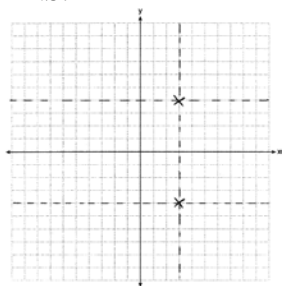
$3x = 30$

$x = 10$

PTS: 2   REF: 081423ge   STA: G.G.46   TOP: Side Splitter Theorem

142 ANS:

PTS: 2   REF: 061333ge   STA: G.G.23   TOP: Locus

143 ANS: 3

$3x - 15 = 2(6)$

$3x = 27$

$x = 9$

PTS: 2   REF: 061311ge   STA: G.G.42   TOP: Midsegments

144 ANS: 3   PTS: 2   REF: 081410ge   STA: G.G.47

TOP: Similarity   KEY: altitude

145 ANS:

$$\sqrt{(-1-3)^2+(4-(-2))^2} = \sqrt{16+36} = \sqrt{52} = \sqrt{4}\sqrt{13} = 2\sqrt{13}$$

PTS: 2　　　　　REF: 081331ge　　　STA: G.G.67　　　TOP: Distance

146 ANS: 2

$$\sqrt{15^2-12^2} = 9$$

PTS: 2　　　　　REF: 081325ge　　　STA: G.G.50　　　TOP: Tangents
KEY: point of tangency

147 ANS: 1

$x^2 = 3 \times 12$

$x = 6$

PTS: 2　　　　　REF: 011308ge　　　STA: G.G.47　　　TOP: Similarity
KEY: altitude

148 ANS: 2

$5x - 22 = 3x + 10$

$2x = 32$

$x = 16$

PTS: 2　　　　　REF: 061403ge　　　STA: G.G.35　　　TOP: Parallel Lines and Transversals

149 ANS: 2
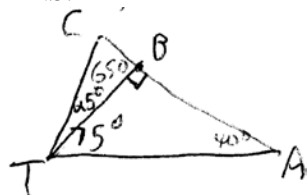
PTS: 2　　　　　REF: 081422ge　　　STA: G.G.34　　　TOP: Angle Side Relationship

150 ANS: 3

$3x + 1 + 4x - 17 + 5x - 20 = 180.$　$3(18) + 1 = 55$

$12x - 36 = 180$　$4(18) - 17 = 55$

$12x = 216$　$5(18) - 20 = 70$

$x = 18$

PTS: 2　　　　　REF: 061308ge　　　STA: G.G.30　　　TOP: Interior and Exterior Angles of Triangles
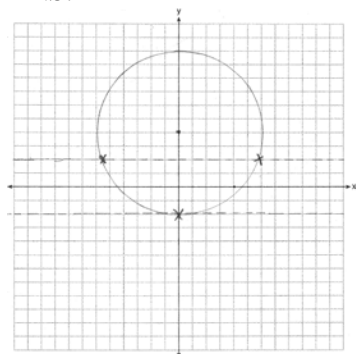
151 ANS:

PTS: 2 REF: 011434ge STA: G.G.22 TOP: Locus

152 ANS: 2

Isosceles or not, $\triangle RSV$ and $\triangle RST$ have a common base, and since $\overline{RS}$ and $\overline{VT}$ are bases, congruent altitudes.

PTS: 2 REF: 061301ge STA: G.G.40 TOP: Trapezoids

153 ANS:

PTS: 4 REF: 061436ge STA: G.G.23 TOP: Locus

154 ANS:

$$12x - 4 + 7x + 13 = 180. \quad 16y + 1 = \frac{12y + 1 + 18y + 6}{2}$$

$$19x + 9 = 180$$
$$19x = 171 \qquad 32y + 2 = 30y + 7$$
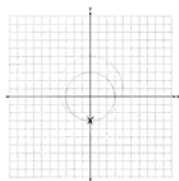$$x = 9 \qquad 2y = 5$$
$$y = \frac{5}{2}$$

PTS: 4 REF: 081337ge STA: G.G.40 TOP: Trapezoids

155 ANS:

$$\sqrt{(3-7)^2 + (-4-2)^2} = \sqrt{16 + 36} = \sqrt{52} = \sqrt{4}\sqrt{13} = 2\sqrt{13}.$$

PTS: 2 REF: 011431ge STA: G.G.67 TOP: Distance

156 ANS:

PTS: 2 REF: 011331ge STA: G.G.23 TOP: Locus

157 ANS: 2 PTS: 2 REF: 081415ge STA: G.G.67
TOP: Distance KEY: general

158 ANS: 2 PTS: 2 REF: 061313ge STA: G.G.70
TOP: Quadratic-Linear Systems

159 ANS: 4 PTS: 2 REF: 011318ge STA: G.G.73
TOP: Equations of Circles

160 ANS: 2
$$\sqrt{8^2 + 15^2} = 17$$

PTS: 2 REF: 061326ge STA: G.G.39 TOP: Special Parallelograms

161 ANS:
Rectangle $ABCD$ with points E and F on side $\overline{AB}$, segments CE and DF intersect at G, and $\angle ADG \cong \angle BCE$ are given. $\overline{AD} \cong \overline{BC}$ because opposite sides of a rectangle are congruent. $\angle A$ and $\angle B$ are right angles and congruent because all angles of a rectangle are right and congruent. $\triangle ADF \cong \triangle BCE$ by ASA. $\overline{AF} \cong \overline{BE}$ per CPCTC. $\overline{EF} \cong \overline{FE}$ under the Reflexive Property. $\overline{AF} - \overline{EF} \cong \overline{BE} - \overline{FE}$ using the Subtraction Property of Segments. $\overline{AE} \cong \overline{BF}$ because of the Definition of Segments.

PTS: 6 REF: 011338ge STA: G.G.27 TOP: Quadrilateral Proofs

162 ANS: 3
The regular polygon with the smallest interior angle is an equilateral triangle, with 60°. $180° - 60° = 120°$

PTS: 2 REF: 011417ge STA: G.G.37 TOP: Interior and Exterior Angles of Polygons

163 ANS: 2
$$m = \frac{1}{3} \qquad 12 = -3(-9) + b$$
$$m_\perp = -3 \qquad 12 = 27 + b$$
$$-15 = b$$

PTS: 2 REF: 081404ge STA: G.G.64 TOP: Parallel and Perpendicular Lines

164 ANS: 3
$$L = 2\pi rh = 2\pi \cdot \frac{6}{2} \cdot 15 = 90\pi$$

PTS: 2 REF: 061405ge STA: G.G.14 TOP: Volume and Lateral Area

165   ANS: 1

$x^2 + 5 = x + 5$ $y = (0) + 5 = 5$

$x^2 - x = 0$ $y = (1) + 5 = 6$

$x(x - 1) = 0$

$\quad x = 0, 1$

PTS: 2   REF: 081406ge   STA: G.G.70   TOP: Quadratic-Linear Systems

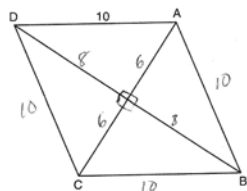166   ANS: 1   PTS: 2   REF: 081421ge   STA: G.G.25
TOP: Compound Statements   KEY: general

167   ANS: 2

PTS: 2   REF: 061414ge   STA: G.G.39   TOP: Special Parallelograms

168   ANS: 2   PTS: 2   REF: 081306ge   STA: G.G.34
TOP: Angle Side Relationship

169   ANS: 3

$144\pi = 4\pi r^2$

$\quad 36 = r^2$

$\quad\ 6 = r$

PTS: 2   REF: 061415ge   STA: G.G.16   TOP: Volume and Surface Area

170   ANS: 3   PTS: 2   REF: 061309ge   STA: G.G.72
TOP: Equations of Circles

171   ANS: 4   PTS: 2   REF: 081403ge   STA: G.G.49
TOP: Chords

172   ANS:

$SA = 4\pi r^2 = 4\pi \cdot 2.5^2 = 25\pi \approx 78.54$

PTS: 2   REF: 011429ge   STA: G.G.16   TOP: Volume and Surface Area

173   ANS: 2   PTS: 2   REF: 011317ge   STA: G.G.22
TOP: Locus

174   ANS: 4

$2x + 36 + 7x - 9 = 180$ $m\angle 1 = 2(17) + 36 = 70$

$\quad\quad 9x + 27 = 180$

$\quad\quad\ \ 9x = 153$

$\quad\quad\quad x = 17$

PTS: 2   REF: 081427ge   STA: G.G.35   TOP: Parallel Lines and Transversals

175 ANS: 1

$$\left(\frac{2+2}{2}, \frac{0+(-8)}{2}\right) = (2,-4) \quad \sqrt{(2-2)^2 + (-8-0)^2} = 8 = d$$

$$4 = r$$

$$16 = r^2$$

PTS: 2   REF: 061428ge   STA: G.G.71   TOP: Equations of Circles

176 ANS: 2

$$\frac{(n-2)180}{n} = 120 \quad .$$

$$180n - 360 = 120n$$

$$60n = 360$$

$$n = 6$$

PTS: 2   REF: 011326ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

177 ANS: 2

$$M_x = \frac{8+(-3)}{2} = 2.5. \quad M_Y = \frac{-4+2}{2} = -1.$$

PTS: 2   REF: 061312ge   STA: G.G.66   TOP: Midpoint

178 ANS: 1

$$2x + x = 12. \quad \overline{BD} = 2(4) = 8$$

$$3x = 12$$

$$x = 4$$

PTS: 2   REF: 011408ge   STA: G.G.43   TOP: Centroid

179 ANS: 4   PTS: 2   REF: 061410ge   STA: G.G.29
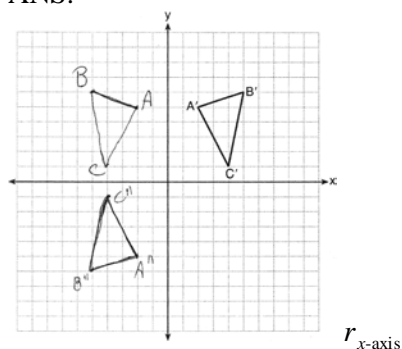TOP: Triangle Congruency

180 ANS: 3

$$x^2 = 3 \times 12. \quad \sqrt{6^2 + 3^2} = \sqrt{45} = \sqrt{9}\sqrt{5} = 3\sqrt{5}$$

$$x = 6$$

PTS: 2   REF: 061327ge   STA: G.G.47   TOP: Similarity
KEY: leg

181 ANS:

$r_{x\text{-axis}}$

PTS: 4   REF: 061435ge   STA: G.G.58   TOP: Compositions of Transformations
KEY: grids

182 ANS: 3   PTS: 2   REF: 011309ge   STA: G.G.20
TOP: Constructions

183 ANS:

Neither. The slope of $y = \frac{1}{2}x - 1$ is $\frac{1}{2}$. The slope of $y + 4 = -\frac{1}{2}(x - 2)$ is $-\frac{1}{2}$. The slopes are neither the same nor opposite reciprocals.

PTS: 2   REF: 011433ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

184 ANS: 4   PTS: 2   REF: 081401ge   STA: G.G.10
TOP: Solids

185 ANS: 3

$$\frac{4}{2 + 3 + 4} \times 180 = 80$$

PTS: 2   REF: 061404ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

186 ANS: 3

midpoint: $\left(\frac{6+8}{2}, \frac{8+4}{2}\right) = (7,6)$. slope: $\frac{8-4}{6-8} = \frac{4}{-2} = -2$; $m_{\perp} = \frac{1}{2}$. $6 = \frac{1}{2}(7) + b$

$$\frac{12}{2} = \frac{7}{2} + b$$

$$\frac{5}{12} = b$$

PTS: 2   REF: 081327ge   STA: G.G.68   TOP: Perpendicular Bisector

187 ANS: 1

$m\angle A + m\angle B = 50$

$30.1 + m\angle B = 50$

$m\angle B = 19.9$

PTS: 2   REF: 081424ge   STA: G.G.32   TOP: Exterior Angle Theorem

188 ANS: 4   PTS: 2   REF: 011406ge   STA: G.G.10
TOP: Solids

189 ANS: 3   PTS: 2   REF: 011322ge   STA: G.G.49
TOP: Chords

190 ANS: 1

$$256 = \frac{1}{3} B \cdot 12$$

$$64 = B$$

$$8 = s$$

PTS: 2   REF: 081428ge   STA: G.G.35   TOP: Volume

191 ANS: 4   PTS: 2   REF: 061412ge   STA: G.G.24
TOP: Negations

192 ANS: 1

$$8 \times 12 = 16x$$

$$6 = x$$

PTS: 2   REF: 081328ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: two chords

193 ANS: 4   PTS: 2   REF: 011415ge   STA: G.G.72
TOP: Equations of Circles

194 ANS:

$$(x,y) \rightarrow (-y,x)$$

$$B(5,1) \rightarrow B'(-1,5)$$

$$C(-3,-2) \rightarrow C'(2,-3)$$

PTS: 2   REF: 061429ge   STA: G.G.54   TOP: Rotations

195 ANS:

$$x^2 = 8(10 + 8)$$

$$x^2 = 144$$

$$x = 12$$

PTS: 2   REF: 061431ge   STA: G.G.47   TOP: Similarity
KEY: leg

196 ANS: 1   PTS: 2   REF: 011412ge   STA: G.G.28
TOP: Triangle Congruency

197 ANS: 2   PTS: 2   REF: 081421ge   STA: G.G.65
TOP: Parallel and Perpendicular Lines

198 ANS:

$86° \cdot 2 = 172°$ $180° - 86° = 94°$

PTS: 2   REF: 081432ge   STA: G.G.51   TOP: Arcs Determined by Angles
KEY: inscribed

199 ANS: 2
$18\pi \cdot 42 \approx 2375$

PTS: 2 REF: 011418ge STA: G.G.14 TOP: Volume and Lateral Area

200 ANS: 4 PTS: 2 REF: 081318ge STA: G.G.26
TOP: Converse and Biconditional

201 ANS:
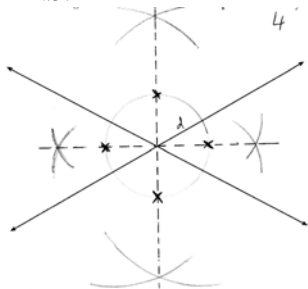
PTS: 2 REF: 081334ge STA: G.G.22 TOP: Locus
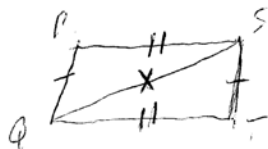
202 ANS: 1 PTS: 2 REF: 081323ge STA: G.G.9
TOP: Planes

203 ANS: 1
If two prisms have equal heights and volume, the area of their bases is equal.

PTS: 2 REF: 081321ge STA: G.G.11 TOP: Volume

204 ANS: 2 PTS: 2 REF: 061315ge STA: G.G.13
TOP: Solids

205 ANS: 3

PTS: 2 REF: 081402ge STA: G.G.38 TOP: Parallelograms

206 ANS: 4
$m\overleftrightarrow{AB} = \dfrac{6-3}{7-5} = \dfrac{3}{2}. \quad m\overleftrightarrow{CD} = \dfrac{4-0}{6-9} = \dfrac{4}{-3}$

PTS: 2 REF: 061318ge STA: G.G.63 TOP: Parallel and Perpendicular Lines

207 ANS: 1 PTS: 2 REF: 081324ge STA: G.G.74
TOP: Graphing Circles

208 ANS: 2
$x + 2x = x^2 \qquad (0,0),(3,3)$

$0 = x^2 - 3x$

$0 = x(x-3)$

$x = 0,3$

PTS: 2 REF: 061406ge STA: G.G.70 TOP: Quadratic-Linear Systems

209 ANS: 2

$$m = \frac{-A}{B} = \frac{-2}{3} \quad m_\perp = \frac{3}{2}$$

     PTS: 2   REF: 061417ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

210 ANS: 2

m∠$ABC = 55$, so m∠$ACR = 60 + 55 = 115$

     PTS: 2   REF: 011414ge   STA: G.G.32   TOP: Exterior Angle Theorem

211 ANS: 1

$$k: \frac{-A}{B} = \frac{-1}{2} \quad p: \frac{-A}{B} = \frac{-6}{3} = -2 \quad m: \frac{-A}{B} = \frac{-(-1)}{2} = \frac{1}{2}$$
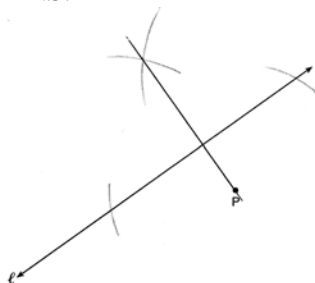
     PTS: 2   REF: 081426ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

212 ANS:

     PTS: 2   REF: 011333ge   STA: G.G.19   TOP: Constructions

213 ANS: 4   PTS: 2   REF: 081409ge   STA: G.G.72

     TOP: Equations of Circles

214 ANS: 3

$$m = \frac{-A}{B} = \frac{-3}{-2} = \frac{3}{2}$$

     PTS: 2   REF: 011324ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

215 ANS:
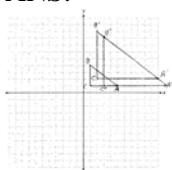
          $A''(11,1)$, $B''(3,7)$, $C''(3,1)$

     PTS: 4   REF: 011336ge   STA: G.G.58   TOP: Compositions of Transformations

216 ANS: 1   PTS: 2   REF: 061307ge   STA: G.G.55

     TOP: Properties of Transformations

217 ANS: 1   PTS: 2   REF: 011320ge   STA: G.G.26

     TOP: Conditional Statements

218 ANS:

$$\sqrt{(7-3)^2 + (-8-0)^2} = \sqrt{16+64} = \sqrt{80} = 4\sqrt{5}$$

PTS: 2   REF: 061331ge   STA: G.G.69   TOP: Triangles in the Coordinate Plane

219 ANS: 1

Parallel chords intercept congruent arcs. $\stackrel{\frown}{mAC} = \stackrel{\frown}{mBD}$. $\dfrac{180-110}{2} = 35$.

PTS: 2   REF: 081302ge   STA: G.G.52   TOP: Chords and Secants

220 ANS: 3

Both pairs of opposite sides are parallel, so not a trapezoid. None of the angles are right angles, so not a rectangle or square. All sides are congruent, so a rhombus.

PTS: 2   REF: 081411ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

221 ANS: 2   PTS: 2   REF: 061305ge   STA: G.G.18

TOP: Constructions

222 ANS: 4   PTS: 2   REF: 011428ge   STA: G.G.50

TOP: Tangents   KEY: common tangency

223 ANS: 2

$$\sqrt{(-2-4)^2 + (-3-(-1))^2} = \sqrt{40} = \sqrt{4}\sqrt{10} = 2\sqrt{10}$$

PTS: 2   REF: 011313ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

224 ANS: 3   PTS: 2   REF: 081419ge   STA: G.G.39

TOP: Special Parallelograms

225 ANS: 4   PTS: 2   REF: 081417ge   STA: G.G.24

TOP: Statements

226 ANS:

$A = 2B - 15$. $2B - 15 + B + 2B - 15 + B = 180$

$C = A + B$ $6B - 30 = 180$

$C = 2B - 15 + B$ $6B = 210$

                     $B = 35$

PTS: 2   REF: 081332ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

Geometry Regents at Random

227 The lateral area of a right circular cone is equal to 120π cm^2. If the base of the cone has a diameter of 24 cm, what is the length of the slant height, in centimeters?
1) 2.5
2) 5
3) 10
4) 15.7

228 The pentagon in the diagram below is formed by five rays.
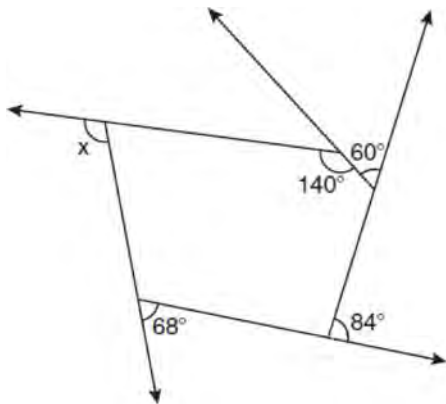

What is the degree measure of angle x?
1) 72
2) 96
3) 108
4) 112

229 What is an equation of a circle with its center at $(-3, 5)$ and a radius of 4?
1) $(x - 3)^2 + (y + 5)^2 = 16$
2) $(x + 3)^2 + (y - 5)^2 = 16$
3) $(x - 3)^2 + (y + 5)^2 = 4$
4) $(x + 3)^2 + (y - 5)^2 = 4$

230 A city is planning to build a new park. The park must be equidistant from school A at $(3, 3)$ and school B at $(3, -5)$. The park also must be exactly 5 miles from the center of town, which is located at the origin on the coordinate graph. Each unit on the graph represents 1 mile. On the set of axes below, sketch the compound loci and label with an **X** all possible locations for the new park.
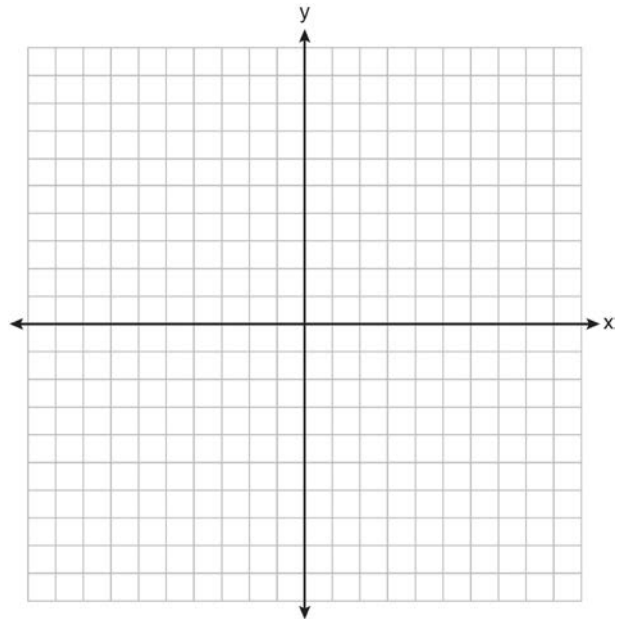
231 What is the measure of an interior angle of a regular octagon?
1) 45°
2) 60°
3) 120°
4) 135°

232 In the diagram below of $\triangle ABC$, D is a point on $\overline{AB}$, $AC = 7$, $AD = 6$, and $BC = 18$.

(Not drawn to scale)
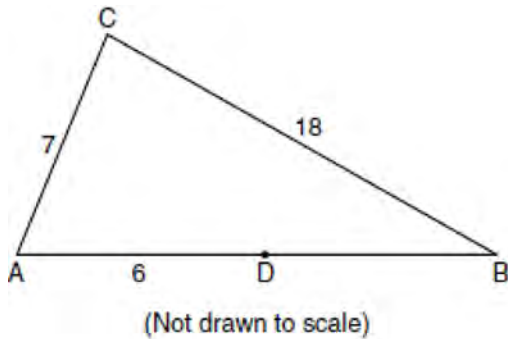
The length of $\overline{DB}$ could be
1) 5
2) 12
3) 19
4) 25

233 A right circular cylinder has a volume of 1,000 cubic inches and a height of 8 inches. What is the radius of the cylinder to the *nearest tenth of an inch*?
1) 6.3
2) 11.2
3) 19.8
4) 39.8

234 What is the contrapositive of the statement, "If I am tall, then I will bump my head"?
1) If I bump my head, then I am tall.
2) If I do not bump my head, then I am tall.
3) If I am tall, then I will not bump my head.
4) If I do not bump my head, then I am not tall.

235 Tim is going to paint a wooden sphere that has a diameter of 12 inches. Find the surface area of the sphere, to the *nearest square inch*.

236 In $\triangle ABC$, m$\angle A = 95$, m$\angle B = 50$, and m$\angle C = 35$. Which expression correctly relates the lengths of the sides of this triangle?
1) $AB < BC < CA$
2) $AB < AC < BC$
3) $AC < BC < AB$
4) $BC < AC < AB$

237 In the diagram below, $\overline{PS}$ is a tangent to circle O at point S, $\overline{PQR}$ is a secant, $PS = x$, $PQ = 3$, and $PR = x + 18$.
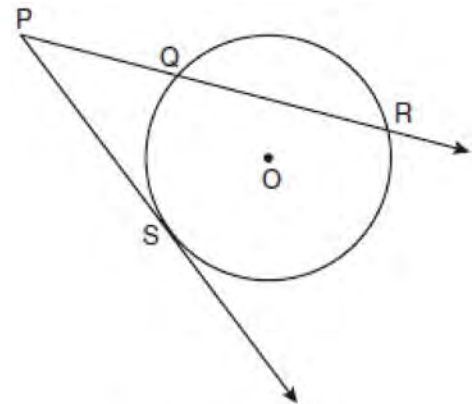
(Not drawn to scale)

What is the length of $\overline{PS}$?
1) 6
2) 9
3) 3
4) 27

44

238 In the diagram below, quadrilateral *STAR* is a rhombus with diagonals $\overline{SA}$ and $\overline{TR}$ intersecting at *E*. $ST = 3x + 30$, $SR = 8x - 5$, $SE = 3z$, $TE = 5z + 5$, $AE = 4z - 8$, m$\angle RTA = 5y - 2$, and m$\angle TAS = 9y + 8$. Find *SR*, *RT*, and m$\angle TAS$.
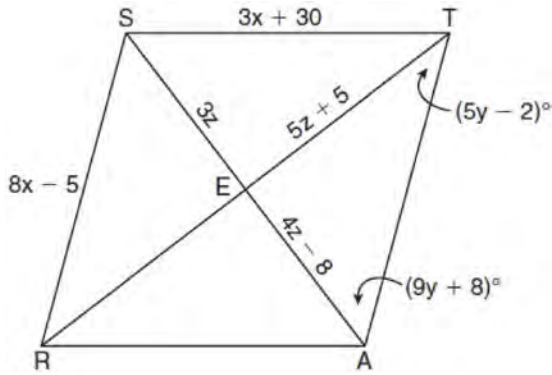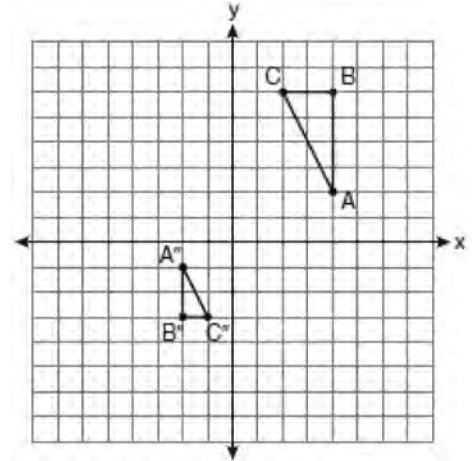

239 In the diagram below of circle *O*, chords $\overline{AB}$ and $\overline{CD}$ intersect at *E*.
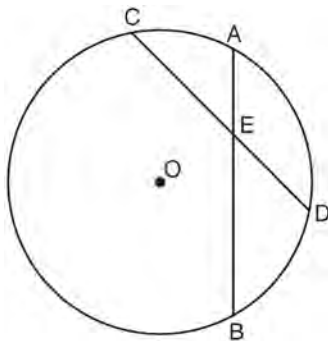
If $CE = 10$, $ED = 6$, and $AE = 4$, what is the length of $\overline{EB}$?
1) 15
2) 12
3) 6.7
4) 2.4

240 After a composition of transformations, the coordinates $A(4,2)$, $B(4,6)$, and $C(2,6)$ become $A''(-2,-1)$, $B''(-2,-3)$, and $C''(-1,-3)$, as shown on the set of axes below.

Which composition of transformations was used?
1) $R_{180°} \circ D_2$
2) $R_{90°} \circ D_2$
3) $D_{\frac{1}{2}} \circ R_{180°}$
4) $D_{\frac{1}{2}} \circ R_{90°}$

241 In the diagram below, quadrilateral *ABCD* is inscribed in circle *O*, $\overline{AB} \parallel \overline{DC}$, and diagonals $\overline{AC}$ and $\overline{BD}$ are drawn. Prove that $\triangle ACD \cong \triangle BDC$.
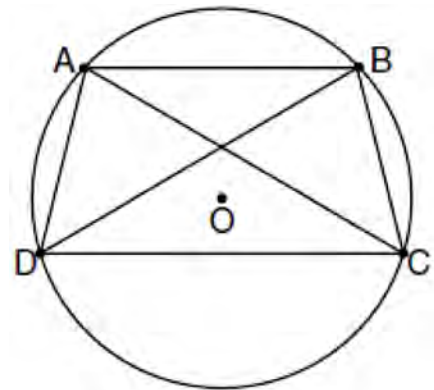
242 Write an equation of the circle whose diameter $\overline{AB}$ has endpoints $A(-4,2)$ and $B(4,-4)$. [The use of the grid below is optional.]
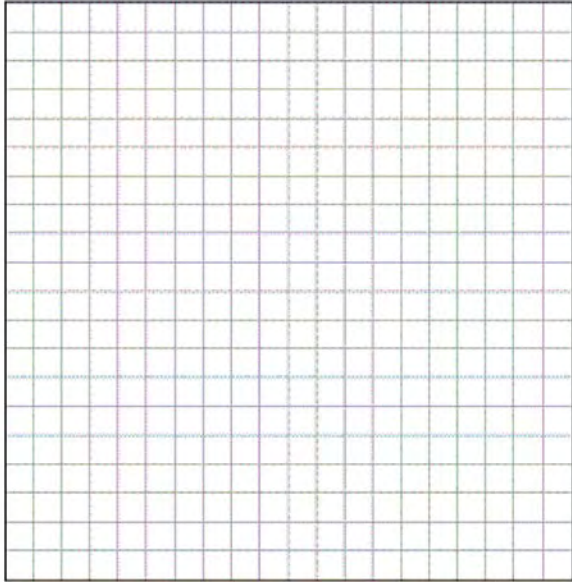
243 In the diagram below, $\triangle ABC$ is shown with $\overline{AC}$ extended through point D.
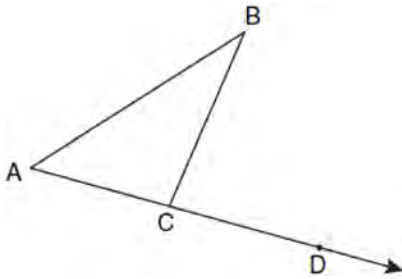
If m$\angle BCD = 6x + 2$, m$\angle BAC = 3x + 15$, and m$\angle ABC = 2x - 1$, what is the value of x?
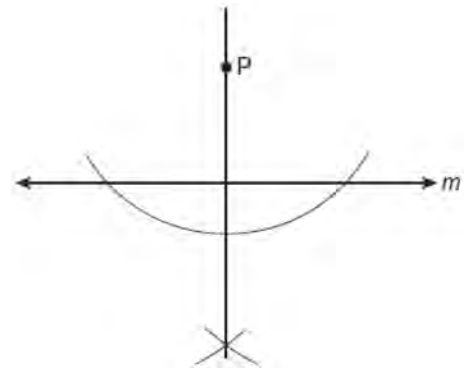1) 12
2) $14\frac{10}{11}$
3) 16
4) $18\frac{1}{9}$

244 Given the system of equations: $y = x^2 - 4x$
$$x = 4$$
The number of points of intersection is
1) 1
2) 2
3) 3
4) 0

245 The diagram below shows the construction of a line through point P perpendicular to line m.

Which statement is demonstrated by this construction?
1) If a line is parallel to a line that is perpendicular to a third line, then the line is also perpendicular to the third line.
2) The set of points equidistant from the endpoints of a line segment is the perpendicular bisector of the segment.
3) Two lines are perpendicular if they are equidistant from a given point.
4) Two lines are perpendicular if they intersect to form a vertical line.

46

246 Using a compass and straightedge, construct the angle bisector of $\angle ABC$ shown below. [Leave all construction marks.]
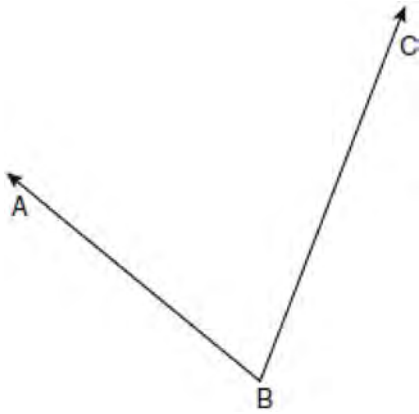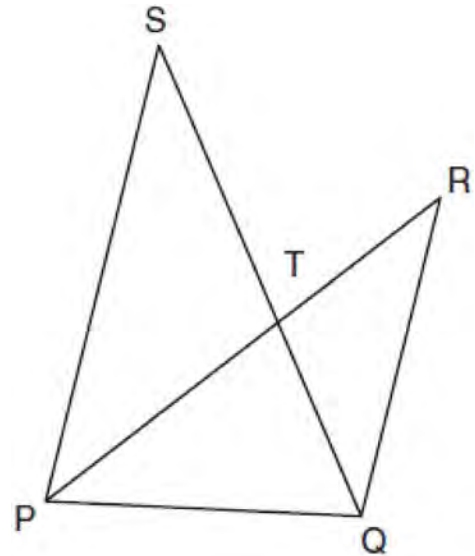
247 The diagram below shows the construction of the perpendicular bisector of $\overline{AB}$.
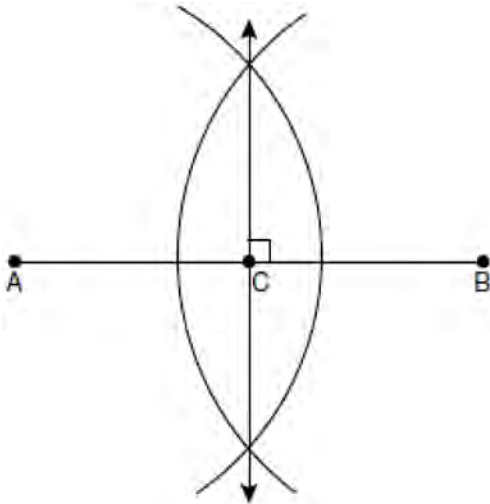
Which statement is *not* true?
1) $AC = CB$
2) $CB = \frac{1}{2} AB$
3) $AC = 2AB$
4) $AC + CB = AB$

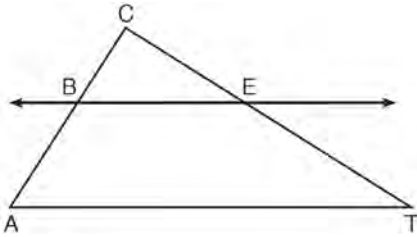248 In the diagram below, $\overline{SQ}$ and $\overline{PR}$ intersect at T, $\overline{PQ}$ is drawn, and $\overline{PS} \parallel \overline{QR}$.

What technique can be used to prove that $\triangle PST \sim \triangle RQT$?
1) SAS
2) SSS
3) ASA
4) AA

249 The vertices of $\triangle ABC$ are $A(-1,-2)$, $B(-1,2)$ and $C(6,0)$. Which conclusion can be made about the angles of $\triangle ABC$?
1) $m\angle A = m\angle B$
2) $m\angle A = m\angle C$
3) $m\angle ACB = 90$
4) $m\angle ABC = 60$

250 In the diagram below of $\triangle ACT$, $\overleftrightarrow{BE} \parallel \overline{AT}$.

If $CB = 3$, $CA = 10$, and $CE = 6$, what is the length of $\overline{ET}$?
1) 5
2) 14
3) 20
4) 26

251 On the set of axes below, Geoff drew rectangle $ABCD$. He will transform the rectangle by using the translation $(x,y) \rightarrow (x+2, y+1)$ and then will reflect the translated rectangle over the x-axis.
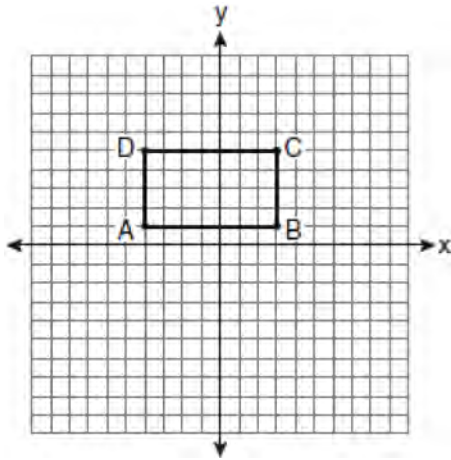
What will be the area of the rectangle after these transformations?
1) exactly 28 square units
2) less than 28 square units
3) greater than 28 square units
4) It cannot be determined from the information given.

252 What is the length, to the *nearest tenth,* of the line segment joining the points $(-4, 2)$ and $(146, 52)$?
1) 141.4
2) 150.5
3) 151.9
4) 158.1

253 In a coordinate plane, how many points are both 5 units from the origin and 2 units from the x-axis?
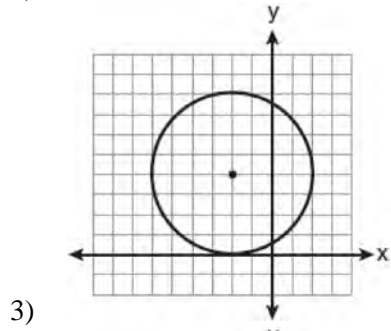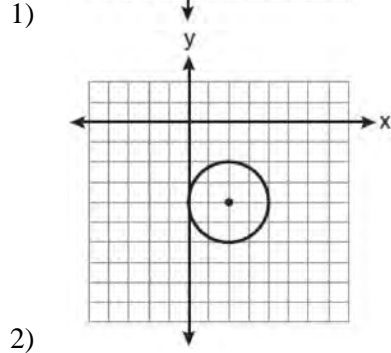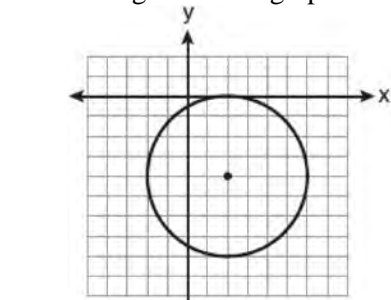1) 1
2) 2
3) 3
4) 4

254 In $\triangle ABC$, point D is on $\overline{AB}$, and point E is on $\overline{BC}$ such that $\overline{DE} \parallel \overline{AC}$. If $DB = 2$, $DA = 7$, and $DE = 3$, what is the length of $\overline{AC}$?
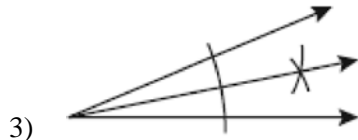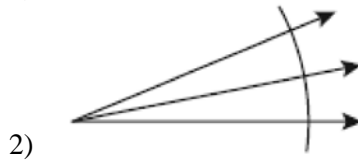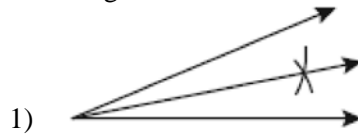1) 8
2) 9
3) 10.5
4) 13.5

255 What is the slope of a line that is perpendicular to the line whose equation is $3x + 4y = 12$?
1) $\dfrac{3}{4}$
2) $-\dfrac{3}{4}$
3) $\dfrac{4}{3}$
4) $-\dfrac{4}{3}$

256 The equation of a circle is $(x-2)^2 + (y+4)^2 = 4$. Which diagram is the graph of the circle?

1)

2)

3)

4)
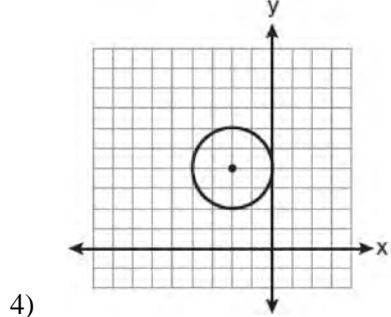
257 Which illustration shows the correct construction of an angle bisector?

1)

2)

3)

4)

258 What is the inverse of the statement "If two triangles are not similar, their corresponding angles are not congruent"?
1) If two triangles are similar, their corresponding angles are not congruent.
2) If corresponding angles of two triangles are not congruent, the triangles are not similar.
3) If two triangles are similar, their corresponding angles are congruent.
4) If corresponding angles of two triangles are congruent, the triangles are similar.

259 Which transformation of the line $x = 3$ results in an image that is perpendicular to the given line?
1) $r_{x\text{-axis}}$
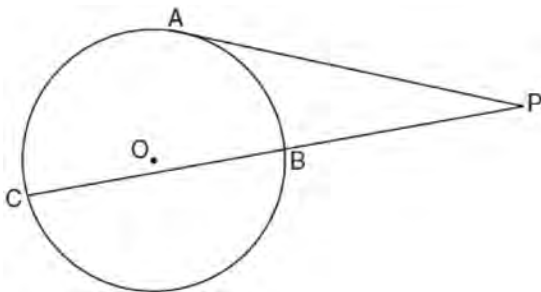2) $r_{y\text{-axis}}$
3) $r_{y=x}$
4) $r_{x=1}$

260 On the set of axes below, sketch the points that are 5 units from the origin and sketch the points that are 2 units from the line $y = 3$. Label with an **X** all points that satisfy both conditions.
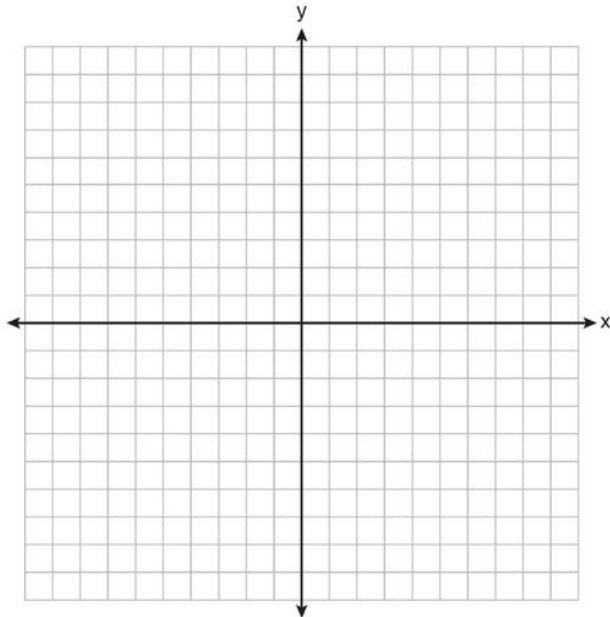
261 In the diagram below, tangent $\overline{PA}$ and secant $\overline{PBC}$ are drawn to circle O from external point P.
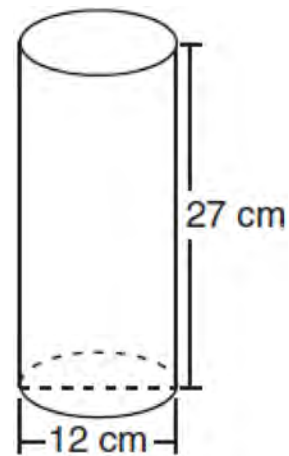

If $PB = 4$ and $BC = 5$, what is the length of $\overline{PA}$?
1) 20
2) 9
3) 8
4) 6

262 Point P is on line m. What is the total number of planes that are perpendicular to line m and pass through point P?
1) 1
2) 2
3) 0
4) infinite

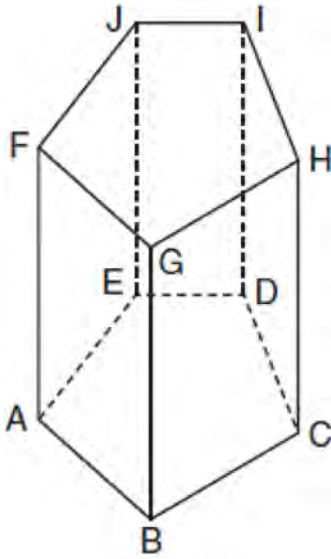263 Which expression represents the volume, in cubic centimeters, of the cylinder represented in the diagram below?

1) 162π
2) 324π
3) 972π
4) $3,888\pi$

264 Through a given point, P, on a plane, how many lines can be drawn that are perpendicular to that plane?
1) 1
2) 2
3) more than 2
4) none

265 The diagram below shows a right pentagonal prism.

Which statement is always true?
1) $\overline{BC} \parallel \overline{ED}$
2) $\overline{FG} \parallel \overline{CD}$
3) $\overline{FJ} \parallel \overline{IH}$
4) $\overline{GB} \parallel \overline{HC}$

266 Write an equation of the line that passes through the point $(6,-5)$ and is parallel to the line whose equation is $2x - 3y = 11$.

267 Which equation represents a line perpendicular to the line whose equation is $2x + 3y = 12$?
1) $6y = -4x + 12$
2) $2y = 3x + 6$
3) $2y = -3x + 6$
4) $3y = -2x + 12$

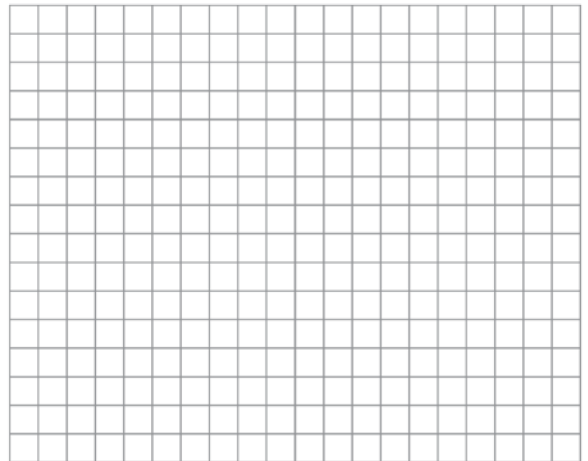268 In the diagram below, a right circular cone has a diameter of 8 inches and a height of 12 inches.
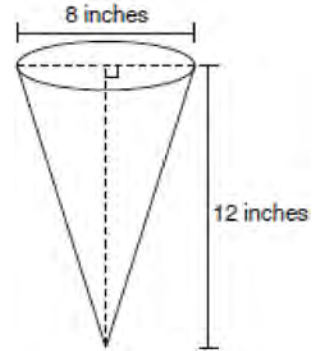
What is the volume of the cone to the *nearest cubic inch*?
1) 201
2) 481
3) 603
4) 804

269 Given: Quadrilateral $ABCD$ has vertices $A(-5,6)$, $B(6,6)$, $C(8,-3)$, and $D(-3,-3)$.
Prove: Quadrilateral $ABCD$ is a parallelogram but is neither a rhombus nor a rectangle. [The use of the grid below is optional.]

270 Given: $y = \frac{1}{4}x - 3$

$\qquad y = x^2 + 8x + 12$

In which quadrant will the graphs of the given equations intersect?
1) I
2) II
3) III
4) IV

271 A circle is represented by the equation $x^2 + (y + 3)^2 = 13$. What are the coordinates of the center of the circle and the length of the radius?
1) $(0, 3)$ and 13
2) $(0, 3)$ and $\sqrt{13}$
3) $(0, -3)$ and 13
4) $(0, -3)$ and $\sqrt{13}$

272 The volume of a cylinder is 12,566.4 cm³. The height of the cylinder is 8 cm. Find the radius of the cylinder to the *nearest tenth of a centimeter*.

273 Given: $\triangle ABC$ and $\triangle EDC$, C is the midpoint of $\overline{BD}$ and $\overline{AE}$
Prove: $\overline{AB} \parallel \overline{DE}$
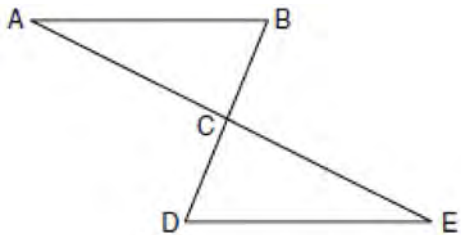
274 Which equation represents the circle whose center is $(-2, 3)$ and whose radius is 5?
1) $(x - 2)^2 + (y + 3)^2 = 5$
2) $(x + 2)^2 + (y - 3)^2 = 5$
3) $(x + 2)^2 + (y - 3)^2 = 25$
4) $(x - 2)^2 + (y + 3)^2 = 25$

275 The coordinates of the vertices of parallelogram $ABCD$ are $A(-3, 2)$, $B(-2, -1)$, $C(4, 1)$, and $D(3, 4)$. The slopes of which line segments could be calculated to show that $ABCD$ is a rectangle?
1) $\overline{AB}$ and $\overline{DC}$
2) $\overline{AB}$ and $\overline{BC}$
3) $\overline{AD}$ and $\overline{BC}$
4) $\overline{AC}$ and $\overline{BD}$

276 Which geometric principle is used to justify the construction below?
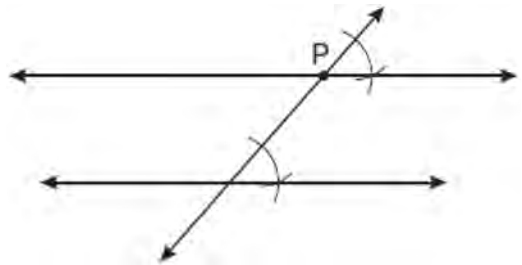
1) A line perpendicular to one of two parallel lines is perpendicular to the other.
2) Two lines are perpendicular if they intersect to form congruent adjacent angles.
3) When two lines are intersected by a transversal and alternate interior angles are congruent, the lines are parallel.
4) When two lines are intersected by a transversal and the corresponding angles are congruent, the lines are parallel.

277 In the diagram below of circle C, $\overline{QR}$ is a diameter, and $Q(1,8)$ and $C(3.5,2)$ are points on a coordinate plane. Find and state the coordinates of point R.
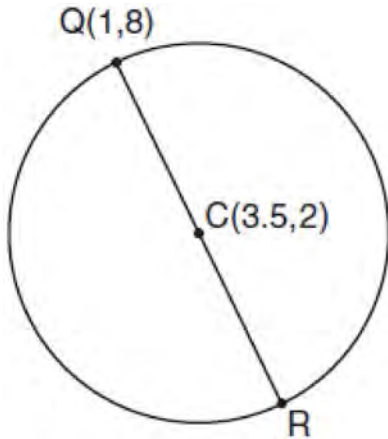

278 In the diagram of $\triangle ABC$ below, $AB = 10$, $BC = 14$, and $AC = 16$. Find the perimeter of the triangle formed by connecting the midpoints of the sides of $\triangle ABC$.
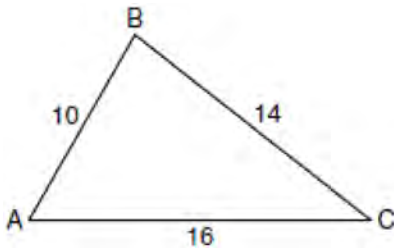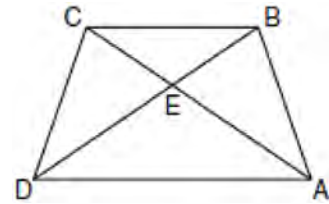

279 If a line segment has endpoints $A(3x+5,3y)$ and $B(x-1,-y)$, what are the coordinates of the midpoint of $\overline{AB}$?
1) $(x+3,2y)$
2) $(2x+2,y)$
3) $(2x+3,y)$
4) $(4x+4,2y)$

280 In the diagram below of right triangle ACB, altitude $\overline{CD}$ intersects $\overline{AB}$ at D. If $AD = 3$ and $DB = 4$, find the length of $\overline{CD}$ in simplest radical form.
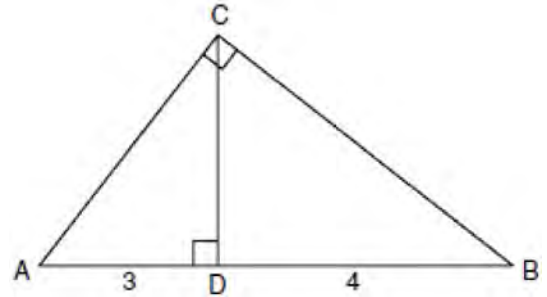

281 In the diagram of trapezoid $ABCD$ below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E and $\triangle ABC \cong \triangle DCB$.

Which statement is true based on the given information?
1) $\overline{AC} \cong \overline{BC}$
2) $\overline{CD} \cong \overline{AD}$
3) $\angle CDE \cong \angle BAD$
4) $\angle CDB \cong \angle BAC$

282 Two triangles are similar, and the ratio of each pair of corresponding sides is $2:1$. Which statement regarding the two triangles is *not* true?
1) Their areas have a ratio of $4:1$.
2) Their altitudes have a ratio of $2:1$.
3) Their perimeters have a ratio of $2:1$.
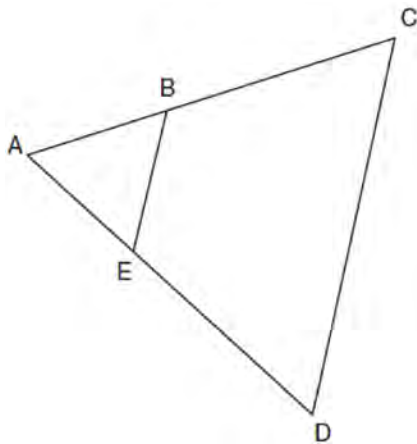4) Their corresponding angles have a ratio of $2:1$.

53

283 In the diagram below of circle O, secant $\overline{AB}$ intersects circle O at D, secant $\overline{AOC}$ intersects circle O at E, $AE = 4$, $AB = 12$, and $DB = 6$.
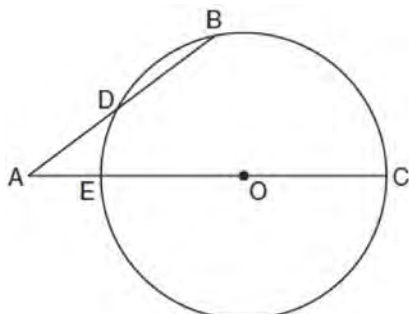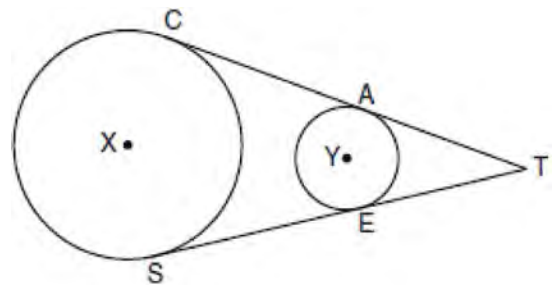

(Not drawn to scale)

What is the length of $\overline{OC}$?
1) 4.5
2) 7
3) 9
4) 14

284 In the diagram below of $\triangle ACD$, E is a point on $\overline{AD}$ and B is a point on $\overline{AC}$, such that $\overline{EB} \parallel \overline{DC}$. If $AE = 3$, $ED = 6$, and $DC = 15$, find the length of $\overline{EB}$.

285 Find an equation of the line passing through the point $(6,5)$ and perpendicular to the line whose equation is $2y + 3x = 6$.

286 In the diagram below, circles X and Y have two tangents drawn to them from external point T. The points of tangency are C, A, S, and E. The ratio of TA to AC is $1:3$. If $TS = 24$, find the length of $\overline{SE}$.

(Not drawn to scale)

287 What is the length of the line segment with endpoints $(-6,4)$ and $(2,-5)$?
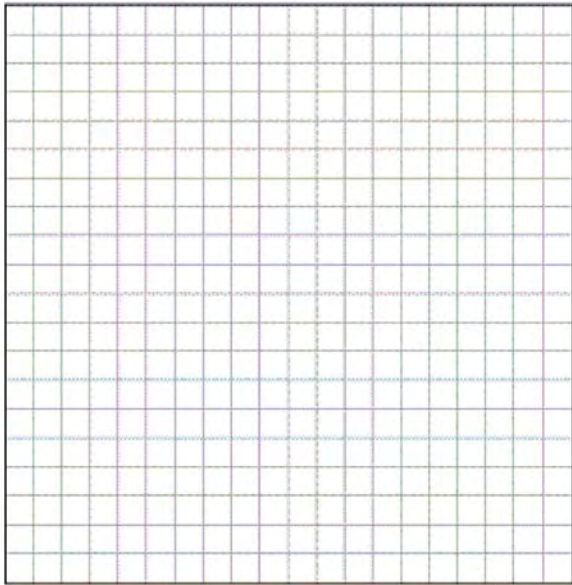1) $\sqrt{13}$
2) $\sqrt{17}$
3) $\sqrt{72}$
4) $\sqrt{145}$

288 What is the slope of a line perpendicular to the line whose equation is $2y = -6x + 8$?
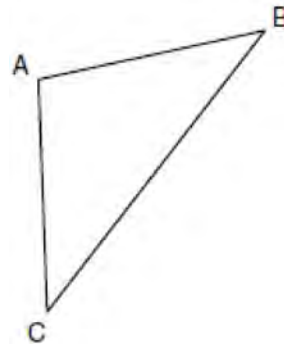1) -3
2) $\dfrac{1}{6}$
3) $\dfrac{1}{3}$
4) -6

289 The coordinates of the vertices of $\triangle ABC$ $A(1,3)$, $B(-2,2)$ and $C(0,-2)$. On the grid below, graph and label $\triangle A''B''C''$, the result of the composite transformation $D_2 \circ T_{3,-2}$. State the coordinates of A'', B'', and C''.

291 In the diagram of $\triangle ABC$ below, $\overline{AB} \cong \overline{AC}$. The measure of $\angle B$ is $40°$.

What is the measure of $\angle A$?
1) $40°$
2) $50°$
3) $70°$
4) $100°$

292 Using a compass and straightedge, and $\overline{AB}$ below, construct an equilateral triangle with all sides congruent to $\overline{AB}$. [Leave all construction marks.]

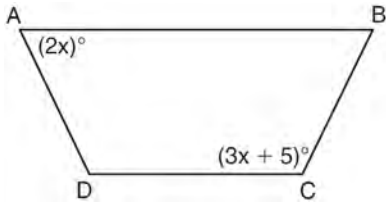290 Given $\triangle ABC \sim \triangle DEF$ such that $\dfrac{AB}{DE} = \dfrac{3}{2}$. Which statement is *not* true?

1) $\dfrac{BC}{EF} = \dfrac{3}{2}$

2) $\dfrac{m\angle A}{m\angle D} = \dfrac{3}{2}$

3) $\dfrac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF} = \dfrac{9}{4}$

4) $\dfrac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF} = \dfrac{3}{2}$

55

293 The diagram below shows isosceles trapezoid
$ABCD$ with $\overline{AB} \parallel \overline{DC}$ and $\overline{AD} \cong \overline{BC}$. If
$m\angle BAD = 2x$ and $m\angle BCD = 3x + 5$, find $m\angle BAD$.

294 Juliann plans on drawing $\triangle ABC$, where the
measure of $\angle A$ can range from 50° to 60° and the
measure of $\angle B$ can range from 90° to 100°. Given
these conditions, what is the correct range of
measures possible for $\angle C$?
1) 20° to 40°
2) 30° to 50°
3) 80° to 90°
4) 120° to 130°

295 In the diagram below of $\triangle HQP$, side $\overline{HP}$ is
extended through P to T, $m\angle QPT = 6x + 20$,
$m\angle HQP = x + 40$, and $m\angle PHQ = 4x - 5$. Find
$m\angle QPT$.
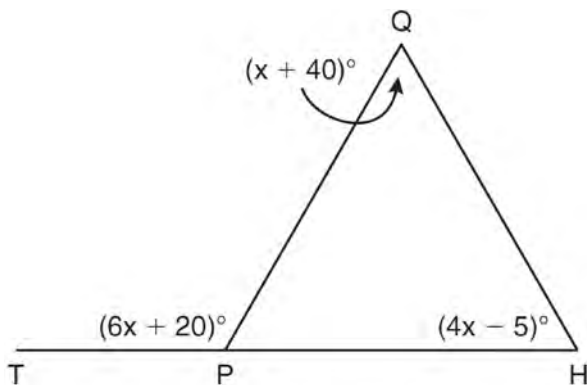
(Not drawn to scale)

296 Square $LMNO$ is shown in the diagram below.
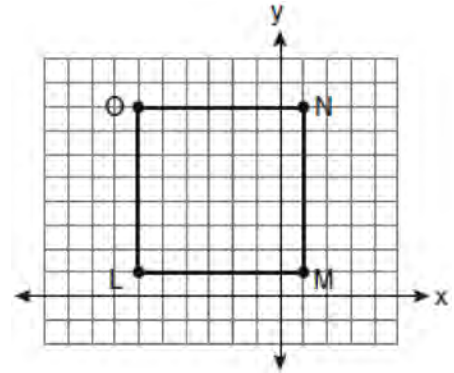
What are the coordinates of the midpoint of
diagonal $\overline{LN}$?
1) $\left(4\frac{1}{2}, -2\frac{1}{2}\right)$

2) $\left(-3\frac{1}{2}, 3\frac{1}{2}\right)$

3) $\left(-2\frac{1}{2}, 3\frac{1}{2}\right)$

4) $\left(-2\frac{1}{2}, 4\frac{1}{2}\right)$

297 What is an equation of the line that passes through
the point $(7,3)$ and is parallel to the line
$4x + 2y = 10$?
1) $y = \frac{1}{2}x - \frac{1}{2}$

2) $y = -\frac{1}{2}x + \frac{13}{2}$

3) $y = 2x - 11$

4) $y = -2x + 17$

56

298 What is the negation of the statement "Squares are parallelograms"?
1) Parallelograms are squares.
2) Parallelograms are not squares.
3) It is not the case that squares are parallelograms.
4) It is not the case that parallelograms are squares.

299 In isosceles trapezoid $ABCD$, $\overline{AB} \cong \overline{CD}$. If $BC = 20$, $AD = 36$, and $AB = 17$, what is the length of the altitude of the trapezoid?
1) 10
2) 12
3) 15
4) 16

300 In the diagram below of regular pentagon $ABCDE$, $\overline{EB}$ is drawn.
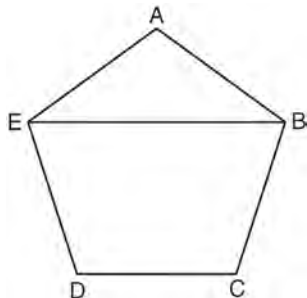
What is the measure of $\angle AEB$?
1) 36°
2) 54°
3) 72°
4) 108°

301 What is the negation of the statement "I am not going to eat ice cream"?
1) I like ice cream.
2) I am going to eat ice cream.
3) If I eat ice cream, then I like ice cream.
4) If I don't like ice cream, then I don't eat ice cream.

302 A right circular cylinder has an altitude of 11 feet and a radius of 5 feet. What is the lateral area, in square feet, of the cylinder, to the *nearest tenth*?
1) 172.7
2) 172.8
3) 345.4
4) 345.6

303 In the diagram below, car A is parked 7 miles from car B. Sketch the points that are 4 miles from car A and sketch the points that are 4 miles from car B. Label with an **X** all points that satisfy both conditions.

304 What is the image of point $A(4,2)$ after the composition of transformations defined by $R_{90°} \circ r_{y=x}$?
1) $(-4,2)$
2) $(4,-2)$
3) $(-4,-2)$
4) $(2,-4)$

305 $\triangle ABC$ is similar to $\triangle DEF$. The ratio of the length of $\overline{AB}$ to the length of $\overline{DE}$ is $3:1$. Which ratio is also equal to $3:1$?
1) $\dfrac{m\angle A}{m\angle D}$
2) $\dfrac{m\angle B}{m\angle F}$
3) $\dfrac{\text{area of } \triangle ABC}{\text{area of } \triangle DEF}$
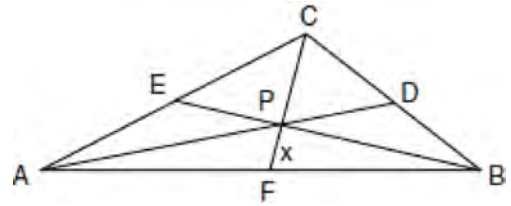4) $\dfrac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle DEF}$

306 In the diagram below of right triangle ACB, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$.
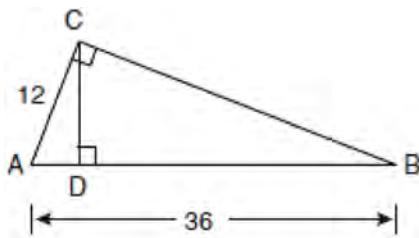
If $AB = 36$ and $AC = 12$, what is the length of $\overline{AD}$?
1) 32
2) 6
3) 3
4) 4

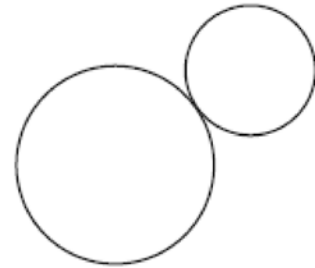307 In the diagram of $\triangle ABC$ below, Jose found centroid P by constructing the three medians. He measured $\overline{CF}$ and found it to be 6 inches.

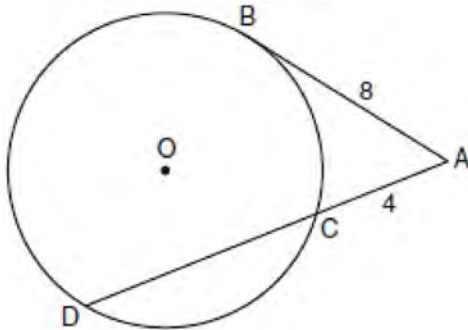If $PF = x$, which equation can be used to find x?
1) $x + x = 6$
2) $2x + x = 6$
3) $3x + 2x = 6$
4) $x + \dfrac{2}{3}x = 6$

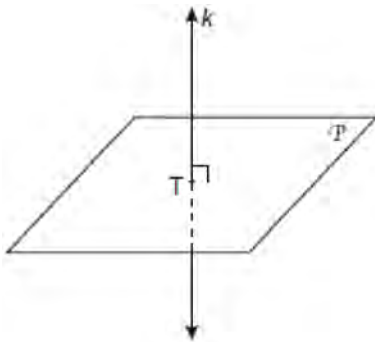308 How many common tangent lines can be drawn to the two externally tangent circles shown below?

1) 1
2) 2
3) 3
4) 4

309 In the diagram below, tangent $\overline{AB}$ and secant $\overline{ACD}$ are drawn to circle O from an external point A, $AB = 8$, and $AC = 4$.


What is the length of $\overline{CD}$?
1) 16
2) 13
3) 12
4) 10

310 In the diagram below, line k is perpendicular to plane $\mathcal{P}$ at point T.

Which statement is true?
1) Any point in plane $\mathcal{P}$ also will be on line k.
2) Only one line in plane $\mathcal{P}$ will intersect line k.
3) All planes that intersect plane $\mathcal{P}$ will pass through T.
4) Any plane containing line k is perpendicular to plane $\mathcal{P}$.

311 The vertices of $\triangle ABC$ are $A(3,2)$, $B(6,1)$, and $C(4,6)$. Identify and graph a transformation of $\triangle ABC$ such that its image, $\triangle A'B'C'$, results in $\overline{AB} \parallel \overline{A'B'}$.
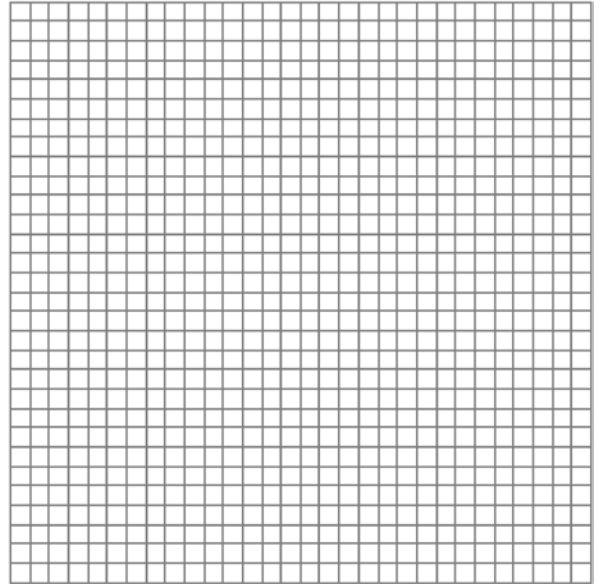
312 In the diagram below of parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$, m$\angle 1 = 45$ and m$\angle DCB = 120$.
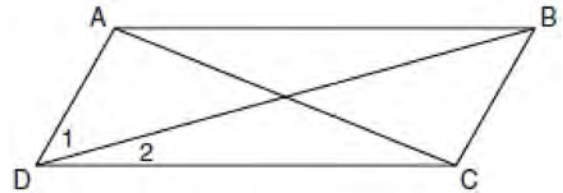
What is the measure of $\angle 2$?
1) 15°
2) 30°
3) 45°
4) 60°

59

313 In the diagram below, $\triangle RST$ is a $3-4-5$ right triangle. The altitude, h, to the hypotenuse has been drawn. Determine the length of h.
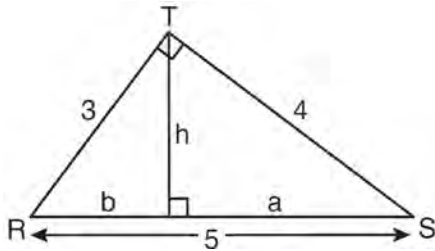

314 In $\triangle ABC$, $m\angle A = x$, $m\angle B = 2x + 2$, and $m\angle C = 3x + 4$. What is the value of x?
1) 29
2) 31
3) 59
4) 61

315 The diagonal $\overline{AC}$ is drawn in parallelogram $ABCD$. Which method can *not* be used to prove that $\triangle ABC \cong \triangle CDA$?
1) SSS
2) SAS
3) SSA
4) ASA

316 In which polygon does the sum of the measures of the interior angles equal the sum of the measures of the exterior angles?
1) triangle
2) hexagon
3) octagon
4) quadrilateral

317 Write a statement that is logically equivalent to the statement "If two sides of a triangle are congruent, the angles opposite those sides are congruent." Identify the new statement as the converse, inverse, or contrapositive of the original statement.

318 What is the negation of the statement "The Sun is shining"?
1) It is cloudy.
2) It is daytime.
3) It is not raining.
4) The Sun is not shining.

319 What is the distance between the points $(-3,2)$ and $(1,0)$?
1) $2\sqrt{2}$
2) $2\sqrt{3}$
3) $5\sqrt{2}$
4) $2\sqrt{5}$

320 What is the equation of a line that passes through the point $(-3,-11)$ and is parallel to the line whose equation is $2x - y = 4$?
1) $y = 2x + 5$
2) $y = 2x - 5$
3) $y = \dfrac{1}{2}x + \dfrac{25}{2}$
4) $y = -\dfrac{1}{2}x - \dfrac{25}{2}$

321 In the diagram below of $\triangle PRT$, Q is a point on $\overline{PR}$, S is a point on $\overline{TR}$, $\overline{QS}$ is drawn, and $\angle RPT \cong \angle RSQ$.
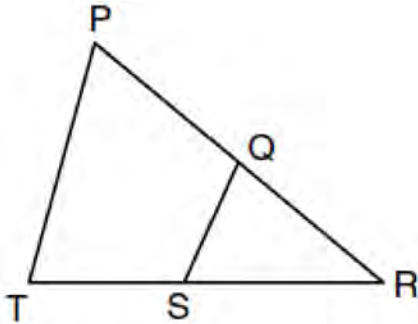
Which reason justifies the conclusion that $\triangle PRT \sim \triangle SRQ$?
1) AA
2) ASA
3) SAS
4) SSS

322 In $\triangle KLM$, $m\angle K = 36$ and $KM = 5$. The transformation D_2 is performed on $\triangle KLM$ to form $\triangle K'L'M'$. Find $m\angle K'$. Justify your answer. Find the length of $\overline{K'M'}$. Justify your answer.

323 A support beam between the floor and ceiling of a house forms a 90° angle with the floor. The builder wants to make sure that the floor and ceiling are parallel. Which angle should the support beam form with the ceiling?
1) 45°
2) 60°
3) 90°
4) 180°

324 What is the solution of the following system of equations?
$$y = (x+3)^2 - 4$$
$$y = 2x + 5$$
1) $(0,-4)$
2) $(-4,0)$
3) $(-4,-3)$ and $(0,5)$
4) $(-3,-4)$ and $(5,0)$

325 In the diagram below of circle O, chord $\overline{AB} \parallel$ chord $\overline{CD}$, and chord $\overline{CD} \parallel$ chord $\overline{EF}$.
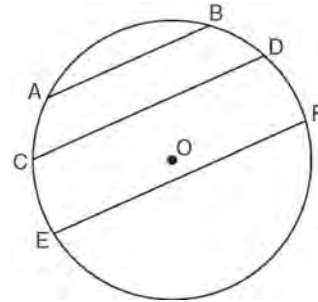
Which statement must be true?
1) $\overarc{CE} \cong \overarc{DF}$
2) $\overarc{AC} \cong \overarc{DF}$
3) $\overarc{AC} \cong \overarc{CE}$
4) $\overarc{EF} \cong \overarc{CD}$

326 Given the equations: $y = x^2 - 6x + 10$
$$y + x = 4$$
What is the solution to the given system of equations?
1) $(2,3)$
2) $(3,2)$
3) $(2,2)$ and $(1,3)$
4) $(2,2)$ and $(3,1)$

327 Isosceles trapezoid $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$. If $AC = 5x + 13$ and $BD = 11x - 5$, what is the value of x?
1) 28
2) $10\dfrac{3}{4}$
3) 3
4) $\dfrac{1}{2}$

328 The endpoints of $\overline{AB}$ are $A(3,2)$ and $B(7,1)$. If $\overline{A''B''}$ is the result of the transformation of $\overline{AB}$ under $D_2 \circ T_{-4,3}$ what are the coordinates of A'' and B''?
1) $A''(-2,10)$ and $B''(6,8)$
2) $A''(-1,5)$ and $B''(3,4)$
3) $A''(2,7)$ and $B''(10,5)$
4) $A''(14,-2)$ and $B''(22,-4)$

329 In the diagram below of circle O, chords $\overline{DF}$, $\overline{DE}$, $\overline{FG}$, and $\overline{EG}$ are drawn such that $m\overarc{DF} : m\overarc{FE} : m\overarc{EG} : m\overarc{GD} = 5:2:1:7$. Identify one pair of inscribed angles that are congruent to each other and give their measure.
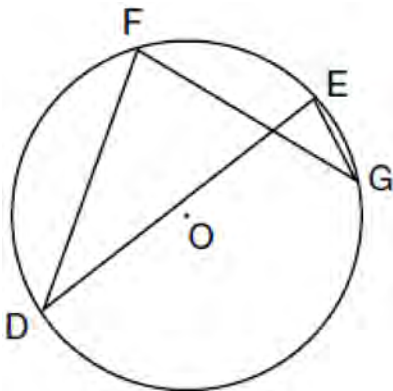
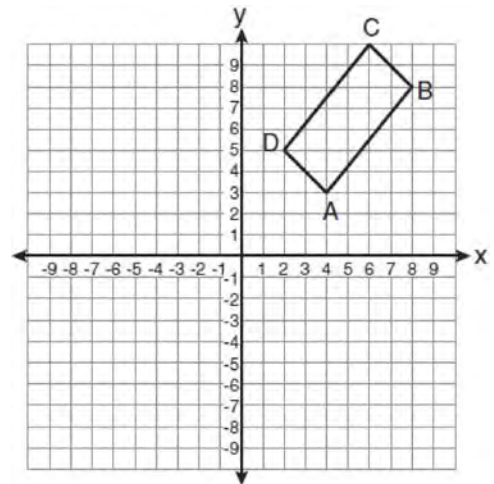330 Based on the diagram below, which statement is true?
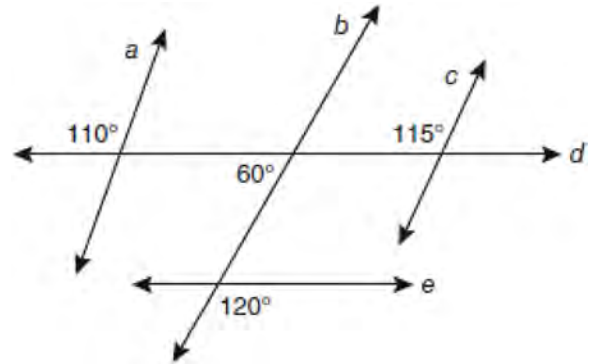
1) $a \parallel b$
2) $a \parallel c$
3) $b \parallel c$
4) $d \parallel e$

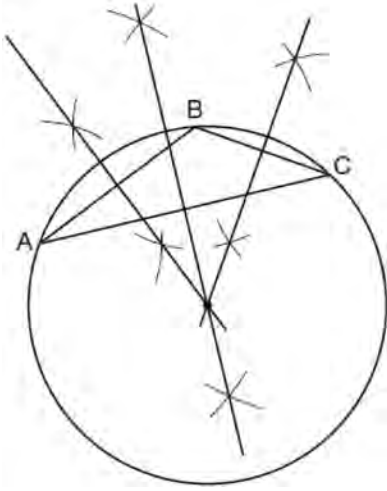331 The rectangle $ABCD$ shown in the diagram below will be reflected across the x-axis.

What will *not* be preserved?
1) slope of $\overline{AB}$
2) parallelism of $\overline{AB}$ and $\overline{CD}$
3) length of $\overline{AB}$
4) measure of $\angle A$

62

332 The diagram below shows the construction of the center of the circle circumscribed about $\triangle ABC$.

This construction represents how to find the intersection of
1) the angle bisectors of $\triangle ABC$
2) the medians to the sides of $\triangle ABC$
3) the altitudes to the sides of $\triangle ABC$
4) the perpendicular bisectors of the sides of $\triangle ABC$

333 A circle with the equation $(x + 6)^2 + (y - 7)^2 = 64$ does *not* include points in Quadrant
1) I
2) II
3) III
4) IV

334 In which triangle do the three altitudes intersect outside the triangle?
1) a right triangle
2) an acute triangle
3) an obtuse triangle
4) an equilateral triangle

335 In $\triangle RST$, m$\angle RST = 46$ and $\overline{RS} \cong \overline{ST}$. Find m$\angle STR$.

336 A transformation of a polygon that always preserves both length and orientation is
1) dilation
2) translation
3) line reflection
4) glide reflection

337 If two different lines are perpendicular to the same plane, they are
1) collinear
2) coplanar
3) congruent
4) consecutive

338 If the endpoints of $\overline{AB}$ are $A(-4,5)$ and $B(2,-5)$, what is the length of $\overline{AB}$?
1) $2\sqrt{34}$
2) 2
3) $\sqrt{61}$
4) 8

339 Tim has a rectangular prism with a length of 10 centimeters, a width of 2 centimeters, and an unknown height. He needs to build another rectangular prism with a length of 5 centimeters and the same height as the original prism. The volume of the two prisms will be the same. Find the width, in centimeters, of the new prism.
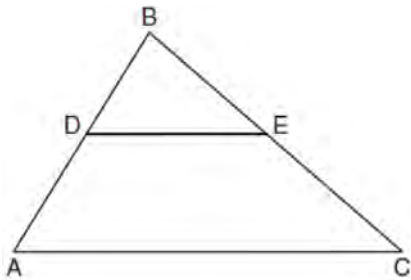
340 Which transformation produces a figure similar but not congruent to the original figure?
  1) $T_{1,3}$
  2) $D_{\frac{1}{2}}$
  3) $R_{90°}$
  4) $r_{y=x}$

341 In the diagram below of $\triangle ABC$, $\overline{DE}$ is a midsegment of $\triangle ABC$, $DE = 7$, $AB = 10$, and $BC = 13$. Find the perimeter of $\triangle ABC$.

342 The diameter of a circle has endpoints at $(-2, 3)$ and $(6, 3)$. What is an equation of the circle?
  1) $(x-2)^2 + (y-3)^2 = 16$
  2) $(x-2)^2 + (y-3)^2 = 4$
 3) $(x+2)^2 + (y+3)^2 = 16$
  4) $(x+2)^2 + (y+3)^2 = 4$

343 In plane $\mathcal{P}$, lines m and n intersect at point A. If line k is perpendicular to line m and line n at point A, then line k is
  1) contained in plane $\mathcal{P}$
  2) parallel to plane $\mathcal{P}$
  3) perpendicular to plane $\mathcal{P}$
  4) skew to plane $\mathcal{P}$

344 Towns A and B are 16 miles apart. How many points are 10 miles from town A and 12 miles from town B?
  1) 1
  2) 2
  3) 3
  4) 0

345 Given $\triangle ABC$ with base $\overline{AFEDC}$, median $\overline{BF}$, altitude $\overline{BD}$, and $\overline{BE}$ bisects $\angle ABC$, which conclusion is valid?
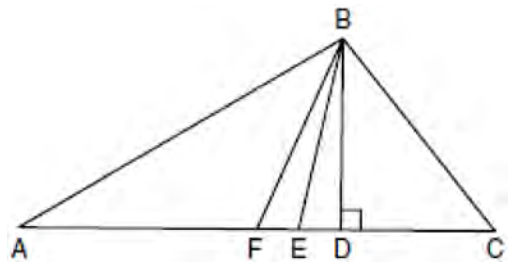
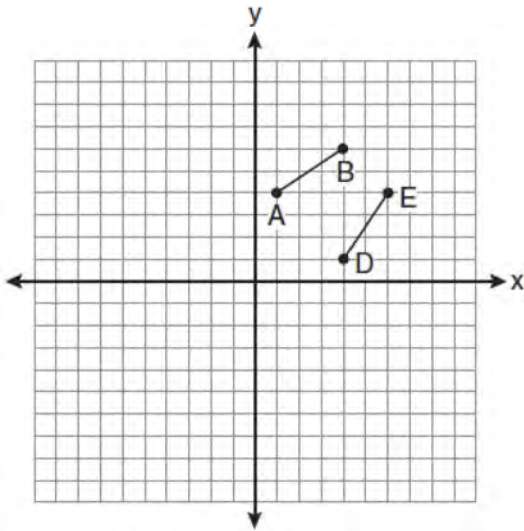 1) $\angle FAB \cong \angle ABF$
  2) $\angle ABF \cong \angle CBD$
  3) $\overline{CE} \cong \overline{EA}$
  4) $\overline{CF} \cong \overline{FA}$

346 What are the center and radius of a circle whose equation is $(x-A)^2 + (y-B)^2 = C$?
  1) center $= (A, B)$; radius $= C$
  2) center $= (-A, -B)$; radius $= C$
  3) center $= (A, B)$; radius $= \sqrt{C}$
  4) center $= (-A, -B)$; radius $= \sqrt{C}$

347 If the diagonals of a quadrilateral do *not* bisect each other, then the quadrilateral could be a
1) rectangle
2) rhombus
3) square
4) trapezoid

348 The diagram below shows $\overline{AB}$ and $\overline{DE}$.

Which transformation will move $\overline{AB}$ onto $\overline{DE}$ such that point D is the image of point A and point E is the image of point B?
1) $T_{3,-3}$
2) $D_{\frac{1}{2}}$
3) $R_{90°}$
4) $r_{y=x}$

349 In right $\triangle DEF$, $m\angle D = 90$ and $m\angle F$ is 12 degrees less than twice $m\angle E$. Find $m\angle E$.

350 The endpoints of $\overline{CD}$ are $C(-2,-4)$ and $D(6,2)$. What are the coordinates of the midpoint of $\overline{CD}$?
1) $(2,3)$
2) $(2,-1)$
3) $(4,-2)$
4) $(4,3)$

351 In the diagram below of trapezoid $RSUT$, $\overline{RS} \parallel \overline{TU}$, X is the midpoint of $\overline{RT}$, and V is the midpoint of $\overline{SU}$.
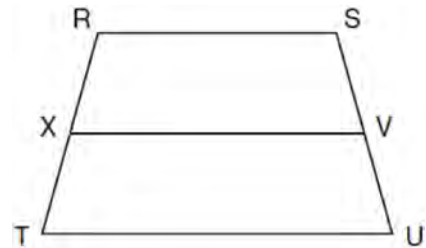
If $RS = 30$ and $XV = 44$, what is the length of $\overline{TU}$?
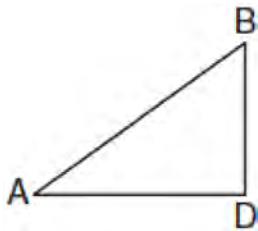1) 37
2) 58
3) 74
4) 118

352 What is the slope of a line perpendicular to the line whose equation is $5x + 3y = 8$?
1) $\dfrac{5}{3}$
2) $\dfrac{3}{5}$
3) $-\dfrac{3}{5}$
4) $-\dfrac{5}{3}$

353 In the diagram of circle O below, chord $\overline{AB}$ intersects chord $\overline{CD}$ at E, $DE = 2x + 8$, $EC = 3$, $AE = 4x - 3$, and $EB = 4$.
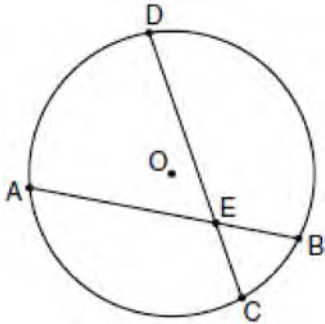

What is the value of x?
1) 1
2) 3.6
3) 5
4) 10.25

354 In the diagram below of $\triangle ADB$, m$\angle BDA = 90$, $AD = 5\sqrt{2}$, and $AB = 2\sqrt{15}$.

What is the length of $\overline{BD}$?
1) $\sqrt{10}$
2) $\sqrt{20}$
3) $\sqrt{50}$
4) $\sqrt{110}$

355 The lateral faces of a regular pyramid are composed of
1) squares
2) rectangles
3) congruent right triangles
4) congruent isosceles triangles

356 In the diagram below of circle O, chords $\overline{AE}$ and $\overline{DC}$ intersect at point B, such that m$\overset{\frown}{AC} = 36$ and m$\overset{\frown}{DE} = 20$.
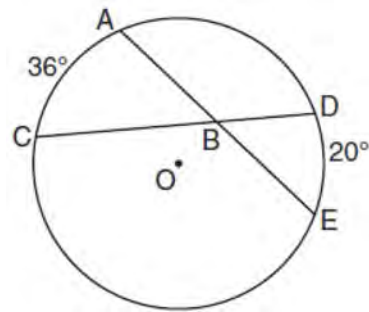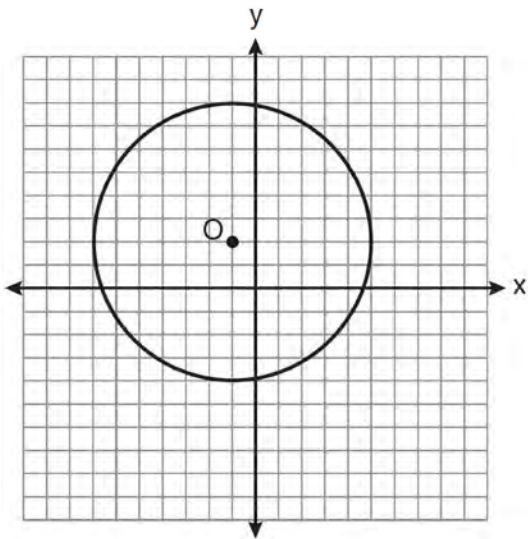

What is m$\angle ABC$?
1) 56
2) 36
3) 28
4) 8

357 Tangents $\overline{PA}$ and $\overline{PB}$ are drawn to circle O from an external point, P, and radii $\overline{OA}$ and $\overline{OB}$ are drawn. If m$\angle APB = 40$, what is the measure of $\angle AOB$?
1) 140°
2) 100°
3) 70°
4) 50°

358 Point A is located at $(4,-7)$. The point is reflected in the x-axis. Its image is located at
1) $(-4,7)$
2) $(-4,-7)$
3) $(4,7)$
4) $(7,-4)$

359 Write an equation for circle O shown on the graph below.

360 What is the equation of a line that is parallel to the line whose equation is $y = x + 2$?
1) $x + y = 5$
2) $2x + y = -2$
3) $y - x = -1$
4) $y - 2x = 3$

361 The equation of a circle is $x^2 + (y - 7)^2 = 16$. What are the center and radius of the circle?
1) center $= (0,7)$; radius $= 4$
2) center $= (0,7)$; radius $= 16$
3) center $= (0,-7)$; radius $= 4$
4) center $= (0,-7)$; radius $= 16$

362 The lines represented by the equations $y + \dfrac{1}{2}x = 4$ and $3x + 6y = 12$ are
1) the same line
2) parallel
3) perpendicular
4) neither parallel nor perpendicular

363 Point A is not contained in plane $\mathcal{B}$. How many lines can be drawn through point A that will be perpendicular to plane $\mathcal{B}$?
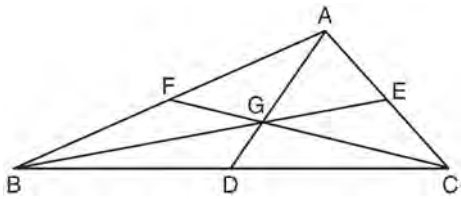1) one
2) two
3) zero
4) infinite

364 Which transformation can map the letter S onto itself?
1) glide reflection
2) translation
3) line reflection
4) rotation

365 In isosceles triangle ABC, $AB = BC$. Which statement will always be true?
1) $m\angle B = m\angle A$
2) $m\angle A > m\angle B$
3) $m\angle A = m\angle C$
4) $m\angle C < m\angle B$

366 In the diagram below of $\triangle ABC$, medians $\overline{AD}$, $\overline{BE}$, and $\overline{CF}$ intersect at G.
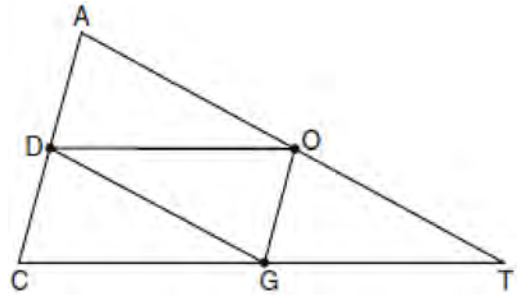

If $CF = 24$, what is the length of $\overline{FG}$?
1) 8
2) 10
3) 12
4) 16

367 A rectangular prism has a volume of $3x^2 + 18x + 24$. Its base has a length of $x + 2$ and a width of 3. Which expression represents the height of the prism?
1) $x + 4$
2) $x + 2$
3) 3
4) $x^2 + 6x + 8$

368 A right circular cone has a base with a radius of 15 cm, a vertical height of 20 cm, and a slant height of 25 cm. Find, in terms of π, the number of square centimeters in the lateral area of the cone.

369 In the diagram below of $\triangle ACT$, D is the midpoint of $\overline{AC}$, O is the midpoint of $\overline{AT}$, and G is the midpoint of $\overline{CT}$.

If $AC = 10$, $AT = 18$, and $CT = 22$, what is the perimeter of parallelogram $CDOG$?
1) 21
2) 25
3) 32
4) 40

370 In the diagram below, circle O has a radius of 5, and $CE = 2$. Diameter $\overline{AC}$ is perpendicular to chord $\overline{BD}$ at E.
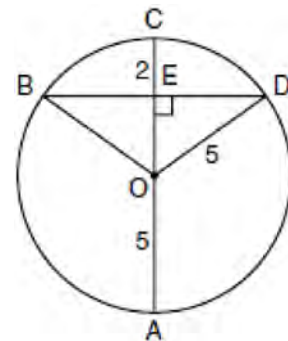
What is the length of $\overline{BD}$?
1) 12
2) 10
3) 8
4) 4

68

371 Which transformation is *not* always an isometry?
1) rotation
2) dilation
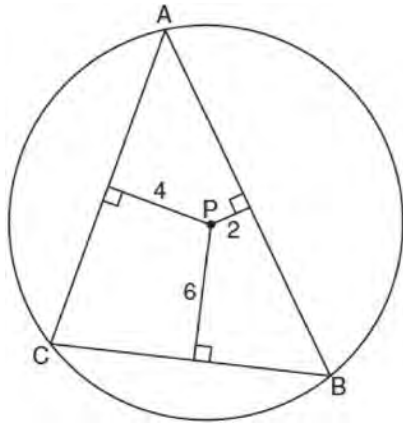3) reflection
4) translation

372 Side $\overline{PQ}$ of $\triangle PQR$ is extended through Q to point T. Which statement is *not* always true?
1) $m\angle RQT > m\angle R$
2) $m\angle RQT > m\angle P$
3) $m\angle RQT = m\angle P + m\angle R$
4) $m\angle RQT > m\angle PQR$

373 In the diagram below, $\triangle ABC$ is inscribed in circle P. The distances from the center of circle P to each side of the triangle are shown.
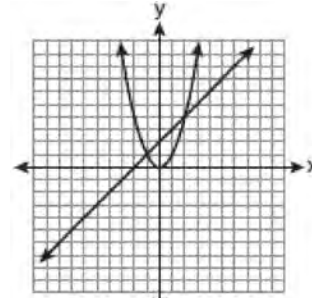

Which statement about the sides of the triangle is true?
1) $AB > AC > BC$
2) $AB < AC$ and $AC > BC$
3) $AC > AB > BC$
4) $AC = AB$ and $AB > BC$
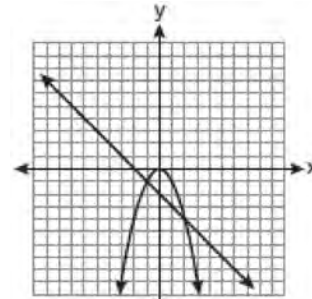
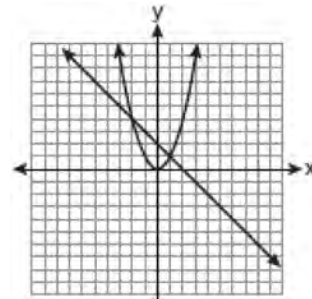374 Which graph could be used to find the solution to the following system of equations?
$$y = -x + 2$$
$$y = x^2$$

1)

2)

3)

4)

69
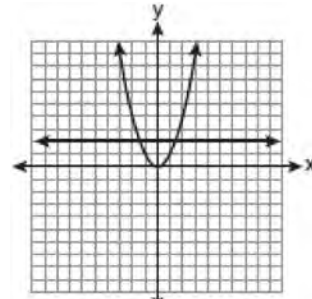
375 In an equilateral triangle, what is the difference between the sum of the exterior angles and the sum of the interior angles?
1) 180°
2) 120°
3) 90°
4) 60°

376 What is the slope of a line perpendicular to the line whose equation is $y = 3x + 4$?
1) $\dfrac{1}{3}$
2) $-\dfrac{1}{3}$
3) 3
4) −3

377 A regular pyramid with a square base is shown in the diagram below.
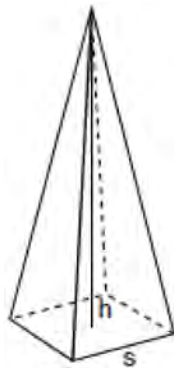
A side, s, of the base of the pyramid is 12 meters, and the height, h, is 42 meters. What is the volume of the pyramid in cubic meters?

378 In the diagram below of parallelogram $STUV$, $SV = x + 3$, $VU = 2x - 1$, and $TU = 4x - 3$.
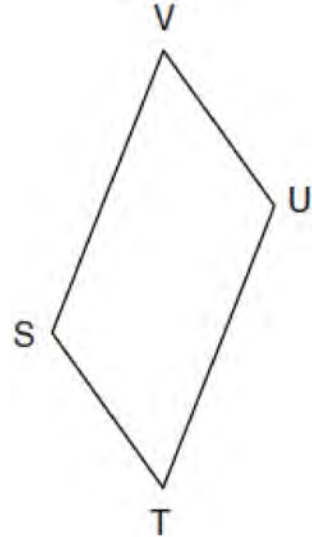
What is the length of $\overline{SV}$?
1) 5
2) 2
3) 7
4) 4

379 One step in a construction uses the endpoints of $\overline{AB}$ to create arcs with the same radii. The arcs intersect above and below the segment. What is the relationship of $\overline{AB}$ and the line connecting the points of intersection of these arcs?
1) collinear
2) congruent
3) parallel
4) perpendicular

70

380 Which set of numbers represents the lengths of the sides of a triangle?
1) {5,18,13}
2) {6,17,22}
3) {16,24,7}
4) {26,8,15}

381 In the diagram below of $\triangle ABC$ with side $\overline{AC}$ extended through D, $m\angle A = 37$ and $m\angle BCD = 117$. Which side of $\triangle ABC$ is the longest side? Justify your answer.

(Not drawn to scale)

382 In the diagram below, under which transformation will $\triangle A'B'C'$ be the image of $\triangle ABC$?
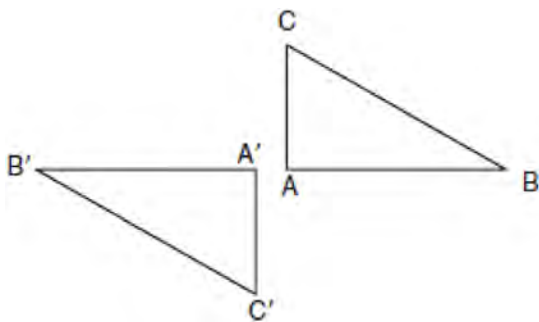
1) rotation
2) dilation
3) translation
4) glide reflection

383 A polygon is transformed according to the rule: $(x,y) \rightarrow (x+2,y)$. Every point of the polygon moves two units in which direction?
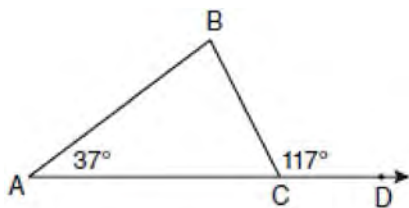1) up
2) down
3) left
4) right

384 In the diagram of $\triangle ABC$ and $\triangle EDC$ below, $\overline{AE}$ and $\overline{BD}$ intersect at C, and $\angle CAB \cong \angle CED$.
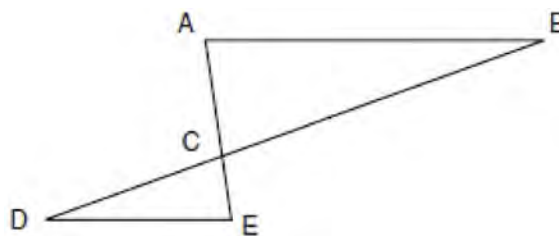
Which method can be used to show that $\triangle ABC$ must be similar to $\triangle EDC$?
1) SAS
2) AA
3) SSS
4) HL

385 What is the converse of the statement "If Bob does his homework, then George gets candy"?
1) If George gets candy, then Bob does his homework.
2) Bob does his homework if and only if George gets candy.
3) If George does not get candy, then Bob does not do his homework.
4) If Bob does not do his homework, then George does not get candy.

386 In the diagram of $\triangle ABC$ and $\triangle DEF$ below, $\overline{AB} \cong \overline{DE}$, $\angle A \cong \angle D$, and $\angle B \cong \angle E$.
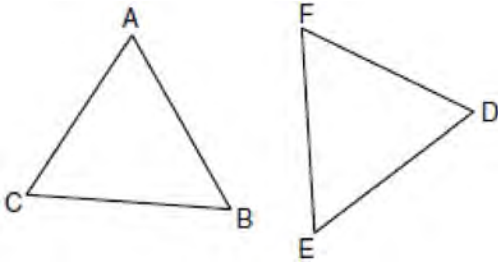
Which method can be used to prove $\triangle ABC \cong \triangle DEF$?
1) SSS
2) SAS
3) ASA
4) HL

387 Write an equation of the perpendicular bisector of the line segment whose endpoints are $(-1, 1)$ and $(7, -5)$. [The use of the grid below is optional]
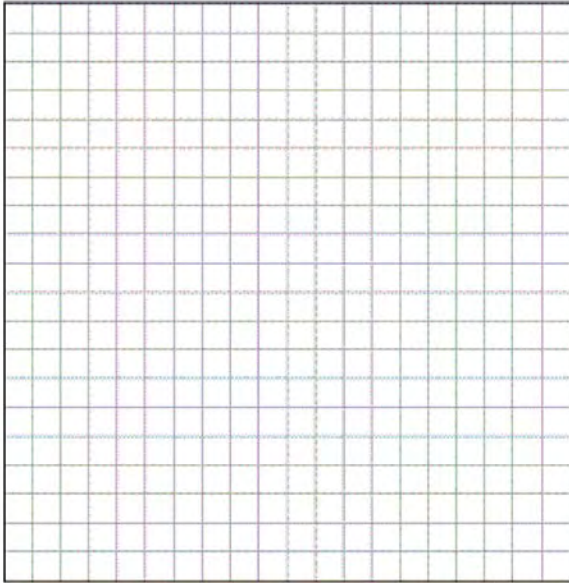
388 In the diagram below of circle C, $m\overarc{QT} = 140$, and $m\angle P = 40$.
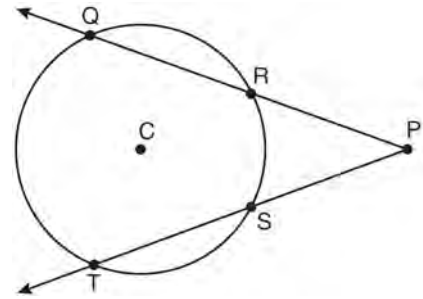
What is $m\overarc{RS}$?
1) 50
2) 60
3) 90
4) 110

389 On the grid below, graph the points that are equidistant from both the x and y axes and the points that are 5 units from the origin. Label with an **X** all points that satisfy *both* conditions.
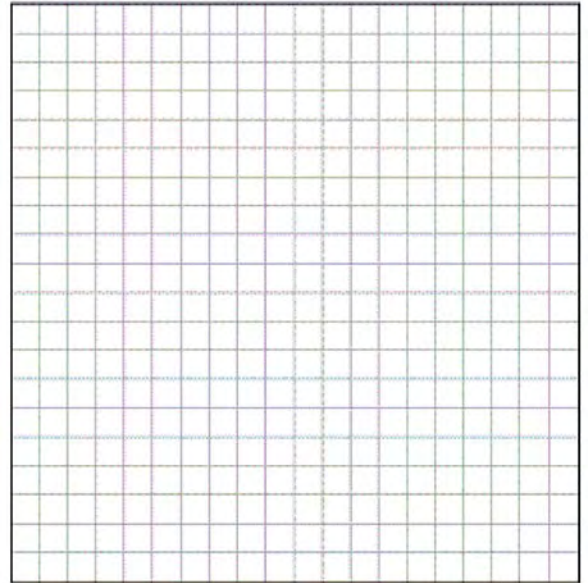
390 In $\triangle ABC$, $\overline{AB} \cong \overline{BC}$. An altitude is drawn from B to $\overline{AC}$ and intersects $\overline{AC}$ at D. Which conclusion is *not* always true?
1) $\angle ABD \cong \angle CBD$
2) $\angle BDA \cong \angle BDC$
3) $\overline{AD} \cong \overline{BD}$
4) $\overline{AD} \cong \overline{DC}$

391 Find an equation of the line passing through the point $(5,4)$ and parallel to the line whose equation is $2x + y = 3$.

392 In the diagram below, circle A and circle B are shown.
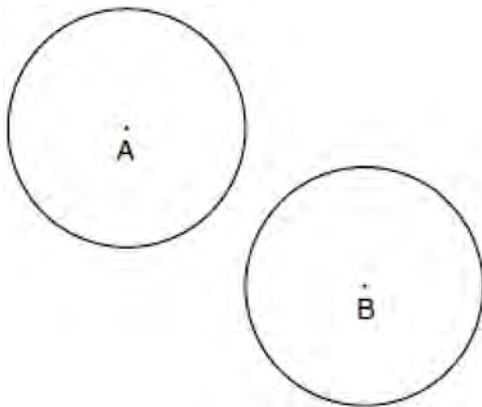
What is the total number of lines of tangency that are common to circle A and circle B?
1) 1
2) 2
3) 3
4) 4

393 Lines k_1 and k_2 intersect at point E. Line m is perpendicular to lines k_1 and k_2 at point E.
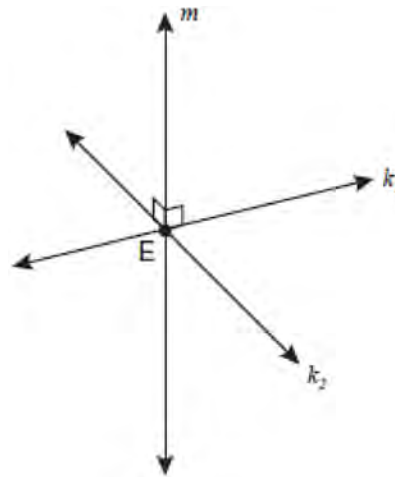
Which statement is always true?
1) Lines k_1 and k_2 are perpendicular.
2) Line m is parallel to the plane determined by lines k_1 and k_2.
3) Line m is perpendicular to the plane determined by lines k_1 and k_2.
4) Line m is coplanar with lines k_1 and k_2.

394 Given: *JKLM* is a parallelogram.
$\overline{JM} \cong \overline{LN}$
$\angle LMN \cong \angle LNM$
Prove: *JKLM* is a rhombus.
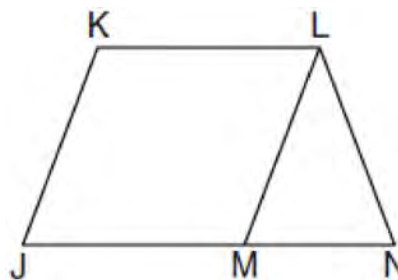
395 Triangle *ABC* has coordinates $A(-6,2)$, $B(-3,6)$, and $C(5,0)$. Find the perimeter of the triangle. Express your answer in simplest radical form. [The use of the grid below is optional.]

398 In three-dimensional space, two planes are parallel and a third plane intersects both of the parallel planes. The intersection of the planes is a
1) plane
2) point
3) pair of parallel lines
4) pair of intersecting lines

399 Which equation represents circle *K* shown in the graph below?
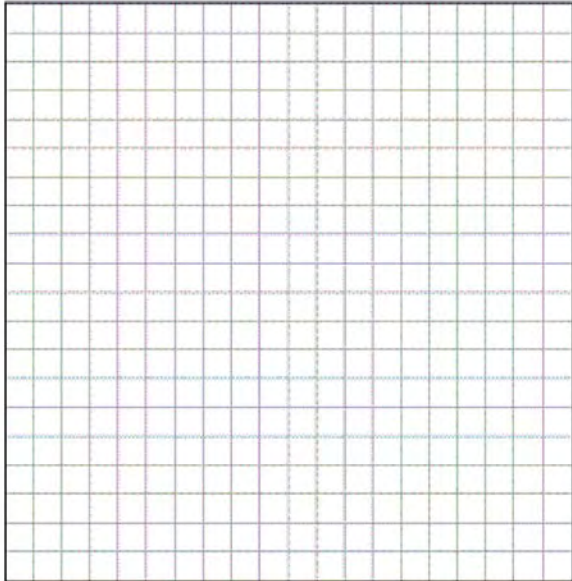
396 If $\triangle ABC \sim \triangle ZXY$, m$\angle A = 50$, and m$\angle C = 30$, what is m$\angle X$?
1) 30
2) 50
3) 80
4) 100
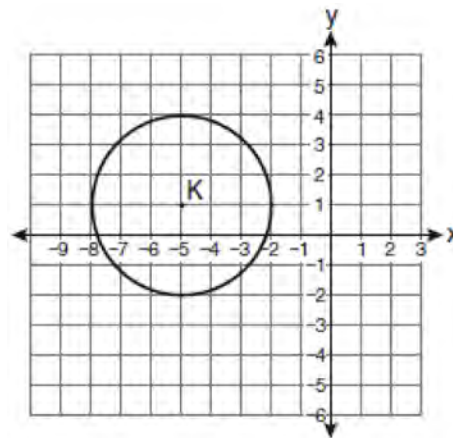
1) $(x+5)^2 + (y-1)^2 = 3$
2) $(x+5)^2 + (y-1)^2 = 9$
3) $(x-5)^2 + (y+1)^2 = 3$
4) $(x-5)^2 + (y+1)^2 = 9$

397 Which statement is logically equivalent to "If it is warm, then I go swimming"
1) If I go swimming, then it is warm.
2) If it is warm, then I do not go swimming.
3) If I do not go swimming, then it is not warm.
4) If it is not warm, then I do not go swimming.

400 If the surface area of a sphere is represented by 144π, what is the volume in terms of π?
1) 36π
2) 48π
3) 216π
4) 288π

401 Which graph represents a circle with the equation $(x-5)^2 + (y+1)^2 = 9$?

1)

2)

3)

4)
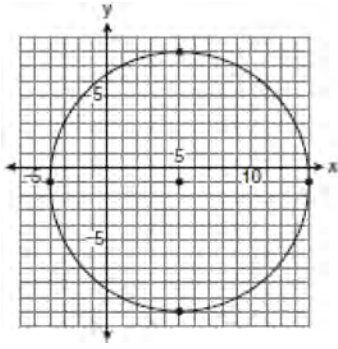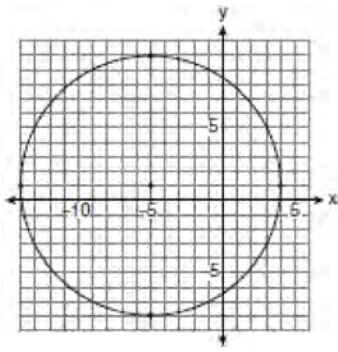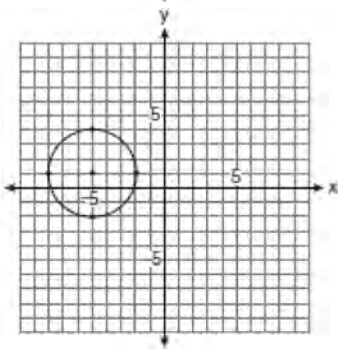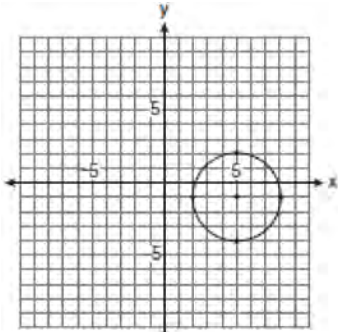
402 In the diagram below, which transformation was used to map $\triangle ABC$ to $\triangle A'B'C'$?
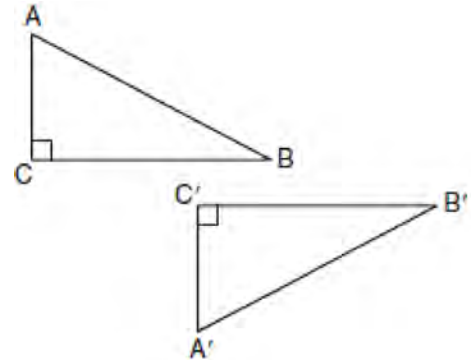
1) dilation
2) rotation
3) reflection
4) glide reflection

403 In the diagram below of $\triangle ABC$, $\overline{CD}$ is the bisector of $\angle BCA$, $\overline{AE}$ is the bisector of $\angle CAB$, and $\overline{BG}$ is drawn.
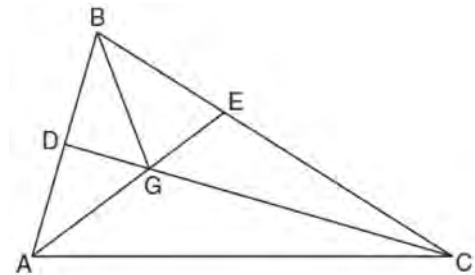
Which statement must be true?
1) $DG = EG$
2) $AG = BG$
3) $\angle AEB \cong \angle AEC$
4) $\angle DBG \cong \angle EBG$

404 In the diagram below, the length of the legs $\overline{AC}$ and $\overline{BC}$ of right triangle ABC are 6 cm and 8 cm, respectively. Altitude $\overline{CD}$ is drawn to the hypotenuse of $\triangle ABC$.
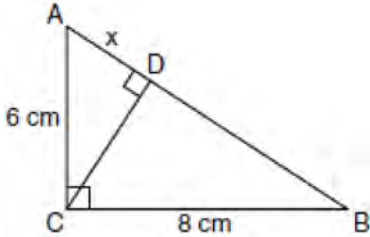
What is the length of $\overline{AD}$ to the *nearest tenth of a centimeter*?
1) 3.6
2) 6.0
3) 6.4
4) 4.0

405 The figure in the diagram below is a triangular prism.
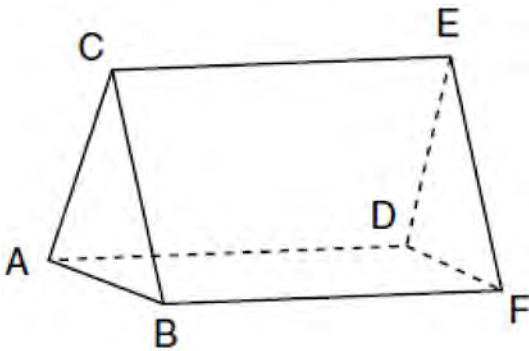
Which statement must be true?
1) $\overline{DE} \cong \overline{AB}$
2) $\overline{AD} \cong \overline{BC}$
3) $\overline{AD} \parallel \overline{CE}$
4) $\overline{DE} \parallel \overline{BC}$

406 Given: Quadrilateral $ABCD$ with $\overline{AB} \cong \overline{CD}$, $\overline{AD} \cong \overline{BC}$, and diagonal $\overline{BD}$ is drawn
Prove: $\angle BDC \cong \angle ABD$

407 In the diagram below of $\triangle TEM$, medians $\overline{TB}$, $\overline{EC}$, and $\overline{MA}$ intersect at D, and $TB = 9$. Find the length of $\overline{TD}$.
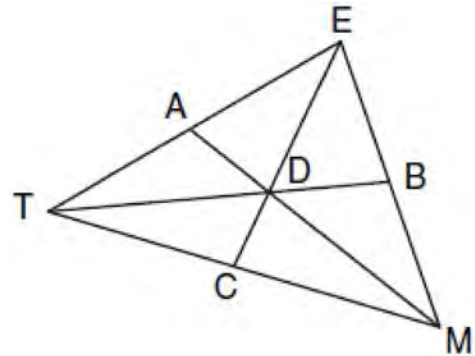
408 The diagram below illustrates the construction of $\overleftrightarrow{PS}$ parallel to $\overleftrightarrow{RQ}$ through point P.
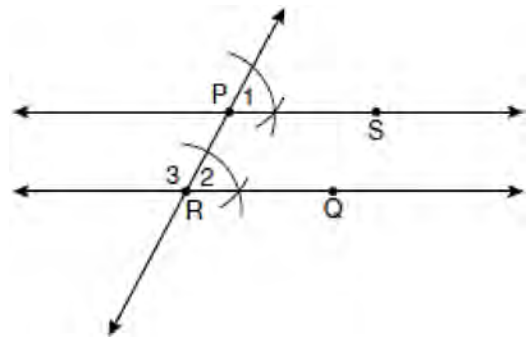
Which statement justifies this construction?
1) $m\angle 1 = m\angle 2$
2) $m\angle 1 = m\angle 3$
3) $\overline{PR} \cong \overline{RQ}$
4) $\overline{PS} \cong \overline{RQ}$

409 Two lines are represented by the equations
$-\frac{1}{2}y = 6x + 10$ and $y = mx$. For which value of m
will the lines be parallel?
1) −12
2) −3
3) 3
4) 12

410 Given: Quadrilateral $ABCD$, diagonal $\overline{AFEC}$,
$\overline{AE} \cong \overline{FC}$, $\overline{BF} \perp \overline{AC}$, $\overline{DE} \perp \overline{AC}$, $\angle 1 \cong \angle 2$
Prove: $ABCD$ is a parallelogram.
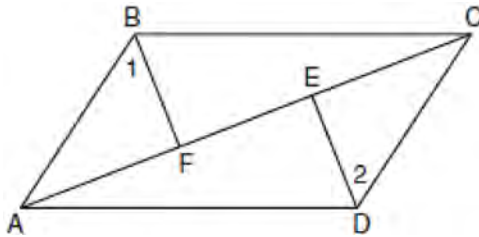
411 The diagram below shows a pennant in the shape of
an isosceles triangle. The equal sides each measure
13, the altitude is $x + 7$, and the base is $2x$.
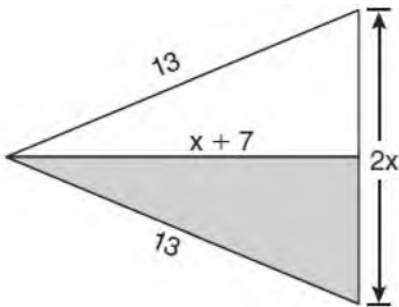
What is the length of the base?
1) 5
2) 10
3) 12
4) 24

412 The degree measures of the angles of $\triangle ABC$ are
represented by x, $3x$, and $5x - 54$. Find the value of
x.

413 Based on the construction below, which statement
must be true?
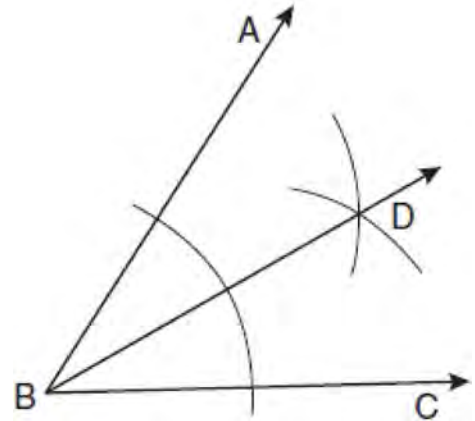
1) $m\angle ABD = \frac{1}{2}m\angle CBD$
2) $m\angle ABD = m\angle CBD$
3) $m\angle ABD = m\angle ABC$
4) $m\angle CBD = \frac{1}{2}m\angle ABD$

414 In $\triangle PQR$, $PQ = 8$, $QR = 12$, and $RP = 13$. Which
statement about the angles of $\triangle PQR$ must be true?
1) $m\angle Q > m\angle P > m\angle R$
2) $m\angle Q > m\angle R > m\angle P$
3) $m\angle R > m\angle P > m\angle Q$
4) $m\angle P > m\angle R > m\angle Q$

415 The endpoints of $\overline{PQ}$ are $P(-3, 1)$ and $Q(4, 25)$.
Find the length of $\overline{PQ}$.

416 The length of $\overline{AB}$ is 3 inches. On the diagram below, sketch the points that are equidistant from A and B and sketch the points that are 2 inches from A. Label with an **X** all points that satisfy both conditions.

A •————————————————• B

417 Using a compass and straightedge, construct the bisector of the angle shown below. [*Leave all construction marks*.]
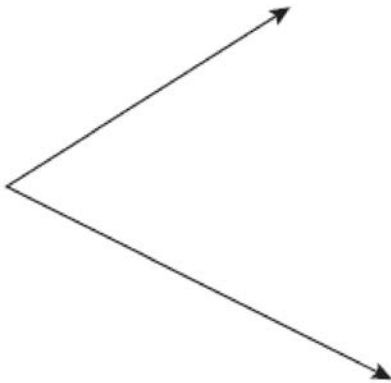
419 In the diagram below of quadrilateral $ABCD$ with diagonal $\overline{BD}$, m$\angle A = 93$, m$\angle ADB = 43$, m$\angle C = 3x + 5$, m$\angle BDC = x + 19$, and m$\angle DBC = 2x + 6$. Determine if $\overline{AB}$ is parallel to $\overline{DC}$. Explain your reasoning.
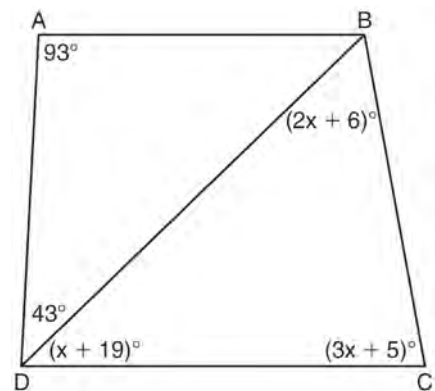
418 Given: Two is an even integer or three is an even integer.
Determine the truth value of this disjunction.
Justify your answer.

420 In the diagram below of circle O, chords $\overline{AD}$ and $\overline{BC}$ intersect at E, $m\widehat{AC} = 87$, and $m\widehat{BD} = 35$.
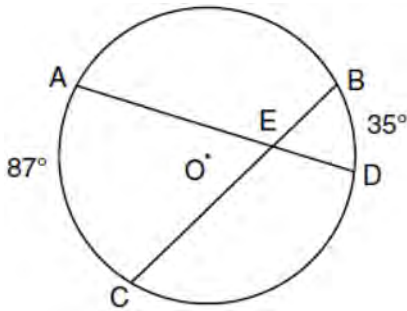
What is the degree measure of $\angle CEA$?
1) 87
2) 61
3) 43.5
4) 26

421 In the diagram below, $\triangle ABC \cong \triangle XYZ$.
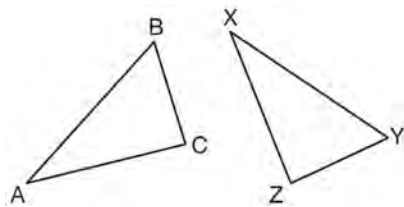
Which two statements identify corresponding congruent parts for these triangles?
1) $\overline{AB} \cong \overline{XY}$ and $\angle C \cong \angle Y$
2) $\overline{AB} \cong \overline{YZ}$ and $\angle C \cong \angle X$
3) $\overline{BC} \cong \overline{XY}$ and $\angle A \cong \angle Y$
4) $\overline{BC} \cong \overline{YZ}$ and $\angle A \cong \angle X$

422 A quadrilateral whose diagonals bisect each other and are perpendicular is a
1) rhombus
2) rectangle
3) trapezoid
4) parallelogram

423 Triangle DEG has the coordinates $D(1,1)$, $E(5,1)$, and $G(5,4)$. Triangle DEG is rotated 90° about the origin to form $\triangle D'E'G'$. On the grid below, graph and label $\triangle DEG$ and $\triangle D'E'G'$. State the coordinates of the vertices D', E', and G'. Justify that this transformation preserves distance.
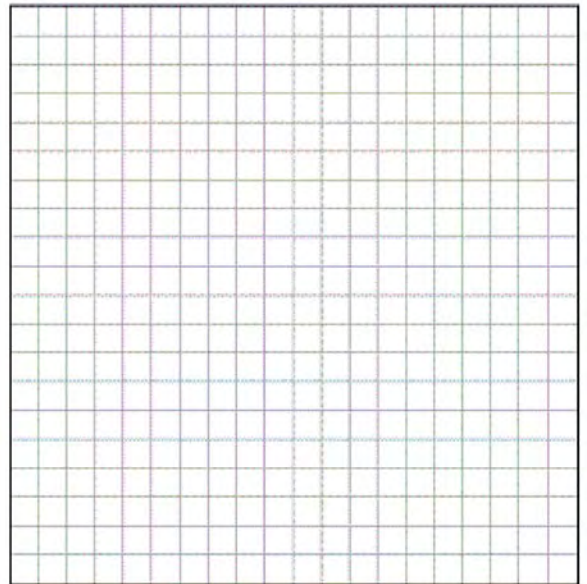
424 The base of a pyramid is a rectangle with a width of 6 cm and a length of 8 cm. Find, in centimeters, the height of the pyramid if the volume is 288 cm^3.

425 In the diagram below of isosceles trapezoid $DEFG$, $\overline{DE} \parallel \overline{GF}$, $DE = 4x - 2$, $EF = 3x + 2$, $FG = 5x - 3$, and $GD = 2x + 5$. Find the value of x.
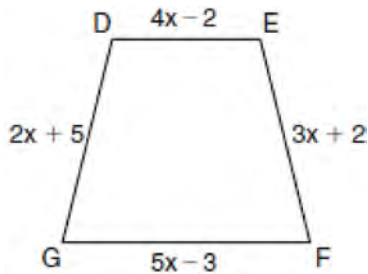
426 In the diagram below, the vertices of $\triangle DEF$ are the midpoints of the sides of equilateral triangle ABC, and the perimeter of $\triangle ABC$ is 36 cm.
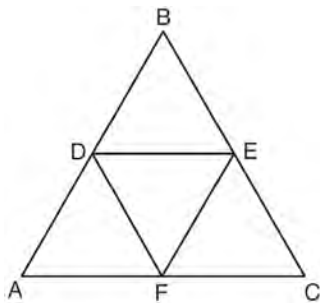
What is the length, in centimeters, of $\overline{EF}$?
1) 6
2) 12
3) 18
4) 4

427 The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are
1) parallel
2) perpendicular
3) the same line
4) neither parallel nor perpendicular

428 Lines j and k intersect at point P. Line m is drawn so that it is perpendicular to lines j and k at point P. Which statement is correct?
1) Lines j and k are in perpendicular planes.
2) Line m is in the same plane as lines j and k.
3) Line m is parallel to the plane containing lines j and k.
4) Line m is perpendicular to the plane containing lines j and k.

429 Triangle XYZ, shown in the diagram below, is reflected over the line $x = 2$. State the coordinates of $\triangle X'Y'Z'$, the image of $\triangle XYZ$.
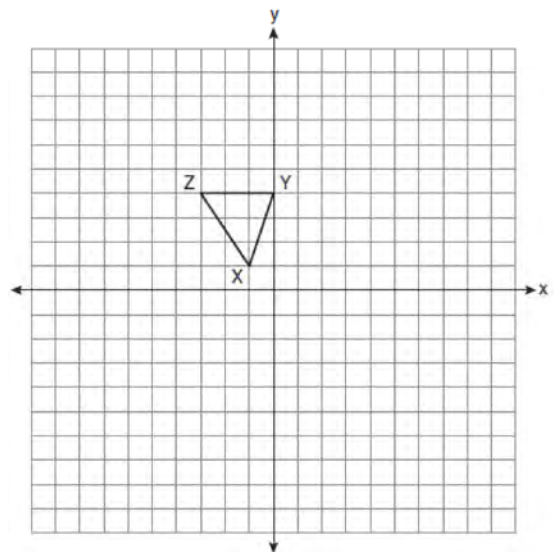
430 In $\triangle ABC$, $AB = 7$, $BC = 8$, and $AC = 9$. Which list has the angles of $\triangle ABC$ in order from smallest to largest?
1) $\angle A, \angle B, \angle C$
2) $\angle B, \angle A, \angle C$
3) $\angle C, \angle B, \angle A$
4) $\angle C, \angle A, \angle B$

431 On the line segment below, use a compass and straightedge to construct equilateral triangle ABC. [Leave all construction marks.]

A •———————————————————————• B

432 In the diagram below, $\triangle ABC \sim \triangle EFG$, $m\angle C = 4x + 30$, and $m\angle G = 5x + 10$. Determine the value of x.
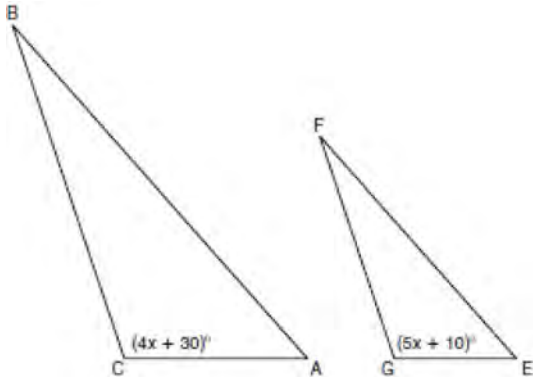
433 What is an equation of the line that contains the point $(3, -1)$ and is perpendicular to the line whose equation is $y = -3x + 2$?

1) $y = -3x + 8$

2) $y = -3x$

3) $y = \dfrac{1}{3}x$

4) $y = \dfrac{1}{3}x - 2$

434 On the set of axes below, graph and label $\triangle DEF$ with vertices at $D(-4, -4)$, $E(-2, 2)$, and $F(8, -2)$. If G is the midpoint of $\overline{EF}$ and H is the midpoint of $\overline{DF}$, state the coordinates of G and H and label each point on your graph. Explain why $\overline{GH} \parallel \overline{DE}$.

81
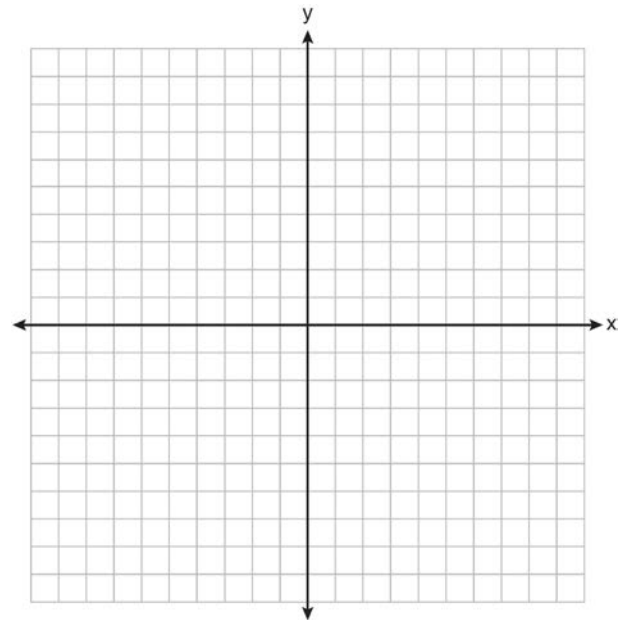
435 Line segment *AB* is tangent to circle *O* at *A*. Which type of triangle is always formed when points *A*, *B*, and *O* are connected?
1) right
2) obtuse
3) scalene
4) isosceles

436 A transversal intersects two lines. Which condition would always make the two lines parallel?
1) Vertical angles are congruent.
2) Alternate interior angles are congruent.
3) Corresponding angles are supplementary.
4) Same-side interior angles are complementary.

437 Line *k* is drawn so that it is perpendicular to two distinct planes, *P* and *R*. What must be true about planes *P* and *R*?
1) Planes *P* and *R* are skew.
2) Planes *P* and *R* are parallel.
3) Planes *P* and *R* are perpendicular.
4) Plane *P* intersects plane *R* but is not perpendicular to plane *R*.

438 Which equation represents a line parallel to the line whose equation is $2y - 5x = 10$?
1) $5y - 2x = 25$
2) $5y + 2x = 10$
3) $4y - 10x = 12$
4) $2y + 10x = 8$

439 In the diagram below of $\triangle AGE$ and $\triangle OLD$, $\angle GAE \cong \angle LOD$, and $\overline{AE} \cong \overline{OD}$.
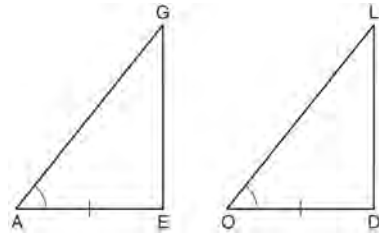
To prove that $\triangle AGE$ and $\triangle OLD$ are congruent by SAS, what other information is needed?
1) $\overline{GE} \cong \overline{LD}$
2) $\overline{AG} \cong \overline{OL}$
3) $\angle AGE \cong \angle OLD$
4) $\angle AEG \cong \angle ODL$

440 Two lines, $\overleftrightarrow{AB}$ and $\overleftrightarrow{CRD}$, are parallel and 10 inches apart. Sketch the locus of all points that are equidistant from $\overleftrightarrow{AB}$ and $\overleftrightarrow{CRD}$ and 7 inches from point *R*. Label with an **X** each point that satisfies both conditions.

82
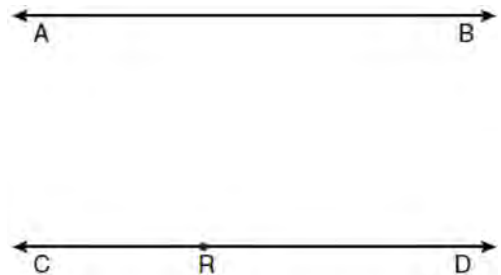
441 In the diagram of circle O below, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overarc{AC} = 30$.
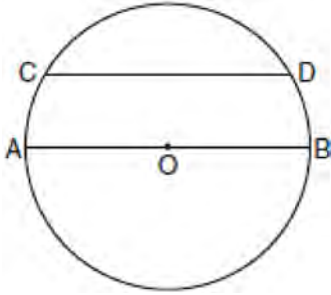
What is $m\overarc{CD}$?
1) 150
2) 120
3) 100
4) 60

442 What is an equation for the circle shown in the graph below?
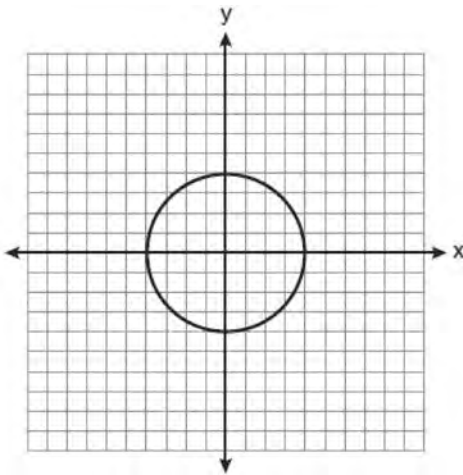
1) $x^2 + y^2 = 2$
2) $x^2 + y^2 = 4$
3) $x^2 + y^2 = 8$
4) $x^2 + y^2 = 16$

443 Which diagram shows the construction of an equilateral triangle?

1)

2)

3)

4)
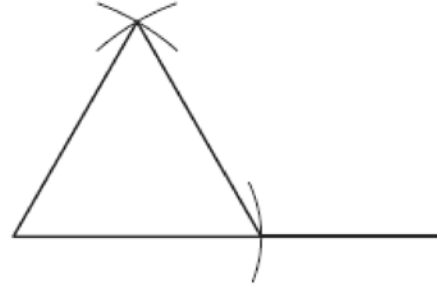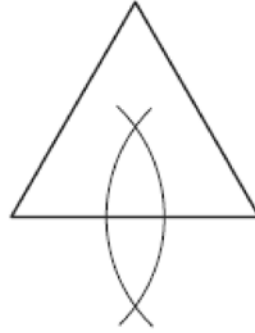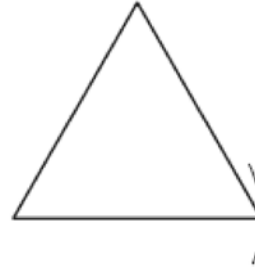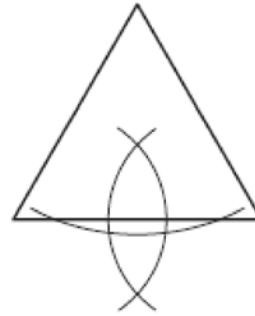
444 On the set of axes below, solve the following system of equations graphically for all values of x and y.

$$y = (x - 2)^2 + 4$$

$$4x + 2y = 14$$
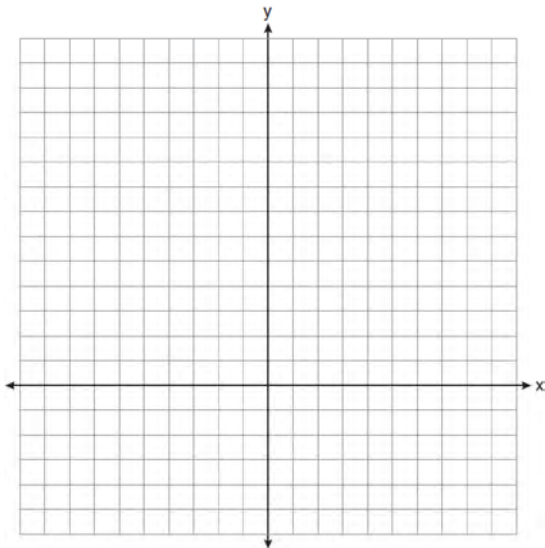
445 Using a compass and straightedge, construct a line that passes through point P and is perpendicular to line m. [Leave all construction marks.]

446 What is an equation of the line that passes through the point $(-2, 5)$ and is perpendicular to the line whose equation is $y = \frac{1}{2}x + 5$?

1) $y = 2x + 1$
2) $y = -2x + 1$
3) $y = 2x + 9$
4) $y = -2x - 9$

447 Triangle ABC has vertices $A(1, 3)$, $B(0, 1)$, and $C(4, 0)$. Under a translation, A', the image point of A, is located at $(4, 4)$. Under this same translation, point C' is located at

1) $(7, 1)$
2) $(5, 3)$
3) $(3, 2)$
4) $(1, -1)$

448 In the diagram of circle O below, chords $\overline{AB}$ and $\overline{CD}$ are parallel, and $\overline{BD}$ is a diameter of the circle.
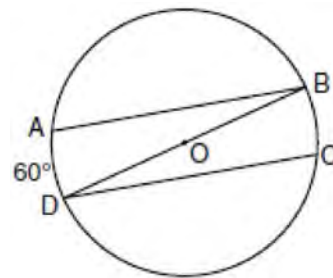
If $m\overset{\frown}{AD} = 60$, what is $m\angle CDB$?

1) 20
2) 30
3) 60
4) 120

449 The coordinates of the vertices of parallelogram
     $ABCD$ are $A(-2,2)$, $B(3,5)$, $C(4,2)$, and $D(-1,-1)$.
     State the coordinates of the vertices of
     parallelogram $A''B''C''D''$ that result from the
     transformation $r_{y-\text{axis}} \circ T_{2,-3}$. [The use of the set of
     axes below is optional.]
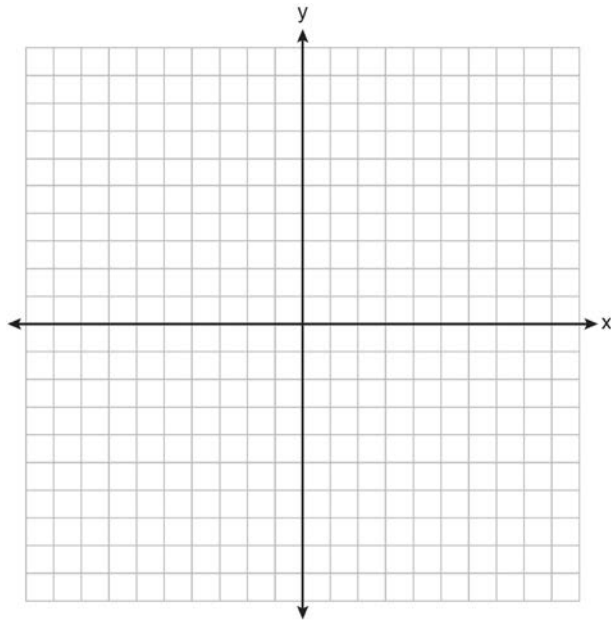
450 Line segment AB has endpoints $A(2,-3)$ and
     $B(-4,6)$. What are the coordinates of the midpoint
     of $\overline{AB}$?
     1) $(-2,3)$
     2) $\left(-1,1\dfrac{1}{2}\right)$
     3) $(-1,3)$
     4) $\left(3,4\dfrac{1}{2}\right)$

451 What are the center and the radius of the circle
     whose equation is $(x-3)^2 + (y+3)^2 = 36$
     1) center $= (3,-3)$; radius $= 6$
     2) center $= (-3,3)$; radius $= 6$
     3) center $= (3,-3)$; radius $= 36$
     4) center $= (-3,3)$; radius $= 36$

452 Which geometric principle is used in the
     construction shown below?
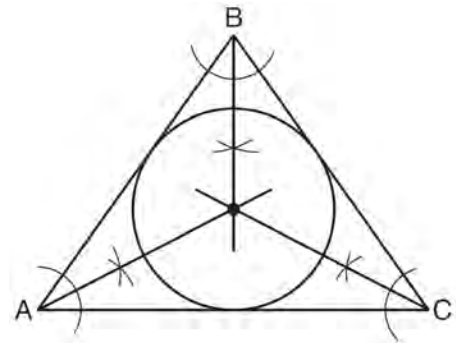
     1) The intersection of the angle bisectors of a
         triangle is the center of the inscribed circle.
     2) The intersection of the angle bisectors of a
         triangle is the center of the circumscribed
         circle.
     3) The intersection of the perpendicular bisectors
         of the sides of a triangle is the center of the
         inscribed circle.
     4) The intersection of the perpendicular bisectors
         of the sides of a triangle is the center of the
         circumscribed circle.

453 In the diagram below of circle O, chords $\overline{AD}$ and $\overline{BC}$ intersect at E.
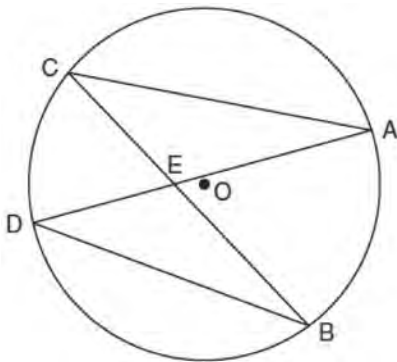
Which relationship must be true?
1) $\triangle CAE \cong \triangle DBE$
2) $\triangle AEC \sim \triangle BED$
3) $\angle ACB \cong \angle CBD$
4) $\overset{\frown}{CA} \cong \overset{\frown}{DB}$

454 The diagram below shows the construction of the bisector of $\angle ABC$.
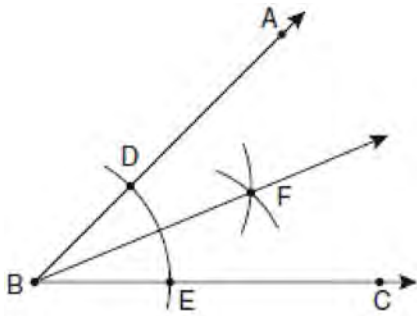
Which statement is *not* true?
1) $m\angle EBF = \frac{1}{2}m\angle ABC$
2) $m\angle DBF = \frac{1}{2}m\angle ABC$
3) $m\angle EBF = m\angle ABC$
4) $m\angle DBF = m\angle EBF$

455 Which expression best describes the transformation shown in the diagram below?
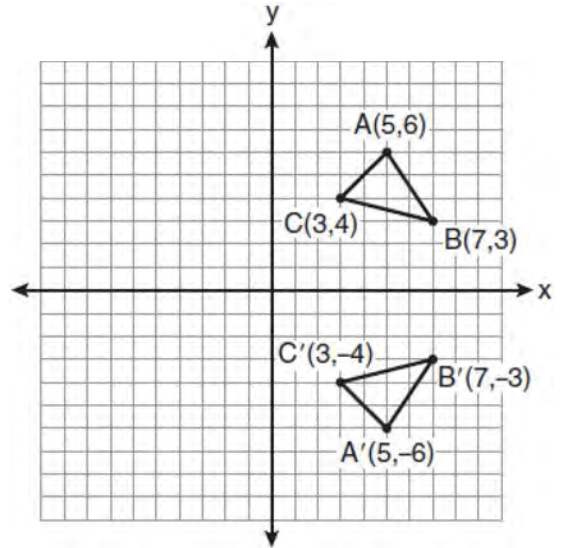
1) same orientation; reflection
2) opposite orientation; reflection
3) same orientation; translation
4) opposite orientation; translation

456 What is the slope of a line perpendicular to the line whose equation is $y = -\frac{2}{3}x - 5$?
1) $-\frac{3}{2}$
2) $-\frac{2}{3}$
3) $\frac{2}{3}$
4) $\frac{3}{2}$

Geometry Regents at Random
Answer Section

227 ANS: 3
$120\pi = \pi(12)(l)$

$10 = l$

PTS: 2   REF: 081314ge   STA: G.G.15   TOP: Volume and Lateral Area
228 ANS: 3
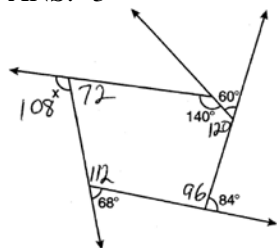
. The sum of the interior angles of a pentagon is $(5-2)180 = 540$.

PTS: 2   REF: 011023ge   STA: G.G.36   TOP: Interior and Exterior Angles of Polygons
229 ANS: 2   PTS: 2   REF: 060910ge   STA: G.G.71
     TOP: Equations of Circles
230 ANS:
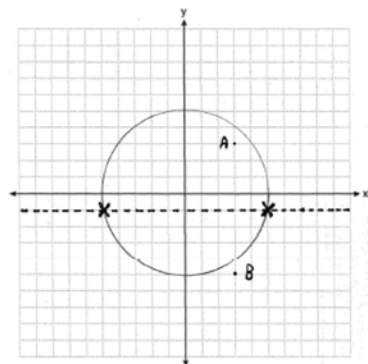
PTS: 4   REF: fall0837ge   STA: G.G.23   TOP: Locus
231 ANS: 4
$(n-2)180 = (8-2)180 = 1080. \quad \dfrac{1080}{8} = 135.$

PTS: 2   REF: fall0827ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons
232 ANS: 2
$7 + 18 > 6 + 12$

PTS: 2   REF: fall0819ge   STA: G.G.33   TOP: Triangle Inequality Theorem

1

233 ANS: 1

$$V = \pi r^2 h$$

$$1000 = \pi r^2 \cdot 8$$

$$r^2 = \frac{1000}{8\pi}$$

$$r \approx 6.3$$

PTS: 2　　　　　　REF: 080926ge　　STA: G.G.14　　　TOP: Volume and Lateral Area

234 ANS: 4　　　　　　PTS: 2　　　　　REF: 060913ge　　STA: G.G.26
TOP: Conditional Statements

235 ANS:
452. $SA = 4\pi r^2 = 4\pi \cdot 6^2 = 144\pi \approx 452$

PTS: 2　　　　　　REF: 061029ge　　STA: G.G.16　　　TOP: Volume and Surface Area

236 ANS: 2
Longest side of a triangle is opposite the largest angle. Shortest side is opposite the smallest angle.

PTS: 2　　　　　　REF: 060911ge　　STA: G.G.34　　　TOP: Angle Side Relationship

237 ANS: 2

$$x^2 = 3(x + 18)$$

$$x^2 - 3x - 54 = 0$$

$$(x - 9)(x + 6) = 0$$

$$x = 9$$

PTS: 2　　　　　　REF: fall0817ge　　STA: G.G.53　　　TOP: Segments Intercepted by Circle
KEY: tangent and secant

238 ANS:
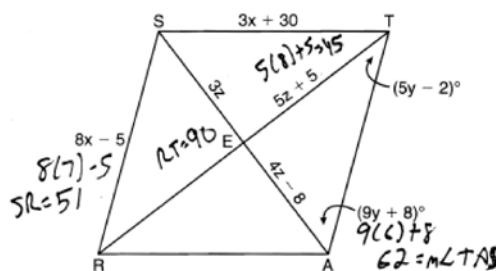
$8x - 5 = 3x + 30$. 　$4z - 8 = 3z$. 　$9y + 8 + 5y - 2 = 90$.

　$5x = 35$　　　　　$z = 8$　　　　$14y + 6 = 90$

　　$x = 7$　　　　　　　　　　$14y = 84$

　　　　　　　　　　　　　　　　$y = 6$

PTS: 6　　　　　　REF: 061038ge　　STA: G.G.39　　　TOP: Special Parallelograms

239 ANS: 1
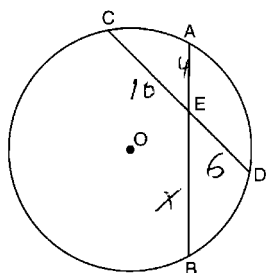
$4x = 6 \cdot 10$

$x = 15$

PTS: 2   REF: 081017ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: two chords

240 ANS: 3   PTS: 2   REF: 060908ge   STA: G.G.60
TOP: Identifying Transformations

241 ANS:

Because $\overline{AB} \parallel \overline{DC}$, $\overset{\frown}{AD} \cong \overset{\frown}{BC}$ since parallel chords intersect congruent arcs. $\angle BDC \cong \angle ACD$ because inscribed angles that intercept congruent arcs are congruent. $\overline{AD} \cong \overline{BC}$ since congruent chords intersect congruent arcs. $\angle DAC \cong \angle DBC$ because inscribed angles that intercept the same arc are congruent. Therefore, $\triangle ACD \cong \triangle BDC$ because of AAS.

PTS: 6   REF: fall0838ge   STA: G.G.27   TOP: Circle Proofs

242 ANS:

Midpoint: $\left(\dfrac{-4+4}{2}, \dfrac{2+(-4)}{2} \right) = (0,-1)$. Distance: $d = \sqrt{(-4-4)^2 + (2-(-4))^2} = \sqrt{100} = 10$

$$r = 5$$
$$r^2 = 25$$

$x^2 + (y+1)^2 = 25$

PTS: 4   REF: 061037ge   STA: G.G.71   TOP: Equations of Circles

243 ANS: 1
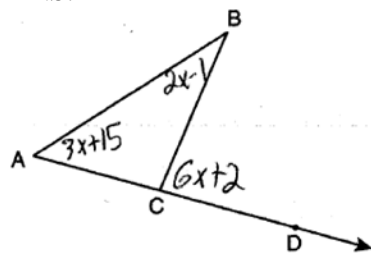
$$3x + 15 + 2x - 1 = 6x + 2$$
$$5x + 14 = 6x + 2$$
$$x = 12$$

PTS: 2   REF: 011021ge   STA: G.G.32   TOP: Exterior Angle Theorem

244 ANS: 1
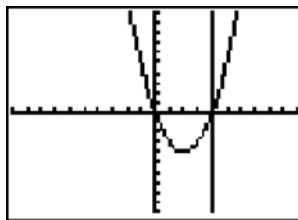
$y = x^2 - 4x = (4)^2 - 4(4) = 0.$ $(4,0)$ is the only intersection.

PTS: 2   REF: 060923ge   STA: G.G.70   TOP: Quadratic-Linear Systems

245 ANS: 2   PTS: 2   REF: 061020ge   STA: G.G.19
TOP: Constructions

246 ANS:
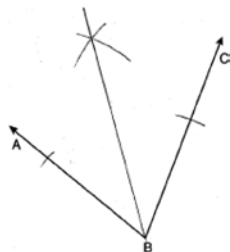
PTS: 2   REF: 080932ge   STA: G.G.17   TOP: Constructions

247 ANS: 3   PTS: 2   REF: fall0804ge   STA: G.G.18
TOP: Constructions

248 ANS: 4   PTS: 2   REF: 011019ge   STA: G.G.44
TOP: Similarity Proofs

249 ANS: 1
Since $\overline{AC} \cong \overline{BC}$, m$\angle A$ = m$\angle B$ under the Isosceles Triangle Theorem.

PTS: 2   REF: fall0809ge   STA: G.G.69   TOP: Triangles in the Coordinate Plane

250 ANS: 2

$\dfrac{3}{7} = \dfrac{6}{x}$

$3x = 42$

$x = 14$

PTS: 2   REF: 081027ge   STA: G.G.46   TOP: Side Splitter Theorem

251 ANS: 1
Translations and reflections do not affect distance.

PTS: 2   REF: 080908ge   STA: G.G.61
TOP: Analytical Representations of Transformations

252 ANS: 4

$d = \sqrt{(146 - (-4))^2 + (52 - 2)^2} = \sqrt{25,000} \approx 158.1$

PTS: 2   REF: 061021ge   STA: G.G.67   TOP: Distance
KEY: general

4

253 ANS: 4   PTS: 2   REF: 060912ge   STA: G.G.23
     TOP: Locus

254 ANS: 4

$$\triangle ABC \sim \triangle DBE. \quad \frac{\overline{AB}}{\overline{DB}} = \frac{\overline{AC}}{\overline{DE}}$$

$$\frac{9}{2} = \frac{x}{3}$$

$$x = 13.5$$

     PTS: 2   REF: 060927ge   STA: G.G.46   TOP: Side Splitter Theorem

255 ANS: 3

$$m = \frac{-A}{B} = -\frac{3}{4}$$

     PTS: 2   REF: 011025ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

256 ANS: 2   PTS: 2   REF: 011020ge   STA: G.G.74
     TOP: Graphing Circles

257 ANS: 3   PTS: 2   REF: 060925ge   STA: G.G.17
     TOP: Constructions

258 ANS: 3   PTS: 2   REF: 011028ge   STA: G.G.26
     TOP: Conditional Statements

259 ANS: 3   PTS: 2   REF: 081021ge   STA: G.G.57
     TOP: Properties of Transformations

260 ANS:
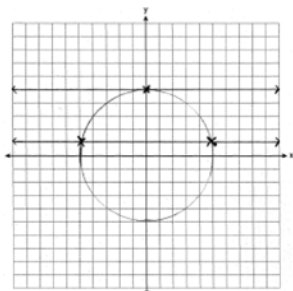
     PTS: 4   REF: 080936ge   STA: G.G.23   TOP: Locus

261 ANS: 4

$$x^2 = (4+5) \times 4$$

$$x^2 = 36$$

$$x = 6$$

     PTS: 2   REF: 011008ge   STA: G.G.53   TOP: Segments Intercepted by Circle
     KEY: tangent and secant

262 ANS: 1   PTS: 2   REF: 060918ge   STA: G.G.2
     TOP: Planes

263 ANS: 3
$$V = \pi r^2 h = \pi \cdot 6^2 \cdot 27 = 972\pi$$

PTS: 2   REF: 011027ge   STA: G.G.14   TOP: Volume and Lateral Area

264 ANS: 1   PTS: 2   REF: 011024ge   STA: G.G.3
TOP: Planes

265 ANS: 4   PTS: 2   REF: 061003ge   STA: G.G.10
TOP: Solids

266 ANS:

$y = \dfrac{2}{3}x - 9$. The slope of $2x - 3y = 11$ is $-\dfrac{A}{B} = \dfrac{-2}{-3} = \dfrac{2}{3}$. $\;-5 = \left(\dfrac{2}{3}\right)(6) + b$

$$-5 = 4 + b$$
$$b = -9$$

PTS: 2   REF: 080931ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

267 ANS: 2

The slope of $2x + 3y = 12$ is $-\dfrac{A}{B} = -\dfrac{2}{3}$. The slope of a perpendicular line is $\dfrac{3}{2}$. Rewritten in slope intercept form,

(2) becomes $y = \dfrac{3}{2}x + 3$.

PTS: 2   REF: 060926ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

268 ANS: 1

$$V = \dfrac{1}{3}\pi r^2 h = \dfrac{1}{3}\pi \cdot 4^2 \cdot 12 \approx 201$$

PTS: 2   REF: 060921ge   STA: G.G.15   TOP: Volume

269 ANS:
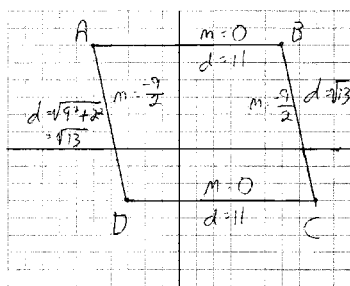
$\overline{AB} \parallel \overline{CD}$ and $\overline{AD} \parallel \overline{CB}$ because their slopes are equal. $ABCD$ is a parallelogram because opposite side are parallel. $\overline{AB} \neq \overline{BC}$. $ABCD$ is not a rhombus because all sides are not equal. $\overline{AB} \sim \perp \overline{BC}$ because their slopes are not opposite reciprocals. $ABCD$ is not a rectangle because $\angle ABC$ is not a right angle.

PTS: 4   REF: 081038ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

270 ANS: 3
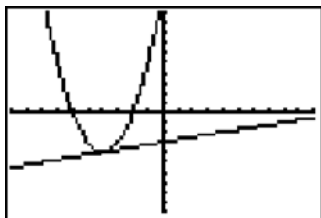
PTS: 2   REF: 061011ge   STA: G.G.70   TOP: Quadratic-Linear Systems

271 ANS: 4   PTS: 2   REF: 060922ge   STA: G.G.73
TOP: Equations of Circles

272 ANS:

22.4. $V = \pi r^2 h$

$$12566.4 = \pi r^2 \cdot 8$$

$$r^2 = \frac{12566.4}{8\pi}$$

$$r \approx 22.4$$

PTS: 2   REF: fall0833ge   STA: G.G.14   TOP: Volume and Lateral Area

273 ANS:
$\overline{AC} \cong \overline{EC}$ and $\overline{DC} \cong \overline{BC}$ because of the definition of midpoint. $\angle ACB \cong \angle ECD$ because of vertical angles.
$\triangle ABC \cong \triangle EDC$ because of SAS. $\angle CDE \cong \angle CBA$ because of CPCTC. $\overline{BD}$ is a transversal intersecting $\overline{AB}$ and
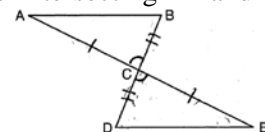
$\overline{ED}$. Therefore $\overline{AB} \parallel \overline{DE}$ because $\angle CDE$ and $\angle CBA$ are congruent alternate interior angles.

PTS: 6   REF: 060938ge   STA: G.G.27   TOP: Triangle Proofs

274 ANS: 3   PTS: 2   REF: 011010ge   STA: G.G.71
TOP: Equations of Circles

275 ANS: 2
Adjacent sides of a rectangle are perpendicular and have opposite and reciprocal slopes.

PTS: 2   REF: 061028ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

276 ANS: 4   PTS: 2   REF: 011009ge   STA: G.G.19
TOP: Constructions

277 ANS:

(6,–4). $C_x = \dfrac{Q_x + R_x}{2}$. $C_y = \dfrac{Q_y + R_y}{2}$.

$$3.5 = \dfrac{1 + R_x}{2} \qquad 2 = \dfrac{8 + R_y}{2}$$

$$7 = 1 + R_x \qquad 4 = 8 + R_y$$

$$6 = R_x \qquad -4 = R_y$$

PTS: 2　　　　REF: 011031ge　　STA: G.G.66　　　TOP: Midpoint
KEY: graph

278 ANS:

20. The sides of the triangle formed by connecting the midpoints are half the sides of the original triangle.
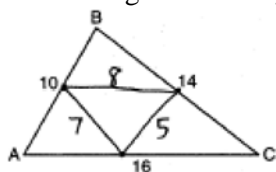
$5 + 7 + 8 = 20$.

PTS: 2　　　　REF: 060929ge　　STA: G.G.42　　　TOP: Midsegments

279 ANS: 2

$$M_x = \dfrac{3x + 5 + x - 1}{2} = \dfrac{4x + 4}{2} = 2x + 2. \quad M_Y = \dfrac{3y + (-y)}{2} = \dfrac{2y}{2} = y.$$

PTS: 2　　　　REF: 081019ge　　STA: G.G.66　　　TOP: Midpoint
KEY: general

280 ANS:

$2\sqrt{3}$. $x^2 = 3 \cdot 4$

$$x = \sqrt{12} = 2\sqrt{3}$$

PTS: 2　　　　REF: fall0829ge　　STA: G.G.47　　　TOP: Similarity
KEY: altitude

281 ANS: 4　　　　PTS: 2　　　　REF: 080905ge　　STA: G.G.29
TOP: Triangle Congruency

282 ANS: 4

Corresponding angles of similar triangles are congruent.

PTS: 2　　　　REF: fall0826ge　　STA: G.G.45　　　TOP: Similarity
KEY: perimeter and area

283 ANS: 2

$(d + 4)4 = 12(6)$

$4d + 16 = 72$

$d = 14$

$r = 7$

PTS: 2   REF: 061023ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: two secants

284 ANS:

5. $\dfrac{3}{x} = \dfrac{6 + 3}{15}$

$9x = 45$

$x = 5$

PTS: 2   REF: 011033ge   STA: G.G.46   TOP: Side Splitter Theorem

285 ANS:

$y = \dfrac{2}{3}x + 1$. $2y + 3x = 6$. $y = mx + b$

$2y = -3x + 6$

$5 = \dfrac{2}{3}(6) + b$

$y = -\dfrac{3}{2}x + 3$

$5 = 4 + b$

$m = -\dfrac{3}{2}$

$1 = b$

$m_\perp = \dfrac{2}{3}$

$y = \dfrac{2}{3}x + 1$

PTS: 4   REF: 061036ge   STA: G.G.64   TOP: Parallel and Perpendicular Lines

286 ANS:

18. If the ratio of *TA* to *AC* is 1:3, the ratio of *TE* to *ES* is also 1:3. $x + 3x = 24$. $3(6) = 18$.

$x = 6$

PTS: 4   REF: 060935ge   STA: G.G.50   TOP: Tangents
KEY: common tangency

287 ANS: 4

$d = \sqrt{(-6 - 2)^2 + (4 - (-5))^2} = \sqrt{64 + 81} = \sqrt{145}$

PTS: 2   REF: 081013ge   STA: G.G.67   TOP: Distance
KEY: general

288 ANS: 3

$2y = -6x + 8$ Perpendicular lines have slope the opposite and reciprocal of each other.

$y = -3x + 4$

$m = -3$

$m_\perp = \dfrac{1}{3}$

PTS: 2   REF: 081024ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

289 ANS:
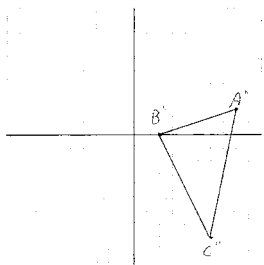
$A''(8,2),\ B''(2,0),\ C''(6,-8)$

PTS: 4   REF: 081036ge   STA: G.G.58   TOP: Compositions of Transformations

290 ANS: 2

Because the triangles are similar, $\dfrac{\text{m}\angle A}{\text{m}\angle D} = 1$

PTS: 2   REF: 011022ge   STA: G.G.45   TOP: Similarity
KEY: perimeter and area

291 ANS: 4
$180 - (40 + 40) = 100$

PTS: 2   REF: 080903ge   STA: G.G.31   TOP: Isosceles Triangle Theorem

292 ANS:
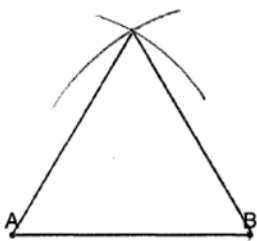
PTS: 2   REF: 011032ge   STA: G.G.20   TOP: Constructions

293 ANS:

   70. $3x + 5 + 3x + 5 + 2x + 2x = 180$

$$10x + 10 = 360$$

$$10x = 350$$

$$x = 35$$

$$2x = 70$$

   PTS: 2   REF: 081029ge   STA: G.G.40   TOP: Trapezoids

294 ANS: 1

If $\angle A$ is at minimum (50°) and $\angle B$ is at minimum (90°), $\angle C$ is at maximum of 40° (180° - (50° + 90°)). If $\angle A$ is at maximum (60°) and $\angle B$ is at maximum (100°), $\angle C$ is at minimum of 20° (180° - (60° + 100°)).

   PTS: 2   REF: 060901ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

295 ANS:

   110. $6x + 20 = x + 40 + 4x - 5$

$$6x + 20 = 5x + 35$$

$$x = 15$$

$$6((15) + 20 = 110$$

   PTS: 2   REF: 081031ge   STA: G.G.32   TOP: Exterior Angle Theorem

296 ANS: 4

$$M_x = \frac{-6 + 1}{2} = -\frac{5}{2}. \quad M_y = \frac{1 + 8}{2} = \frac{9}{2}.$$

   PTS: 2   REF: 060919ge   STA: G.G.66   TOP: Midpoint

   KEY: graph

297 ANS: 4

The slope of a line in standard form is $-\dfrac{A}{B}$, so the slope of this line is $\dfrac{-4}{2} = -2$. A parallel line would also have a slope of -2. Since the answers are in slope intercept form, find the y-intercept: $y = mx + b$

$$3 = -2(7) + b$$

$$17 = b$$

   PTS: 2   REF: 081010ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

298 ANS: 3   PTS: 2   REF: 080924ge   STA: G.G.24

   TOP: Negations

299 ANS: 3

$$\frac{36-20}{2} = 8. \quad \sqrt{17^2 - 8^2} = 15$$
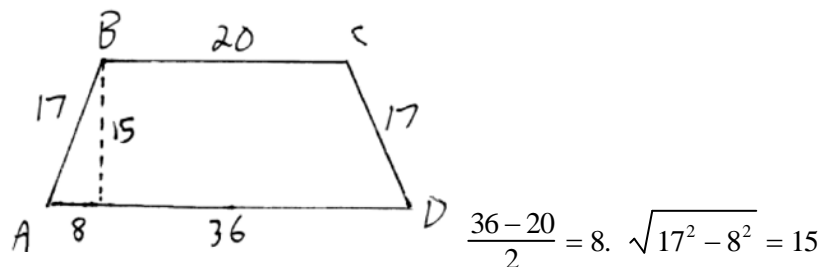
PTS: 2   REF: 061016ge   STA: G.G.40   TOP: Trapezoids

300 ANS: 1

$$\angle A = \frac{(n-2)180}{n} = \frac{(5-2)180}{5} = 108 \quad \angle AEB = \frac{180-108}{2} = 36$$

PTS: 2   REF: 081022ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

301 ANS: 2   PTS: 2   REF: 061002ge   STA: G.G.24

TOP: Negations

302 ANS: 4

$$L = 2\pi rh = 2\pi \cdot 5 \cdot 11 \approx 345.6$$

PTS: 2   REF: 061006ge   STA: G.G.14   TOP: Volume and Lateral Area

303 ANS:
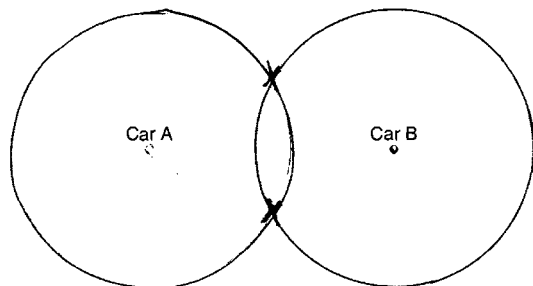
PTS: 2   REF: 081033ge   STA: G.G.22   TOP: Locus

304 ANS: 1

$A'(2,4)$

PTS: 2   REF: 011023ge   STA: G.G.54   TOP: Compositions of Transformations

KEY: basic

305 ANS: 4   PTS: 2   REF: 081023ge   STA: G.G.45

TOP: Similarity   KEY: perimeter and area

306 ANS: 4

Let $\overline{AD} = x$. $36x = 12^2$

$\qquad\qquad x = 4$

PTS: 2   REF: 080922ge   STA: G.G.47   TOP: Similarity

KEY: leg

12

307 ANS: 2
The centroid divides each median into segments whose lengths are in the ratio 2 : 1.

PTS: 2   REF: 060914ge   STA: G.G.43   TOP: Centroid
308 ANS: 3   PTS: 2   REF: 080928ge   STA: G.G.50
TOP: Tangents   KEY: common tangency
309 ANS: 3

$4(x + 4) = 8^2$

$4x + 16 = 64$

$x = 12$

PTS: 2   REF: 060916ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: tangent and secant
310 ANS: 4   PTS: 2   REF: 080914ge   STA: G.G.7
TOP: Planes
311 ANS:
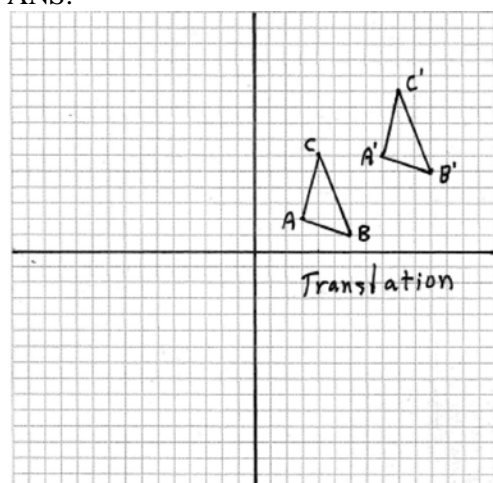
PTS: 2   REF: fall0830ge   STA: G.G.55   TOP: Properties of Transformations
312 ANS: 1
$\angle DCB$ and $\angle ADC$ are supplementary adjacent angles of a parallelogram. $180 - 120 = 60$. $\angle 2 = 60 - 45 = 15$.

PTS: 2   REF: 080907ge   STA: G.G.38   TOP: Parallelograms
313 ANS:
2.4. $5a = 4^2$ $5b = 3^2$ $h^2 = ab$

$a = 3.2$ $b = 1.8$ $h^2 = 3.2 \cdot 1.8$

$h = \sqrt{5.76} = 2.4$

PTS: 4   REF: 081037ge   STA: G.G.47   TOP: Similarity
KEY: leg

13

314 ANS: 1
$$x + 2x + 2 + 3x + 4 = 180$$
$$6x + 6 = 180$$
$$x = 29$$

PTS: 2   REF: 011002ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

315 ANS: 3   PTS: 2   REF: 080913ge   STA: G.G.28
TOP: Triangle Congruency

316 ANS: 4
sum of interior $\angle$s $=$ sum of exterior $\angle$s
$$(n - 2)180 = n\left(180 - \frac{(n - 2)180}{n}\right)$$
$$180n - 360 = 180n - 180n + 360$$
$$180n = 720$$
$$n = 4$$

PTS: 2   REF: 081016ge   STA: G.G.36   TOP: Interior and Exterior Angles of Polygons

317 ANS:
Contrapositive-If two angles of a triangle are not congruent, the sides opposite those angles are not congruent.

PTS: 2   REF: fall0834ge   STA: G.G.26   TOP: Conditional Statements

318 ANS: 4   PTS: 2   REF: fall0802ge   STA: G.G.24
TOP: Negations

319 ANS: 4
$$d = \sqrt{(-3 - 1)^2 + (2 - 0)^2} = \sqrt{16 + 4} = \sqrt{20} = \sqrt{4} \cdot \sqrt{5} = 2\sqrt{5}$$

PTS: 2   REF: 011017ge   STA: G.G.67   TOP: Distance
KEY: general

320 ANS: 2

The slope of a line in standard form is $-\dfrac{A}{B}$, so the slope of this line is $\dfrac{-2}{-1} = 2$. A parallel line would also have a slope of 2. Since the answers are in slope intercept form, find the y-intercept: $y = mx + b$
$$-11 = 2(-3) + b$$
$$-5 = b$$

PTS: 2   REF: fall0812ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

321 ANS: 1
$\triangle PRT$ and $\triangle SRQ$ share $\angle R$ and it is given that $\angle RPT \cong \angle RSQ$.

PTS: 2   REF: fall0821ge   STA: G.G.44   TOP: Similarity Proofs

322 ANS:
36, because a dilation does not affect angle measure. 10, because a dilation does affect distance.

PTS: 4   REF: 011035ge   STA: G.G.59   TOP: Properties of Transformations

323 ANS: 3   PTS: 2   REF: 081002ge   STA: G.G.9
TOP: Planes

324 ANS: 3

$$(x + 3)^2 - 4 = 2x + 5$$

$$x^2 + 6x + 9 - 4 = 2x + 5$$

$$x^2 + 4x = 0$$

$$x(x + 4) = 0$$

$$x = 0, -4$$

PTS: 2   REF: 081004ge   STA: G.G.70   TOP: Quadratic-Linear Systems

325 ANS: 1
Parallel lines intercept congruent arcs.

PTS: 2   REF: 061001ge   STA: G.G.52   TOP: Chords and Secants

326 ANS: 4
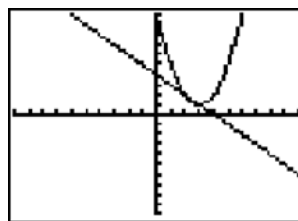
$y + x = 4$. $x^2 - 6x + 10 = -x + 4$. $y + x = 4$. $y + 2 = 4$

$y = -x + 4$ $x^2 - 5x + 6 = 0$ $y + 3 = 4$ $y = 2$

$(x - 3)(x - 2) = 0$ $y = 1$

$x = 3$ or 2

PTS: 2   REF: 080912ge   STA: G.G.70   TOP: Quadratic-Linear Systems

327 ANS: 3
The diagonals of an isosceles trapezoid are congruent. $5x + 3 = 11x - 5$.

$$6x = 18$$

$$x = 3$$

PTS: 2   REF: fall0801ge   STA: G.G.40   TOP: Trapezoids

328 ANS: 1
After the translation, the coordinates are $A'(-1, 5)$ and $B'(3, 4)$. After the dilation, the coordinates are $A''(-2, 10)$ and $B''(6, 8)$.

PTS: 2   REF: fall0823ge   STA: G.G.58   TOP: Compositions of Transformations

329 ANS:

$\angle D$, $\angle G$ and 24° or $\angle E$, $\angle F$ and 84°. $m\overset{\frown}{FE} = \dfrac{2}{15} \times 360 = 48$. Since the chords forming $\angle D$ and $\angle G$ are

intercepted by $\overset{\frown}{FE}$, their measure is 24°. $m\overset{\frown}{GD} = \dfrac{7}{15} \times 360 = 168$. Since the chords forming $\angle E$ and $\angle F$ are

intercepted by $\overset{\frown}{GD}$, their measure is 84°.

PTS: 4   REF: fall0836ge   STA: G.G.51   TOP: Arcs Determined by Angles
KEY: inscribed

330 ANS: 4
The marked 60º angle and the angle above it are on the same straight line and supplementary. This unmarked
supplementary angle is 120º. Because the unmarked 120º angle and the marked 120º angle are alternate exterior
angles and congruent, $d \parallel e$.

PTS: 2   REF: 080901ge   STA: G.G.35   TOP: Parallel Lines and Transversals

331 ANS: 1   PTS: 2   REF: 061005ge   STA: G.G.55
TOP: Properties of Transformations

332 ANS: 4   PTS: 2   REF: 080925ge   STA: G.G.21
TOP: Centroid, Orthocenter, Incenter and Circumcenter

333 ANS: 4   PTS: 2   REF: 011426ge   STA: G.G.73
TOP: Equations of Circles

334 ANS: 3   PTS: 2   REF: fall0825ge   STA: G.G.21
TOP: Centroid, Orthocenter, Incenter and Circumcenter

335 ANS:

67. $\dfrac{180 - 46}{2} = 67$

PTS: 2   REF: 011029ge   STA: G.G.31   TOP: Isosceles Triangle Theorem

336 ANS: 2   PTS: 2   REF: 081015ge   STA: G.G.56
TOP: Identifying Transformations

337 ANS: 2   PTS: 2   REF: 080927ge   STA: G.G.4
TOP: Planes

338 ANS: 1

$d = \sqrt{(-4-2)^2 + (5-(-5))^2} = \sqrt{36 + 100} = \sqrt{136} = \sqrt{4} \cdot \sqrt{34} = 2\sqrt{34}$.

PTS: 2   REF: 080919ge   STA: G.G.67   TOP: Distance
KEY: general

339 ANS:

4. $l_1 w_1 h_1 = l_2 w_2 h_2$

   $10 \times 2 \times h = 5 \times w_2 \times h$

   $20 = 5w_2$

   $w_2 = 4$

PTS: 2   REF: 011030ge   STA: G.G.11   TOP: Volume

340 ANS: 2
A dilation affects distance, not angle measure.

PTS: 2 REF: 080906ge STA: G.G.60 TOP: Identifying Transformations
341 ANS:
37. Since $\overline{DE}$ is a midsegment, $AC = 14$. $10 + 13 + 14 = 37$

PTS: 2 REF: 061030ge STA: G.G.42 TOP: Midsegments
342 ANS: 1
$M_x = \dfrac{-2+6}{2} = 2$. $M_y = \dfrac{3+3}{2} = 3$. The center is $(2,3)$. $d = \sqrt{(-2-6)^2 + (3-3)^2} = \sqrt{64+0} = 8$. If the diameter is 8, the radius is 4 and $r^2 = 16$.

PTS: 2 REF: fall0820ge STA: G.G.71 TOP: Equations of Circles
343 ANS: 3 PTS: 2 REF: 061017ge STA: G.G.1
TOP: Planes
344 ANS: 2 PTS: 2 REF: 011011ge STA: G.G.22
TOP: Locus
345 ANS: 4
Median $\overline{BF}$ bisects $\overline{AC}$ so that $\overline{CF} \cong \overline{FA}$.

PTS: 2 REF: fall0810ge STA: G.G.24 TOP: Statements
346 ANS: 3 PTS: 2 REF: fall0814ge STA: G.G.73
TOP: Equations of Circles
347 ANS: 4 PTS: 2 REF: 061008ge STA: G.G.40
TOP: Trapezoids
348 ANS: 4 PTS: 2 REF: 061018ge STA: G.G.56
TOP: Identifying Transformations
349 ANS:
34. $2x - 12 + x + 90 = 180$

$$3x + 78 = 90$$

$$3x = 102$$

$$x = 34$$

PTS: 2 REF: 061031ge STA: G.G.30 TOP: Interior and Exterior Angles of Triangles
350 ANS: 2
$M_x = \dfrac{-2+6}{2} = 2$. $M_y = \dfrac{-4+2}{2} = -1$

PTS: 2 REF: 080910ge STA: G.G.66 TOP: Midpoint
KEY: general

351 ANS: 2

The length of the midsegment of a trapezoid is the average of the lengths of its bases. $\dfrac{x+30}{2} = 44.$

$$x + 30 = 88$$
$$x = 58$$

PTS: 2   REF: 011001ge   STA: G.G.40   TOP: Trapezoids

352 ANS: 2

The slope of a line in standard form is $-\dfrac{A}{B}$ so the slope of this line is $-\dfrac{5}{3}$ Perpendicular lines have slope that are the opposite and reciprocal of each other.

PTS: 2   REF: fall0828ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

353 ANS: 2
$4(4x - 3) = 3(2x + 8)$

$16x - 12 = 6x + 24$

$10x = 36$

$x = 3.6$

PTS: 2   REF: 080923ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: two chords

354 ANS: 1
$a^2 + (5\sqrt{2})^2 = (2\sqrt{15})^2$

$a^2 + (25 \times 2) = 4 \times 15$

$a^2 + 50 = 60$

$a^2 = 10$

$a = \sqrt{10}$

PTS: 2   REF: 011016ge   STA: G.G.48   TOP: Pythagorean Theorem

355 ANS: 4   PTS: 2   REF: 060904ge   STA: G.G.13
TOP: Solids

356 ANS: 3
$\dfrac{36 + 20}{2} = 28$

PTS: 2   REF: 061019ge   STA: G.G.51   TOP: Arcs Determined by Angles
KEY: inside circle

357 ANS: 1   PTS: 2   REF: 081012ge   STA: G.G.50
TOP: Tangents   KEY: two tangents

358 ANS: 3   PTS: 2   REF: 060905ge   STA: G.G.54
TOP: Reflections   KEY: basic

359 ANS:

$(x + 1)^2 + (y - 2)^2 = 36$

PTS: 2   REF: 081034ge   STA: G.G.72   TOP: Equations of Circles

360 ANS: 3

The slope of $y = x + 2$ is 1. The slope of $y - x = -1$ is $\dfrac{-A}{B} = \dfrac{-(-1)}{1} = 1.$

PTS: 2   REF: 080909ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

361 ANS: 1   PTS: 2   REF: 081009ge   STA: G.G.73

TOP: Equations of Circles

362 ANS: 2

$y + \dfrac{1}{2} x = 4 \quad 3x + 6y = 12$

$\quad\quad\quad\quad 6y = -3x + 12$

$y = -\dfrac{1}{2} x + 4$

$\quad\quad\quad\quad y = -\dfrac{3}{6} x + 2$

$m = -\dfrac{1}{2}$

$\quad\quad\quad\quad y = -\dfrac{1}{2} x + 2$

PTS: 2   REF: 081014ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

363 ANS: 1   PTS: 2   REF: 081008ge   STA: G.G.3

TOP: Planes

364 ANS: 4   PTS: 2   REF: 061015ge   STA: G.G.56

TOP: Identifying Transformations

365 ANS: 3   PTS: 2   REF: 061004ge   STA: G.G.31

TOP: Isosceles Triangle Theorem

366 ANS: 1

The centroid divides each median into segments whose lengths are in the ratio 2 : 1. $\overline{GC} = 2\overline{FG}$

$$\overline{GC} + \overline{FG} = 24$$
$$2\overline{FG} + \overline{FG} = 24$$
$$3\overline{FG} = 24$$
$$\overline{FG} = 8$$

PTS: 2   REF: 081018ge   STA: G.G.43   TOP: Centroid

367 ANS: 1

$$\frac{3x^2 + 18x + 24}{3(x + 2)}$$

$$\frac{3(x^2 + 6x + 8)}{3(x + 2)}$$

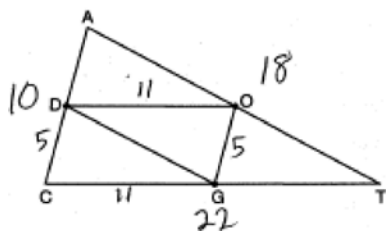$$\frac{3(x + 4)(x + 2)}{3(x + 2)}$$

$$x + 4$$

PTS: 2   REF: fall0815ge   STA: G.G.12   TOP: Volume

368 ANS:

375π $L = \pi r l = \pi(15)(25) = 375\pi$

PTS: 2   REF: 081030ge   STA: G.G.15   TOP: Lateral Area

369 ANS: 3

PTS: 2   REF: 080920ge   STA: G.G.42   TOP: Midsegments

370 ANS: 3

Because $\overline{OC}$ is a radius, its length is 5. Since $CE = 2$ $OE = 3$. $\triangle EDO$ is a 3-4-5 triangle. If $ED = 4$, $BD = 8$.

PTS: 2   REF: fall0811ge   STA: G.G.49   TOP: Chords

371 ANS: 2   PTS: 2   REF: 011006ge   STA: G.G.56

TOP: Identifying Transformations

372 ANS: 4

(4) is not true if $\angle PQR$ is obtuse.

PTS: 2   REF: 060924ge   STA: G.G.32   TOP: Exterior Angle Theorem

373 ANS: 1

The closer a chord is to the center of a circle, the longer the chord.

PTS: 2   REF: 011005ge   STA: G.G.49   TOP: Chords

374 ANS: 3
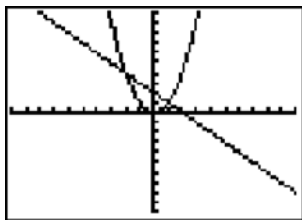
　　　PTS: 2　　　　　　REF: fall0805ge　　　STA: G.G.70　　　　TOP: Quadratic-Linear Systems
375 ANS: 1
In an equilateral triangle, each interior angle is 60° and each exterior angle is 120° (180° - 120°). The sum of the three interior angles is 180° and the sum of the three exterior angles is 360°.

　　　PTS: 2　　　　　　REF: 060909ge　　　STA: G.G.30　　　　TOP: Interior and Exterior Angles of Triangles
376 ANS: 2　　　　　　PTS: 2　　　　　　REF: 061022ge　　　STA: G.G.62
　　　TOP: Parallel and Perpendicular Lines
377 ANS:

2016. $V = \frac{1}{3} Bh = \frac{1}{3} s^2 h = \frac{1}{3} 12^2 \cdot 42 = 2016$

　　　PTS: 2　　　　　　REF: 080930ge　　　STA: G.G.13　　　　TOP: Volume
378 ANS: 1
Opposite sides of a parallelogram are congruent. $4x - 3 = x + 3$. $SV = (2) + 3 = 5$.

$$3x = 6$$

$$x = 2$$

　　　PTS: 2　　　　　　REF: 011013ge　　　STA: G.G.38　　　　TOP: Parallelograms
379 ANS: 4　　　　　　PTS: 2　　　　　　REF: 081005ge　　　STA: G.G.18
　　　TOP: Constructions
380 ANS: 2
$6 + 17 > 22$

　　　PTS: 2　　　　　　REF: 080916ge　　　STA: G.G.33　　　　TOP: Triangle Inequality Theorem
381 ANS:

$\overline{AC}$. m∠$BCA = 63$ and m∠$ABC = 80$. $\overline{AC}$ is the longest side as it is opposite the largest angle.

　　　PTS: 2　　　　　　REF: 080934ge　　　STA: G.G.34　　　　TOP: Angle Side Relationship
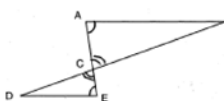382 ANS: 1　　　　　　PTS: 2　　　　　　REF: 060903ge　　　STA: G.G.56
　　　TOP: Identifying Transformations
383 ANS: 4　　　　　　PTS: 2　　　　　　REF: fall0818ge　　　STA: G.G.61
　　　TOP: Analytical Representations of Transformations
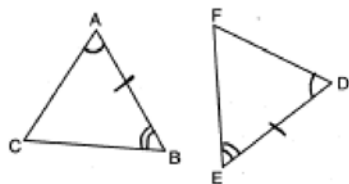384 ANS: 2

∠ACB and ∠ECD are congruent vertical angles and ∠$CAB \cong$ ∠CED.

　　　PTS: 2　　　　　　REF: 060917ge　　　STA: G.G.44　　　　TOP: Similarity Proofs

21

385 ANS: 1   PTS: 2   REF: 061009ge   STA: G.G.26
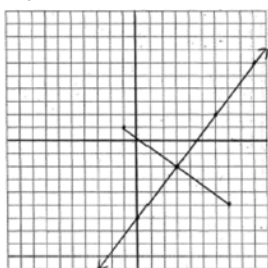TOP: Converse and Biconditional

386 ANS: 3

PTS: 2   REF: 060902ge   STA: G.G.28   TOP: Triangle Congruency

387 ANS:

$y = \dfrac{4}{3}x - 6.$ $M_x = \dfrac{-1+7}{2} = 3$ The perpendicular bisector goes through $(3,-2)$ and has a slope of $\dfrac{4}{3}$.

$$M_y = \frac{1+(-5)}{2} = -2$$

$$m = \frac{1-(-5)}{-1-7} = -\frac{3}{4}$$

$y - y_M = m(x - x_M).$

$y - 1 = \dfrac{4}{3}(x - 2)$

PTS: 4   REF: 080935ge   STA: G.G.68   TOP: Perpendicular Bisector

388 ANS: 2

$\dfrac{140 - \overline{RS}}{2} = 40$

$140 - \overline{RS} = 80$

$\overline{RS} = 60$

PTS: 2   REF: 081025ge   STA: G.G.51   TOP: Arcs Determined by Angles
KEY: outside circle

389 ANS:
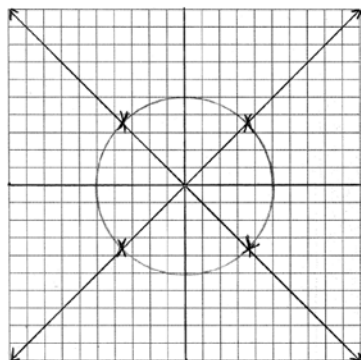
PTS: 4   REF: 011037ge   STA: G.G.23   TOP: Locus

390 ANS: 3   PTS: 2   REF: 011007ge   STA: G.G.31
TOP: Isosceles Triangle Theorem

391 ANS:

$y = -2x + 14$. The slope of $2x + y = 3$ is $\dfrac{-A}{B} = \dfrac{-2}{1} = -2$. $y = mx + b$.

$$4 = (-2)(5) + b$$
$$b = 14$$

PTS: 2   REF: 060931ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

392 ANS: 4   PTS: 2   REF: fall0824ge   STA: G.G.50
TOP: Tangents   KEY: common tangency

393 ANS: 3   PTS: 2   REF: fall0816ge   STA: G.G.1
TOP: Planes

394 ANS:

$\overline{JK} \cong \overline{LM}$ because opposite sides of a parallelogram are congruent. $\overline{LM} \cong \overline{LN}$ because of the Isosceles Triangle Theorem. $\overline{LM} \cong \overline{JM}$ because of the transitive property. *JKLM* is a rhombus because all sides are congruent.

PTS: 4   REF: 011036ge   STA: G.G.27   TOP: Quadrilateral Proofs

395 ANS:
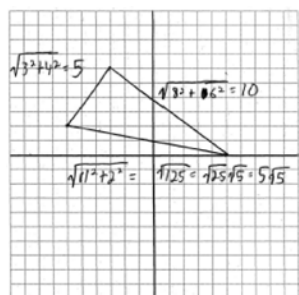
$15 + 5\sqrt{5}$.

PTS: 4   REF: 060936ge   STA: G.G.69   TOP: Triangles in the Coordinate Plane

396   ANS: 4
$180 - (50 + 30) = 100$

PTS: 2   REF: 081006ge   STA: G.G.45   TOP: Similarity
KEY: basic

397   ANS: 3   PTS: 2   REF: 081026ge   STA: G.G.26
TOP: Contrapositive

398   ANS: 3   PTS: 2   REF: 060928ge   STA: G.G.8
TOP: Planes

399   ANS: 2   PTS: 2   REF: 080921ge   STA: G.G.72
TOP: Equations of Circles

400   ANS: 4

$$SA = 4\pi r^2 \quad V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \cdot 6^3 = 288\pi$$

$$144\pi = 4\pi r^2$$

$$36 = r^2$$

$$6 = r$$

PTS: 2   REF: 081020ge   STA: G.G.16   TOP: Surface Area

401   ANS: 1   PTS: 2   REF: 060920ge   STA: G.G.74
TOP: Graphing Circles

402   ANS: 4   PTS: 2   REF: 080915ge   STA: G.G.56
TOP: Identifying Transformations

403   ANS: 4
$\overline{BG}$ is also an angle bisector since it intersects the concurrence of $\overline{CD}$ and $\overline{AE}$

PTS: 2   REF: 061025ge   STA: G.G.21
KEY: Centroid, Orthocenter, Incenter and Circumcenter

404   ANS: 1
$\overline{AB} = 10$ since $\triangle ABC$ is a 6-8-10 triangle. $6^2 = 10x$

$$3.6 = x$$

PTS: 2   REF: 060915ge   STA: G.G.47   TOP: Similarity
KEY: leg

405   ANS: 3
The lateral edges of a prism are parallel.

PTS: 2   REF: fall0808ge   STA: G.G.10   TOP: Solids

406 ANS:

$\overline{BD} \cong \overline{DB}$ (Reflexive Property); $\triangle ABD \cong \triangle CDB$ (SSS); $\angle BDC \cong \angle ABD$ (CPCTC).
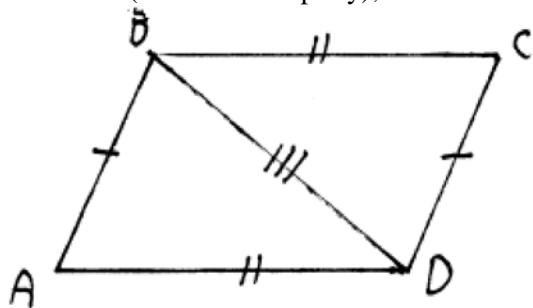
PTS: 4   REF: 061035ge   STA: G.G.27   TOP: Quadrilateral Proofs

407 ANS:

6. The centroid divides each median into segments whose lengths are in the ratio 2 : 1. $\overline{TD} = 6$ and $\overline{DB} = 3$

PTS: 2   REF: 011034ge   STA: G.G.43   TOP: Centroid

408 ANS: 1   PTS: 2   REF: fall0807ge   STA: G.G.19

TOP: Constructions

409 ANS: 1

$$-2\left(-\frac{1}{2}y = 6x + 10\right)$$

$$y = -12x - 20$$

PTS: 2   REF: 061027ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

410 ANS:
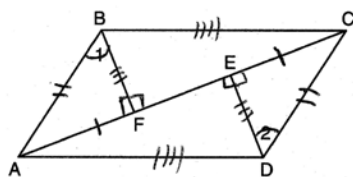
 $\overline{FE} \cong \overline{FE}$ (Reflexive Property); $\overline{AE} - \overline{FE} \cong \overline{FC} - \overline{EF}$ (Line Segment Subtraction Theorem); $\overline{AF} \cong \overline{CE}$ (Substitution); $\angle BFA \cong \angle DEC$ (All right angles are congruent); $\triangle BFA \cong \triangle DEC$ (AAS); $\overline{AB} \cong \overline{CD}$ and $\overline{BF} \cong \overline{DE}$ (CPCTC); $\angle BFC \cong \angle DEA$ (All right angles are congruent); $\triangle BFC \cong \triangle DEA$ (SAS); $\overline{AD} \cong \overline{CB}$ (CPCTC); $ABCD$ is a parallelogram (opposite sides of quadrilateral $ABCD$ are congruent)

PTS: 6   REF: 080938ge   STA: G.G.27   TOP: Quadrilateral Proofs

411 ANS: 2

$$x^2 + (x+7)^2 = 13^2$$

$$x^2 + x^2 + 7x + 7x + 49 = 169$$

$$2x^2 + 14x - 120 = 0$$

$$x^2 + 7x - 60 = 0$$

$$(x+12)(x-5) = 0$$

$$x = 5$$

$$2x = 10$$

PTS: 2   REF: 061024ge   STA: G.G.48   TOP: Pythagorean Theorem

412 ANS:

26. $x + 3x + 5x - 54 = 180$

$$9x = 234$$

$$x = 26$$

PTS: 2   REF: 080933ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

413 ANS: 2   PTS: 2   REF: 011004ge   STA: G.G.17
    TOP: Constructions

414 ANS: 1   PTS: 2   REF: 061010ge   STA: G.G.34
    TOP: Angle Side Relationship

415 ANS:

25. $d = \sqrt{(-3-4)^2 + (1-25)^2} = \sqrt{49+576} = \sqrt{625} = 25.$

PTS: 2   REF: fall0831ge   STA: G.G.67   TOP: Distance
KEY: general

416 ANS:
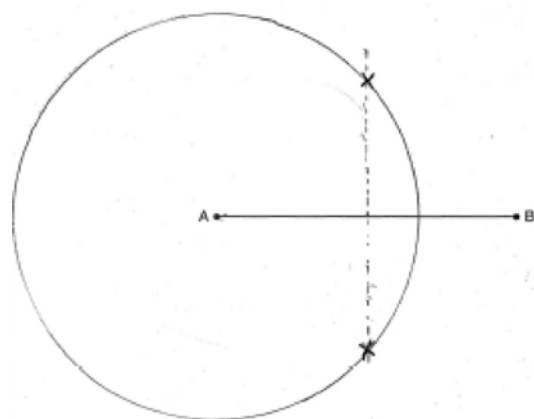
PTS: 2   REF: 060932ge   STA: G.G.22   TOP: Locus

417 ANS:
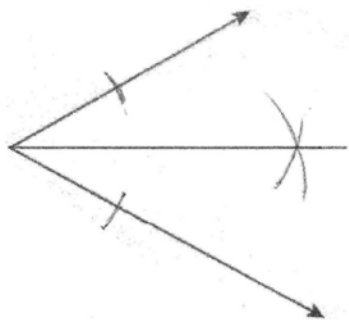
PTS: 2 REF: fall0832ge STA: G.G.17 TOP: Constructions

418 ANS:

True. The first statement is true and the second statement is false. In a disjunction, if either statement is true, the disjunction is true.

PTS: 2 REF: 060933ge STA: G.G.25 TOP: Compound Statements
KEY: disjunction

419 ANS:

Yes, m$\angle ABD = $ m$\angle BDC = 44$ $\;180 - (93 + 43) = 44$ $\;x + 19 + 2x + 6 + 3x + 5 = 180$. Because alternate interior

$$6x + 30 = 180$$

$$6x = 150$$

$$x = 25$$

$$x + 19 = 44$$

angles $\angle ABD$ and $\angle CDB$ are congruent, $\overline{AB}$ is parallel to $\overline{DC}$.

PTS: 4 REF: 081035ge STA: G.G.35 TOP: Parallel Lines and Transversals

420 ANS: 2

$$\frac{87 + 35}{2} = \frac{122}{2} = 61$$

PTS: 2 REF: 011015ge STA: G.G.51 TOP: Arcs Determined by Angles
KEY: inside circle

421 ANS: 4
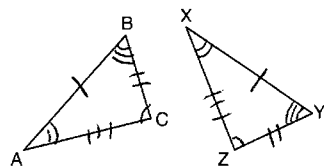
PTS: 2 REF: 081001ge STA: G.G.29 TOP: Triangle Congruency

422 ANS: 1 PTS: 2 REF: 080918ge STA: G.G.41
TOP: Special Quadrilaterals

423 ANS:
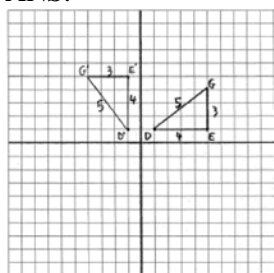
$D'(-1,1), E'(-1,5), G'(-4,5)$

PTS: 4   REF: 080937ge   STA: G.G.55   TOP: Properties of Transformations

424 ANS:

18. $V = \frac{1}{3}Bh = \frac{1}{3}lwh$

$288 = \frac{1}{3} \cdot 8 \cdot 6 \cdot h$

$288 = 16h$

$18 = h$

PTS: 2   REF: 061034ge   STA: G.G.13   TOP: Volume

425 ANS:

3. The non-parallel sides of an isosceles trapezoid are congruent. $2x + 5 = 3x + 2$

$x = 3$

PTS: 2   REF: 080929ge   STA: G.G.40   TOP: Trapezoids

426 ANS: 1
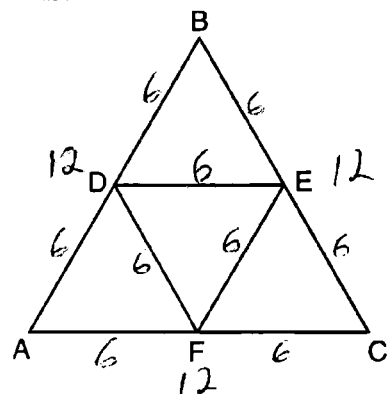
PTS: 2   REF: 081003ge   STA: G.G.42   TOP: Midsegments

427 ANS: 4

$3y + 1 = 6x + 4.$ $2y + 1 = x - 9$

$3y = 6x + 3$ $2y = x - 10$

$y = 2x + 1$ $y = \frac{1}{2}x - 5$

PTS: 2   REF: fall0822ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

428 ANS: 4   PTS: 2   REF: 011012ge   STA: G.G.1

TOP: Planes

429 ANS:
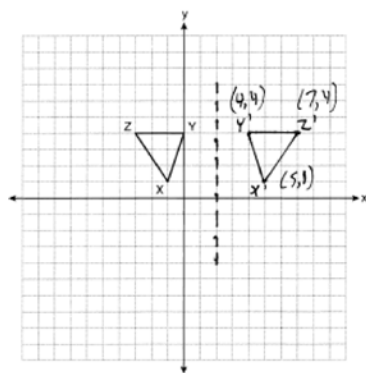
PTS: 2   REF: 061032ge   STA: G.G.54   TOP: Reflections

KEY: grids

430 ANS: 4

Longest side of a triangle is opposite the largest angle. Shortest side is opposite the smallest angle.

PTS: 2   REF: 081011ge   STA: G.G.34   TOP: Angle Side Relationship

431 ANS:
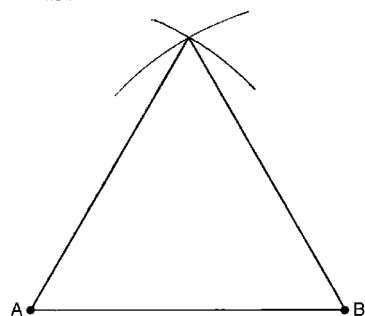
PTS: 2   REF: 081032ge   STA: G.G.20   TOP: Constructions

432 ANS:

20. $5x + 10 = 4x + 30$

$x = 20$

PTS: 2   REF: 060934ge   STA: G.G.45   TOP: Similarity

KEY: basic

433 ANS: 4

The slope of $y = -3x + 2$ is -3. The perpendicular slope is $\frac{1}{3}$. $-1 = \frac{1}{3}(3) + b$

$$-1 = 1 + b$$
$$b = -2$$

PTS: 2   REF: 011018ge   STA: G.G.64   TOP: Parallel and Perpendicular Lines

434 ANS:
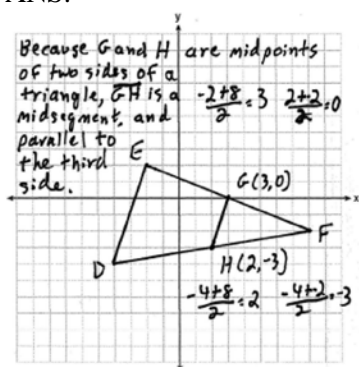
PTS: 4   REF: fall0835ge   STA: G.G.42   TOP: Midsegments

435 ANS: 1   PTS: 2   REF: 061013ge   STA: G.G.50
TOP: Tangents   KEY: point of tangency

436 ANS: 2   PTS: 2   REF: 061007ge   STA: G.G.35
TOP: Parallel Lines and Transversals

437 ANS: 2   PTS: 2   REF: fall0806ge   STA: G.G.9
TOP: Planes

438 ANS: 3

$$m = \frac{-A}{B} = \frac{5}{2}. \quad m = \frac{-A}{B} = \frac{10}{4} = \frac{5}{2}$$

PTS: 2   REF: 011014ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

439 ANS: 2
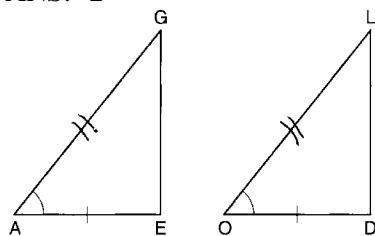
PTS: 2   REF: 081007ge   STA: G.G.28   TOP: Triangle Congruency

440 ANS:
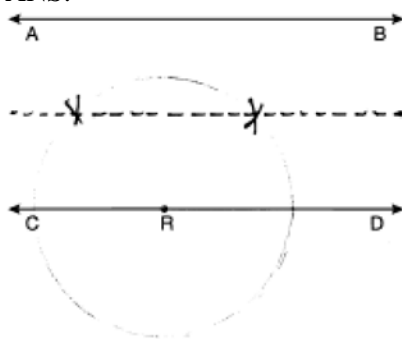
PTS: 2   REF: 061033ge   STA: G.G.22   TOP: Locus

441 ANS: 2

Parallel chords intercept congruent arcs. $m\widehat{AC} = m\widehat{BD} = 30$. $180 - 30 - 30 = 120$.

PTS: 2   REF: 080904ge   STA: G.G.52   TOP: Chords and Secants

442 ANS: 4

The radius is 4. $r^2 = 16$.

PTS: 2   REF: 061014ge   STA: G.G.72   TOP: Equations of Circles

443 ANS: 1   PTS: 2   REF: 061012ge   STA: G.G.20

TOP: Constructions

444 ANS:
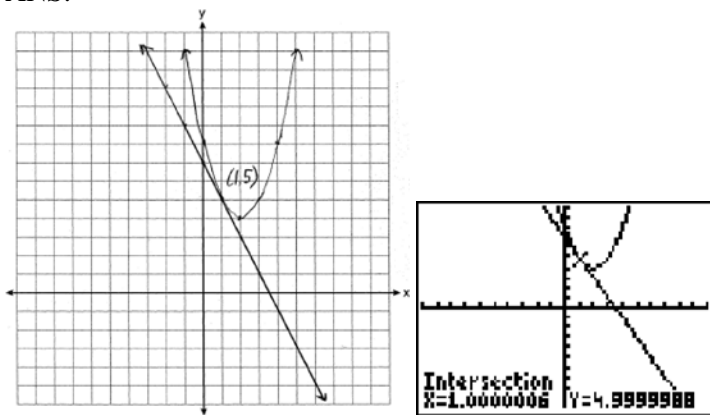
PTS: 6   REF: 011038ge   STA: G.G.70   TOP: Quadratic-Linear Systems

31

445 ANS:
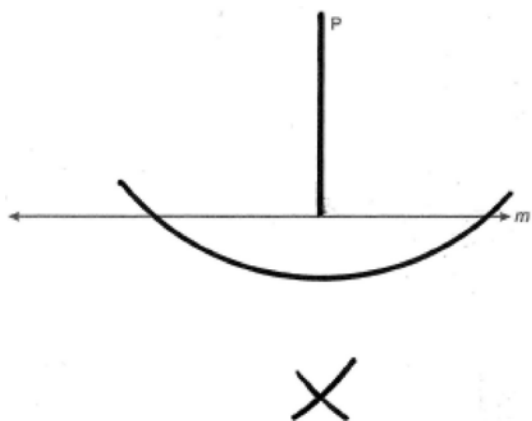
PTS: 2   REF: 060930ge   STA: G.G.19   TOP: Constructions

446 ANS: 2

The slope of $y = \frac{1}{2}x + 5$ is $\frac{1}{2}$. The slope of a perpendicular line is -2. $y = mx + b$.

$$5 = (-2)(-2) + b$$
$$b = 1$$

PTS: 2   REF: 060907ge   STA: G.G.64   TOP: Parallel and Perpendicular Lines

447 ANS: 1

$(x,y) \rightarrow (x + 3, y + 1)$

PTS: 2   REF: fall0803ge   STA: G.G.54   TOP: Translations

448 ANS: 2

Parallel chords intercept congruent arcs. $m\overset{\frown}{AD} = m\overset{\frown}{BC} = 60$. $m\angle CDB = \frac{1}{2}m\overset{\frown}{BC} = 30$.

PTS: 2   REF: 060906ge   STA: G.G.52   TOP: Chords and Secants

449 ANS:
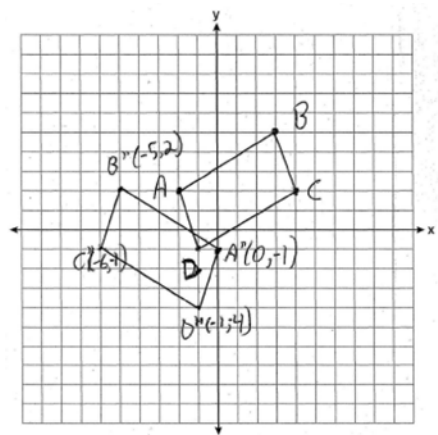
PTS: 4   REF: 060937ge   STA: G.G.54   TOP: Compositions of Transformations

KEY: grids

450 ANS: 2

$$M_x = \frac{2 + (-4)}{2} = -1. \quad M_Y = \frac{-3 + 6}{2} = \frac{3}{2}.$$

PTS: 2 REF: fall0813ge STA: G.G.66 TOP: Midpoint
KEY: general
451 ANS: 1 PTS: 2 REF: 080911ge STA: G.G.73
TOP: Equations of Circles
452 ANS: 1 PTS: 2 REF: 081028ge STA: G.G.21
TOP: Centroid, Orthocenter, Incenter and Circumcenter
453 ANS: 2
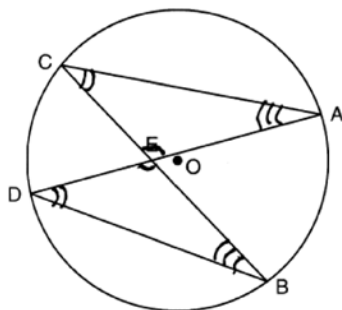
PTS: 2 REF: 061026ge STA: G.G.51 TOP: Arcs Determined by Angles
KEY: inscribed
454 ANS: 3 PTS: 2 REF: 080902ge STA: G.G.17
TOP: Constructions
455 ANS: 2 PTS: 2 REF: 011003ge STA: G.G.55
TOP: Properties of Transformations
456 ANS: 4

The slope of $y = -\frac{2}{3}x - 5$ is $-\frac{2}{3}$. Perpendicular lines have slope that are opposite reciprocals.

PTS: 2 REF: 080917ge STA: G.G.62 TOP: Parallel and Perpendicular Lines

Geometry Regents at Random

457 Which equation represents the circle shown in the graph below?
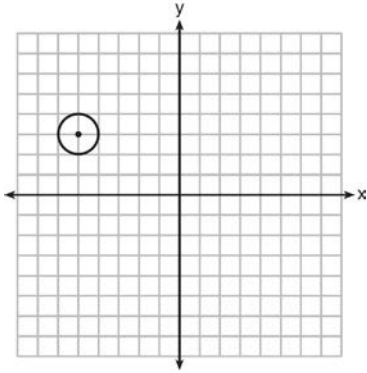
1) $(x-5)^2 + (y+3)^2 = 1$
2) $(x+5)^2 + (y-3)^2 = 1$
3) $(x-5)^2 + (y+3)^2 = 2$
4) $(x+5)^2 + (y-3)^2 = 2$

458 In $\triangle ABC$, $m\angle A = 65$ and $m\angle B$ is greater than $m\angle A$. The lengths of the sides of $\triangle ABC$ in order from smallest to largest are

1) $\overline{AB}, \overline{BC}, \overline{AC}$
2) $\overline{BC}, \overline{AB}, \overline{AC}$
3) $\overline{AC}, \overline{BC}, \overline{AB}$
4) $\overline{AB}, \overline{AC}, \overline{BC}$

459 Triangle $A'B'C'$ is the image of $\triangle ABC$ after a dilation of 2. Which statement is true?

1) $AB = A'B'$
2) $BC = 2(B'C')$
3) $m\angle B = m\angle B'$
4) $m\angle A = \dfrac{1}{2}(m\angle A')$

460 What is the solution of the system of equations graphed below?

$$y = 2x + 1$$

$$y = x^2 + 2x - 3$$
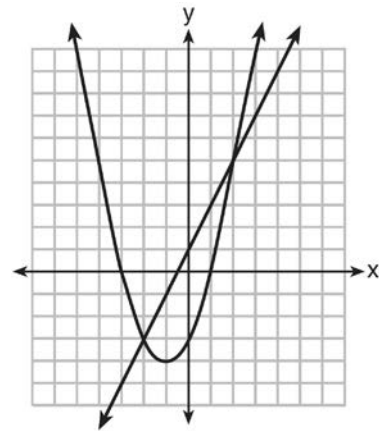
1) $(0,-3)$
2) $(-1,-4)$
3) $(-3,0)$ and $(1,0)$
4) $(-2,-3)$ and $(2,5)$

461 A carpenter made a storage container in the shape of a rectangular prism. It is 5 feet high and has a volume of 720 cubic feet. He wants to make a second container with the same height and volume as the first one, but in the shape of a triangular prism. What will be the number of square feet in the area of the base of the new container?

1) 36
2) 72
3) 144
4) 288

462   In $\triangle ABC$ shown below, L is the midpoint of $\overline{BC}$, M is the midpoint of $\overline{AB}$, and N is the midpoint of $\overline{AC}$.
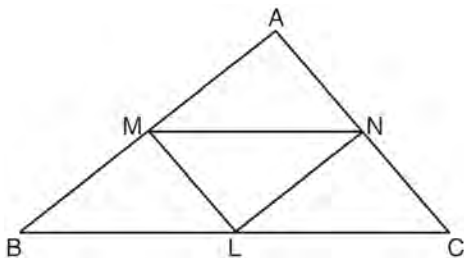
If $MN = 8$, $ML = 5$, and $NL = 6$, the perimeter of trapezoid $BMNC$ is
1)   26
2)   28
3)   30
4)   35

463   What are the coordinates of the image of point $A(2,-7)$ under the translation $(x,y) \rightarrow (x-3, y+5)$?
1) $(-1,-2)$
2) $(-1,2)$
3) $(5,-12)$
4) $(5,12)$

464   The slope of $\overline{QR}$ is $\dfrac{x-1}{4}$ and the slope of $\overline{ST}$ is $\dfrac{8}{3}$.

If $\overline{QR} \perp \overline{ST}$, determine and state the value of x.

465   Write an equation of a line that is parallel to the line whose equation is $3y = x + 6$ and that passes through the point $(-3,4)$.

466   The bases of a prism are right trapezoids, as shown in the diagram below.
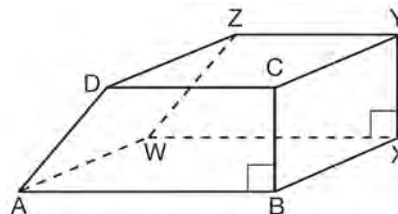
Which two edges do *not* lie in the same plane?
1) $\overline{BC}$ and $\overline{WZ}$
2) $\overline{AW}$ and $\overline{CY}$
3) $\overline{DC}$ and $\overline{WX}$
4) $\overline{BX}$ and $\overline{AB}$

467   In the diagram below of isosceles $\triangle ABC$, the measure of vertex angle B is $80°$. If $\overline{AC}$ extends to point D, what is m$\angle BCD$?
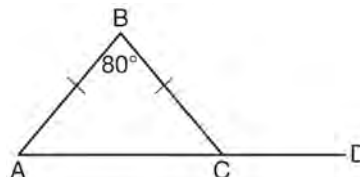
1)   50
2)   80
3)   100
4)   130

468   Point W is located in plane $\mathcal{R}$. How many distinct lines passing through point W are perpendicular to plane $\mathcal{R}$?
1)   one
2)   two
3)   zero
4)   infinite

469 The lines represented by the equations $4x + 6y = 6$ and $y = \dfrac{2}{3}x - 1$ are

1) parallel
2) the same line
3) perpendicular
4) intersecting, but *not* perpendicular

470 The statement "$x > 5$ or $x < 3$" is *false* when x is equal to

1) 1
2) 2
3) 7
4) 4

471 The diagram below shows square $ABCD$ where E and F are points on $\overline{BC}$ such that $\overline{BE} \cong \overline{FC}$, and segments AF and DE are drawn. Prove that $\overline{AF} \cong \overline{DE}$.
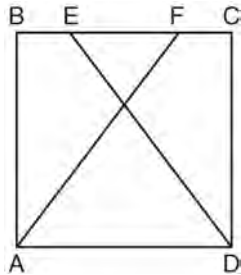

472 Determine and state the measure, in degrees, of an interior angle of a regular decagon.

473 Using a compass and straightedge, locate the midpoint of $\overline{AB}$ by construction. [Leave all construction marks.]
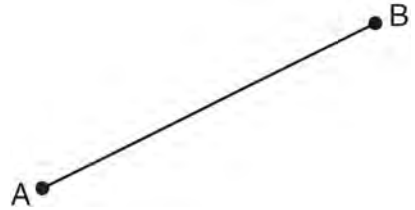
474 The image of $\overline{RS}$ after a reflection through the origin is $\overline{R'S'}$. If the coordinates of the endpoints of $\overline{RS}$ are $R(2,-3)$ and $S(5,1)$, state and label the coordinates of R' and S'. [The use of the set of axes below is optional.]

89
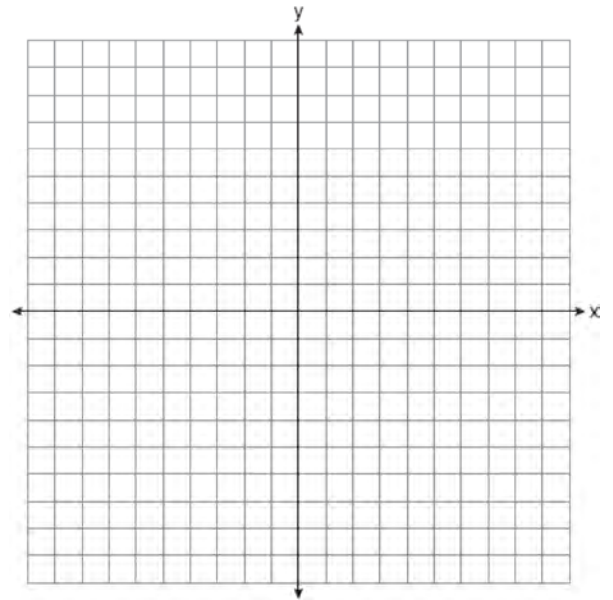
475 In the diagram of the circle below, $\overline{AD} \parallel \overline{BC}$, $\overarc{AB} = (5x + 30)°$, and $\overarc{CD} = (9x - 10)°$.
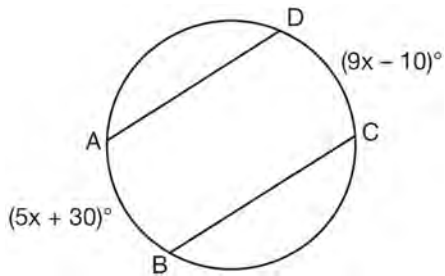
What is $m\overarc{AB}$?
1) 5
2) 10
3) 55
4) 80

476 In the diagram below, line ℓ is parallel to line m, and line w is a transversal.

(Not drawn to scale)
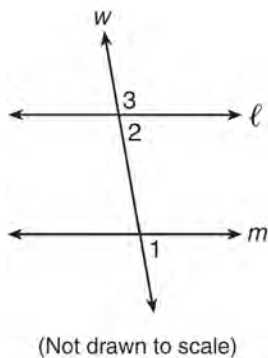
If $m\angle 2 = 3x + 17$ and $m\angle 3 = 5x - 21$, what is $m\angle 1$?
1) 19
2) 23
3) 74
4) 86

477 Which construction of parallel lines is justified by the theorem "If two lines are cut by a transversal to form congruent alternate interior angles, then the lines are parallel"?
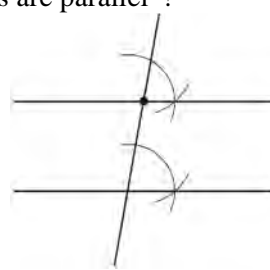
1)
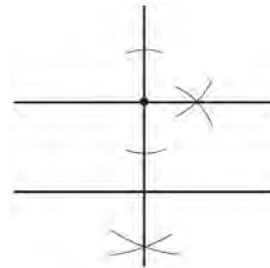
2)
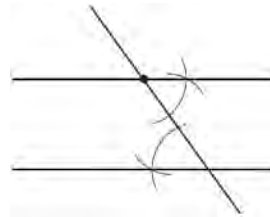
3)
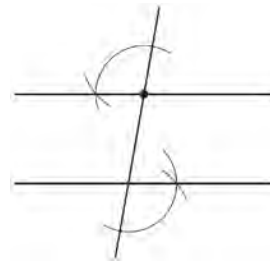
4)

478 If two sides of a triangle have lengths of 4 and 10, the third side could be
1) 8
2) 2
3) 16
4) 4

479 In all isosceles triangles, the exterior angle of a base angle must always be
1) a right angle
2) an acute angle
3) an obtuse angle
4) equal to the vertex angle

480 What is an equation of the line that passes through the point $(2,4)$ and is perpendicular to the line whose equation is $3y = 6x + 3$?
1) $y = -\frac{1}{2}x + 5$
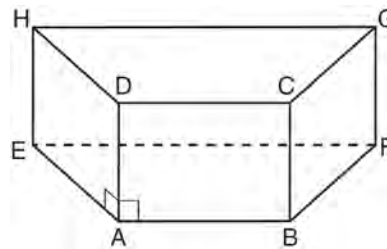2) $y = -\frac{1}{2}x + 4$
3) $y = 2x - 6$
4) $y = 2x$

481 As shown in the diagram below, when hexagon *ABCDEF* is reflected over line *m*, the image is hexagon *A'B'C'D'E'F'*.
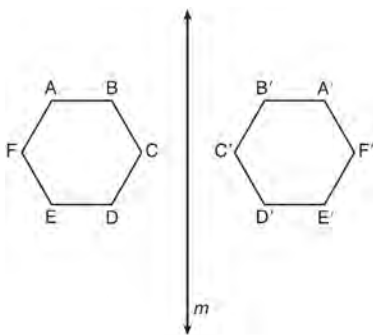
Under this transformation, which property is *not* preserved?
1) area
2) distance
3) orientation
4) angle measure

482 In the prism shown below, $\overline{AD} \perp \overline{AE}$ and $\overline{AD} \perp \overline{AB}$.

Which plane is perpendicular to $\overline{AD}$?
1) HEA
2) BAD
3) EAB
4) EHG

483 For which diagram is the statement $\triangle ABC \sim \triangle ADE$ *not* always true??
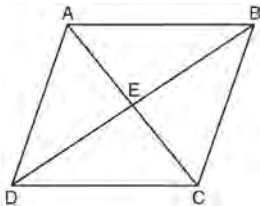

1)

2)

3)

4)

91

484 Triangle ABC has vertices $A(-1,1)$, $B(1,3)$, and $C(4,1)$. The image of $\triangle ABC$ after the transformation $r_{y=x}$ is $\triangle A'B'C'$. State and label the coordinates of $\triangle A'B'C'$. [The use of the set of axes below is optional.]
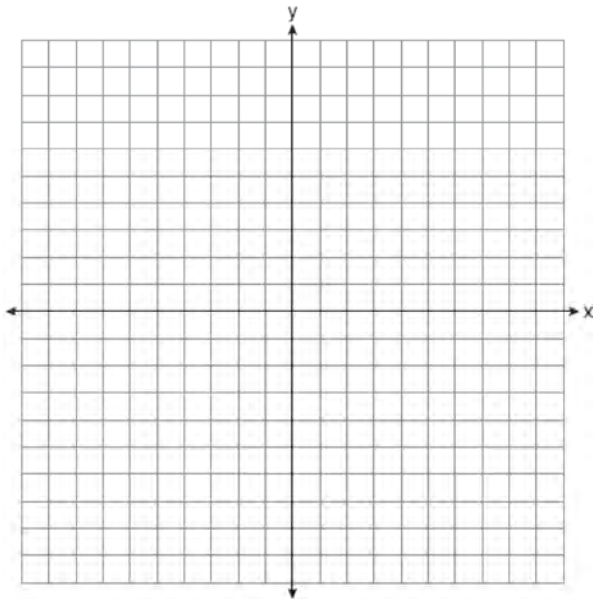
485 Parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E is shown below.

Which statement must be true?
1) $\overline{BE} \cong \overline{CE}$
2) $\angle BAE \cong \angle DCE$
3) $\overline{AB} \cong \overline{BC}$
4) $\angle DAE \cong \angle CBE$

486 What are the truth values of the statement "Opposite angles of a trapezoid are always congruent" and its negation?
1) The statement is true and its negation is true.
2) The statement is true and its negation is false.
3) The statement is false and its negation is true.
4) The statement is false and its negation is false.

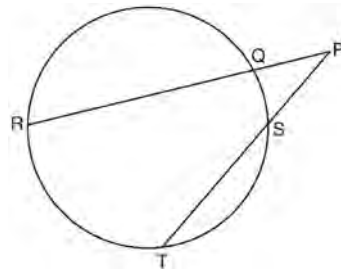487 The equations of lines k, m, and n are given below.
$$k: 3y + 6 = 2x$$
$$m: 3y + 2x + 6 = 0$$
$$n: 2y = 3x + 6$$
Which statement is true?
1) $k \parallel m$
2) $n \parallel m$
3) $m \perp k$
4) $m \perp n$

488 In the diagram below, secants $\overline{PQR}$ and $\overline{PST}$ are drawn to a circle from point P.
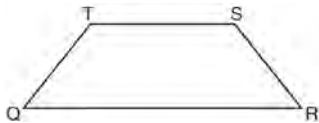

If $PR = 24$, $PQ = 6$, and $PS = 8$, determine and state the length of $\overline{PT}$.

92

489 If $\triangle ABC \sim \triangle LMN$, which statement is *not* always true?
1) $m\angle A \cong m\angle N$
2) $m\angle B \cong m\angle M$
3) $\dfrac{\text{area of } \triangle ABC}{\text{area of } \triangle LMN} = \dfrac{(AC)^2}{(LN)^2}$
4) $\dfrac{\text{perimeter of } \triangle ABC}{\text{perimeter of } \triangle LMN} = \dfrac{AB}{LM}$

490 In isosceles trapezoid $QRST$ shown below, $\overline{QR}$ and $\overline{TS}$ are bases.


If $m\angle Q = 5x + 3$ and $m\angle R = 7x - 15$, what is $m\angle Q$?
1) 83
2) 48
3) 16
4) 9

491 The measures of the angles of a triangle are in the ratio $5:6:7$. Determine the measure, in degrees, of the *smallest* angle of the triangle.

492 In quadrilateral $ABCD$, each diagonal bisects opposite angles. If $m\angle DAB = 70$, then $ABCD$ must be a
1) rectangle
2) trapezoid
3) rhombus
4) square

493 A right rectangular prism is shown in the diagram below.
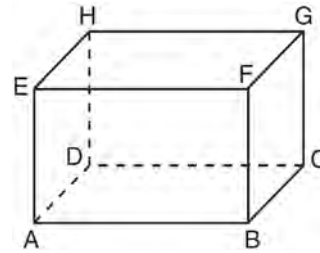
Which line segments are coplanar?
1) $\overline{EF}$ and $\overline{BC}$
2) $\overline{HD}$ and $\overline{FG}$
3) $\overline{GH}$ and $\overline{FB}$
4) $\overline{EA}$ and $\overline{GC}$

494 Students made four statements about a circle.
   A: The coordinates of its center are $(4, -3)$.
   B: The coordinates of its center are $(-4, 3)$.
   C: The length of its radius is $5\sqrt{2}$.
   D: The length of its radius is 25.
If the equation of the circle is $(x + 4)^2 + (y - 3)^2 = 50$, which statements are correct?
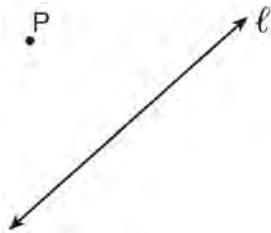1) A and C
2) A and D
3) B and C
4) B and D

495 In parallelogram $ABCD$, with diagonal $\overline{AC}$ drawn, $m\angle BCA = 4x + 2$, $m\angle DAC = 6x - 6$, $m\angle BAC = 5y - 1$, and $m\angle DCA = 7y - 15$. Determine $m\angle B$.

93

496 What are the coordinates of P', the image of point $P(x,y)$ after translation $T_{4,4}$?

1) $(x-4, y-4)$
2) $(x+4, y+4)$
3) $(4x, 4y)$
4) $(4,4)$

497 In the diagram below, point P is not on line ℓ.

How many distinct planes that contain point P are also perpendicular to line ℓ?

1) 1
2) 2
3) 0
4) an infinite amount

498 What is an equation of the line that passes through the point $(-2, 1)$ and is parallel to the line whose equation is $4x - 2y = 8$?

1) $y = \frac{1}{2}x + 2$
2) $y = \frac{1}{2}x - 2$
3) $y = 2x + 5$
4) $y = 2x - 5$

499 A paper container in the shape of a right circular cone has a radius of 3 inches and a height of 8 inches. Determine and state the number of cubic inches in the volume of the cone, in terms of π.

500 In isosceles triangle RST shown below, $\overline{RS} \cong \overline{RT}$, M and N are midpoints of $\overline{RS}$ and $\overline{RT}$, respectively, and $\overline{MN}$ is drawn. If $MN = 3.5$ and the perimeter of $\triangle RST$ is 25, determine and state the length of $\overline{NT}$.
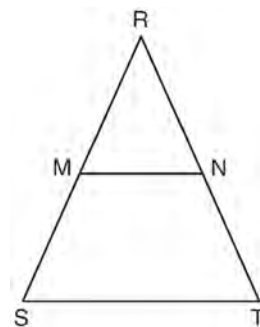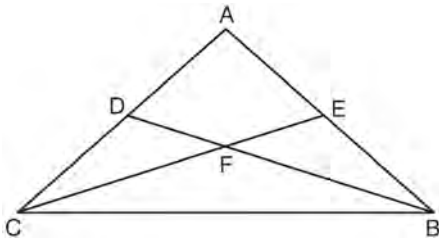

501 Points A and B are on line ℓ, and line ℓ is parallel to line m, as shown in the diagram below.
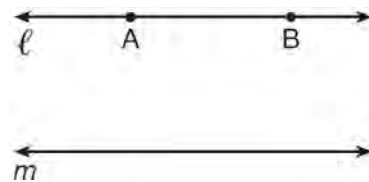
How many points are in the same plane as ℓ and m and equidistant from ℓ and m, and also equidistant from A and B?

1) 1
2) 2
3) 3
4) 0

502 In $\triangle ABC$ shown below with $\overline{ADC}$, $\overline{AEB}$, $\overline{CFE}$, and $\overline{BFD}$, $\triangle ACE \cong \triangle ABD$.


Which statement must be true?
1) $\angle ACF \cong \angle BCF$
2) $\angle DAE \cong \angle DFE$
3) $\angle BCD \cong \angle ABD$
4) $\angle AEF \cong \angle ADF$

503 Given: "If a polygon is a triangle, then the sum of its interior angles is 180°." What is the contrapositive of this statement?
1) "If the sum of the interior angles of a polygon is not 180°, then it is not a triangle."
2) "A polygon is a triangle if and only if the sum of its interior angles is 180°."
3) "If a polygon is not a triangle, then the sum of the interior angles is not 180°."
4) "If the sum of the interior angles of a polygon is 180°, then it is a triangle."

504 A circle whose center has coordinates $(-3,4)$ passes through the origin. What is the equation of the circle?
1) $(x+3)^2 + (y-4)^2 = 5$
2) $(x+3)^2 + (y-4)^2 = 25$
3) $(x-3)^2 + (y+4)^2 = 5$
4) $(x-3)^2 + (y+4)^2 = 25$

505 Parallel secants $\overleftrightarrow{FH}$ and $\overleftrightarrow{GJ}$ intersect circle O, as shown in the diagram below.
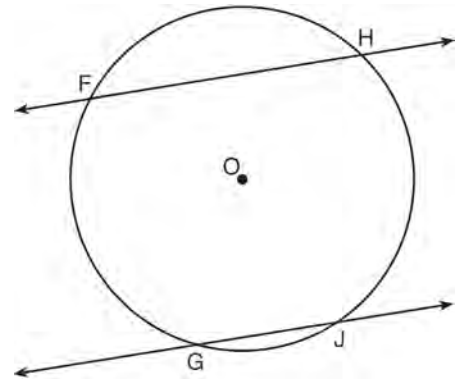
If $m\overarc{FH} = 106$ and $m\overarc{GJ} = 24$, then $m\overarc{FG}$ equals
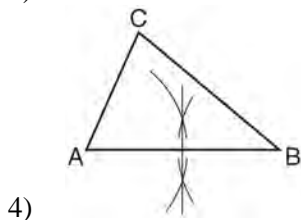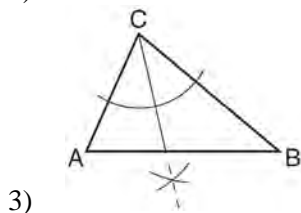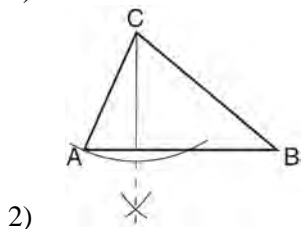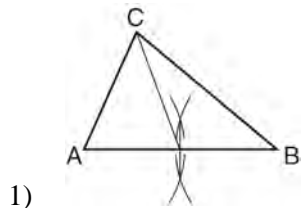1) 106
2) 115
3) 130
4) 156

506 In the diagram below, $\overline{QM}$ is an altitude of right triangle PQR, $PM = 8$, and $RM = 18$.
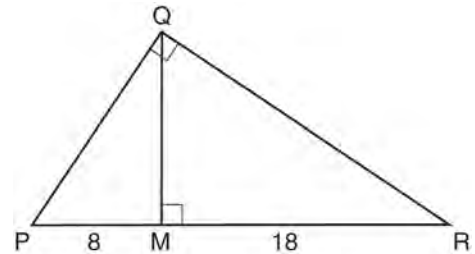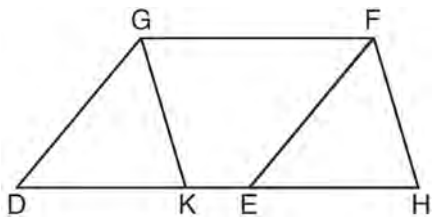

What is the length of $\overline{QM}$?
1) 20
2) 16
3) 12
4) 10

95

507 Which diagram illustrates a correct construction of an altitude of $\triangle ABC$?

1)

2)

3)

4)

508 Given: Parallelogram *DEFG*, *K* and *H* are points on $\overrightarrow{DE}$ such that $\angle DGK \cong \angle EFH$ and $\overline{GK}$ and $\overline{FH}$ are drawn.

Prove: $\overline{DK} \cong \overline{EH}$

509 Which equation represents a circle whose center is the origin and that passes through the point $(-4,0)$?

1) $x^2 + y^2 = 8$
2) $x^2 + y^2 = 16$
3) $(x+4)^2 + y^2 = 8$
4) $(x+4)^2 + y^2 = 16$

510 From external point *A*, two tangents to circle *O* are drawn. The points of tangency are *B* and *C*. Chord $\overline{BC}$ is drawn to form $\triangle ABC$. If m$\angle ABC = 66$, what is m$\angle A$?

1) 33
2) 48
3) 57
4) 66

511 Point *P* is 5 units from line *j*. Sketch the locus of points that are 3 units from line *j* and also sketch the locus of points that are 8 units from *P*. Label with an **X** all points that satisfy *both* conditions.

512 If $\triangle W'X'Y'$ is the image of $\triangle WXY$ after the transformation $R_{90°}$, which statement is *false*?
1) $XY = X'Y'$
2) $\overline{WX} \parallel \overline{W'X'}$
3) $\triangle WXY \cong \triangle W'X'Y'$
4) $m\angle XWY = m\angle X'W'Y'$

513 Quadrilateral *HYPE* has vertices $H(2,3)$, $Y(1,7)$, $P(-2,7)$, and $E(-2,4)$. State and label the coordinates of the vertices of $H''Y''P''E''$ after the composition of transformations $r_{x-axis} \circ T_{5,-3}$. [The use of the set of axes below is optional.]
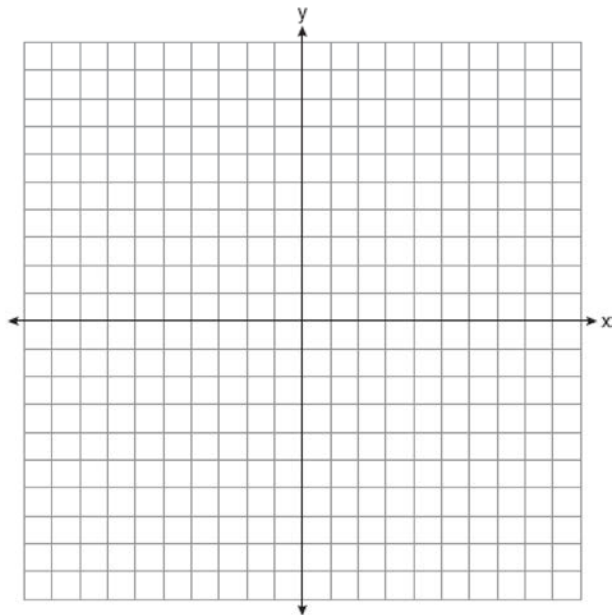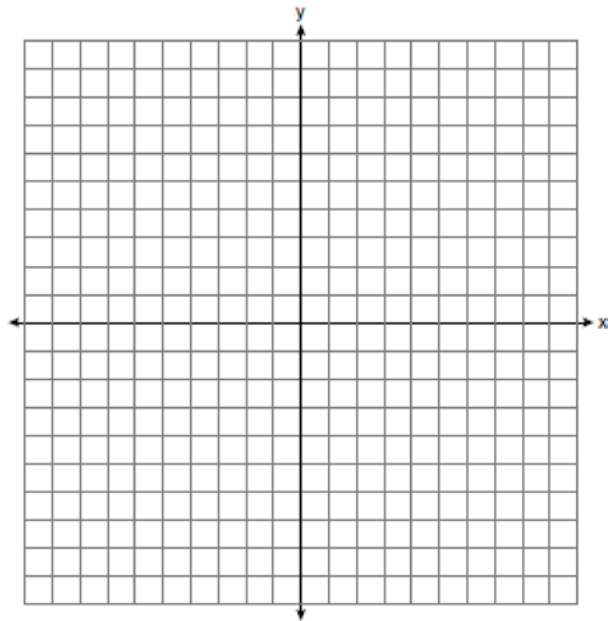
514 The diameter of a sphere is 12 inches. What is the volume of the sphere to the *nearest cubic inch*?
1) 288
2) 452
3) 905
4) 7,238

515 Solve the following system of equations graphically. State the coordinates of all points in the solution.
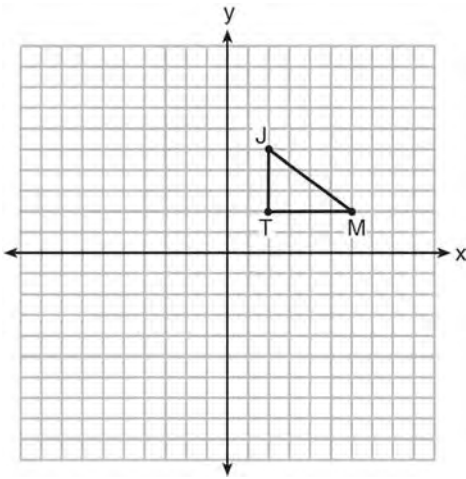$$y + 4x = x^2 + 5$$
$$x + y = 5$$

516 The sum of the interior angles of a regular polygon is 720°. How many sides does the polygon have?
1) 8
2) 6
3) 5
4) 4

517 The corresponding medians of two similar triangles are 8 and 20. If the perimeter of the larger triangle is 45, what is the perimeter of the smaller triangle?
1) 14
2) 18
3) 33
4) 37

518 Triangle *JTM* is shown on the graph below.

Which transformation would result in an image that is *not* congruent to $\triangle JTM$?
1) $r_{y=x}$
2) $R_{90°}$
3) $T_{0,-3}$
4) D_2

519 The coordinates of the endpoints of $\overline{CD}$ are $C(3,8)$ and $D(6,-1)$. Find the length of $\overline{CD}$ in simplest radical form.

520 In a circle whose equation is $(x-1)^2 + (y+3)^2 = 9$, the coordinates of the center and length of its radius are
1) $(1,-3)$ and $r = 81$
2) $(-1,3)$ and $r = 81$
3) $(1,-3)$ and $r = 3$
4) $(-1,3)$ and $r = 3$

521 In $\triangle JKL$, $\overline{JL} \cong \overline{KL}$. If $m\angle J = 58$, then $m\angle L$ is
1) 61
2) 64
3) 116
4) 122

522 Write an equation of the line that is perpendicular to the line whose equation is $2y = 3x + 12$ and that passes through the origin.

523 In the diagram below, right triangle *RSU* is inscribed in circle *O*, and $\overline{UT}$ is the altitude drawn to hypotenuse $\overline{RS}$. The length of $\overline{RT}$ is 16 more than the length of $\overline{TS}$ and $TU = 15$. Find the length of $\overline{TS}$. Find, in simplest radical form, the length of $\overline{RU}$.
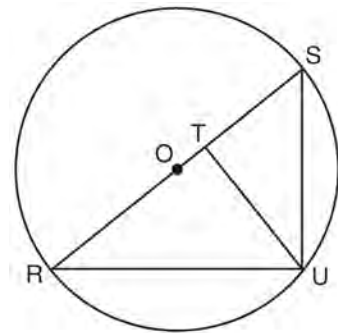
524 Which set of numbers could be the lengths of the sides of an isosceles triangle?
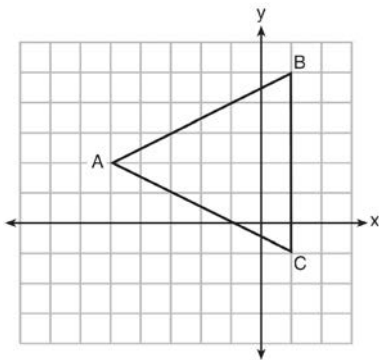1) $\{1,1,2\}$
2) $\{3,3,5\}$
3) $\{3,4,5\}$
4) $\{4,4,9\}$

525 In the diagram below of $\triangle ABC$, with $\overline{CDEA}$ and $\overline{BGFA}$, $\overline{EF} \parallel \overline{DG} \parallel \overline{CB}$.
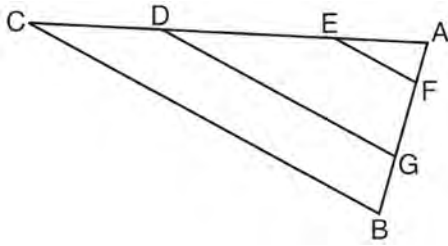
Which statement is *false*?

1) $\dfrac{AC}{AD} = \dfrac{AB}{AG}$

2) $\dfrac{AE}{AF} = \dfrac{AC}{AB}$

3) $\dfrac{AE}{AD} = \dfrac{EC}{AC}$
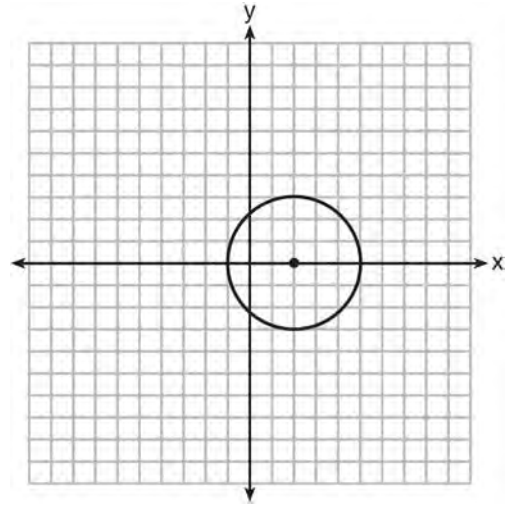
4) $\dfrac{BG}{BA} = \dfrac{CD}{CA}$

526 Triangle *ABC* is graphed on the set of axes below.

What are the coordinates of the point of intersection of the medians of $\triangle ABC$?

1) $(-1, 2)$
2) $(-3, 2)$
3) $(0, 2)$
4) $(1, 2)$

527 Which equation represents the circle shown in the graph below?

1) $(x - 2)^2 + y^2 = 9$
2) $(x + 2)^2 + y^2 = 9$
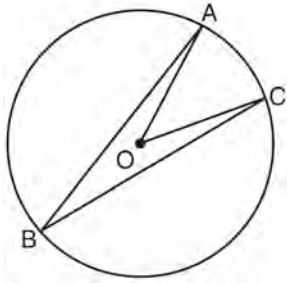3) $(x - 2)^2 + y^2 = 3$
4) $(x + 2)^2 + y^2 = 3$

528 In parallelogram *JKLM*, m$\angle L$ exceeds m$\angle M$ by 30 degrees. What is the measure of m$\angle J$?

1) $75°$
2) $105°$
3) $165°$
4) $195°$

529 The image of $\triangle ABC$ after the transformation r_{y-axis} is $\triangle A'B'C'$. Which property is *not* preserved?

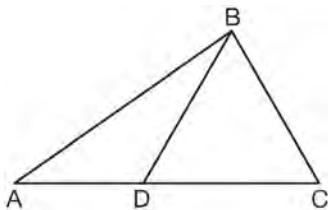1) distance
2) orientation
3) collinearity
4) angle measure

530 In the diagram below of circle O, m$\angle ABC = 24$.

What is the m$\angle AOC$?
1) 12
2) 24
3) 48
4) 60

531 In the diagram of $\triangle ABC$ below, $\overline{BD}$ is drawn to side $\overline{AC}$.

If m$\angle A = 35$, m$\angle ABD = 25$, and m$\angle C = 60$, which type of triangle is $\triangle BCD?$
1) equilateral
2) scalene
3) obtuse
4) right

532 What is the measure of each interior angle in a regular octagon?
1) 108°
2) 135°
3) 144°
4) 1080°

533 Point M is the midpoint of $\overline{AB}$. If the coordinates of M are $(2,8)$ and the coordinates of A are $(10,12)$, what are the coordinates of B?
1) $(6,10)$
2) $(-6,4)$
3) $(-8,-4)$
4) $(18,16)$

534 Point A lies on plane $\mathcal{P}$. How many distinct lines passing through point A are perpendicular to plane $\mathcal{P}$?
1) 1
2) 2
3) 0
4) infinite

535 As shown in the diagram below, a right circular cone has a height of 12 and a radius of 5.
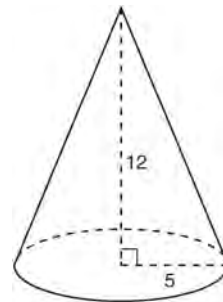
Determine, in terms of π, the lateral area of the right circular cone.
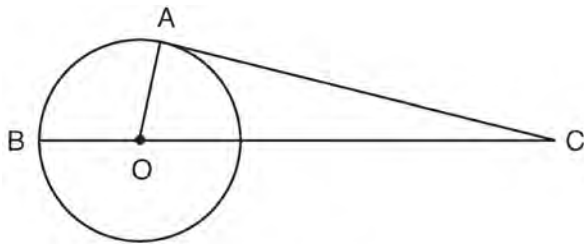
536 Rectangle $KLMN$ has vertices $K(0,4)$, $L(4,2)$, $M(1,-4)$, and $N(-3,-2)$. Determine and state the coordinates of the point of intersection of the diagonals.

537 Which pair of edges is *not* coplanar in the cube shown below?
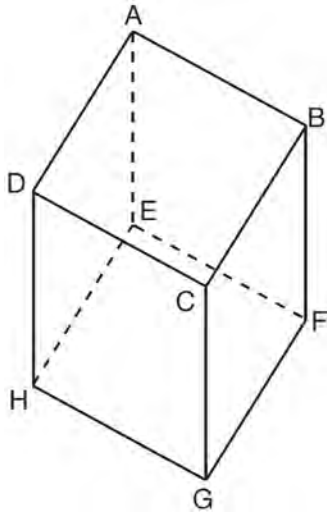
1) $\overline{EH}$ and $\overline{CD}$
2) $\overline{AD}$ and $\overline{FG}$
3) $\overline{DH}$ and $\overline{AE}$
4) $\overline{AB}$ and $\overline{EF}$

538 In the diagram below of circle O with radius $\overline{OA}$, tangent $\overline{CA}$ and secant $\overline{COB}$ are drawn.
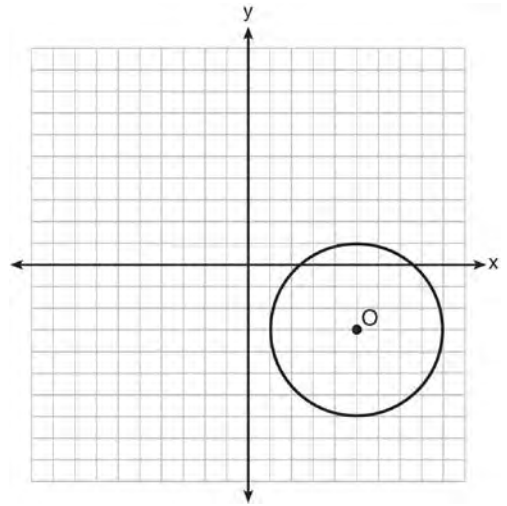

(Not drawn to scale)

If $AC = 20$ cm and $OA = 7$ cm, what is the length of $\overline{OC}$, to the *nearest centimeter*?
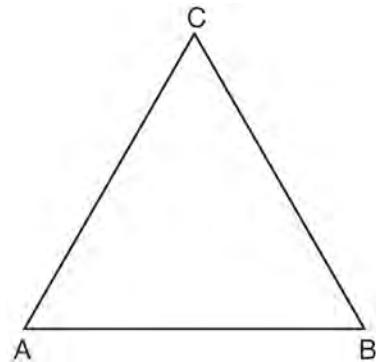1) 19
2) 20
3) 21
4) 27

539 The diagram below is a graph of circle O.

Which equation represents circle O?
1) $(x-5)^2 + (y+3)^2 = 4$
2) $(x+5)^2 + (y-3)^2 = 4$
3) $(x-5)^2 + (y+3)^2 = 16$
4) $(x+5)^2 + (y-3)^2 = 16$

540 In the diagram below, $\triangle ABC$ is equilateral.


Using a compass and straightedge, construct a new equilateral triangle congruent to $\triangle ABC$ in the space below. [Leave all construction marks.]

101

541 What is an equation of the line that passes through the point $(4,5)$ and is parallel to the line whose equation is $y = \frac{2}{3}x - 4$?

1) $2y + 3x = 11$
2) $2y + 3x = 22$
3) $3y - 2x = 2$
4) $3y - 2x = 7$

542 In the diagram below of right triangle ABC, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$, $AD = 3$, and $DB = 4$.
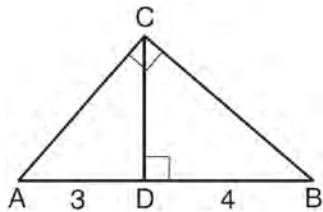

What is the length of $\overline{CB}$?

1) $2\sqrt{3}$
2) $\sqrt{21}$
3) $2\sqrt{7}$
4) $4\sqrt{3}$

543 Given the statement, "If a number has exactly two factors, it is a prime number," what is the contrapositive of this statement?

1) If a number does not have exactly two factors, then it is not a prime number.
2) If a number is not a prime number, then it does not have exactly two factors.
3) If a number is a prime number, then it has exactly two factors.
4) A number is a prime number if it has exactly two factors.

544 In the diagram below, a right circular cone with a radius of 3 inches has a slant height of 5 inches, and a right cylinder with a radius of 4 inches has a height of 6 inches.
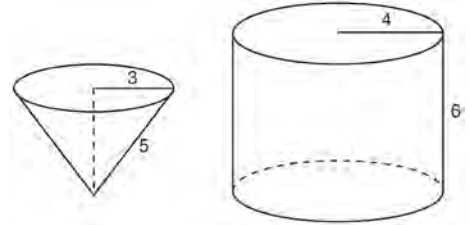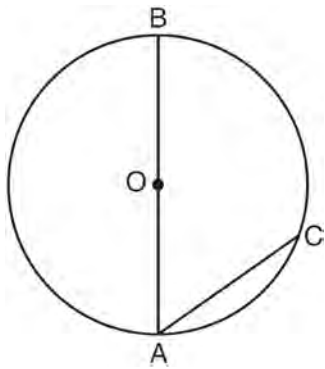

Determine and state the number of full cones of water needed to completely fill the cylinder with water.

545 In the diagram below, $\overline{A'B'}$ is the image of $\overline{AB}$ under which single transformation?
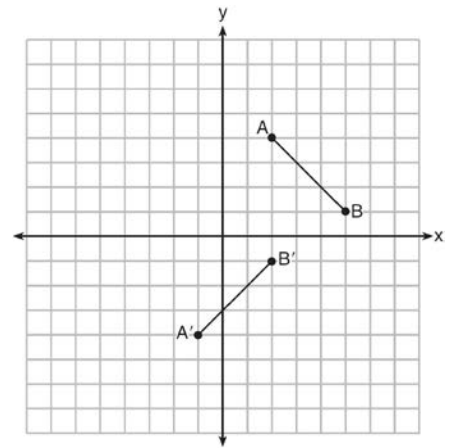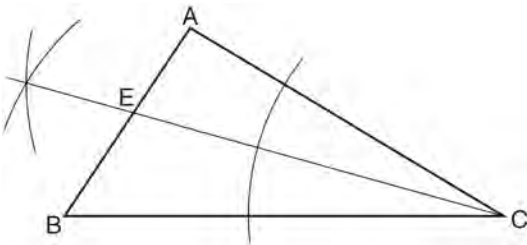

1) dilation
2) rotation
3) translation
4) glide reflection

546 As shown in the diagram below, $\overline{AB}$ is a diameter of circle O, and chord $\overline{AC}$ is drawn.
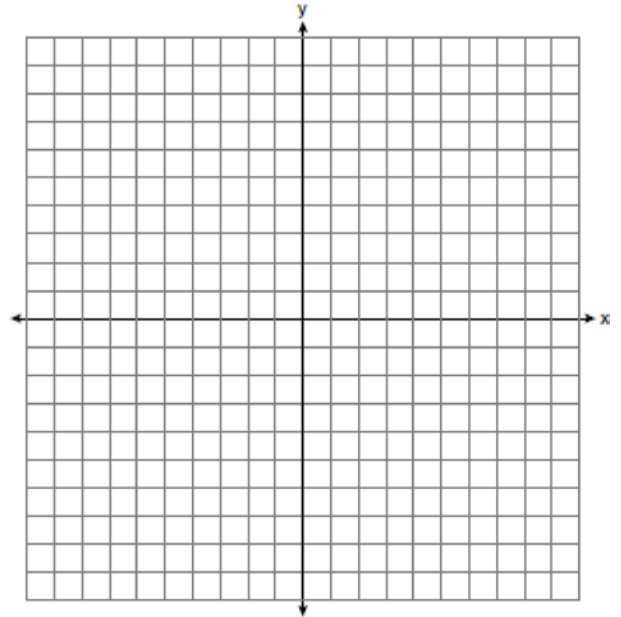

If m$\angle BAC = 70$, then m$\overarc{AC}$ is
1) 40
2) 70
3) 110
4) 140

547 A student used a compass and a straightedge to construct $\overline{CE}$ in $\triangle ABC$ as shown below.

Which statement must always be true for this construction?
1) $\angle CEA \cong \angle CEB$
2) $\angle ACE \cong \angle BCE$
3) $\overline{AE} \cong \overline{BE}$
4) $\overline{EC} \cong \overline{AC}$

548 On the set of axes below, graph the locus of points 5 units from the point $(2,-3)$ and the locus of points 2 units from the line whose equation is $y = -1$. State the coordinates of all points that satisfy *both* conditions.

549 What is the length of a line segment whose endpoints have coordinates $(5,3)$ and $(1,6)$?
1) 5
2) 25
3) $\sqrt{17}$
4) $\sqrt{29}$

550 Points A, B, C, and D are located on circle O, forming trapezoid $ABCD$ with $\overline{AB} \parallel \overline{DC}$. Which statement must be true?
1) $\overline{AB} \cong \overline{DC}$
2) $\overarc{AD} \cong \overarc{BC}$
3) $\angle A \cong \angle D$
4) $\overarc{AB} \cong \overarc{DC}$

103

551 The equations $y = 2x + 3$ and $y = -x^2 - x + 1$ are graphed on the same set of axes. The coordinates of a point in the solution of this system of equations are
1) $(0, 1)$
2) $(1, 5)$
3) $(-1, -2)$
4) $(-2, -1)$

552 In the diagram below of $\triangle MAR$, medians $\overline{MN}$, $\overline{AT}$, and $\overline{RH}$ intersect at O.
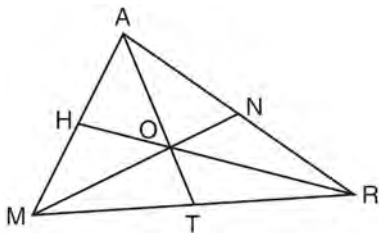
If $TO = 10$, what is the length of $\overline{TA}$?
1) 30
2) 25
3) 20
4) 15

553 Quadrilateral $ABCD$ undergoes a transformation, producing quadrilateral $A'B'C'D'$. For which transformation would the area of $A'B'C'D'$ *not* be equal to the area of $ABCD$?
1) a rotation of 90° about the origin
2) a reflection over the y-axis
3) a dilation by a scale factor of 2
4) a translation defined by $(x, y) \rightarrow (x + 4, y - 1)$

554 In $\triangle ABC$, $AB = 4$, $BC = 7$, and $AC = 10$. Which statement is true?
1) $m\angle B > m\angle C > m\angle A$
2) $m\angle B > m\angle A > m\angle C$
3) $m\angle C > m\angle B > m\angle A$
4) $m\angle C > m\angle A > m\angle B$

555 Which quadrilateral has diagonals that are always perpendicular bisectors of each other?
1) square
2) rectangle
3) trapezoid
4) parallelogram

556 On the set of axes below, graph two horizontal lines whose y-intercepts are $(0, -2)$ and $(0, 6)$, respectively. Graph the locus of points equidistant from these horizontal lines. Graph the locus of points 3 units from the y-axis. State the coordinates of the points that satisfy both loci.
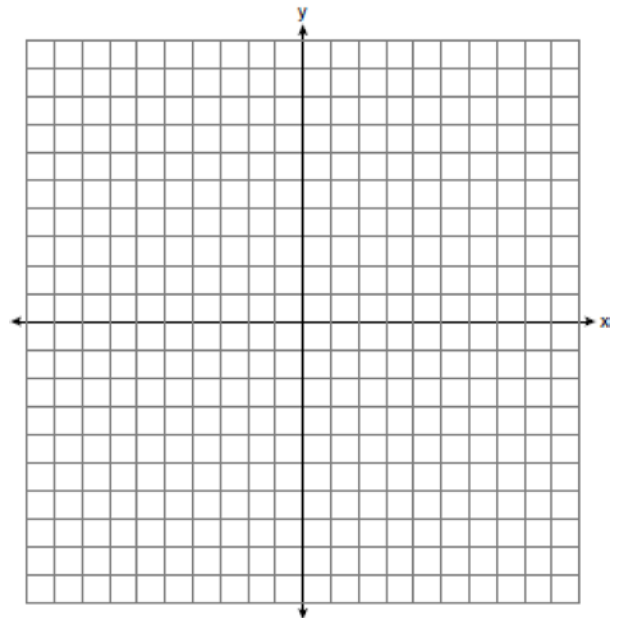
557 On the set of axes below, graph and label circle A whose equation is $(x+4)^2 + (y-2)^2 = 16$ and circle B whose equation is $x^2 + y^2 = 9$. Determine, in simplest radical form, the length of the line segment with endpoints at the centers of circles A and B.
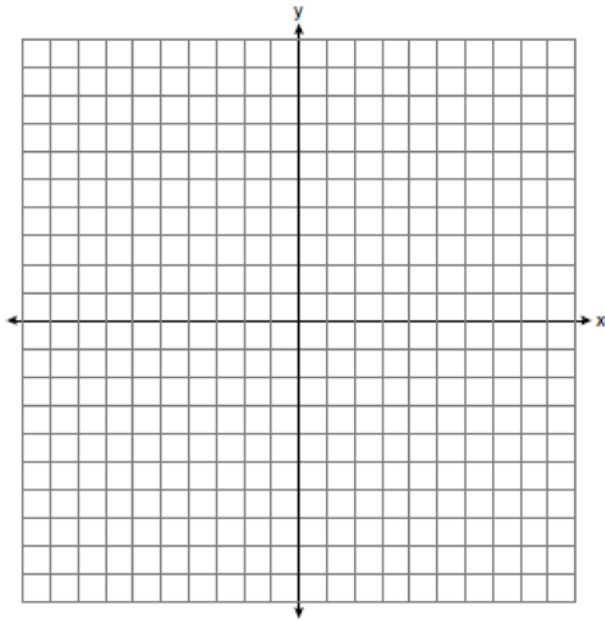

558 Which statement is the inverse of "If $x + 3 = 7$, then $x = 4$"?
1) If $x = 4$, then $x + 3 = 7$.
2) If $x \neq 4$, then $x + 3 \neq 7$.
3) If $x + 3 \neq 7$, then $x \neq 4$.
4) If $x + 3 = 7$, then $x \neq 4$.

559 If $\overline{AB}$ is defined by the endpoints $A(4,2)$ and $B(8,6)$, write an equation of the line that is the perpendicular bisector of $\overline{AB}$.

560 In $\triangle ABC$, $m\angle B < m\angle A < m\angle C$. Which statement is *false*?
1) $AC > BC$
2) $BC > AC$
3) $AC < AB$
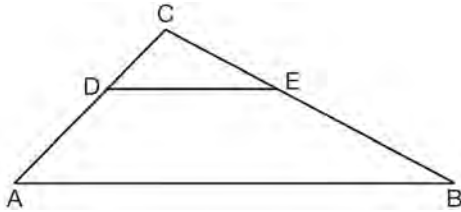4) $BC < AB$

561 In the diagram below of $\triangle ABC$, point H is the intersection of the three medians.
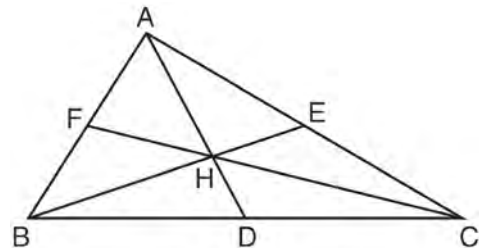
If $\overline{DH}$ measures 2.4 centimeters, what is the length, in centimeters, of $\overline{AD}$?
1) 3.6
2) 4.8
3) 7.2
4) 9.6

562 What are the coordinates of the midpoint of the line segment with endpoints $(2,-5)$ and $(8,3)$?
1) $(3,-4)$
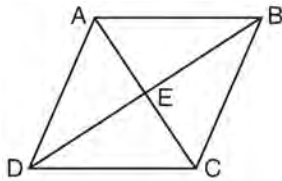2) $(3,-1)$
3) $(5,-4)$
4) $(5,-1)$

563 In the diagram of $\triangle ABC$ below, $\overline{DE} \parallel \overline{AB}$.

If $CD = 4$, $CA = 10$, $CE = x + 2$, and $EB = 4x - 7$, what is the length of $\overline{CE}$?
1) 10
2) 8
3) 6
4) 4

564 In the diagram below of rhombus $ABCD$, the diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.

If $AC = 18$ and $BD = 24$, what is the length of one side of rhombus $ABCD?$
1) 15
2) 18
3) 24
4) 30

565 A regular polygon with an exterior angle of 40° is a
1) pentagon
2) hexagon
3) nonagon
4) decagon

566 Which graph represents a circle whose equation is $(x - 2)^2 + (y + 4)^2 = 4$?
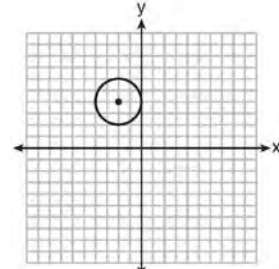
1)
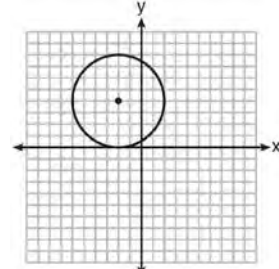
2)

3)

4)

567 The lengths of two sides of a triangle are 7 and 11. Which inequality represents all possible values for x, the length of the third side of the triangle?
1) $4 \le x \le 18$
2) $4 < x \le 18$
3) $4 \le x < 18$
4) $4 < x < 18$

Geometry Regents at Random
Answer Section

457 ANS: 2   PTS: 2   REF: 081520ge   STA: G.G.72
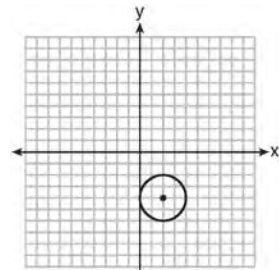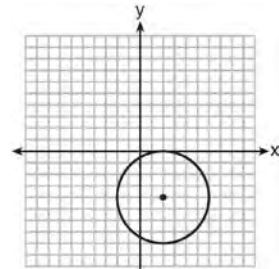TOP: Equations of Circles

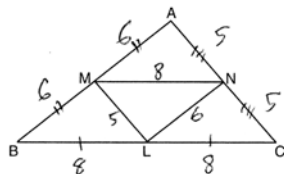458 ANS: 1   PTS: 2   REF: 061523ge   STA: G.G.34
TOP: Angle Side Relationship

459 ANS: 3   PTS: 2   REF: 011524ge   STA: G.G.58
TOP: Dilations

460 ANS: 4   PTS: 2   REF: 011501ge   STA: G.G.70
TOP: Quadratic-Linear Systems

461 ANS: 3
$720 = 5B$

$144 = B$

PTS: 2   REF: 081523ge   STA: G.G.11   TOP: Volume

462 ANS: 4

PTS: 2   REF: 061520ge   STA: G.G.42   TOP: Midsegments

463 ANS: 1
$(2,-7) \rightarrow (2-3,-7+5) = (-1,-2)$

PTS: 2   REF: 061504ge   STA: G.G.61
TOP: Analytical Representations of Transformations

464 ANS:
$$\frac{x-1}{4} = \frac{-3}{8}$$

$$8x - 8 = -12$$

$$8x = -4$$

$$x = -\frac{1}{2}$$

PTS: 2   REF: 011534ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

465 ANS:
$m = \frac{1}{3}$ $4 = \frac{1}{3}(-3) + b$ $y = \frac{1}{3}x + 5$

$4 = -1 + b$

$5 = b$

PTS: 2   REF: 011532ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

1

466 ANS: 1   PTS: 2   REF: 011526ge   STA: G.G.10
     TOP: Solids

467 ANS: 4

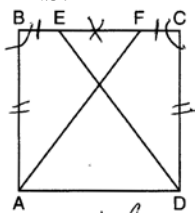$$180 - \frac{180 - 80}{2} = 130$$

     PTS: 2   REF: 011508ge   STA: G.G.31   TOP: Isosceles Triangle Theorem

468 ANS: 1   PTS: 2   REF: 011512ge   STA: G.G.3
     TOP: Planes

469 ANS: 4

$$m = \frac{-A}{B} = \frac{-4}{6} = -\frac{2}{3}$$

     PTS: 2   REF: 011520ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

470 ANS: 4   PTS: 2   REF: 081505ge   STA: G.G.25
   TOP: Compound Statements   KEY: disjunction

471 ANS:

Square *ABCD*; *E* and *F* are points on $\overline{BC}$ such that $\overline{BE} \cong \overline{FC}$; $\overline{AF}$ and $\overline{DE}$ drawn (Given). $\overline{AB} \cong \overline{CD}$ (All sides of a square are congruent). $\angle ABF \cong \angle DCE$ (All angles of a square are equiangular). $\overline{EF} \cong \overline{FE}$ (Reflexive property). $\overline{BE} + \overline{EF} \cong \overline{FC} + \overline{FE}$ (Additive property of line segments). $\overline{BF} \cong \overline{CE}$ (Angle addition). $\triangle ABF \cong \triangle DCE$ (SAS). $\overline{AF} \cong \overline{DE}$ (CPCTC).

     PTS: 6   REF: 061538ge   STA: G.G.27   TOP: Quadrilateral Proofs

472 ANS:

$$\frac{(n - 2)180}{n} = \frac{(10 - 2)180}{10} = 144$$

     PTS: 2   REF: 011531ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons
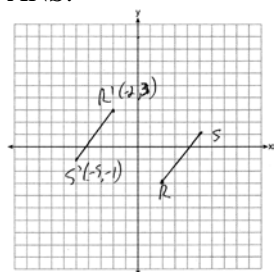
473 ANS:
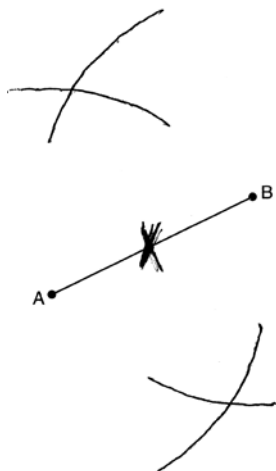
PTS: 2   REF: 061532ge   STA: G.G.18   TOP: Constructions

474 ANS:

PTS: 2   REF: 081529ge   STA: G.G.54   TOP: Reflections
KEY: grids

475 ANS: 4
$9x - 10 = 5x + 30$ $5(10) + 30 = 80$

$4x = 40$

$x = 10$

PTS: 2   REF: 011525ge   STA: G.G.52   TOP: Chords and Secants

476 ANS: 4
$3x + 17 + 5x - 21 = 180$ $m\angle 1 = 3(23) + 17 = 86$

$8x - 4 = 180$

$8x = 184$

$x = 23$

PTS: 2   REF: 011513ge   STA: G.G.35   TOP: Parallel Lines and Transversals

477 ANS: 3   PTS: 2   REF: 081512ge   STA: G.G.19
TOP: Constructions

478 ANS: 1

$10 - 4 < s < 10 + 4$

$6 < s < 14$

PTS: 2   REF: 011519ge   STA: G.G.33   TOP: Triangle Inequality Theorem

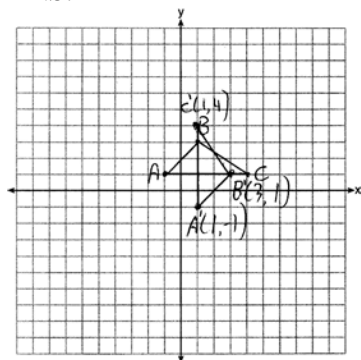479 ANS: 3   PTS: 2   REF: 061508ge   STA: G.G.32

TOP: Exterior Angle Theorem

480 ANS: 1

$m = \dfrac{6}{3} = 2 \quad m_{\perp} = -\dfrac{1}{2} \quad 4 = -\dfrac{1}{2}(2) + b$

$4 = -1 + b$

$5 = b$

PTS: 2   REF: 061507ge   STA: G.G.64   TOP: Parallel and Perpendicular Lines

481 ANS: 3   PTS: 2   REF: 011503ge   STA: G.G.55

TOP: Properties of Transformations

482 ANS: 3   PTS: 2   REF: 061522ge   STA: G.G.1

TOP: Planes

483 ANS: 4   PTS: 2   REF: 011528ge   STA: G.G.44

TOP: Similarity Proofs

484 ANS:

PTS: 2   REF: 061530ge   STA: G.G.54   TOP: Reflections

KEY: grids

485 ANS: 2   PTS: 2   REF: 011522ge   STA: G.G.38

TOP: Parallelograms

486 ANS: 3   PTS: 2   REF: 011506ge   STA: G.G.24

TOP: Negations

487 ANS: 4

$k: m = \dfrac{2}{3} \quad m: m = \dfrac{-A}{B} = \dfrac{-2}{3} \quad n: m = \dfrac{3}{2}$

PTS: 2   REF: 061518ge   STA: G.G.63   TOP: Parallel and Perpendicular Lines

488 ANS:

$24 \cdot 6 = w \cdot 8$

$144 = 8w$

$18 = w$

PTS: 2　　　　REF: 011533ge　　STA: G.G.53　　　TOP: Segments Intercepted by Circle
KEY: two secants

489 ANS: 1　　　PTS: 2　　　　REF: 061517ge　　STA: G.G.45
TOP: Similarity　　KEY: perimeter and area

490 ANS: 2

$5x + 3 = 7x - 15 \quad 5(9) + 3 = 48$

$18 = 2x$

$9 = x$

PTS: 2　　　　REF: 011515ge　　STA: G.G.40　　　TOP: Trapezoids

491 ANS:

$\dfrac{5}{5 + 6 + 7} \cdot 180 = 50$

PTS: 2　　　　REF: 061529ge　　STA: G.G.30　　　TOP: Interior and Exterior Angles of Triangles

492 ANS: 3

Diagonals of rectangles and trapezoids do not bisect opposite angles. m∠DAB = 90 if $ABCD$ is a square.

PTS: 2　　　　REF: 061511ge　　STA: G.G.39　　　TOP: Special Parallelograms

493 ANS: 4　　　PTS: 2　　　　REF: 061503ge　　STA: G.G.10
TOP: Solids

494 ANS: 3

$r^2 = 50$

$r = \sqrt{50} = \sqrt{25}\sqrt{2} = 5\sqrt{2}$

PTS: 2　　　　REF: 061515ge　　STA: G.G.73　　　TOP: Equations of Circles

495 ANS:

$6x - 6 = 4x + 2$ m∠$BCA = 4(4) + 2 = 18$ $7y - 15 = 5y - 1$ m∠$BAC = 5(7) - 1 = 34$ m∠$B = 180 - (18 + 34) = 128$

$2x = 8 \qquad\qquad\qquad\qquad 2y = 14$

$x = 4 \qquad\qquad\qquad\qquad\; y = 7$

PTS: 4　　　　REF: 061536ge　　STA: G.G.38　　　TOP: Parallelograms

496 ANS: 2　　　PTS: 2　　　　REF: 081504ge　　STA: G.G.61
TOP: Analytical Representations of Transformations

497 ANS: 1　　　PTS: 2　　　　REF: 081514ge　　STA: G.G.2
TOP: Planes

498 ANS: 3

$m = \dfrac{-A}{B} = \dfrac{-4}{-2} = 2$ $y = mx + b$

$1 = 2(-2) + b$

$1 = -4 + b$

$5 = b$

PTS: 2   REF: 081509ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

499 ANS:

$V = \dfrac{1}{3}\pi(3^2)(8) = 24\pi$

PTS: 2   REF: 081530ge   STA: G.G.15   TOP: Volume and Lateral Area

500 ANS:

$2x + 7 = 25$ $NT = 4.5$

$2x = 18$

$x = 9$

PTS: 2   REF: 081531ge   STA: G.G.42   TOP: Midsegments

501 ANS: 1   PTS: 2   REF: 081522ge   STA: G.G.22
TOP: Locus

502 ANS: 4   PTS: 2   REF: 081501ge   STA: G.G.29
TOP: Triangle Congruency

503 ANS: 1   PTS: 2   REF: 081513ge   STA: G.G.26
TOP: Contrapositive

504 ANS: 2   PTS: 2   REF: 011511ge   STA: G.G.71
TOP: Equations of Circles

505 ANS: 2

Parallel secants intercept congruent arcs. $\dfrac{360 - (106 + 24)}{2} = \dfrac{230}{2} = 115$

PTS: 2   REF: 081503ge   STA: G.G.52   TOP: Chords and Secants

506 ANS: 3

$x^2 = 8 \times 18$

$x^2 = 144$

$x = 12$

PTS: 2   REF: 061506ge   STA: G.G.47   TOP: Similarity
KEY: altitude

507 ANS: 2   PTS: 2   REF: 061512ge   STA: G.G.19
TOP: Constructions

508 ANS:

Parallelogram *DEFG*, *K* and *H* are points on $\overrightarrow{DE}$ such that $\angle DGK \cong \angle EFH$ and $\overline{GK}$ and $\overline{FH}$ are drawn (given). $\overline{DG} \cong \overline{EF}$ (opposite sides of a parallelogram are congruent). $\overline{DG} \parallel \overline{EF}$ (opposite sides of a parallelogram are parallel). $\angle D \cong \angle FEH$ (corresponding angles formed by parallel lines and a transversal are congruent).
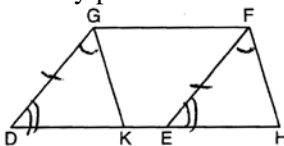
$\triangle DGK \cong \triangle EFH$ (ASA). $\overline{DK} \cong \overline{EH}$ (CPCTC).

PTS: 6 REF: 081538ge STA: G.G.27 TOP: Quadrilateral Proofs
509 ANS: 2 PTS: 2 REF: 061524ge STA: G.G.71
TOP: Equations of Circles
510 ANS: 2
$180 - 2(66) = 48$

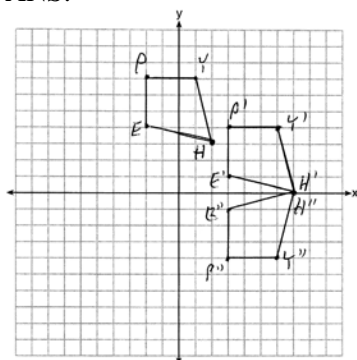PTS: 2 REF: 061513ge STA: G.G.50 TOP: Tangents
KEY: two tangents
511 ANS:
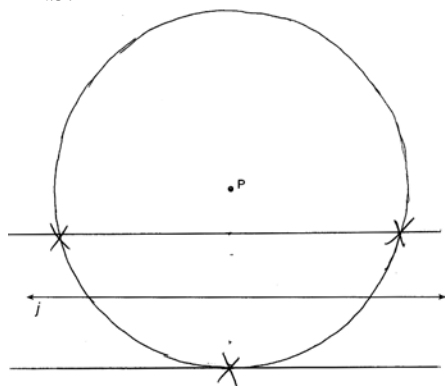
PTS: 4 REF: 061537ge STA: G.G.22 TOP: Locus
512 ANS: 2 PTS: 2 REF: 061509ge STA: G.G.55
TOP: Properties of Transformations

7

513 ANS:

$$H'(7,0), Y'(6,4), P'(3,4), E'(3,1)$$

$$H''(7,0), Y''(6,-4), P''(3,-4), E''(3,-1)$$

PTS: 4   REF: 011535ge   STA: G.G.58   TOP: Compositions of Transformations
KEY: grids

514 ANS: 3

$$V = \frac{2}{3}\pi\left(\frac{12}{2}\right)^3 \approx 905$$
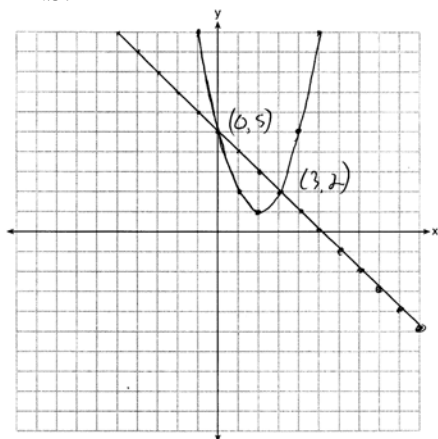
PTS: 2   REF: 061502ge   STA: G.G.16   TOP: Volume and Surface Area

515 ANS:

PTS: 4   REF: 061535ge   STA: G.G.70   TOP: Quadratic-Linear Systems

516 ANS: 2

$$180(n-2) = 720$$

$$n - 2 = 4$$

$$n = 6$$

PTS: 2   REF: 061521ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

517 ANS: 2

$$45 \cdot \frac{8}{20} = 18$$

PTS: 2   REF: 081511ge   STA: G.G.45   TOP: Similarity
KEY: perimeter and area
518 ANS: 4   PTS: 2   REF: 081506ge   STA: G.G.59
TOP: Properties of Transformations
519 ANS:

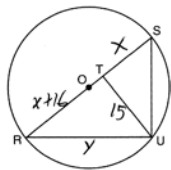$$\sqrt{(6-3)^2 + (-1-8)^2} = \sqrt{9+81} = \sqrt{90} = \sqrt{9}\sqrt{10} = 3\sqrt{10}.$$

PTS: 2   REF: 061533ge   STA: G.G.67   TOP: Distance
520 ANS: 3   PTS: 2   REF: 081502ge   STA: G.G.73
TOP: Equations of Circles
521 ANS: 2
$180 - 2(58) = 64$

PTS: 2   REF: 081510ge   STA: G.G.31   TOP: Isosceles Triangle Theorem
522 ANS:

$$m = \frac{3}{2}; m_\perp = -\frac{2}{3} \quad y = -\frac{2}{3}x$$

PTS: 2   REF: 081533ge   STA: G.G.64   TOP: Parallel and Perpendicular Lines
523 ANS:

$$x(x+16) = 15^2 \quad 25 \cdot 34 = y^2$$
$$x^2 + 16x - 225 = 0 \quad 5\sqrt{34} = y$$
$$(x+25)(x-9) = 0$$
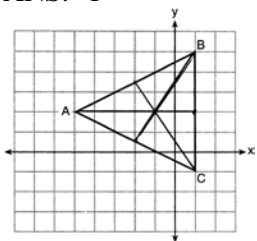$$x = 9$$

PTS: 6   REF: 011538ge   STA: G.G.47   TOP: Similarity
KEY: leg
524 ANS: 2   PTS: 2   REF: 081527ge   STA: G.G.33
TOP: Triangle Inequality Theorem
525 ANS: 3   PTS: 2   REF: 081507ge   STA: G.G.46
TOP: Side Splitter Theorem

526 ANS: 1

PTS: 2   REF: 011516ge   STA: G.G.21
TOP: Centroid, Orthocenter, Incenter and Circumcenter

527 ANS: 1   PTS: 2   REF: 061510ge   STA: G.G.72
TOP: Equations of Circles

528 ANS: 2

$L + L - 30 = 180$

$\quad 2L = 210$

$\quad\quad L = 105$

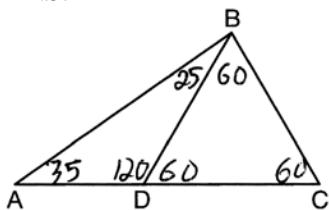PTS: 2   REF: 081519ge   STA: G.G.38   TOP: Parallelograms

529 ANS: 2   PTS: 2   REF: 081515ge   STA: G.G.55
TOP: Properties of Transformations

530 ANS: 3   PTS: 2   REF: 011523ge   STA: G.G.51
TOP: Arcs Determined by Angles   KEY: inscribed

531 ANS: 1

PTS: 2   REF: 011504ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

532 ANS: 2

$(n - 2)180 = (8 - 2)180 = 1080. \ \dfrac{1080}{8} = 135.$

PTS: 2   REF: 081521ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

533 ANS: 2

$2 = \dfrac{10 + x}{2}. \quad 8 = \dfrac{12 + y}{2}$

$4 = 10 + x \quad 16 = 12 + y$

$-6 = x \quad\quad 4 = y$

PTS: 2   REF: 061505ge   STA: G.G.66   TOP: Midpoint

534 ANS: 1   PTS: 2   REF: 061514ge   STA: G.G.3
TOP: Planes

535 ANS:

$l = \sqrt{12^2 + 5^2} = \sqrt{169} = 13$ $L = \pi r l = \pi(5)(13) = 65\pi$

PTS: 2　　　　REF: 061531ge　　STA: G.G.15　　　TOP: Volume and Lateral Area

536 ANS:

$\left(\dfrac{0+1}{2}, \dfrac{4 + -4}{2}\right)$

$\left(\dfrac{1}{2}, 0\right)$

PTS: 2　　　　REF: 081534ge　　STA: G.G.69　　　TOP: Quadrilaterals in the Coordinate Plane

537 ANS: 1　　　　PTS: 2　　　　REF: 081508ge　　STA: G.G.10
TOP: Solids

538 ANS: 3

$\sqrt{20^2 + 7^2} \approx 21$

PTS: 2　　　　REF: 081525ge　　STA: G.G.50　　　TOP: Tangents
KEY: point of tangency

539 ANS: 3　　　　PTS: 2　　　　REF: 011514ge　　STA: G.G.72
TOP: Equations of Circles

540 ANS:
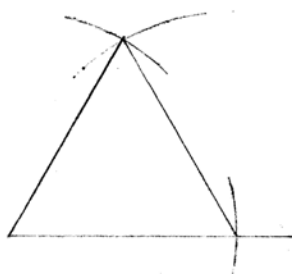
PTS: 2　　　　REF: 081532ge　　STA: G.G.20　　　TOP: Constructions

541 ANS: 4

$\dfrac{2}{3}(x - 4) = y - 5$

$2x - 8 = 3y - 15$

$7 = 3y - 2x$

PTS: 2　　　　REF: 061528ge　　STA: G.G.65　　　TOP: Parallel and Perpendicular Lines

11

542 ANS: 3

$$x^2 = 4 \cdot 7$$

$$x = \sqrt{4} \cdot \sqrt{7}$$

$$x = 2\sqrt{7}$$

    PTS: 2   REF: 081528ge   STA: G.G.47   TOP: Similarity
    KEY: leg

543 ANS: 2   PTS: 2   REF: 011517ge   STA: G.G.26
    TOP: Contrapositive

544 ANS:

$$h = \sqrt{5^2 - 3^2} = 4 \quad V = \frac{1}{3}\pi \cdot 3^2 \cdot 4 = 12\pi \quad V = \pi \cdot 4^2 \cdot 6 = 96\pi \quad \frac{96\pi}{12\pi} = 8$$

    PTS: 4   REF: 011537ge   STA: G.G.15   TOP: Volume and Lateral Area

545 ANS: 4

(2) rotation is also a correct response

    PTS: 2   REF: 011527ge   STA: G.G.56   TOP: Identifying Transformations

546 ANS: 1   PTS: 2   REF: 081518ge   STA: G.G.51
    TOP: Arcs Determined by Angles   KEY: inscribed

547 ANS: 2   PTS: 2   REF: 011509ge   STA: G.G.17
    TOP: Constructions

548 ANS:
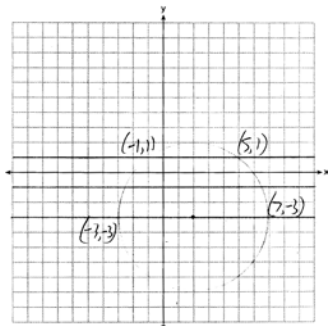
    PTS: 4   REF: 081535ge   STA: G.G.23   TOP: Locus

549 ANS: 1

$$d = \sqrt{(5-1)^2 + (3-6)^2} = \sqrt{16+9} = \sqrt{25} = 5$$

    PTS: 2   REF: 011507ge   STA: G.G.67   TOP: Distance
    KEY: general

550 ANS: 2   PTS: 2   REF: 061516ge   STA: G.G.52
    TOP: Chords and Secants

551 ANS: 4

$$2x + 3 = -x^2 - x + 1 \quad y = 2(-2) + 3 = -1$$

$$x^2 + 3x + 2 = 0$$

$$(x + 2)(x + 1) = 0$$

$$x = -2, -1$$

   PTS: 2   REF: 081516ge   STA: G.G.70   TOP: Quadratic-Linear Systems

552 ANS: 1   PTS: 2   REF: 061527ge   STA: G.G.43
   TOP: Centroid

553 ANS: 3   PTS: 2   REF: 061501ge   STA: G.G.61
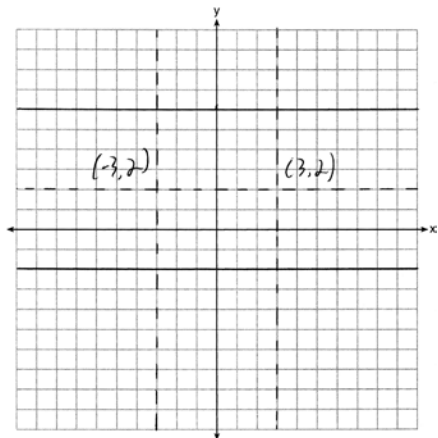   TOP: Analytical Representations of Transformations

554 ANS: 2   PTS: 2   REF: 011510ge   STA: G.G.34
   TOP: Angle Side Relationship

555 ANS: 1   PTS: 2   REF: 081517ge   STA: G.G.41
   TOP: Special Quadrilaterals

556 ANS:

   PTS: 4   REF: 011536ge   STA: G.G.23   TOP: Locus

557 ANS:
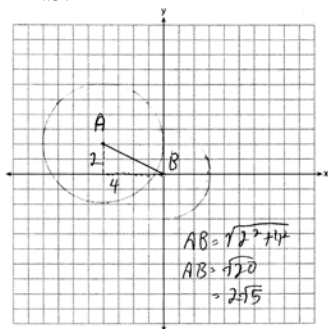
   PTS: 4   REF: 081537ge   STA: G.G.74   TOP: Graphing Circles

558 ANS: 3   PTS: 2   REF: 061526ge   STA: G.G.26
   TOP: Inverse

559 ANS:

$$M = \left(\frac{4+8}{2}, \frac{2+6}{2}\right) = (6,4) \quad m = \frac{6-2}{8-4} = \frac{4}{4} = 1 \quad m_\perp = -1 \quad y - 1 = -(x-6)$$

PTS: 4   REF: 081536ge   STA: G.G.68   TOP: Perpendicular Bisector

560 ANS: 1   PTS: 2   REF: 081524ge   STA: G.G.34
TOP: Angle Side Relationship

561 ANS: 3
$2.4 + 2(2.4) = 7.2$

PTS: 2   REF: 081526ge   STA: G.G.43   TOP: Centroid

562 ANS: 4

$$M_x = \frac{2+8}{2} = 5. \quad M_Y = \frac{-5+3}{2} = -1.$$

PTS: 2   REF: 011502ge   STA: G.G.66   TOP: Midpoint
KEY: general

563 ANS: 3

$$\frac{4}{6} = \frac{x+2}{4x-7}$$

$$16x - 28 = 6x + 12$$

$$10x = 40$$

$$x = 4$$

PTS: 2   REF: 011521ge   STA: G.G.46   TOP: Side Splitter Theorem

564 ANS: 1
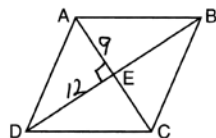
$\sqrt{9^2 + 12^2} = 15$

PTS: 2   REF: 011505ge   STA: G.G.39   TOP: Special Parallelograms

565 ANS: 3

$$180 - \frac{(n-2)180}{n} = 40$$

$$180n - 180n + 360 = 40n$$

$$360 = 40n$$

$$n = 9$$

PTS: 2   REF: 061519ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

566 ANS: 3   PTS: 2   REF: 011518ge   STA: G.G.74
TOP: Graphing Circles

567 ANS: 4
$11 - 7 = 4, 11 + 7 = 18$

PTS: 2 REF: 061525ge STA: G.G.33 TOP: Triangle Inequality Theorem

Geometry Regents at Random

568 Given the true statement, "The medians of a triangle are concurrent," write the negation of the statement and give the truth value for the negation.

569 In the diagram below, trapezoid $ABCD$, with bases $\overline{AB}$ and $\overline{DC}$, is inscribed in circle O, with diameter $\overline{DC}$. If $m\widehat{AB}=80$, find $m\widehat{BC}$.
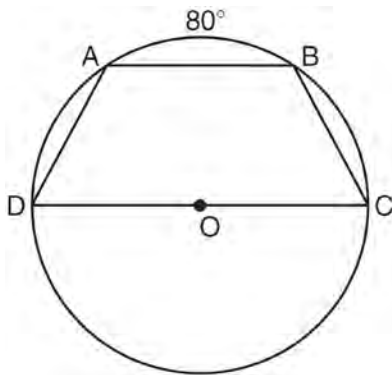
570 In the diagram below of circle O, chord $\overline{AB}$ bisects chord $\overline{CD}$ at E. If $AE = 8$ and $BE = 9$, find the length of $\overline{CE}$ in simplest radical form.
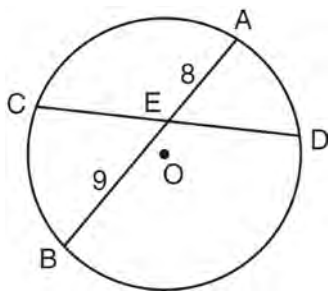
571 In the diagram below of $\triangle ACE$, medians $\overline{AD}$, $\overline{EB}$, and $\overline{CF}$ intersect at G. The length of $\overline{FG}$ is 12 cm.
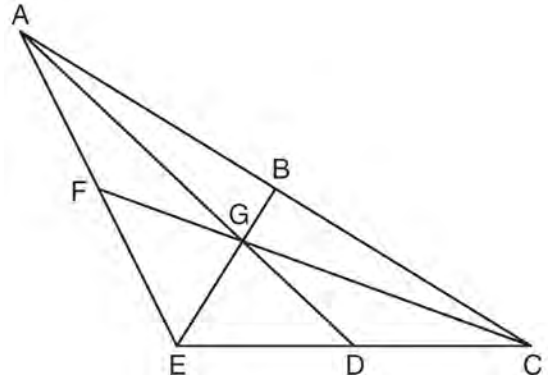
What is the length, in centimeters, of $\overline{GC}$?
1) 24
2) 12
3) 6
4) 4

572 The diagram below shows a pair of congruent triangles, with $\angle ADB \cong \angle CDB$ and $\angle ABD \cong \angle CBD$.
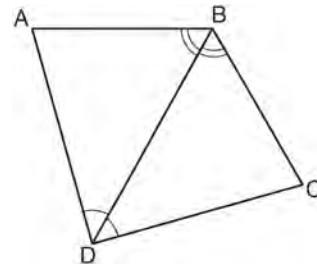
Which statement must be true?
1) $\angle ADB \cong \angle CBD$
2) $\angle ABC \cong \angle ADC$
3) $\overline{AB} \cong \overline{CD}$
4) $\overline{AD} \cong \overline{CD}$

107

573 The diagram below shows a rectangular prism.
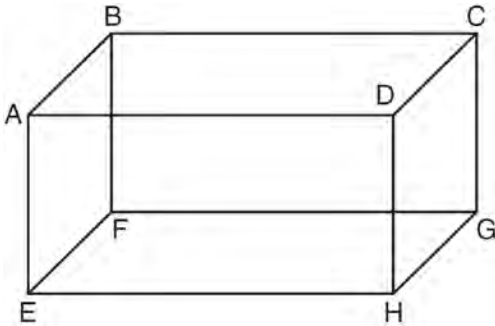
Which pair of edges are segments of lines that are coplanar?

1) $\overline{AB}$ and $\overline{DH}$
2) $\overline{AE}$ and $\overline{DC}$
3) $\overline{BC}$ and $\overline{EH}$
4) $\overline{CG}$ and $\overline{EF}$

574 Quadrilateral MNOP is a trapezoid with $\overline{MN} \parallel \overline{OP}$. If $M'N'O'P'$ is the image of MNOP after a reflection over the x-axis, which two sides of quadrilateral $M'N'O'P'$ are parallel?

1) $\overline{M'N'}$ and $\overline{O'P'}$
2) $\overline{M'N'}$ and $\overline{N'O'}$
3) $\overline{P'M'}$ and $\overline{O'P'}$
4) $\overline{P'M'}$ and $\overline{N'O'}$

575 The coordinates of point A are $(-3a, 4b)$. If point A' is the image of point A reflected over the line $y = x$, the coordinates of A' are

1) $(4b, -3a)$
2) $(3a, 4b)$
3) $(-3a, -4b)$
4) $(-4b, -3a)$

576 A student wrote the sentence "4 is an odd integer." What is the negation of this sentence and the truth value of the negation?

1) 3 is an odd integer; true
2) 4 is not an odd integer; true
3) 4 is not an even integer; false
4) 4 is an even integer; false

577 Triangle ABC has vertices $A(3,3)$, $B(7,9)$, and $C(11,3)$. Determine the point of intersection of the medians, and state its coordinates. [The use of the set of axes below is optional.]
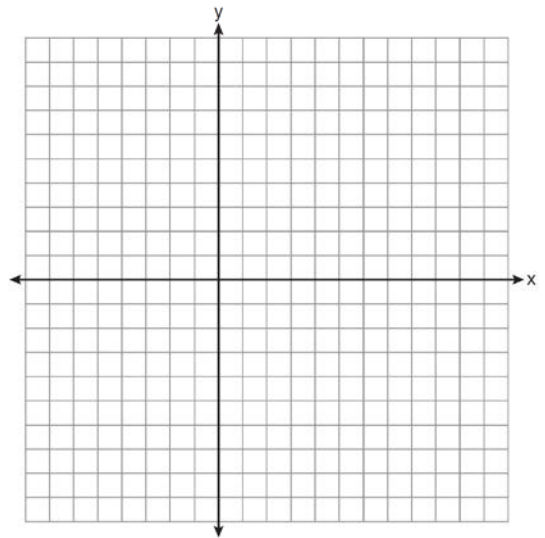
578 In circle O, diameter $\overline{RS}$ has endpoints $R(3a, 2b - 1)$ and $S(a - 6, 4b + 5)$. Find the coordinates of point O, in terms of a and b. Express your answer in simplest form.

579 Which equation represents circle O with center $(2,-8)$ and radius 9?

1) $(x+2)^2 + (y-8)^2 = 9$
2) $(x-2)^2 + (y+8)^2 = 9$
3) $(x+2)^2 + (y-8)^2 = 81$
4) $(x-2)^2 + (y+8)^2 = 81$

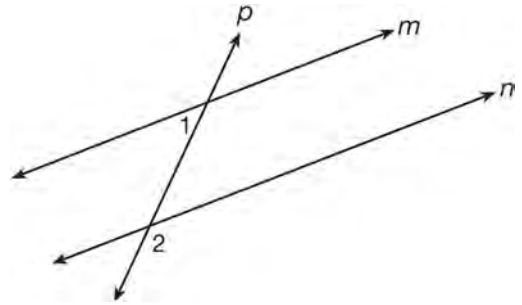580 What is an equation of circle O shown in the graph below?
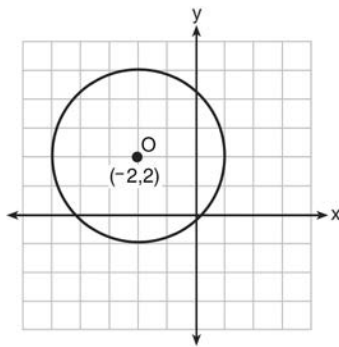
1) $(x+2)^2 + (y-2)^2 = 9$
2) $(x+2)^2 + (y-2)^2 = 3$
3) $(x-2)^2 + (y+2)^2 = 9$
4) $(x-2)^2 + (y+2)^2 = 3$

581 Point A lies in plane $\mathcal{B}$. How many lines can be drawn perpendicular to plane $\mathcal{B}$ through point A?

1) one
2) two
3) zero
4) infinite

582 As shown in the diagram below, lines m and n are cut by transversal p.

If $m\angle 1 = 4x + 14$ and $m\angle 2 = 8x + 10$, lines m and n are parallel when x equals

1) 1
2) 6
3) 13
4) 17

583 Which equation represents a line that is parallel to the line whose equation is $y = \frac{3}{2}x - 3$ and passes through the point $(1,2)$?

1) $y = \frac{3}{2}x + \frac{1}{2}$
2) $y = \frac{2}{3}x + \frac{4}{3}$
3) $y = \frac{3}{2}x - 2$
4) $y = -\frac{2}{3}x + \frac{8}{3}$

584 Which statement is the negation of "Two is a prime number" and what is the truth value of the negation?

1) Two is not a prime number; false
2) Two is not a prime number; true
3) A prime number is two; false
4) A prime number is two; true

585 In the diagram below of right triangle ABC, $\overline{CD}$ is the altitude to hypotenuse $\overline{AB}$, $CB = 6$, and $AD = 5$.
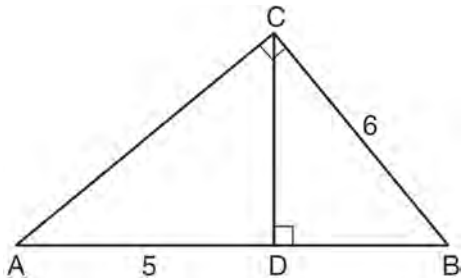
What is the length of $\overline{BD}$?
1) 5
2) 9
3) 3
4) 4

586 The coordinates of the endpoints of $\overline{FG}$ are $(-4,3)$ and $(2,5)$. Find the length of $\overline{FG}$ in simplest radical form.

587 If two distinct planes, $\mathcal{A}$ and $\mathcal{B}$, are perpendicular to line c, then which statement is true?
1) Planes $\mathcal{A}$ and $\mathcal{B}$ are parallel to each other.
2) Planes $\mathcal{A}$ and $\mathcal{B}$ are perpendicular to each other.
3) The intersection of planes $\mathcal{A}$ and $\mathcal{B}$ is a line parallel to line c.
4) The intersection of planes $\mathcal{A}$ and $\mathcal{B}$ is a line perpendicular to line c.

588 Write the negation of the statement "2 is a prime number," and determine the truth value of the negation.

589 In the diagram of $\triangle ABC$ shown below, $\overline{DE} \parallel \overline{BC}$.
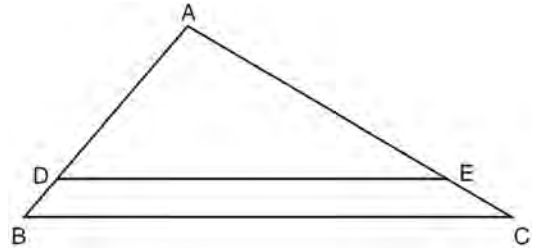
If $AB = 10$, $AD = 8$, and $AE = 12$, what is the length of $\overline{EC}$?
1) 6
2) 2
3) 3
4) 15

590 Which reason could be used to prove that a parallelogram is a rhombus?
1) Diagonals are congruent.
2) Opposite sides are parallel.
3) Diagonals are perpendicular.
4) Opposite angles are congruent.

591 When a quadrilateral is reflected over the line $y = x$, which geometric relationship is *not* preserved?
1) congruence
2) orientation
3) parallelism
4) perpendicularity

592 Which statement is true about every parallelogram?
1) All four sides are congruent.
2) The interior angles are all congruent.
3) Two pairs of opposite sides are congruent.
4) The diagonals are perpendicular to each other.

593 In the diagram below, point B is the incenter of $\triangle FEC$, and $\overline{EBR}$, $\overline{CBD}$, and $\overline{FB}$ are drawn.
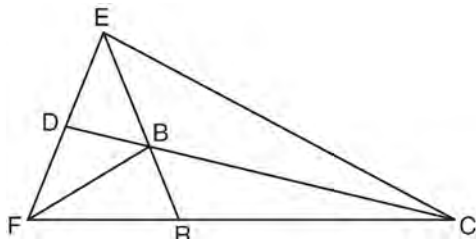
If m$\angle FEC = 84$ and m$\angle ECF = 28$, determine and state m$\angle BRC$.

594 In the diagram below of circle O, chord $\overline{AB}$ is parallel to chord $\overline{GH}$. Chord $\overline{CD}$ intersects $\overline{AB}$ at E and $\overline{GH}$ at F.
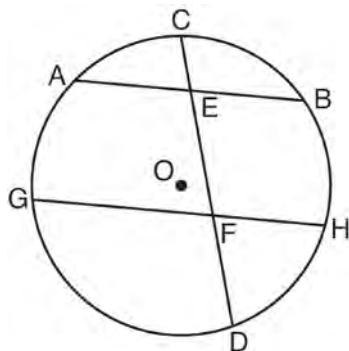

Which statement must always be true?
1) $\overparen{AC} \cong \overparen{CB}$
2) $\overparen{DH} \cong \overparen{BH}$
3) $\overparen{AB} \cong \overparen{GH}$
4) $\overparen{AG} \cong \overparen{BH}$

595 Two lines are represented by the equations $x + 2y = 4$ and $4y - 2x = 12$. Determine whether these lines are parallel, perpendicular, or neither. Justify your answer.

596 On the set of axes below, graph the locus of points that are 4 units from the line $x = 3$ and the locus of points that are 5 units from the point $(0,2)$. Label with an **X** all points that satisfy both conditions.
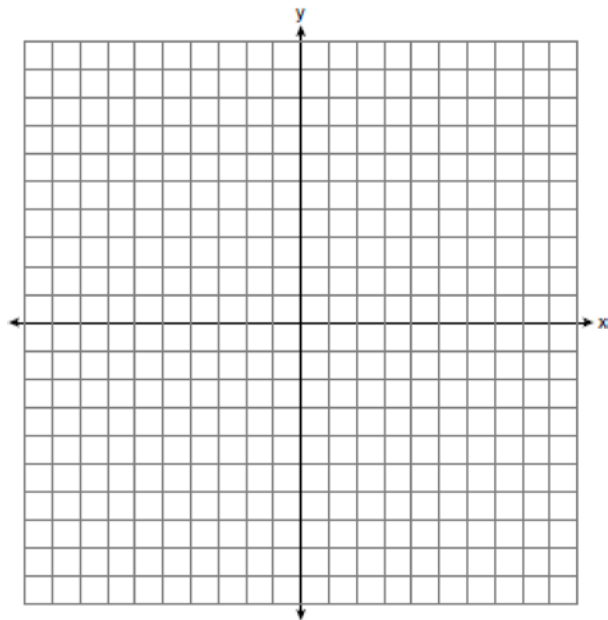
597 What are the center and the radius of the circle whose equation is $(x - 5)^2 + (y + 3)^2 = 16$?
1) $(-5,3)$ and 16
2) $(5,-3)$ and 16
3) $(-5,3)$ and 4
4) $(5,-3)$ and 4

598 A pentagon is drawn on the set of axes below. If the pentagon is reflected over the y-axis, determine if this transformation is an isometry. Justify your answer. [The use of the set of axes is optional.]
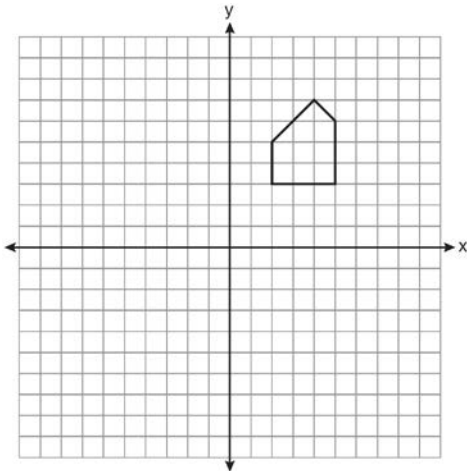
599 If $\triangle JKL \cong \triangle MNO$, which statement is always true?
1) $\angle KLJ \cong \angle NMO$
2) $\angle KJL \cong \angle MON$
3) $\overline{JL} \cong \overline{MO}$
4) $\overline{JK} \cong \overline{ON}$

600 What is an equation of the line that is perpendicular to the line whose equation is $y = \frac{3}{5}x - 2$ and that passes through the point $(3, -6)$?
1) $y = \frac{5}{3}x - 11$
2) $y = -\frac{5}{3}x + 11$
3) $y = -\frac{5}{3}x - 1$
4) $y = \frac{5}{3}x + 1$

601 Triangle ABC has vertices $A(0,0)$, $B(3,2)$, and $C(0,4)$. The triangle may be classified as
1) equilateral
2) isosceles
3) right
4) scalene

602 As shown on the set of axes below, $\triangle GHS$ has vertices $G(3,1)$, $H(5,3)$, and $S(1,4)$. Graph and state the coordinates of $\triangle G''H''S''$, the image of $\triangle GHS$ after the transformation $T_{-3,1} \circ D_2$.
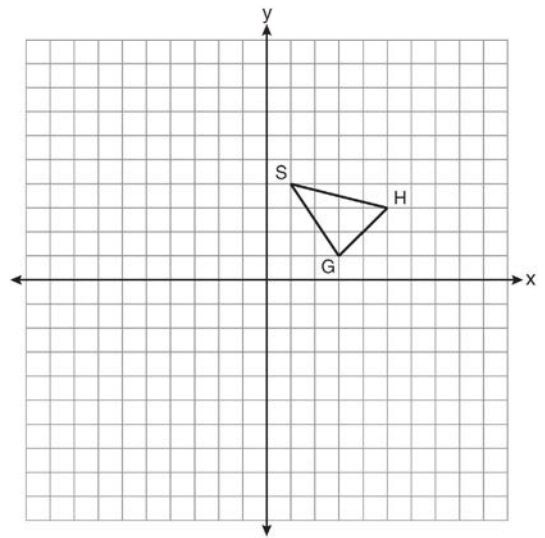
603 Plane $\mathcal{R}$ is perpendicular to line k and plane $\mathcal{D}$ is perpendicular to line k. Which statement is correct?
1) Plane $\mathcal{R}$ is perpendicular to plane $\mathcal{D}$.
2) Plane $\mathcal{R}$ is parallel to plane $\mathcal{D}$.
3) Plane $\mathcal{R}$ intersects plane $\mathcal{D}$.
4) Plane $\mathcal{R}$ bisects plane $\mathcal{D}$.

604 In the diagram below of circle O, $\overline{PA}$ is tangent to circle O at A, and $\overline{PBC}$ is a secant with points B and C on the circle.
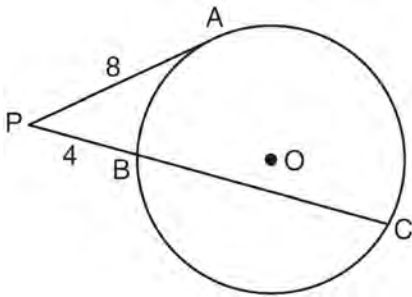

If $PA = 8$ and $PB = 4$, what is the length of $\overline{BC}$?
1) 20
2) 16
3) 15
4) 12

605 The cylindrical tank shown in the diagram below is to be painted. The tank is open at the top, and the bottom does *not* need to be painted. Only the outside needs to be painted. Each can of paint covers 600 square feet. How many cans of paint must be purchased to complete the job?
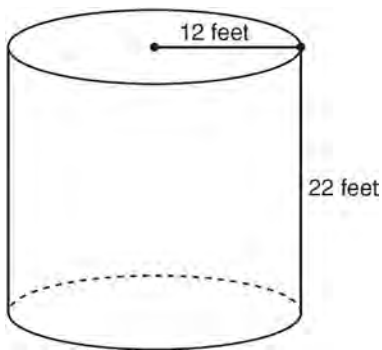
606 On the set of coordinate axes below, graph the locus of points that are equidistant from the lines $y = 6$ and $y = 2$ and also graph the locus of points that are 3 units from the y-axis. State the coordinates of *all* points that satisfy *both* conditions.
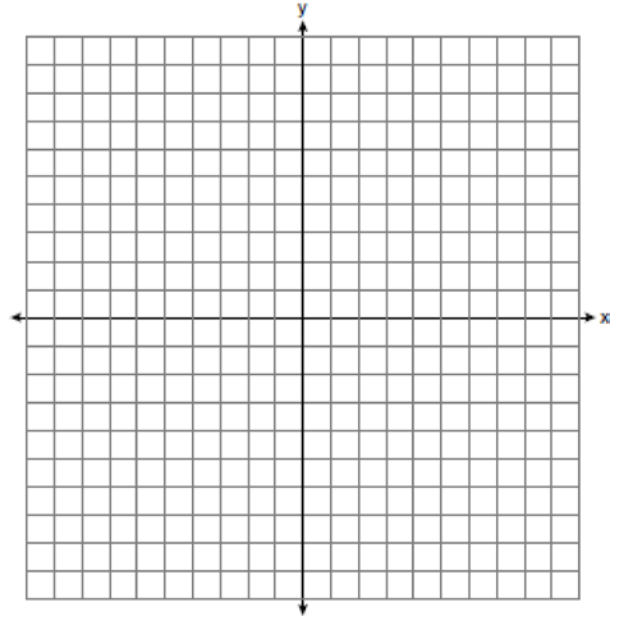
607 The diagonals of a quadrilateral are congruent but do not bisect each other. This quadrilateral is
1) an isosceles trapezoid
2) a parallelogram
3) a rectangle
4) a rhombus

608 What is the length of the line segment whose endpoints are $(1,-4)$ and $(9,2)$?
1) 5
2) $2\sqrt{17}$
3) 10
4) $2\sqrt{26}$

609 In the diagram below of isosceles trapezoid $ABCD$, $AB = CD = 25$, $AD = 26$, and $BC = 12$.
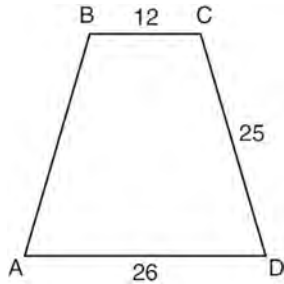
What is the length of an altitude of the trapezoid?
1) 7
2) 14
3) 19
4) 24

610 The point $(3,-2)$ is rotated 90° about the origin and then dilated by a scale factor of 4. What are the coordinates of the resulting image?
1) $(-12,8)$
2) $(12,-8)$
3) $(8,12)$
4) $(-8,-12)$

611 Which equation of a circle will have a graph that lies entirely in the first quadrant?
1) $(x-4)^2 + (y-5)^2 = 9$
2) $(x+4)^2 + (y+5)^2 = 9$
3) $(x+4)^2 + (y+5)^2 = 25$
4) $(x-5)^2 + (y-4)^2 = 25$

612 The Parkside Packing Company needs a rectangular shipping box. The box must have a length of 11 inches and a width of 8 inches. Find, to the *nearest tenth of an inch*, the minimum height of the box such that the volume is *at least* 800 cubic inches.

613 Which line is parallel to the line whose equation is $4x + 3y = 7$ and also passes through the point $(-5,2)$?
1) $4x + 3y = -26$
2) $4x + 3y = -14$
3) $3x + 4y = -7$
4) $3x + 4y = 14$

614 If the vertex angles of two isosceles triangles are congruent, then the triangles must be
1) acute
2) congruent
3) right
4) similar

615 A sphere is inscribed inside a cube with edges of 6 cm. In cubic centimeters, what is the volume of the sphere, in terms of π?
1) 12π
2) 36π
3) 48π
4) 288π

114

616 What is an equation of the circle with a radius of 5 and center at $(1, -4)$?
1) $(x + 1)^2 + (y - 4)^2 = 5$
2) $(x - 1)^2 + (y + 4)^2 = 5$
3) $(x + 1)^2 + (y - 4)^2 = 25$
4) $(x - 1)^2 + (y + 4)^2 = 25$

617 In the diagram below of circle O, chords $\overline{RT}$ and $\overline{QS}$ intersect at M. Secant $\overline{PTR}$ and tangent $\overline{PS}$ are drawn to circle O. The length of $\overline{RM}$ is two more than the length of $\overline{TM}$, $QM = 2$, $SM = 12$, and $PT = 8$.
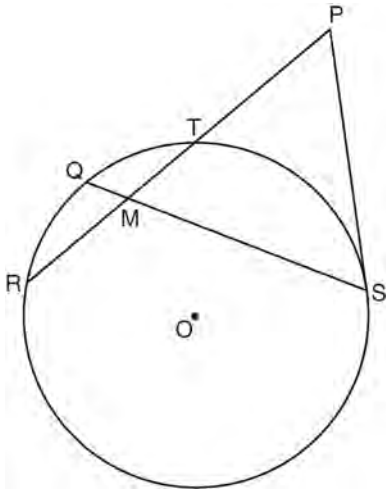
Find the length of $\overline{RT}$. Find the length of $\overline{PS}$.

618 A paint can is in the shape of a right circular cylinder. The volume of the paint can is 600π cubic inches and its altitude is 12 inches. Find the radius, in inches, of the base of the paint can. Express the answer in simplest radical form. Find, to the *nearest tenth of a square inch*, the lateral area of the paint can.

619 What is the image of the point $(2, -3)$ after the transformation r_{y-axis}?
1) $(2, 3)$
2) $(-2, -3)$
3) $(-2, 3)$
4) $(-3, 2)$

620 In a given triangle, the point of intersection of the three medians is the same as the point of intersection of the three altitudes. Which classification of the triangle is correct?
1) scalene triangle
2) isosceles triangle
3) equilateral triangle
4) right isosceles triangle

621 In the diagram below of $\triangle ABC$, $\overline{BC}$ is extended to D.
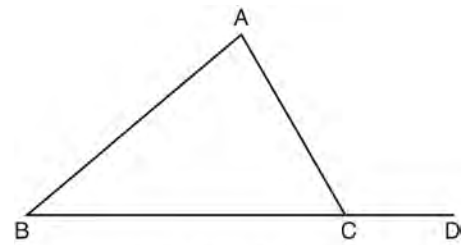
(Not drawn to scale)

If $m\angle A = x^2 - 6x$, $m\angle B = 2x - 3$, and $m\angle ACD = 9x + 27$, what is the value of x?
1) 10
2) 2
3) 3
4) 15

622 What is an equation of a circle with center $(7,-3)$ and radius 4?

1) $(x-7)^2 + (y+3)^2 = 4$
2) $(x+7)^2 + (y-3)^2 = 4$
3) $(x-7)^2 + (y+3)^2 = 16$
4) $(x+7)^2 + (y-3)^2 = 16$

623 What is the equation of a circle whose center is 4 units above the origin in the coordinate plane and whose radius is 6?

1) $x^2 + (y-6)^2 = 16$
2) $(x-6)^2 + y^2 = 16$
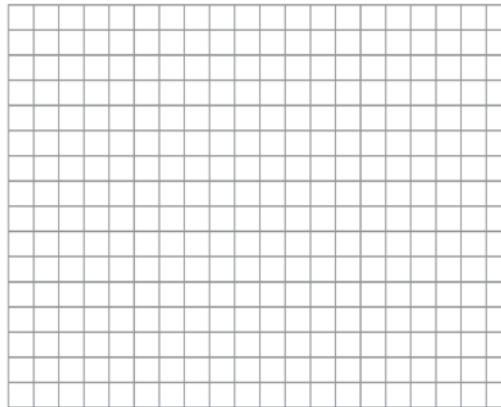3) $x^2 + (y-4)^2 = 36$
4) $(x-4)^2 + y^2 = 36$

624 Using a compass and straightedge, on the diagram below of $\overleftrightarrow{RS}$, construct an equilateral triangle with $\overline{RS}$ as one side. [Leave all construction marks.]

625 Given: $\triangle ABC$ with vertices $A(-6,-2)$, $B(2,8)$, and $C(6,-2)$. $\overline{AB}$ has midpoint D, $\overline{BC}$ has midpoint E, and $\overline{AC}$ has midpoint F.
Prove: $ADEF$ is a parallelogram
$\qquad\qquad$ $ADEF$ is *not* a rhombus
[The use of the grid is optional.]

626 What is the length of the line segment whose endpoints are $A(-1,9)$ and $B(7,4)$?

1) $\sqrt{61}$
2) $\sqrt{89}$
3) $\sqrt{205}$
4) $\sqrt{233}$

627 In rhombus $ABCD$, the diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. If $AE = 5$ and $BE = 12$, what is the length of $\overline{AB}$?

1) 7
2) 10
3) 13
4) 17

628 Given that *ABCD* is a parallelogram, a student wrote the proof below to show that a pair of its opposite angles are congruent.
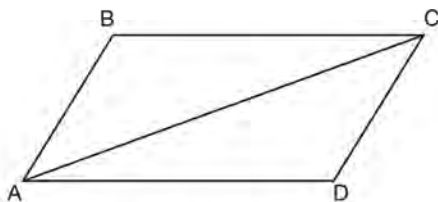
Statement	Reason
1. ABCD is a parallelogram.	1. Given
2. $\overline{BC} \cong \overline{AD}$ $\overline{AB} \cong \overline{DC}$	2. Opposite sides of a parallelogram are congruent.
3. $\overline{AC} \cong \overline{CA}$	3. Reflexive Postulate of Congruency
4. $\triangle ABC \cong \triangle CDA$	4. Side-Side-Side
5. $\angle B \cong \angle D$	5. _____

What is the reason justifying that $\angle B \cong \angle D$?
1) Opposite angles in a quadrilateral are congruent.
2) Parallel lines have congruent corresponding angles.
3) Corresponding parts of congruent triangles are congruent.
4) Alternate interior angles in congruent triangles are congruent.

629 If $\overleftrightarrow{AB}$ is contained in plane P, and $\overleftrightarrow{AB}$ is perpendicular to plane R, which statement is true?
1) $\overleftrightarrow{AB}$ is parallel to plane R.
2) Plane P is parallel to plane R.
3) $\overleftrightarrow{AB}$ is perpendicular to plane P.
4) Plane P is perpendicular to plane R.

630 As shown on the graph below, $\triangle R'S'T'$ is the image of $\triangle RST$ under a single transformation.
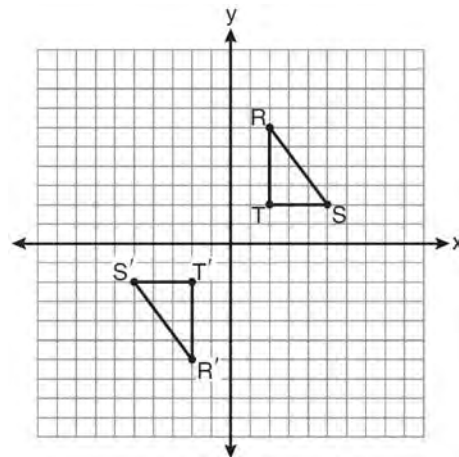
Which transformation does this graph represent?
1) glide reflection
2) line reflection
3) rotation
4) translation

631 In circle *O*, a diameter has endpoints $(-5,4)$ and $(3,-6)$. What is the length of the diameter?
1) $\sqrt{2}$
2) $2\sqrt{2}$
3) $\sqrt{10}$
4) $2\sqrt{41}$

632 The volume, in cubic centimeters, of a sphere whose diameter is 6 centimeters is
1) 12π
2) 36π
3) 48π
4) 288π

633 As shown in the diagram below, a kite needs a vertical and a horizontal support bar attached at opposite corners. The upper edges of the kite are 7 inches, the side edges are x inches, and the vertical support bar is $(x + 1)$ inches.
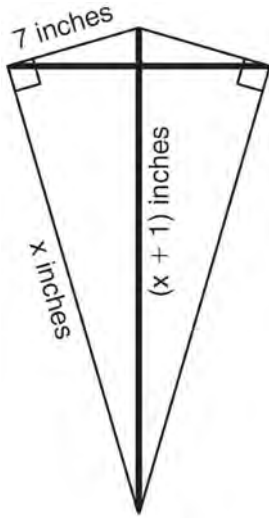
What is the measure, in inches, of the vertical support bar?
1) 23
2) 24
3) 25
4) 26

634 An equation of the line that passes through $(2, -1)$ and is parallel to the line $2y + 3x = 8$ is

1) $y = \dfrac{3}{2}x - 4$

2) $y = \dfrac{3}{2}x + 4$

3) $y = -\dfrac{3}{2}x - 2$

4) $y = -\dfrac{3}{2}x + 2$

635 In the diagram below, parallelogram $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$ that intersect at point E.
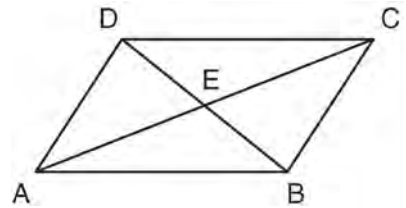
Which expression is *not* always true?
1) $\angle DAE \cong \angle BCE$
2) $\angle DEC \cong \angle BEA$
3) $\overline{AC} \cong \overline{DB}$
4) $\overline{DE} \cong \overline{EB}$

636 In the diagram below, $\triangle LMO$ is isosceles with $LO = MO$.
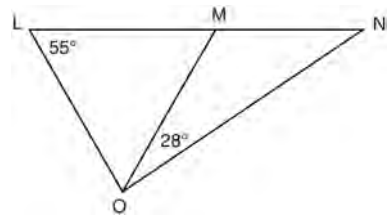
If m$\angle L = 55$ and m$\angle NOM = 28$, what is m$\angle N$?
1) 27
2) 28
3) 42
4) 70

637 The equation of line k is $y = \dfrac{1}{3}x - 2$. The equation of line m is $-2x + 6y = 18$. Lines k and m are
1) parallel
2) perpendicular
3) the same line
4) neither parallel nor perpendicular

638 What is the equation of the line that passes through the point $(-9, 6)$ and is perpendicular to the line $y = 3x - 5$?
1) $y = 3x + 21$
2) $y = -\frac{1}{3}x - 3$
3) $y = 3x + 33$
4) $y = -\frac{1}{3}x + 3$

639 The angles of triangle ABC are in the ratio of $8:3:4$. What is the measure of the *smallest* angle?
1) 12°
2) 24°
3) 36°
4) 72°

640 In the diagram below, $\overline{DE}$ joins the midpoints of two sides of $\triangle ABC$.
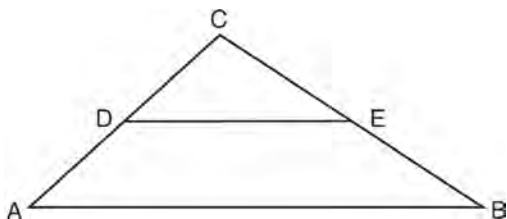
Which statement is *not* true?
1) $CE = \frac{1}{2}CB$
2) $DE = \frac{1}{2}AB$
3) area of $\triangle CDE = \frac{1}{2}$ area of $\triangle CAB$
4) perimeter of $\triangle CDE = \frac{1}{2}$ perimeter of $\triangle CAB$

641 Triangle ABC has coordinates $A(2, -2)$, $B(2, 1)$, and $C(4, -2)$. Triangle $A'B'C'$ is the image of $\triangle ABC$ under $T_{5, -2}$. On the set of axes below, graph and label $\triangle ABC$ and its image, $\triangle A'B'C'$. Determine the relationship between the area of $\triangle ABC$ and the area of $\triangle A'B'C'$. Justify your response.
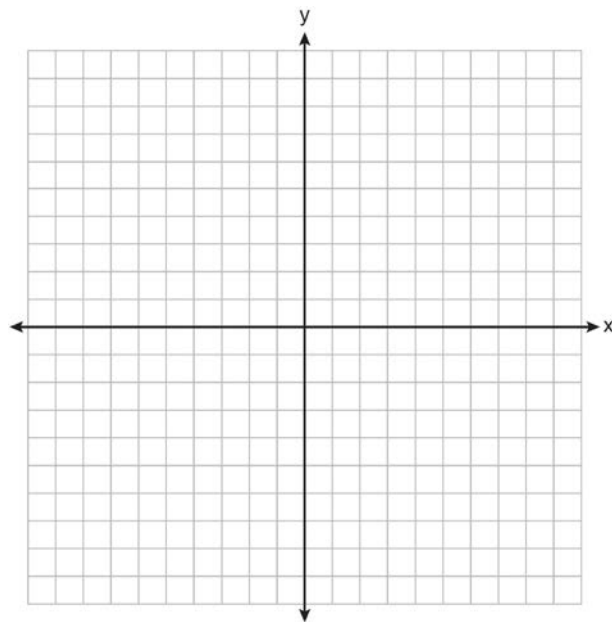
642 A circle has the equation $(x - 2)^2 + (y + 3)^2 = 36$. What are the coordinates of its center and the length of its radius?
1) $(-2, 3)$ and 6
2) $(2, -3)$ and 6
3) $(-2, 3)$ and 36
4) $(2, -3)$ and 36

643 A sphere has a diameter of 18 meters. Find the volume of the sphere, in cubic meters, in terms of π.

644 In the diagram below, point *M* is located on $\overleftrightarrow{AB}$.

Sketch the locus of points that are 1 unit from $\overleftrightarrow{AB}$ and the locus of points 2 units from point *M*. Label with an **X** all points that satisfy both conditions.
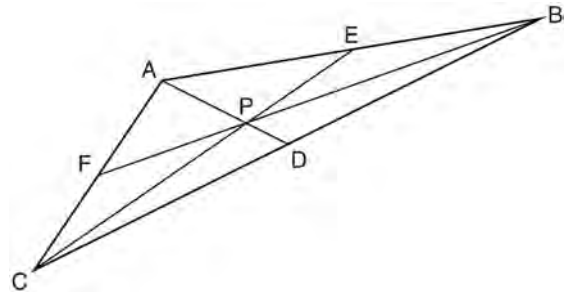

646 As shown in the diagram below, $\triangle ABC \sim \triangle DEF$, $AB = 7x$, $BC = 4$, $DE = 7$, and $EF = x$.
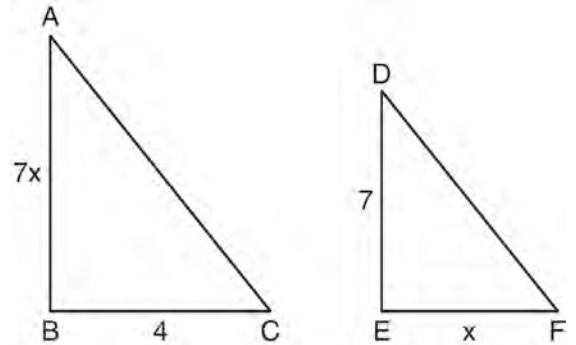
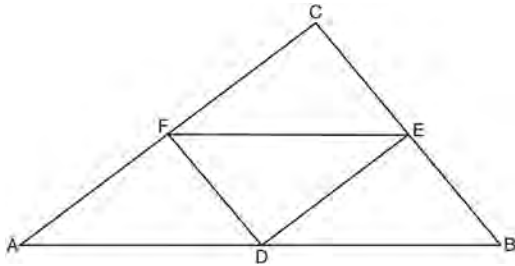What is the length of $\overline{AB}$?
1) 28
2) 2
3) 14
4) 4

645 In the diagram below of rhombus *ABCD*, m∠*C* = 100.

What is m∠*DBC*?
1) 40
2) 45
3) 50
4) 80

647 In the diagram below of $\triangle ABC$, $\overline{AE} \cong \overline{BE}$, $\overline{AF} \cong \overline{CF}$, and $\overline{CD} \cong \overline{BD}$.

Point *P* must be the
1) centroid
2) circumcenter
3) Incenter
4) orthocenter

120

648 In the diagram of $\triangle ABC$ shown below, D is the midpoint of $\overline{AB}$, E is the midpoint of $\overline{BC}$, and F is the midpoint of $\overline{AC}$.

If $AB = 20$, $BC = 12$, and $AC = 16$, what is the perimeter of trapezoid $ABEF$?
1) 24
2) 36
3) 40
4) 44

649 In the diagram below of circle O, radius $\overline{OC}$ is 5 cm. Chord $\overline{AB}$ is 8 cm and is perpendicular to $\overline{OC}$ at point P.
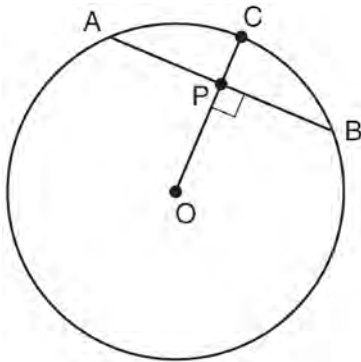
What is the length of $\overline{OP}$, in centimeters?
1) 8
2) 2
3) 3
4) 4

650 Line n intersects lines l and m, forming the angles shown in the diagram below.
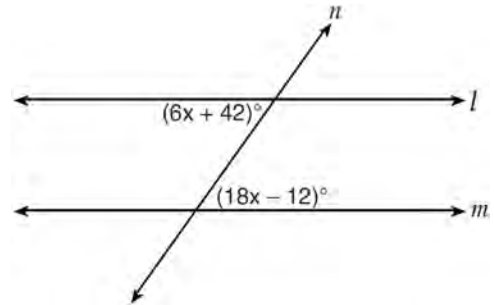
Which value of x would prove $l \parallel m$?
1) 2.5
2) 4.5
3) 6.25
4) 8.75

651 The vertices of parallelogram $ABCD$ are $A(2,0)$, $B(0,-3)$, $C(3,-3)$, and $D(5,0)$. If $ABCD$ is reflected over the x-axis, how many vertices remain invariant?
1) 1
2) 2
3) 3
4) 0

652 How many points are both 4 units from the origin and also 2 units from the line $y = 4$?
1) 1
2) 2
3) 3
4) 4

653 On the diagram below, use a compass and straightedge to construct the bisector of $\angle XYZ$. [Leave all construction marks.]
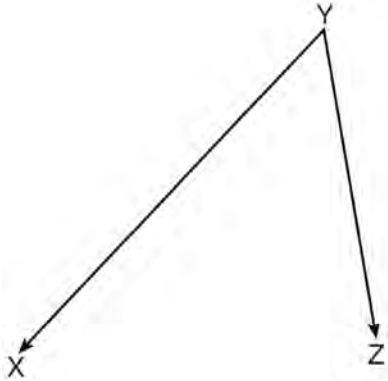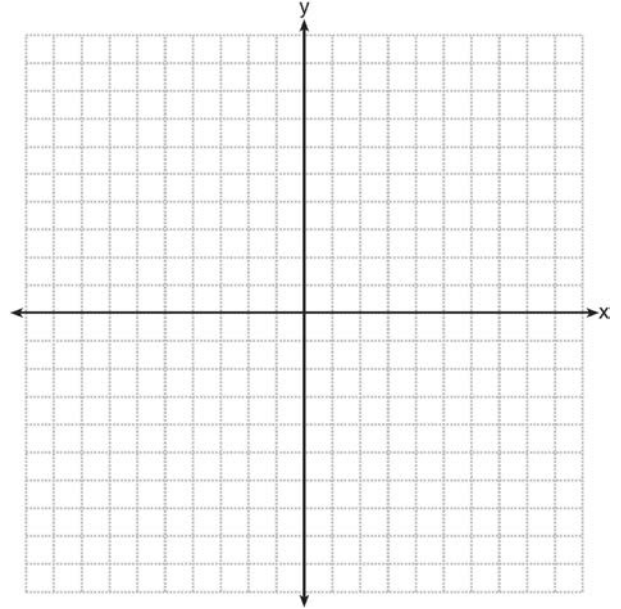

654 In the diagram below, point P is the centroid of $\triangle ABC$.
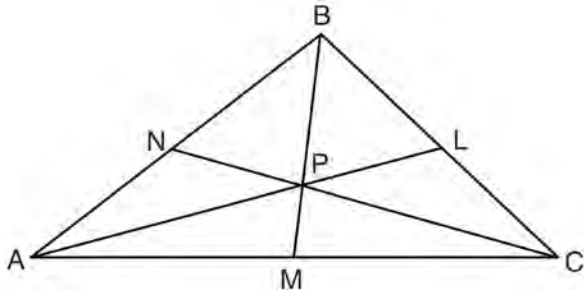
If $PM = 2x + 5$ and $BP = 7x + 4$, what is the length of $\overline{PM}$?
1) 9
2) 2
3) 18
4) 27

655 The coordinates of the vertices of $\triangle ABC$ are $A(1,2)$, $B(-4,3)$, and $C(-3,-5)$. State the coordinates of $\triangle A'B'C'$, the image of $\triangle ABC$ after a rotation of 90° about the origin. [The use of the set of axes below is optional.]

656 When $\triangle ABC$ is dilated by a scale factor of 2, its image is $\triangle A'B'C'$. Which statement is true?
1) $\overline{AC} \cong \overline{A'C'}$
2) $\angle A \cong \angle A'$
3) perimeter of $\triangle ABC$ = perimeter of $\triangle A'B'C'$
4) 2(area of $\triangle ABC$) = area of $\triangle A'B'C'$

657 The slope of line ℓ is $-\dfrac{1}{3}$. What is an equation of a line that is perpendicular to line ℓ?
1) $y + 2 = \dfrac{1}{3}x$
2) $-2x + 6 = 6y$
3) $9x - 3y = 27$
4) $3x + y = 0$

122

658 In the diagram below of circle O, diameter $\overline{AB}$ is perpendicular to chord $\overline{CD}$ at E. If $AO = 10$ and $BE = 4$, find the length of $\overline{CE}$.
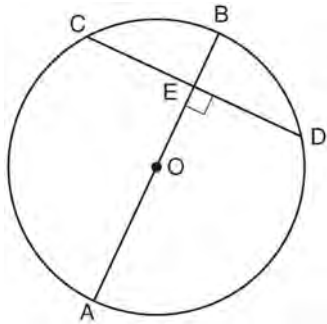
659 The vertices of $\triangle RST$ are $R(-6,5)$, $S(-7,-2)$, and $T(1,4)$. The image of $\triangle RST$ after the composition $T_{-2,3} \circ r_{y=x}$ is $\triangle R''S''T''$. State the coordinates of $\triangle R''S''T''$. [The use of the set of axes below is optional.]
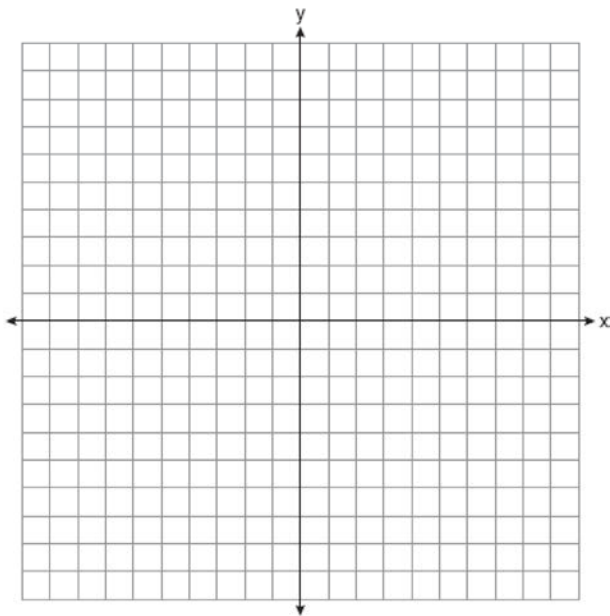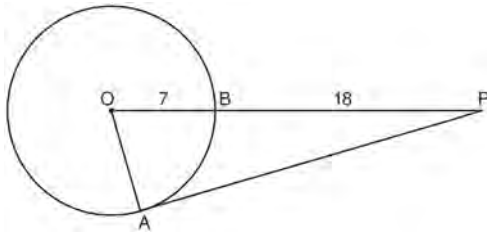

660 Which diagram represents a correct construction of equilateral $\triangle ABC$, given side $\overline{AB}$?
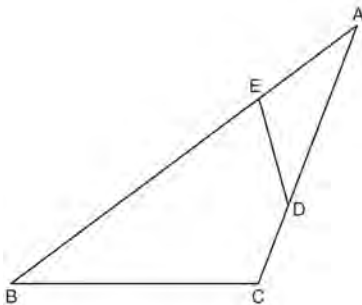

1)

2)

3)

4)
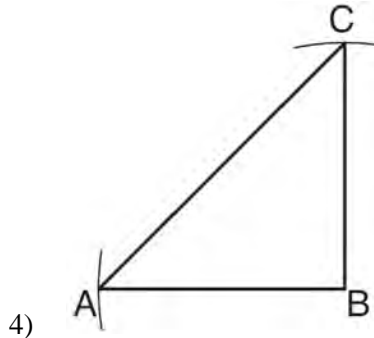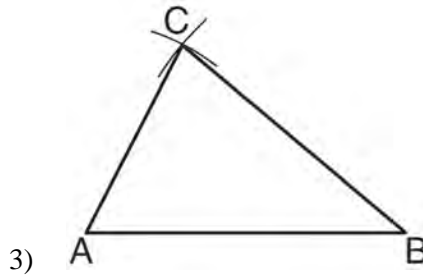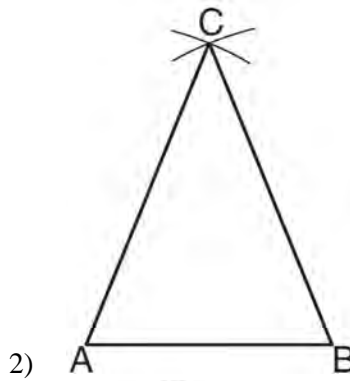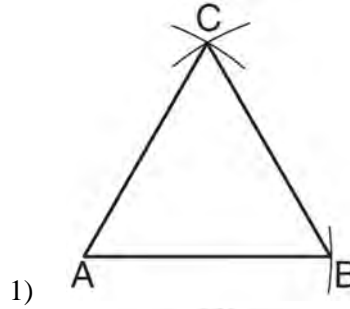
661 Find the slope of a line perpendicular to the line whose equation is $2y - 6x = 4$.

662 In the diagram below of $\triangle PAO$, $\overline{AP}$ is tangent to circle O at point A, $OB = 7$, and $BP = 18$.

What is the length of $\overline{AP}$?
1) 10
2) 12
3) 17
4) 24

663 The diagram below shows $\triangle ABC$, with $\overline{AEB}$, $\overline{ADC}$, and $\angle ACB \cong \angle AED$. Prove that $\triangle ABC$ is similar to $\triangle ADE$.
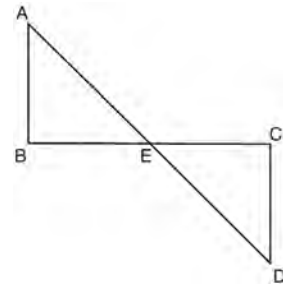
664 What is the volume, in cubic centimeters, of a cylinder that has a height of 15 cm and a diameter of 12 cm?
1) 180π
2) 540π
3) 675π
4) $2,160\pi$
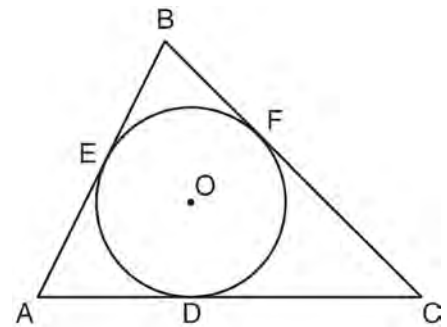
665 Given: $\overline{AD}$ bisects $\overline{BC}$ at E.
$\overline{AB} \perp \overline{BC}$
$\overline{DC} \perp \overline{BC}$
Prove: $\overline{AB} \cong \overline{DC}$

666 In the diagram below, $\triangle ABC$ is circumscribed about circle O and the sides of $\triangle ABC$ are tangent to the circle at points D, E, and F.

If $AB = 20$, $AE = 12$, and $CF = 15$, what is the length of $\overline{AC}$?
1) 8
2) 15
3) 23
4) 27

667 The two lines represented by the equations below are graphed on a coordinate plane.

$$x + 6y = 12$$

$$3(x - 2) = -y - 4$$

Which statement best describes the two lines?
1) The lines are parallel.
2) The lines are the same line.
3) The lines are perpendicular.
4) The lines intersect at an angle other than 90°.

668 The diameter of a sphere is 15 inches. What is the volume of the sphere, to the *nearest tenth of a cubic inch*?
1) 706.9
2) 1767.1
3) 2827.4
4) 14,137.2

669 What is the slope of a line that is perpendicular to the line represented by the equation $x + 2y = 3$?
1) -2
2) 2
3) $-\dfrac{1}{2}$
4) $\dfrac{1}{2}$

670 Which compound statement is true?
1) A triangle has three sides and a quadrilateral has five sides.
2) A triangle has three sides if and only if a quadrilateral has five sides.
3) If a triangle has three sides, then a quadrilateral has five sides.
4) A triangle has three sides or a quadrilateral has five sides.

671 The statement "x is a multiple of 3, and x is an even integer" is true when x is equal to
1) 9
2) 8
3) 3
4) 6

672 In the diagram below of circle O, diameter $\overline{AB}$ is parallel to chord $\overline{CD}$.
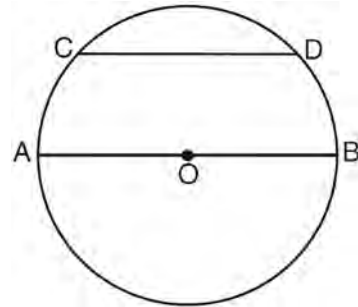
If $m\overarc{CD} = 70$, what is $m\overarc{AC}$?
1) 110
2) 70
3) 55
4) 35

673 Given three distinct quadrilaterals, a square, a rectangle, and a rhombus, which quadrilaterals must have perpendicular diagonals?
1) the rhombus, only
2) the rectangle and the square
3) the rhombus and the square
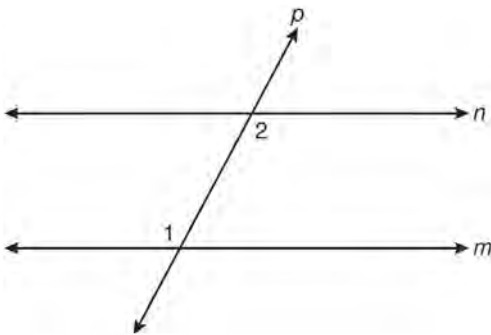4) the rectangle, the rhombus, and the square

674 In the diagram below of right triangle *ABC*, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$, $AC = 16$, and $CD = 7$.
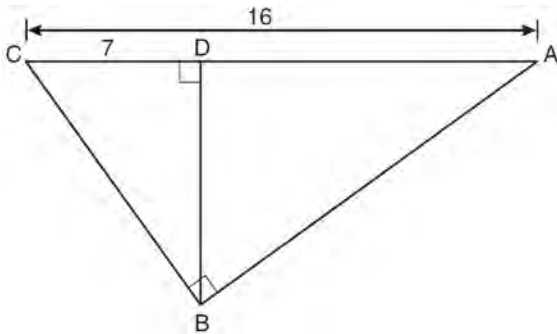
What is the length of $\overline{BD}$?
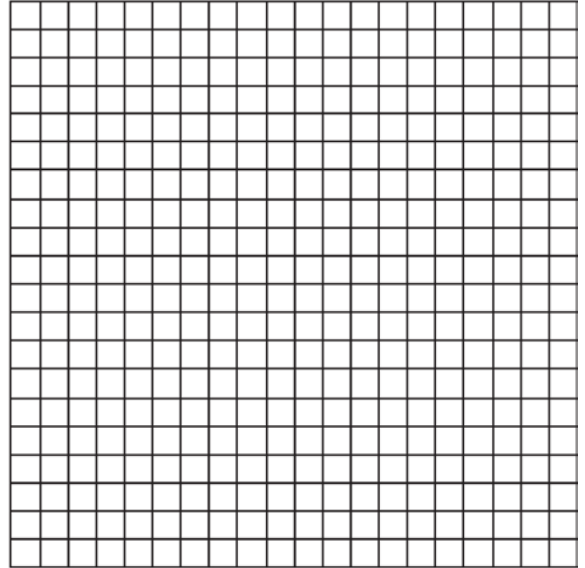1) $3\sqrt{7}$
2) $4\sqrt{7}$
3) $7\sqrt{3}$
4) 12

675 In the diagram below, line *p* intersects line *m* and line *n*.

If m∠1 = 7*x* and m∠2 = 5*x* + 30, lines *m* and *n* are parallel when *x* equals
1) 12.5
2) 15
3) 87.5
4) 105

676 Quadrilateral *MATH* has coordinates *M*(1,1), *A*(−2,5), *T*(3,5), and *H*(6,1). Prove that quadrilateral *MATH* is a rhombus and prove that it is *not* a square. [The use of the grid is optional.]
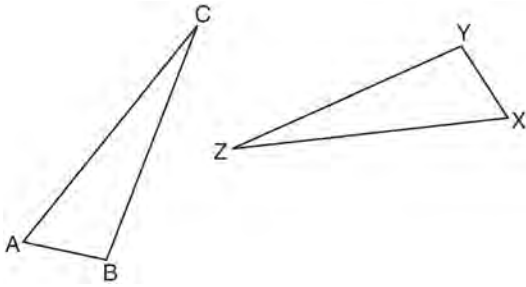

677 As shown in the diagram of △*ACD* below, *B* is a point on $\overline{AC}$ and $\overline{DB}$ is drawn.
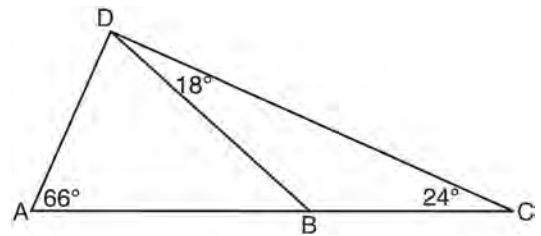
If m∠*A* = 66, m∠*CDB* = 18, and m∠*C* = 24, what is the longest side of △*ABD*?
1) $\overline{AB}$
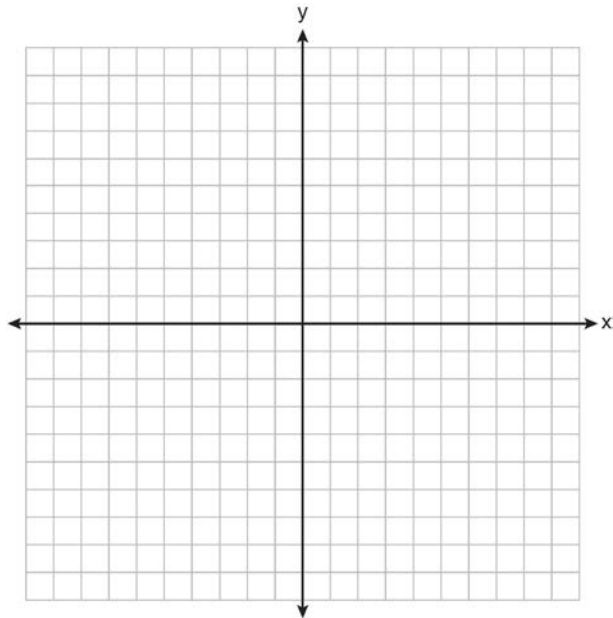2) $\overline{DC}$
3) $\overline{AD}$
4) $\overline{BD}$

126

678 In the diagram below, $\triangle ABC \cong \triangle XYZ$.

Which statement must be true?
1) $\angle C \cong \angle Y$
2) $\angle A \cong \angle X$
3) $\overline{AC} \cong \overline{YZ}$
4) $\overline{CB} \cong \overline{XZ}$

679 Triangle *HKL* has vertices $H(-7,2)$, $K(3,-4)$, and $L(5,4)$. The midpoint of $\overline{HL}$ is *M* and the midpoint of $\overline{LK}$ is *N*. Determine and state the coordinates of points *M* and *N*. Justify the statement: $\overline{MN}$ is parallel to $\overline{HK}$. [The use of the set of axes below is optional.]

680 In the diagram below of $\triangle ABC$, side $\overline{BC}$ is extended to point *D*, m$\angle A = x$, m$\angle B = 2x + 15$, and m$\angle ACD = 5x + 5$.
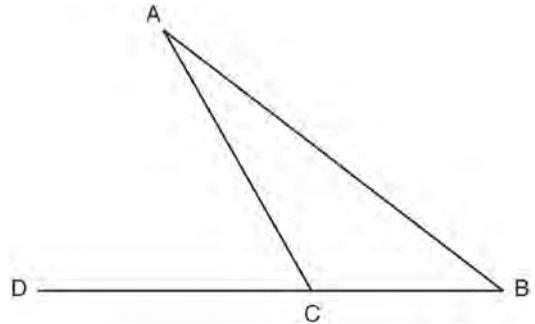

What is m$\angle B$?
1) 5
2) 20
3) 25
4) 55

681 Which equation represents the line that is perpendicular to $2y = x + 2$ and passes through the point $(4,3)$?
1) $y = \dfrac{1}{2}x - 5$
2) $y = \dfrac{1}{2}x + 1$
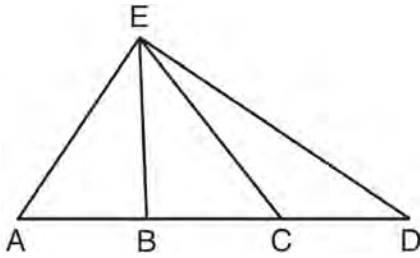3) $y = -2x + 11$
4) $y = -2x - 5$

682 Parallelogram *ABCD* has coordinates $A(1,5)$, $B(6,3)$, $C(3,-1)$, and $D(-2,1)$. What are the coordinates of *E*, the intersection of diagonals $\overline{AC}$ and $\overline{BD}$?
1) $(2,2)$
2) $(4.5,1)$
3) $(3.5,2)$
4) $(-1,3)$

683 In the diagram below of $\triangle ACD$, B is a point on $\overline{AC}$ such that $\triangle ADB$ is an equilateral triangle, and $\triangle DBC$ is an isosceles triangle with $\overline{DB} \cong \overline{BC}$. Find m$\angle C$.
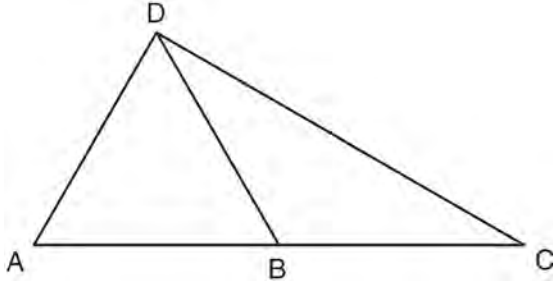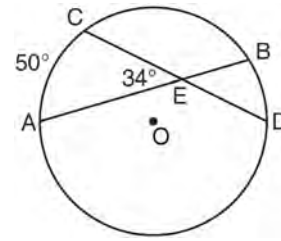

684 In $\triangle AED$ with $\overline{ABCD}$ shown in the diagram below, $\overline{EB}$ and $\overline{EC}$ are drawn.

If $\overline{AB} \cong \overline{CD}$, which statement could always be proven?
1) $\overline{AC} \cong \overline{DB}$
2) $\overline{AE} \cong \overline{ED}$
3) $\overline{AB} \cong \overline{BC}$
4) $\overline{EC} \cong \overline{EA}$

685 Find, in degrees, the measures of both an interior angle and an exterior angle of a regular pentagon.

686 In the diagram below of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E.

If m$\angle AEC = 34$ and m$\overarc{AC} = 50$, what is m$\overarc{DB}$?
1) 16
2) 18
3) 68
4) 118

687 In the diagram below, $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are tangents to circle O at points F, E, and D, respectively, $AF = 6$, $CD = 5$, and $BE = 4$.
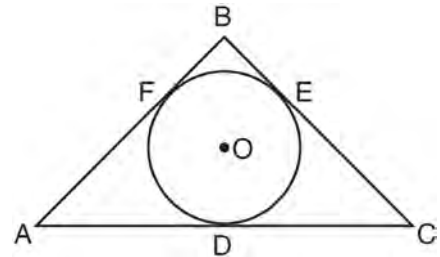
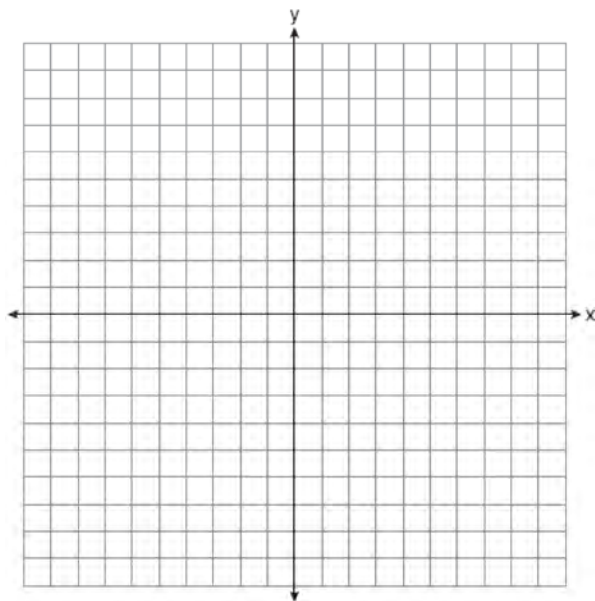What is the perimeter of $\triangle ABC$?
1) 15
2) 25
3) 30
4) 60

688 In $\triangle DEF$, m$\angle D = 3x + 5$, m$\angle E = 4x - 15$, and m$\angle F = 2x + 10$. Which statement is true?
1) $DF = FE$
2) $DE = FE$
3) m$\angle E =$ m$\angle F$
4) m$\angle D =$ m$\angle F$

689 Triangle *TAP* has coordinates $T(-1,4)$, $A(2,4)$, and $P(2,0)$. On the set of axes below, graph and label $\triangle T'A'P'$, the image of $\triangle TAP$ after the translation $(x,y) \rightarrow (x - 5, y - 1)$.
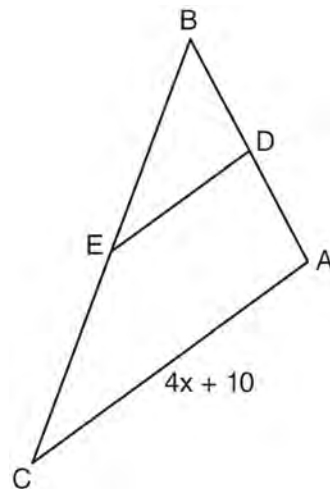

690 Point *P* lies on line *m*. Point *P* is also included in distinct planes *Q*, *R*, *S*, and *T*. At most, how many of these planes could be perpendicular to line *m*?
1) 1
2) 2
3) 3
4) 4

691 In the diagram below of $\triangle ADE$, *B* is a point on $\overline{AE}$ and *C* is a point on $\overline{AD}$ such that $\overline{BC} \parallel \overline{ED}$, $AC = x - 3$, $BE = 20$, $AB = 16$, and $AD = 2x + 2$. Find the length of $\overline{AC}$.
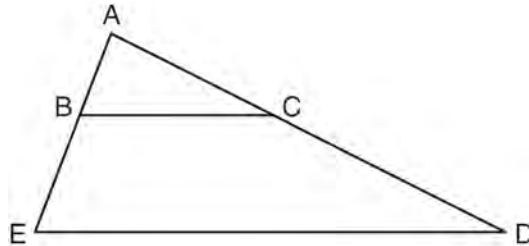
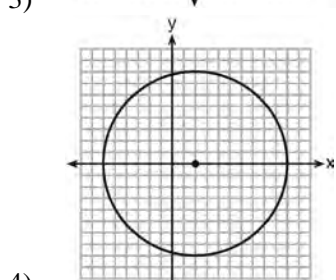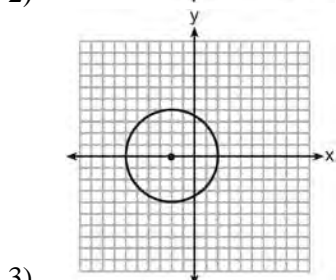

692 In the diagram below of $\triangle ABC$, *D* is the midpoint of $\overline{AB}$, and *E* is the midpoint of $\overline{BC}$.

If $AC = 4x + 10$, which expression represents *DE*?
1) $x + 2.5$
2) $2x + 5$
3) $2x + 10$
4) $8x + 20$

129

693 Which graph represents a circle whose equation is $(x + 2)^2 + y^2 = 16$?

1)

2)

3)

4)
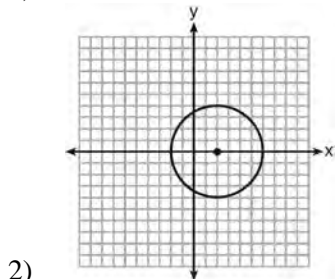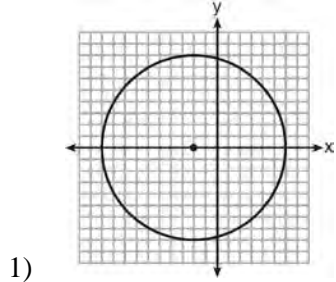
694 In circle O shown below, diameter $\overline{DB}$ is perpendicular to chord $\overline{AC}$ at E.
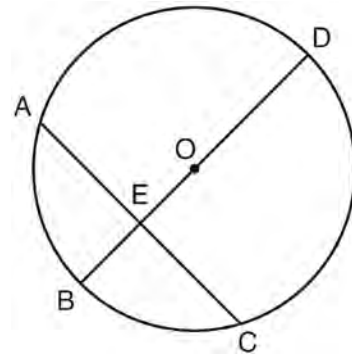
If $DB = 34$, $AC = 30$, and $DE > BE$, what is the length of $\overline{BE}$?
1) 8
2) 9
3) 16
4) 25

695 In the diagram below of $\triangle BCD$, side $\overline{DB}$ is extended to point A.
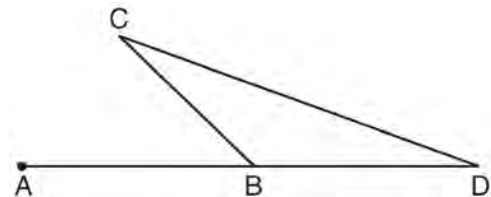
Which statement must be true?
1) $m\angle C > m\angle D$
2) $m\angle ABC < m\angle D$
3) $m\angle ABC > m\angle C$
4) $m\angle ABC > m\angle C + m\angle D$

696 What is an equation of circle O shown in the graph below?
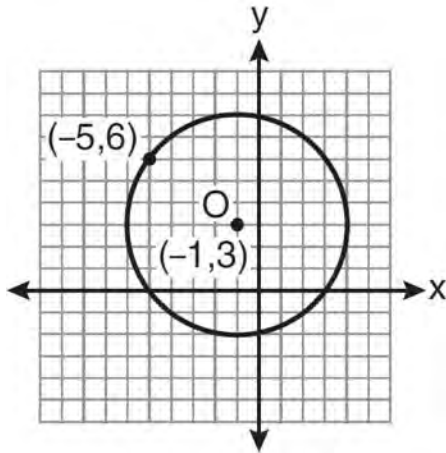
1) $(x+1)^2 + (y-3)^2 = 25$
2) $(x-1)^2 + (y+3)^2 = 25$
3) $(x-5)^2 + (y+6)^2 = 25$
4) $(x+5)^2 + (y-6)^2 = 25$

697 Using a compass and straightedge, construct the bisector of $\angle CBA$. [Leave all construction marks.]
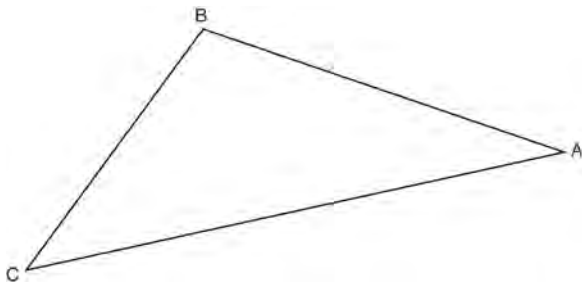
698 In $\triangle PQR$, $\angle PRQ$ is a right angle and $\overline{RT}$ is drawn perpendicular to hypotenuse $\overline{PQ}$. If $PT = x$, $RT = 6$, and $TQ = 4x$, what is the length of $\overline{PQ}$?
1) 9
2) 12
3) 3
4) 15

699 In the diagram below, $\triangle A'B'C'$ is a transformation of $\triangle ABC$, and $\triangle A''B''C''$ is a transformation of $\triangle A'B'C'$.
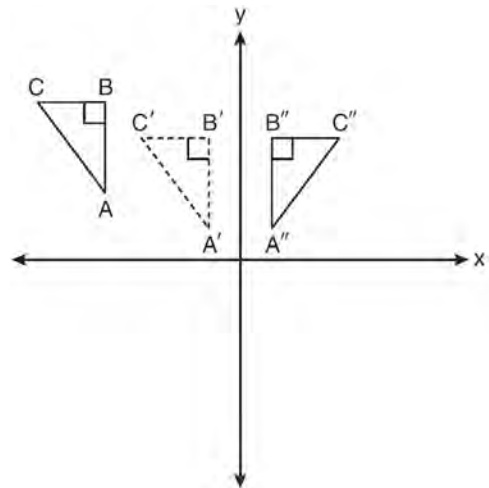
The composite transformation of $\triangle ABC$ to $\triangle A''B''C''$ is an example of a
1) reflection followed by a rotation
2) reflection followed by a translation
3) translation followed by a rotation
4) translation followed by a reflection

700 In the diagram below of $\triangle ABC$, $\overline{AB} \cong \overline{AC}$, $m\angle A = 3x$, and $m\angle B = x + 20$.
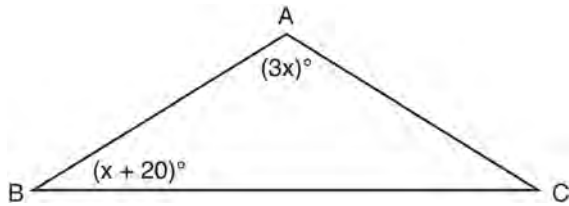
What is the value of x?
1) 10
2) 28
3) 32
4) 40

701 In the diagram below, $\overline{PA}$ and $\overline{PB}$ are tangent to circle O, $\overline{OA}$ and $\overline{OB}$ are radii, and $\overline{OP}$ intersects the circle at C. Prove: $\angle AOP \cong \angle BOP$
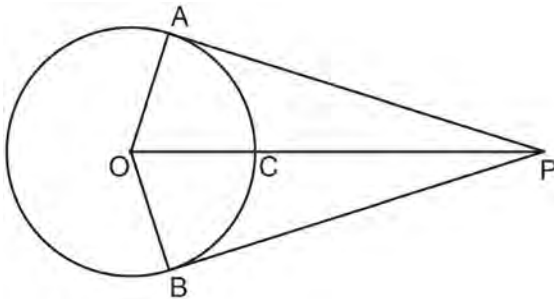
702 In $\triangle RST$, $m\angle R = 58$ and $m\angle S = 73$. Which inequality is true?
1) $RT < TS < RS$
2) $RS < RT < TS$
3) $RT < RS < TS$
4) $RS < TS < RT$

703 The vertices of the triangle in the diagram below are $A(7,9)$, $B(3,3)$, and $C(11,3)$.
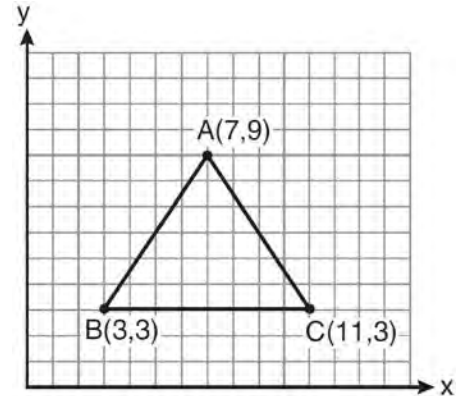
What are the coordinates of the centroid of $\triangle ABC$?
1) $(5,6)$
2) $(7,3)$
3) $(7,5)$
4) $(9,6)$

704 In the diagram below, $MATH$ is a rhombus with diagonals $\overline{AH}$ and $\overline{MT}$.
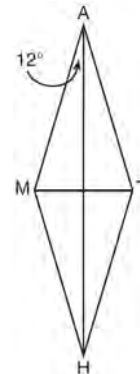
If $m\angle HAM = 12$, what is $m\angle AMT$?
1) 12
2) 78
3) 84
4) 156

132

705 In the diagram below of $\triangle ABC$, D is a point on $\overline{AB}$, E is a point on $\overline{BC}$, $\overline{AC} \parallel \overline{DE}$, $CE = 25$ inches, $AD = 18$ inches, and $DB = 12$ inches. Find, to the *nearest tenth of an inch*, the length of $\overline{EB}$.
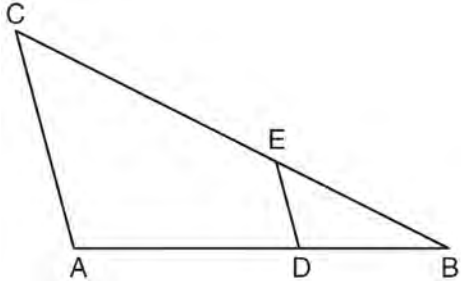
706 In $\triangle ABC$ shown below, P is the centroid and $BF = 18$.
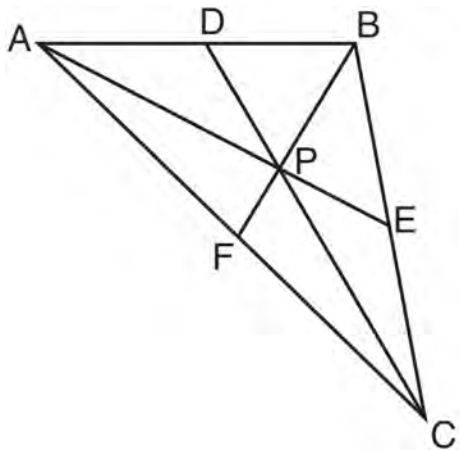
What is the length of $\overline{BP}$?
1) 6
2) 9
3) 3
4) 12

707 On the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the perpendicular bisector of $\overline{AC}$. [Leave all construction marks.]
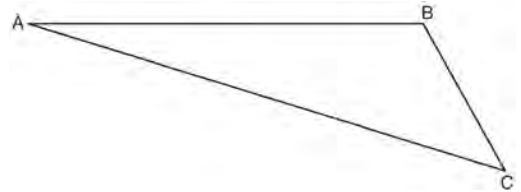
708 Line segment AB is shown in the diagram below.
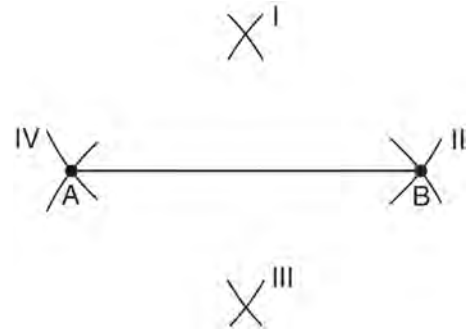
Which two sets of construction marks, labeled I, II, III, and IV, are part of the construction of the perpendicular bisector of line segment AB?
1) I and II
2) I and III
3) II and III
4) II and IV

133

709 In the diagram below of $\triangle ABC$, $\overleftrightarrow{TV} \parallel \overline{BC}$, $AT = 5$, $TB = 7$, and $AV = 10$.
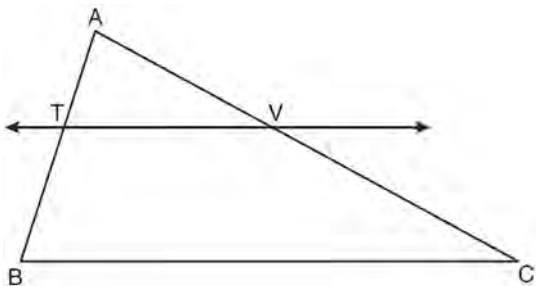
What is the length of $\overline{VC}$?

1) $3\frac{1}{2}$

2) $7\frac{1}{7}$

3) 14

4) 24

710 The graph below shows $\overline{JT}$ and its image, $\overline{J'T'}$, after a transformation.
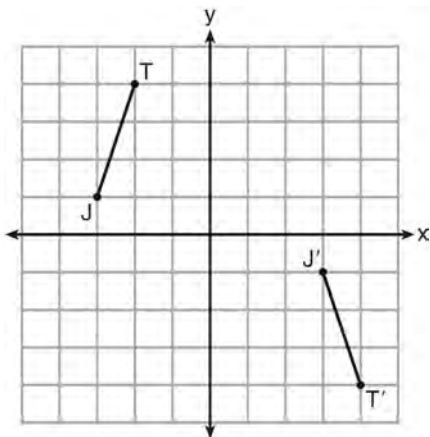
Which transformation would map $\overline{JT}$ onto $\overline{J'T'}$?
1) translation
2) glide reflection
3) rotation centered at the origin
4) reflection through the origin

711 The diagram below shows the construction of $\overleftrightarrow{AB}$ through point P parallel to $\overleftrightarrow{CD}$.
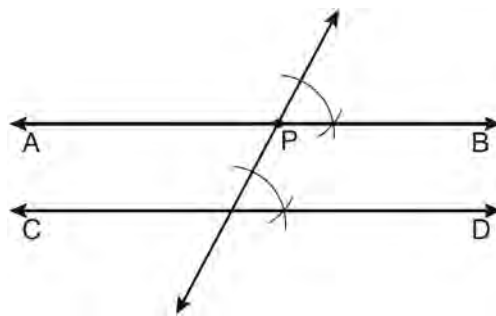
Which theorem justifies this method of construction?
1) If two lines in a plane are perpendicular to a transversal at different points, then the lines are parallel.
2) If two lines in a plane are cut by a transversal to form congruent corresponding angles, then the lines are parallel.
3) If two lines in a plane are cut by a transversal to form congruent alternate interior angles, then the lines are parallel.
4) If two lines in a plane are cut by a transversal to form congruent alternate exterior angles, then the lines are parallel.

712 The volume of a rectangular prism is 144 cubic inches. The height of the prism is 8 inches. Which measurements, in inches, could be the dimensions of the base?
1) 3.3 by 5.5
2) 2.5 by 7.2
3) 12 by 8
4) 9 by 9

134

713 In the diagram below of circle O, diameter $\overline{AOB}$ is perpendicular to chord $\overline{CD}$ at point E, $OA = 6$, and $OE = 2$.
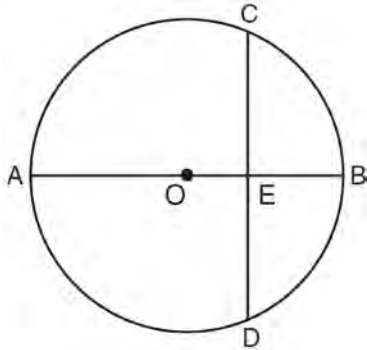
What is the length of $\overline{CE}$?

1) $4\sqrt{3}$
2) $2\sqrt{3}$
3) $8\sqrt{2}$
4) $4\sqrt{2}$

714 In the diagram of $\triangle JEA$ below, m$\angle JEA = 90$ and m$\angle EAJ = 48$. Line segment MS connects points M and S on the triangle, such that m$\angle EMS = 59$.
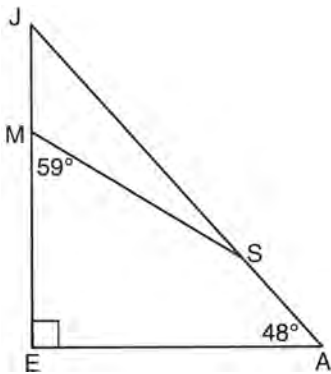
What is m$\angle JSM$?
1) 163
2) 121
3) 42
4) 17

715 A straightedge and compass were used to create the construction below. Arc EF was drawn from point B, and arcs with equal radii were drawn from E and F.
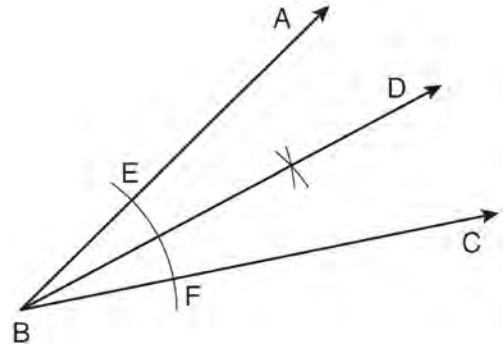
Which statement is *false*?
1) m$\angle ABD =$ m$\angle DBC$
2) $\frac{1}{2}$ (m$\angle ABC$) = m$\angle ABD$
3) 2(m$\angle DBC$) = m$\angle ABC$
4) 2(m$\angle ABC$) = m$\angle CBD$

716 Using a compass and straightedge, construct a line perpendicular to $\overline{AB}$ through point P. [Leave all construction marks.]

135
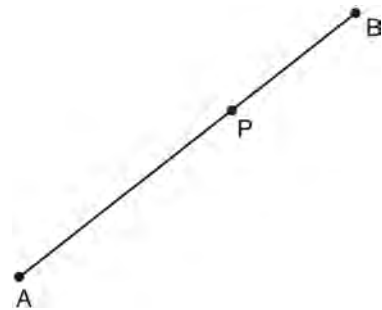
717 The coordinates of trapezoid $ABCD$ are $A(-4,5)$, $B(1,5)$, $C(1,2)$, and $D(-6,2)$. Trapezoid $A''B''C''D''$ is the image after the composition $r_{x-axis} \circ r_{y=x}$ is performed on trapezoid $ABCD$. State the coordinates of trapezoid $A''B''C''D''$. [The use of the set of axes below is optional.]
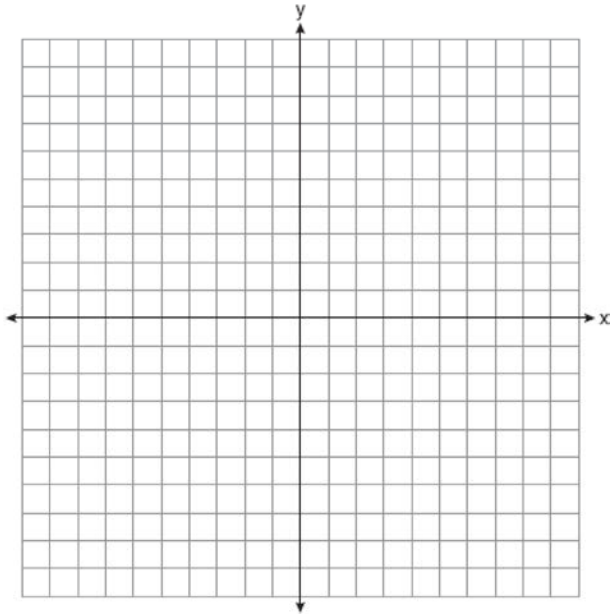
718 In the diagram below of quadrilateral $ABCD$, $\overline{AD} \cong \overline{BC}$ and $\angle DAE \cong \angle BCE$. Line segments AC, DB, and FG intersect at E. Prove: $\triangle AEF \cong \triangle CEG$
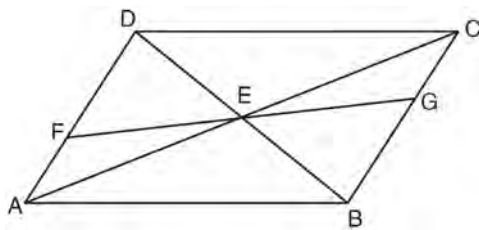
719 A line segment has endpoints $A(7,-1)$ and $B(-3,3)$. What are the coordinates of the midpoint of $\overline{AB}$?
1) $(1,2)$
2) $(2,1)$
3) $(-5,2)$
4) $(5,-2)$

720 Lines m and n intersect at point A. Line k is perpendicular to both lines m and n at point A. Which statement *must* be true?
1) Lines m, n, and k are in the same plane.
2) Lines m and n are in two different planes.
3) Lines m and n are perpendicular to each other.
4) Line k is perpendicular to the plane containing lines m and n.

721 Using a compass and straightedge, construct the perpendicular bisector of side $\overline{AR}$ in $\triangle ART$ shown below. [Leave all construction marks.]
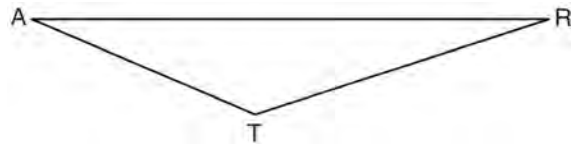
722 A cylinder has a height of 7 cm and a base with a diameter of 10 cm. Determine the volume, in cubic centimeters, of the cylinder in terms of π.

723 In the diagram below, $\overline{EF}$ is the median of trapezoid $ABCD$.
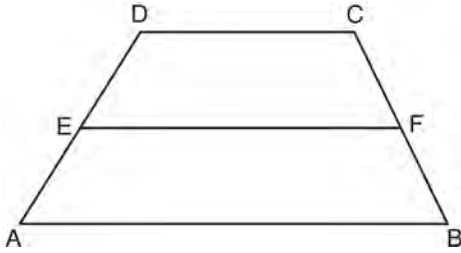
If $AB = 5x - 9$, $DC = x + 3$, and $EF = 2x + 2$, what is the value of x?
1) 5
2) 2
3) 7
4) 8

724 What is an equation of the circle shown in the graph below?
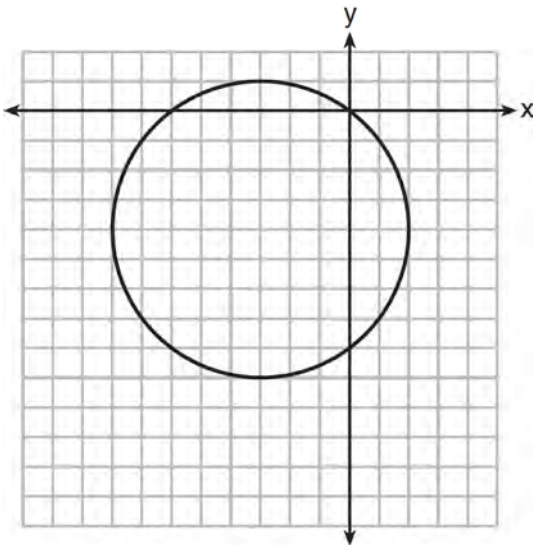
1) $(x - 3)^2 + (y - 4)^2 = 25$
2) $(x + 3)^2 + (y + 4)^2 = 25$
3) $(x - 3)^2 + (y - 4)^2 = 10$
4) $(x + 3)^2 + (y + 4)^2 = 10$

725 The number of degrees in the sum of the interior angles of a pentagon is
1) 72
2) 360
3) 540
4) 720

726 Segment AB is the diameter of circle M. The coordinates of A are $(-4, 3)$. The coordinates of M are $(1, 5)$. What are the coordinates of B?
1) $(6, 7)$
2) $(5, 8)$
3) $(-3, 8)$
4) $(-5, 2)$
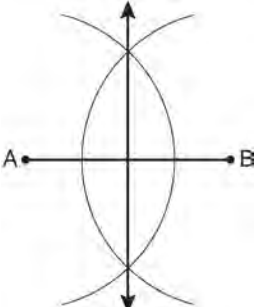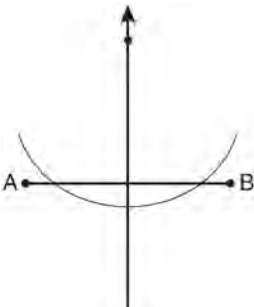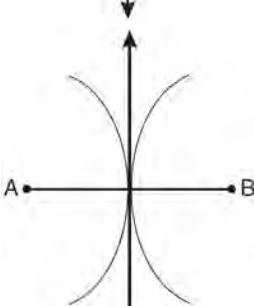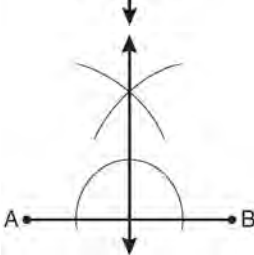
727 A line segment has endpoints $(4, 7)$ and $(1, 11)$. What is the length of the segment?
1) 5
2) 7
3) 16
4) 25

728 As shown in the diagram below, the diagonals of parallelogram $QRST$ intersect at E. If $QE = x^2 + 6x$, $SE = x + 14$, and $TE = 6x - 1$, determine TE algebraically.

137
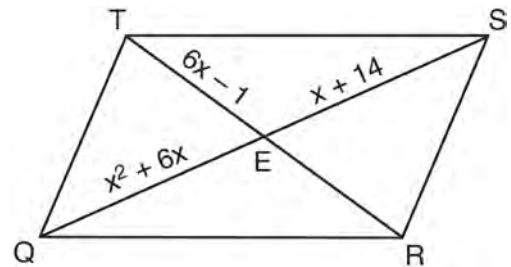
729 Which diagram shows the construction of the perpendicular bisector of $\overline{AB}$?

1)

2)

3)

4)

730 Solve the following system of equations graphically.

$$2x^2 - 4x = y + 1$$

$$x + y = 1$$
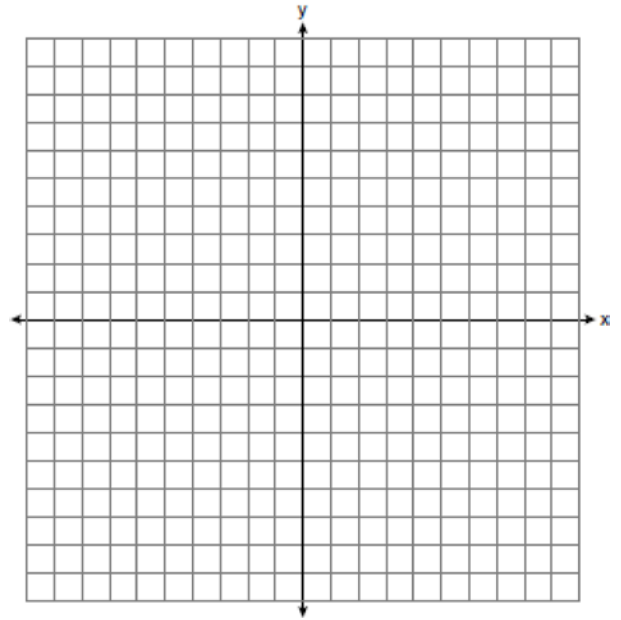
731 In scalene triangle ABC, m$\angle B = 45$ and m$\angle C = 55$. What is the order of the sides in length, from longest to shortest?
1) $\overline{AB}, \overline{BC}, \overline{AC}$
2) $\overline{BC}, \overline{AC}, \overline{AB}$
3) $\overline{AC}, \overline{BC}, \overline{AB}$
4) $\overline{BC}, \overline{AB}, \overline{AC}$

732 What is the length of $\overline{AB}$ with endpoints $A(-1,0)$ and $B(4,-3)$?
1) $\sqrt{6}$
2) $\sqrt{18}$
3) $\sqrt{34}$
4) $\sqrt{50}$

138

733 What is an equation of the line that passes through the point $(-2,3)$ and is parallel to the line whose equation is $y = \frac{3}{2}x - 4$?

1) $y = \frac{-2}{3}x$

2) $y = \frac{-2}{3}x + \frac{5}{3}$

3) $y = \frac{3}{2}x$

4) $y = \frac{3}{2}x + 6$

734 Write an equation of the circle graphed in the diagram below.
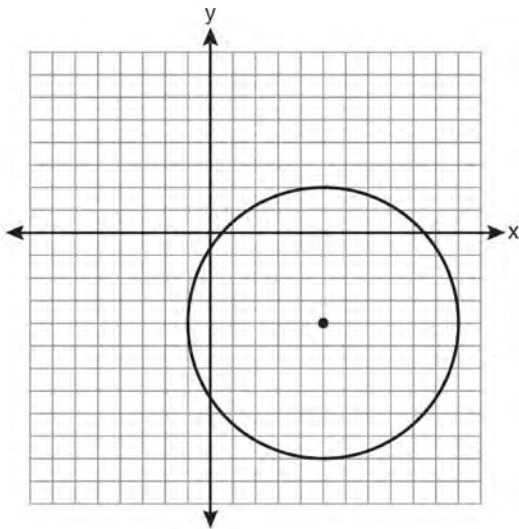
735 Determine whether the two lines represented by the equations $y = 2x + 3$ and $2y + x = 6$ are parallel, perpendicular, or neither. Justify your response.

736 Given: $\overline{BE}$ and $\overline{AD}$ intersect at point C
$\overline{BC} \cong \overline{EC}$
$\overline{AC} \cong \overline{DC}$
AB and DE are drawn
Prove: $\triangle ABC \cong \triangle DEC$
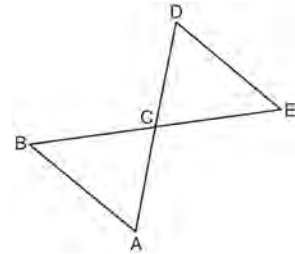
737 In the diagram below, tangent $\overline{ML}$ and secant $\overline{MNK}$ are drawn to circle O. The ratio $m\overset{\frown}{LN} : m\overset{\frown}{NK} : m\overset{\frown}{KL}$ is $3:4:5$. Find $m\angle LMK$.
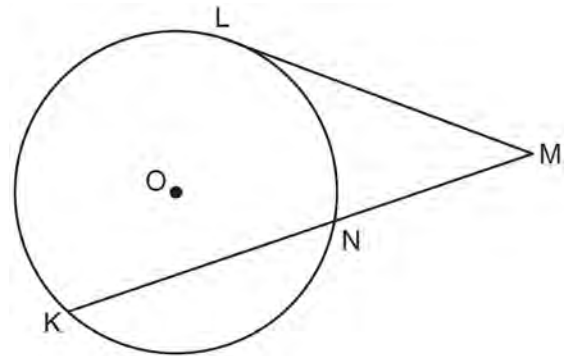
738 Plane $\mathcal{A}$ is parallel to plane $\mathcal{B}$. Plane $\mathcal{C}$ intersects plane $\mathcal{A}$ in line m and intersects plane $\mathcal{B}$ in line n. Lines m and n are
1) intersecting
2) parallel
3) perpendicular
4) skew

739 In the diagram below of $\triangle GJK$, H is a point on $\overline{GJ}$, $\overline{HJ} \cong \overline{JK}$, m$\angle G = 28$, and m$\angle GJK = 70$. Determine whether $\triangle GHK$ is an isosceles triangle and justify your answer.
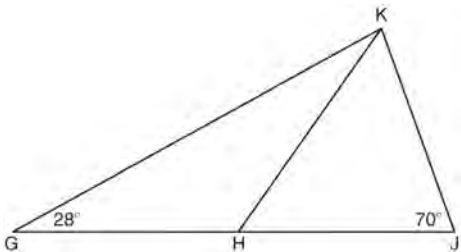
740 In the diagram of quadrilateral $ABCD$, $\overline{AB} \parallel \overline{CD}$, $\angle ABC \cong \angle CDA$, and diagonal $\overline{AC}$ is drawn.
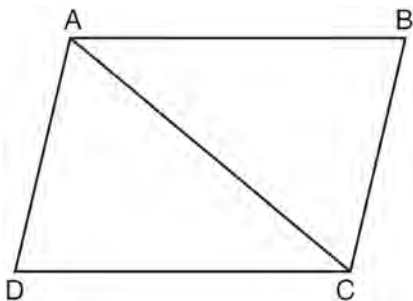
Which method can be used to prove $\triangle ABC$ is congruent to $\triangle CDA$?
1) AAS
2) SSA
3) SAS
4) SSS

741 Which quadrilateral has diagonals that always bisect its angles and also bisect each other?
1) rhombus
2) rectangle
3) parallelogram
4) isosceles trapezoid

742 On the set of axes below, graph the locus of points that are four units from the point $(2,1)$. On the same set of axes, graph the locus of points that are two units from the line $x = 4$. State the coordinates of all points that satisfy both conditions.
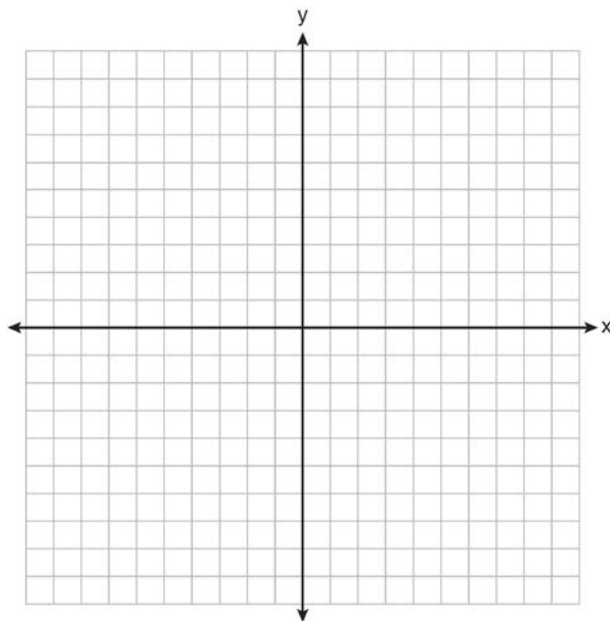
743 The coordinates of the endpoints of $\overline{AB}$ are $A(0,0)$ and $B(0,6)$. The equation of the perpendicular bisector of $\overline{AB}$ is
1) $x = 0$
2) $x = 3$
3) $y = 0$
4) $y = 3$

744 What is the measure of each interior angle of a regular hexagon?
1) 60°
2) 120°
3) 135°
4) 270°

745 The sum of the interior angles of a polygon of n sides is
1) 360
2) $\dfrac{360}{n}$
3) $(n-2) \cdot 180$
4) $\dfrac{(n-2) \cdot 180}{n}$

746 In $\triangle ABC$, $AB = 5$ feet and $BC = 3$ feet. Which inequality represents all possible values for the length of $\overline{AC}$, in feet?
1) $2 \le AC \le 8$
2) $2 < AC < 8$
3) $3 \le AC \le 7$
4) $3 < AC < 7$

747 A packing carton in the shape of a triangular prism is shown in the diagram below.
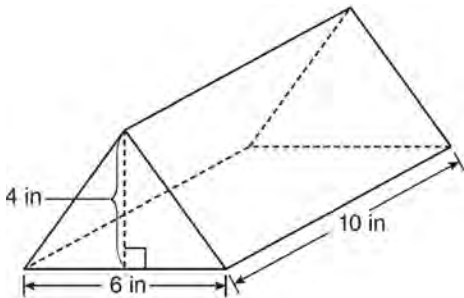
What is the volume, in cubic inches, of this carton?
1) 20
2) 60
3) 120
4) 240

748 In the diagram below, $\ell \parallel m$ and $\overline{QR} \perp \overline{ST}$ at R.
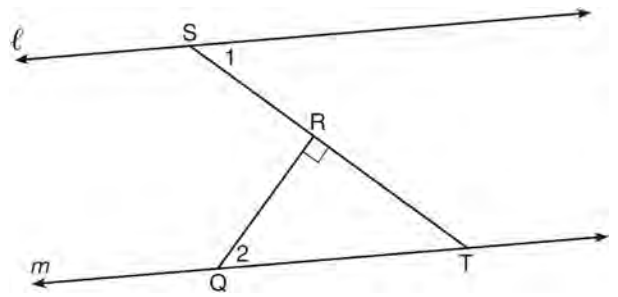
If $m\angle 1 = 63$, find $m\angle 2$.

749 Pentagon $PQRST$ has $\overline{PQ}$ parallel to $\overline{TS}$. After a translation of $T_{2,-5}$, which line segment is parallel to $\overline{P'Q'}$?
1) $\overline{R'Q'}$
2) $\overline{R'S'}$
3) $\overline{T'S'}$
4) $\overline{T'P'}$

750 In parallelogram $ABCD$ shown below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E.
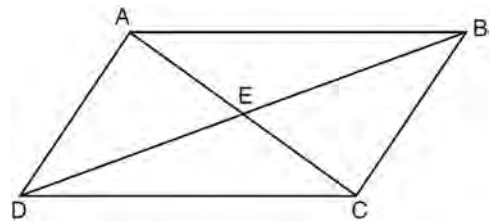
Which statement must be true?
1) $\overline{AC} \cong \overline{DB}$
2) $\angle ABD \cong \angle CBD$
3) $\triangle AED \cong \triangle CEB$
4) $\triangle DCE \cong \triangle BCE$

751 Which type of triangle can be drawn using the points $(-2,3)$, $(-2,-7)$, and $(4,-5)$?
1) scalene
2) isosceles
3) equilateral
4) no triangle can be drawn

752 In the diagram below, $\triangle ABC \sim \triangle RST$.
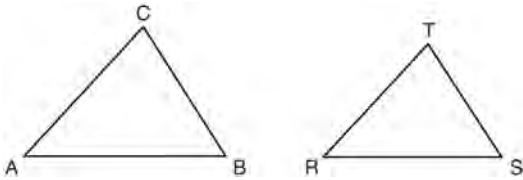
Which statement is *not* true?
1) $\angle A \cong \angle R$
2) $\dfrac{AB}{RS} = \dfrac{BC}{ST}$
3) $\dfrac{AB}{BC} = \dfrac{ST}{RS}$
4) $\dfrac{AB+BC+AC}{RS+ST+RT} = \dfrac{AB}{RS}$

753 In the diagram below, *LATE* is an isosceles trapezoid with $\overline{LE} \cong \overline{AT}$, $LA = 24$, $ET = 40$, and $AT = 10$. Altitudes $\overline{LF}$ and $\overline{AG}$ are drawn.
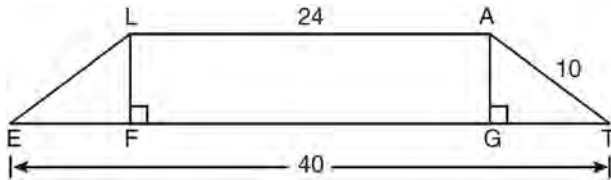
What is the length of $\overline{LF}$?
1) 6
2) 8
3) 3
4) 4

754 In the diagram below of circle O, chord $\overline{AB}$ is parallel to chord $\overline{CD}$.
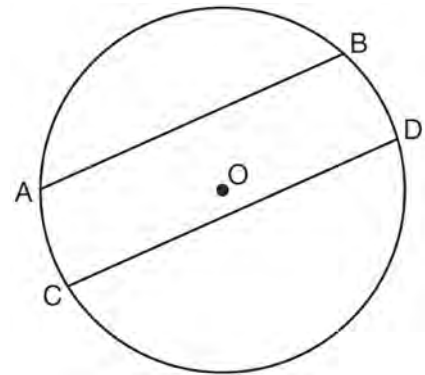
Which statement must be true?
1) $\overparen{AC} \cong \overparen{BD}$
2) $\overparen{AB} \cong \overparen{CD}$
3) $\overline{AB} \cong \overline{CD}$
4) $\overparen{ABD} \cong \overparen{CDB}$

755 As shown in the diagram below, $\overleftrightarrow{EF}$ intersects planes $\mathcal{P}$, $\mathcal{Q}$, and $\mathcal{R}$.
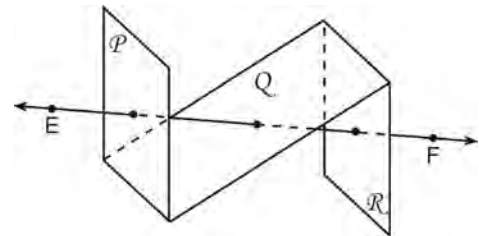
If $\overleftrightarrow{EF}$ is perpendicular to planes $\mathcal{P}$ and $\mathcal{R}$, which statement must be true?
1) Plane $\mathcal{P}$ is perpendicular to plane $\mathcal{Q}$.
2) Plane $\mathcal{R}$ is perpendicular to plane $\mathcal{P}$.
3) Plane $\mathcal{P}$ is parallel to plane $\mathcal{Q}$.
4) Plane $\mathcal{R}$ is parallel to plane $\mathcal{P}$.

756 For which polygon does the sum of the measures of the interior angles equal the sum of the measures of the exterior angles?
1) hexagon
2) pentagon
3) quadrilateral
4) triangle

757 On the set of axes below, solve the system of equations graphically and state the coordinates of all points in the solution.
$$y = (x - 2)^2 - 3$$
$$2y + 16 = 4x$$
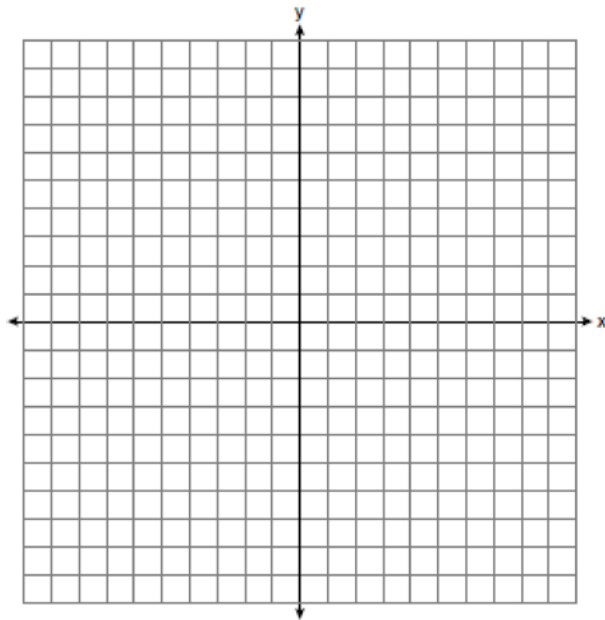
758 In $\triangle FGH$, m$\angle F = 42$ and an exterior angle at vertex H has a measure of 104. What is m$\angle G$?
1) 34
2) 62
3) 76
4) 146

759 Triangle ABC has vertices $A(-2,2)$, $B(-1,-3)$, and $C(4,0)$. Find the coordinates of the vertices of $\triangle A'B'C'$, the image of $\triangle ABC$ after the transformation $r_{x\text{-axis}}$. [The use of the grid is optional.]
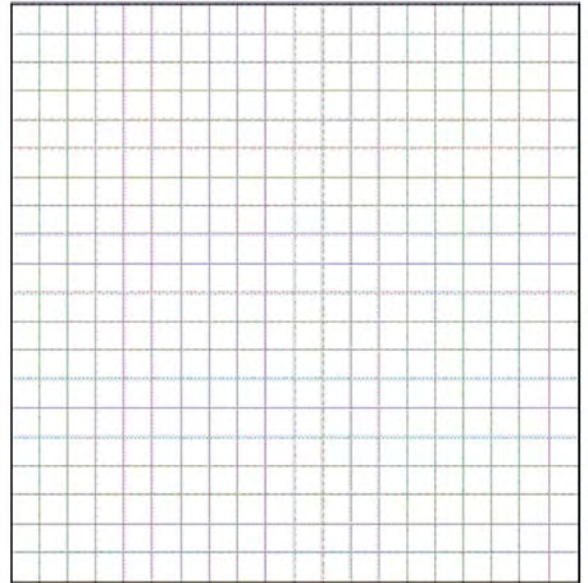
760 When writing a geometric proof, which angle relationship could be used alone to justify that two angles are congruent?
1) supplementary angles
2) linear pair of angles
3) adjacent angles
4) vertical angles

761 Which set of numbers does *not* represent the sides of a right triangle?
1) $\{6, 8, 10\}$
2) $\{8, 15, 17\}$
3) $\{8, 24, 25\}$
4) $\{15, 36, 39\}$

143

762 The angle formed by the radius of a circle and a tangent to that circle has a measure of
1) 45°
2) 90°
3) 135°
4) 180°

766 Point M is the midpoint of $\overline{AB}$. If the coordinates of A are $(-3,6)$ and the coordinates of M are $(-5,2)$, what are the coordinates of B?
1) $(1,2)$
2) $(7,10)$
3) $(-4,4)$
4) $(-7,-2)$

763 Scalene triangle ABC is similar to triangle DEF. Which statement is *false*?
1) $AB:BC=DE:EF$
2) $AC:DF=BC:EF$
3) $\angle ACB \cong \angle DFE$
4) $\angle ABC \cong \angle EDF$

767 Triangle PQR has angles in the ratio of $2:3:5$. Which type of triangle is $\triangle PQR$?
1) acute
2) isosceles
3) obtuse
4) right

764 In the diagram below, two parallel lines intersect circle O at points A, B, C, and D, with $m\widehat{AB} = x + 20$ and $m\widehat{DC} = 2x - 20$. Find $m\widehat{AB}$.

768 The diagram below represents a rectangular solid.
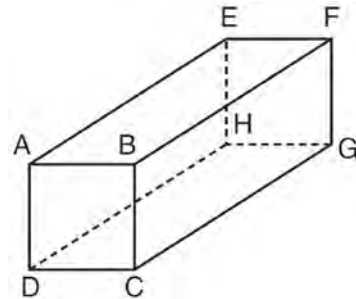
Which statement must be true?
1) $\overline{EH}$ and $\overline{BC}$ are coplanar
2) $\overline{FG}$ and $\overline{AB}$ are coplanar
3) $\overline{EH}$ and $\overline{AD}$ are skew
4) $\overline{FG}$ and $\overline{CG}$ are skew

765 The equation of a circle with its center at $(-3,5)$ and a radius of 4 is
1) $(x+3)^2 + (y-5)^2 = 4$
2) $(x-3)^2 + (y+5)^2 = 4$
3) $(x+3)^2 + (y-5)^2 = 16$
4) $(x-3)^2 + (y+5)^2 = 16$

769 On the diagram below, use a compass and straightedge to construct the bisector of $\angle ABC$. [Leave all construction marks.]
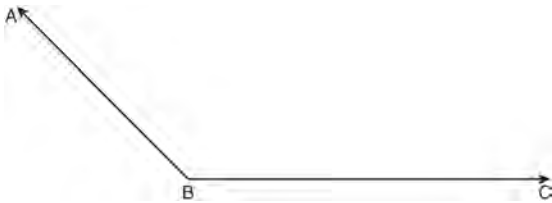
770 In the diagram below of $\triangle DAE$ and $\triangle BCE$, $\overline{AB}$ and $\overline{CD}$ intersect at E, such that $\overline{AE} \cong \overline{CE}$ and $\angle BCE \cong \angle DAE$.
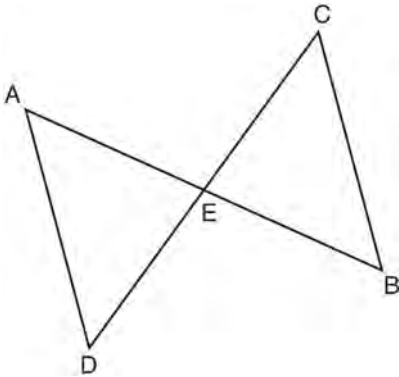
Triangle DAE can be proved congruent to triangle BCE by
1) ASA
2) SAS
3) SSS
4) HL

771 Which equation represents the perpendicular bisector of $\overline{AB}$ whose endpoints are $A(8,2)$ and $B(0,6)$?
1) $y = 2x - 4$
2) $y = -\dfrac{1}{2}x + 2$
3) $y = -\dfrac{1}{2}x + 6$
4) $y = 2x - 12$

772 As shown in the diagram below, $\overline{FJ}$ is contained in plane $\mathcal{R}$, $\overline{BC}$ and $\overline{DE}$ are contained in plane $\mathcal{S}$, and $\overline{FJ}$, $\overline{BC}$, and $\overline{DE}$ intersect at A.
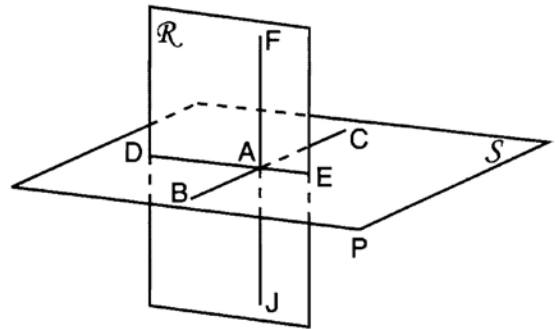
Which fact is sufficient to show that planes $\mathcal{R}$ and $\mathcal{S}$ are perpendicular?
1) $\overline{FA} \perp \overline{DE}$
2) $\overline{AD} \perp \overline{AF}$
3) $\overline{BC} \perp \overline{FJ}$
4) $\overline{DE} \perp \overline{BC}$

773 When a dilation is performed on a hexagon, which property of the hexagon will *not* be preserved in its image?
1) parallelism
2) orientation
3) length of sides
4) measure of angles

145

774 A man wants to place a new bird bath in his yard so that it is 30 feet from a fence, f, and also 10 feet from a light pole, P. As shown in the diagram below, the light pole is 35 feet away from the fence.
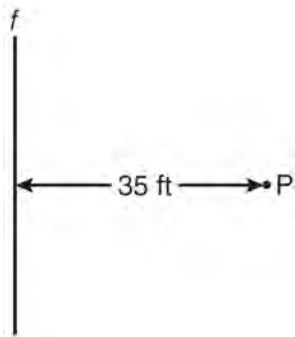
How many locations are possible for the bird bath?
1) 1
2) 2
3) 3
4) 0

775 Which equation represents the line parallel to the line whose equation is $4x + 2y = 14$ and passing through the point $(2,2)$?
1) $y = -2x$
2) $y = -2x + 6$
3) $y = \frac{1}{2}x$
4) $y = \frac{1}{2}x + 1$

776 What is the image of the point $(-5,2)$ under the translation $T_{3,-4}$?
1) $(-9,5)$
2) $(-8,6)$
3) $(-2,-2)$
4) $(-15,-8)$

777 What is the slope of a line perpendicular to the line whose equation is $20x - 2y = 6$?
1) -10
2) $-\frac{1}{10}$
3) 10
4) $\frac{1}{10}$

778 As shown in the diagram below of $\triangle ABC$, a compass is used to find points D and E, equidistant from point A. Next, the compass is used to find point F, equidistant from points D and E. Finally, a straightedge is used to draw $\overrightarrow{AF}$. Then, point G, the intersection of $\overrightarrow{AF}$ and side $\overline{BC}$ of $\triangle ABC$, is labeled.
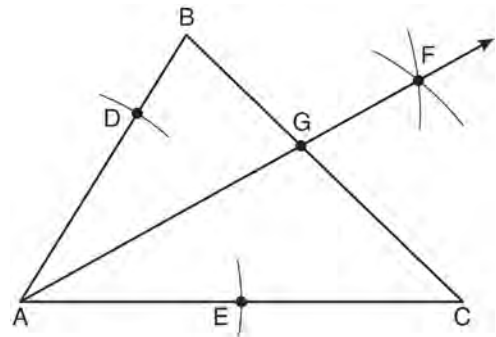
Which statement must be true?
1) $\overrightarrow{AF}$ bisects side $\overline{BC}$
2) $\overrightarrow{AF}$ bisects $\angle BAC$
3) $\overrightarrow{AF} \perp \overline{BC}$
4) $\triangle ABG \sim \triangle ACG$

146

779 When solved graphically, what is the solution to the following system of equations?
$$y = x^2 - 4x + 6$$
$$y = x + 2$$

1) $(1,4)$
2) $(4,6)$
3) $(1,3)$ and $(4,6)$
4) $(3,1)$ and $(6,4)$

780 What is the equation of a line passing through $(2,-1)$ and parallel to the line represented by the equation $y = 2x + 1$?

1) $y = -\frac{1}{2}x$
2) $y = -\frac{1}{2}x + 1$
3) $y = 2x - 5$
4) $y = 2x - 1$

781 In the diagram of $\triangle KLM$ below, $m\angle L = 70$, $m\angle M = 50$, and $\overline{MK}$ is extended through N.
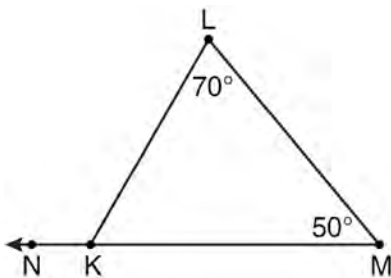
What is the measure of $\angle LKN$?
1) $60°$
2) $120°$
3) $180°$
4) $300°$

782 The graph below shows the locus of points equidistant from the x-axis and y-axis. On the same set of axes, graph the locus of points 3 units from the line $x = 0$. Label with an **X** *all* points that satisfy both conditions.
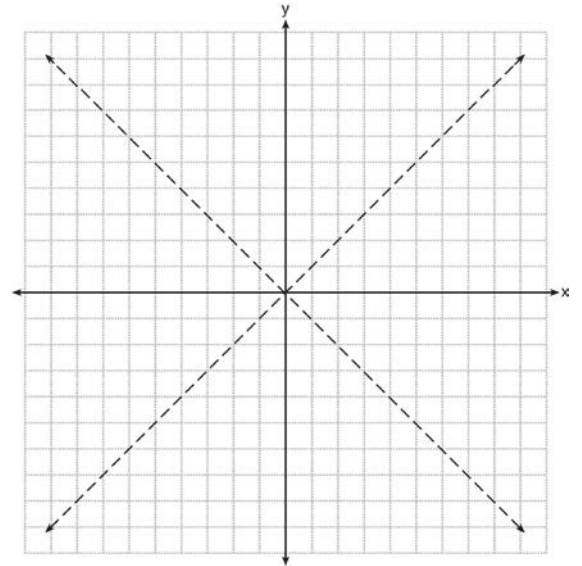
783 In the diagram below, lines n and m are cut by transversals p and q.
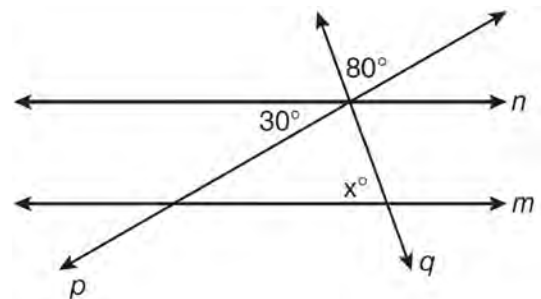
What value of x would make lines n and m parallel?
1) 110
2) 80
3) 70
4) 50

147

784 What is the slope of a line that is perpendicular to the line whose equation is $3x + 5y = 4$?

1) $-\dfrac{3}{5}$

2) $\dfrac{3}{5}$

3) $-\dfrac{5}{3}$

4) $\dfrac{5}{3}$

785 In the diagram below, $\overleftrightarrow{AB}$ is perpendicular to plane $AEFG$.
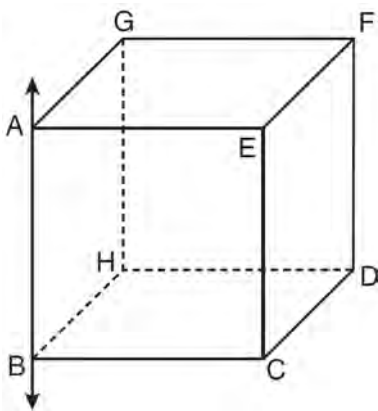
Which plane must be perpendicular to plane $AEFG$?
1) $ABCE$
2) $BCDH$
3) $CDFE$
4) $HDFG$

786 For a triangle, which two points of concurrence could be located outside the triangle?
1) incenter and centroid
2) centroid and orthocenter
3) incenter and circumcenter
4) circumcenter and orthocenter

787 The coordinates of the vertices of $\triangle RST$ are $R(-2,3)$, $S(4,4)$, and $T(2,-2)$. Triangle $R'S'T'$ is the image of $\triangle RST$ after a rotation of $90°$ about the origin. State the coordinates of the vertices of $\triangle R'S'T'$. [The use of the set of axes below is optional.]
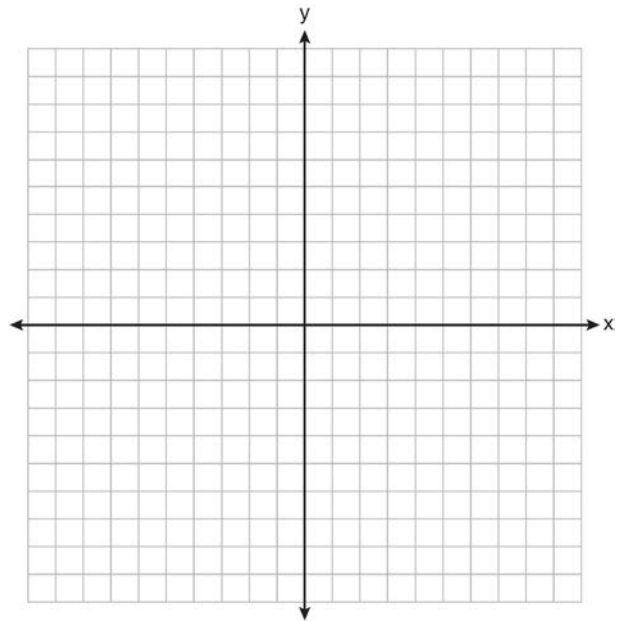
788 In the diagram below, $\triangle ABC \sim \triangle DEF$, $DE = 4$, $AB = x$, $AC = x + 2$, and $DF = x + 6$. Determine the length of $\overline{AB}$. [Only an algebraic solution can receive full credit.]

148
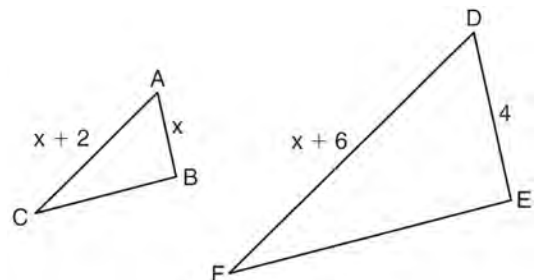
789 Which graph represents a circle with the equation $(x-3)^2 + (y+1)^2 = 4$?

1)

2)

3)

4)
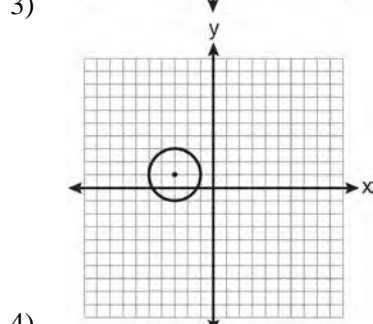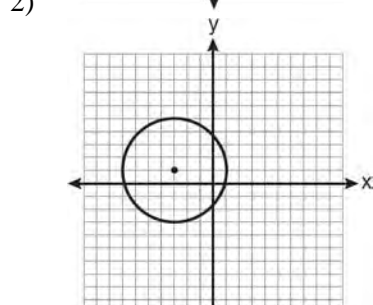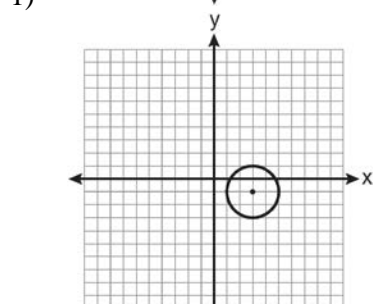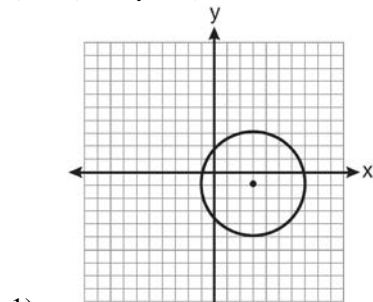
790 In the diagram below of $\overline{ABCD}$, $\overline{AC} \cong \overline{BD}$.

Using this information, it could be proven that
1) $BC = AB$
2) $AB = CD$
3) $AD - BC = CD$
4) $AB + CD = AD$

791 In the diagram below, quadrilateral *JUMP* is inscribed in a circle..
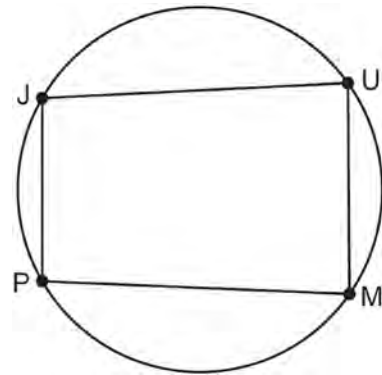
Opposite angles *J* and *M* must be
1) right
2) complementary
3) congruent
4) supplementary

792 In $\triangle ABC$ and $\triangle DEF$, $\dfrac{AC}{DF} = \dfrac{CB}{FE}$. Which additional information would prove $\triangle ABC \sim \triangle DEF$?
1) $AC = DF$
2) $CB = FE$
3) $\angle ACB \cong \angle DFE$
4) $\angle BAC \cong \angle EDF$

149

793   On the set of axes below, solve the following system of equations graphically and state the coordinates of *all* points in the solution.

$$(x+3)^2 + (y-2)^2 = 25$$

$$2y + 4 = -x$$
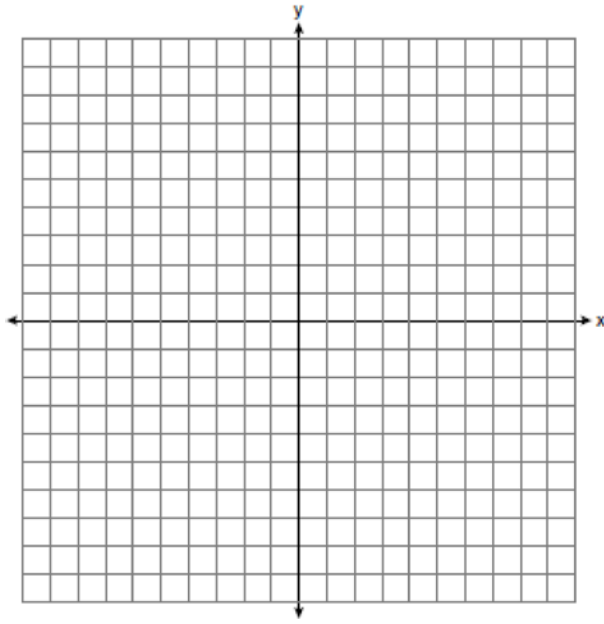
794   As shown in the diagram below, $\overline{AC}$ bisects $\angle BAD$ and $\angle B \cong \angle D$.
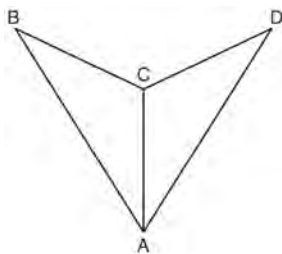
Which method could be used to prove $\triangle ABC \cong \triangle ADC$?
1)   SSS
2)   AAA
3)   SAS
4)   AAS

795   Lines a and b intersect at point P. Line c passes through P and is perpendicular to the plane containing lines a and b. Which statement must be true?
1)   Lines a, b, and c are coplanar.
2)   Line a is perpendicular to line b.
3)   Line c is perpendicular to both line a and line b.
4)   Line c is perpendicular to line a or line b, but not both.

796   Chords $\overline{AB}$ and $\overline{CD}$ intersect at E in circle O, as shown in the diagram below. Secant $\overline{FDA}$ and tangent $\overline{FB}$ are drawn to circle O from external point F and chord $\overline{AC}$ is drawn. The $m\overarc{DA} = 56$, $m\overarc{DB} = 112$, and the ratio of $m\overarc{AC}:m\overarc{CB} = 3:1$.
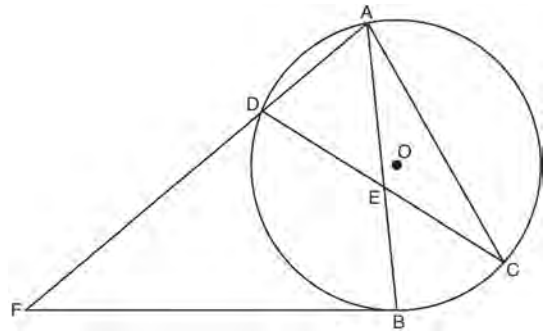
Determine $m\angle CEB$. Determine $m\angle F$. Determine $m\angle DAC$.

797 In the diagram below, $\overline{BFCE}$, $\overline{AB} \perp \overline{BE}$,
$\overline{DE} \perp \overline{BE}$, and $\angle BFD \cong \angle ECA$. Prove that
$\triangle ABC \sim \triangle DEF$.
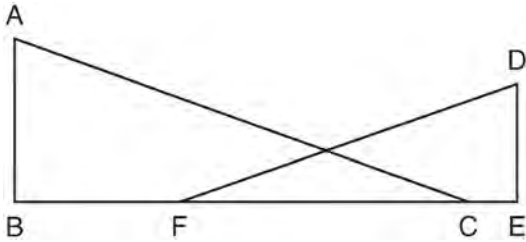
798 Triangle ABC is graphed on the set of axes below.
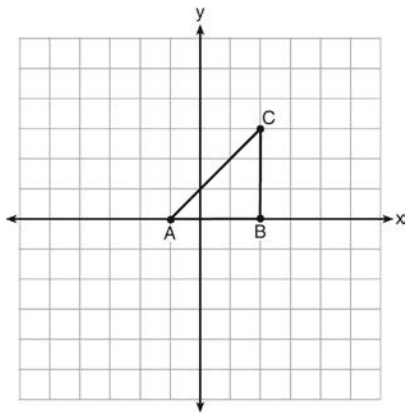
Which transformation produces an image that is
similar to, but *not* congruent to, $\triangle ABC$?
1) $T_{2,3}$
2) D_2
3) $r_{y=x}$
4) R_{90}

Geometry Regents at Random
Answer Section

568 ANS:
The medians of a triangle are not concurrent. False.

PTS: 2   REF: 061129ge   STA: G.G.24   TOP: Negations

569 ANS:
$$\frac{180-80}{2}=50$$

PTS: 2   REF: 081129ge   STA: G.G.52   TOP: Chords and Secants

570 ANS:
$$x^2 = 9 \cdot 8$$
$$x = \sqrt{72}$$
$$x = \sqrt{36}\sqrt{2}$$
$$x = 6\sqrt{2}$$

PTS: 2   REF: 011132ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: two chords

571 ANS: 1   PTS: 2   REF: 061104ge   STA: G.G.43
TOP: Centroid

572 ANS: 4   PTS: 2   REF: 011216ge   STA: G.G.29
TOP: Triangle Congruency

573 ANS: 3   PTS: 2   REF: 011105ge   STA: G.G.10
TOP: Solids

574 ANS: 1   PTS: 2   REF: 011102ge   STA: G.G.55
TOP: Properties of Transformations

575 ANS: 1   PTS: 2   REF: 081113ge   STA: G.G.54
TOP: Reflections   KEY: basic

576 ANS: 2   PTS: 2   REF: 061202ge   STA: G.G.24
TOP: Negations

577 ANS:

$(7,5)$ $m_{\overline{AB}} = \left(\frac{3+7}{2}, \frac{3+9}{2}\right) = (5,6)$ $m_{\overline{BC}} = \left(\frac{7+11}{2}, \frac{9+3}{2}\right) = (9,6)$
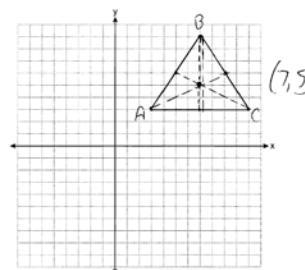
PTS: 2   REF: 081134ge   STA: G.G.21
TOP: Centroid, Orthocenter, Incenter and Circumcenter

1

578 ANS:

$(2a - 3, 3b + 2).$ $\left(\dfrac{3a + a - 6}{2}, \dfrac{2b - 1 + 4b + 5}{2} \right) = \left(\dfrac{4a - 6}{2}, \dfrac{6b + 4}{2} \right) = (2a - 3, 3b + 2)$

PTS: 2 REF: 061134ge STA: G.G.66 TOP: Midpoint
579 ANS: 4 PTS: 2 REF: 011212ge STA: G.G.71
TOP: Equations of Circles
580 ANS: 1 PTS: 2 REF: 011220ge STA: G.G.72
TOP: Equations of Circles
581 ANS: 1 PTS: 2 REF: 011218ge STA: G.G.3
TOP: Planes
582 ANS: 3
$4x + 14 + 8x + 10 = 180$

$12x = 156$

$x = 13$

PTS: 2 REF: 081213ge STA: G.G.35 TOP: Parallel Lines and Transversals
583 ANS: 1

$m = \dfrac{3}{2}$ $y = mx + b$

$2 = \dfrac{3}{2}(1) + b$

$\dfrac{1}{2} = b$

PTS: 2 REF: 081217ge STA: G.G.65 TOP: Parallel and Perpendicular Lines
584 ANS: 1 PTS: 2 REF: 011213ge STA: G.G.24
TOP: Negations
585 ANS: 4
$6^2 = x(x + 5)$

$36 = x^2 + 5x$

$0 = x^2 + 5x - 36$

$0 = (x + 9)(x - 4)$

$x = 4$

PTS: 2 REF: 011123ge STA: G.G.47 TOP: Similarity
KEY: leg
586 ANS:

$\sqrt{(-4 - 2)^2 + (3 - 5)^2} = \sqrt{36 + 4} = \sqrt{40} = \sqrt{4}\sqrt{10} = 2\sqrt{10}.$

PTS: 2 REF: 081232ge STA: G.G.67 TOP: Distance
587 ANS: 1 PTS: 2 REF: 061108ge STA: G.G.9
TOP: Planes

588 ANS:
2 is not a prime number, false.

PTS: 2 REF: 081229ge STA: G.G.24 TOP: Negations

589 ANS: 3

$\dfrac{8}{2} = \dfrac{12}{x}$.
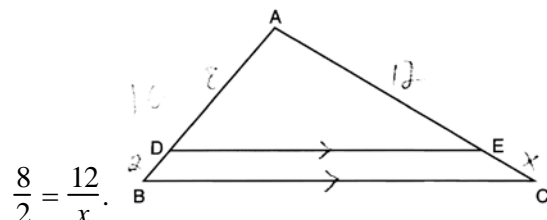
$8x = 24$

$x = 3$

PTS: 2 REF: 061216ge STA: G.G.46 TOP: Side Splitter Theorem

590 ANS: 3 PTS: 2 REF: 061228ge STA: G.G.39
TOP: Special Parallelograms

591 ANS: 2 PTS: 2 REF: 011211ge STA: G.G.55
TOP: Properties of Transformations

592 ANS: 3 PTS: 2 REF: 011104ge STA: G.G.38
TOP: Parallelograms

593 ANS:

$180 - \left(\dfrac{84}{2} + 28 \right) = 180 - 70 = 110$

PTS: 2 REF: 061534ge STA: G.G.21
TOP: Centroid, Orthocenter, Incenter and Circumcenter

594 ANS: 4
Parallel lines intercept congruent arcs.

PTS: 2 REF: 081201ge STA: G.G.52 TOP: Chords and Secants

595 ANS:

The slope of $x + 2y = 4$ is $m = \dfrac{-A}{B} = \dfrac{-1}{2}$. The slope of $4y - 2x = 12$ is $\dfrac{-A}{B} = \dfrac{2}{4} = \dfrac{1}{2}$. Since the slopes are neither equal nor opposite reciprocals, the lines are neither parallel nor perpendicular.

PTS: 2 REF: 061231ge STA: G.G.63 TOP: Parallel and Perpendicular Lines

596 ANS:
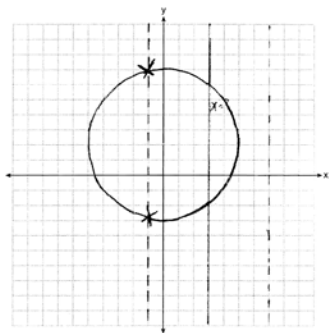
PTS: 2 REF: 061234ge STA: G.G.23 TOP: Locus

597 ANS: 4 PTS: 2 REF: 061114ge STA: G.G.73
TOP: Equations of Circles

598 ANS:
Yes. A reflection is an isometry.

PTS: 2 REF: 061132ge STA: G.G.55 TOP: Properties of Transformations

599 ANS: 3 PTS: 2 REF: 061102ge STA: G.G.29
TOP: Triangle Congruency

600 ANS: 3 PTS: 2 REF: 011217ge STA: G.G.64
TOP: Parallel and Perpendicular Lines

601 ANS: 2 PTS: 2 REF: 061115ge STA: G.G.69
TOP: Triangles in the Coordinate Plane

602 ANS:
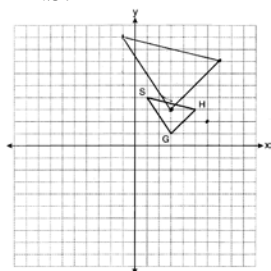
$G''(3,3), H''(7,7), S''(-1,9)$

PTS: 4 REF: 081136ge STA: G.G.58 TOP: Compositions of Transformations

603 ANS: 2 PTS: 2 REF: 011109ge STA: G.G.9
TOP: Planes

604 ANS: 4

$4(x+4) = 8^2$

$4x + 16 = 64$

$4x = 48$

$x = 12$

PTS: 2 REF: 061117ge STA: G.G.53 TOP: Segments Intercepted by Circle
KEY: tangent and secant

605 ANS:

$L = 2\pi rh = 2\pi \cdot 12 \cdot 22 \approx 1659.$ $\dfrac{1659}{600} \approx 2.8.$ 3 cans are needed.

PTS: 2   REF: 061233ge   STA: G.G.14   TOP: Volume and Lateral Area

606 ANS:
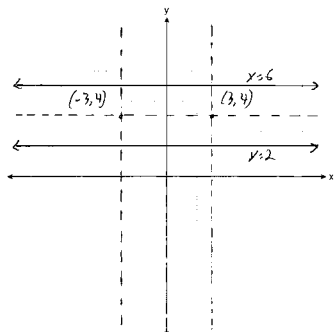
PTS: 4   REF: 061135ge   STA: G.G.23   TOP: Locus

607 ANS: 1   PTS: 2   REF: 081121ge   STA: G.G.39

TOP: Special Parallelograms

608 ANS: 3

$d = \sqrt{(1-9)^2 + (-4-2)^2} = \sqrt{64+36} = \sqrt{100} = 10$

PTS: 2   REF: 081107ge   STA: G.G.67   TOP: Distance

KEY: general

609 ANS: 4

$\sqrt{25^2 - \left(\dfrac{26-12}{2}\right)^2} = 24$

PTS: 2   REF: 011219ge   STA: G.G.40   TOP: Trapezoids

610 ANS: 3

$(3,-2) \rightarrow (2,3) \rightarrow (8,12)$

PTS: 2   REF: 011126ge   STA: G.G.54   TOP: Compositions of Transformations

KEY: basic

611 ANS: 1   PTS: 2   REF: 061223ge   STA: G.G.73

TOP: Equations of Circles

612 ANS:

9.1. $(11)(8)h = 800$

        $h \approx 9.1$

PTS: 2   REF: 061131ge   STA: G.G.12   TOP: Volume

613 ANS: 2

The slope of a line in standard form is $\dfrac{-A}{B}$, so the slope of this line is $\dfrac{-4}{3}$. A parallel line would also have a slope

of $\dfrac{-4}{3}$. Since the answers are in standard form, use the point-slope formula. $y - 2 = -\dfrac{4}{3}(x + 5)$

$$3y - 6 = -4x - 20$$

$$4x + 3y = -14$$

PTS: 2   REF: 061123ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

614 ANS: 4   PTS: 2   REF: 061124ge   STA: G.G.31
TOP: Isosceles Triangle Theorem

615 ANS: 2

$$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi \cdot \left(\frac{6}{2}\right)^3 \approx 36\pi$$

PTS: 2   REF: 081215ge   STA: G.G.16   TOP: Volume and Surface Area

616 ANS: 4   PTS: 2   REF: 081110ge   STA: G.G.71
TOP: Equations of Circles

617 ANS:
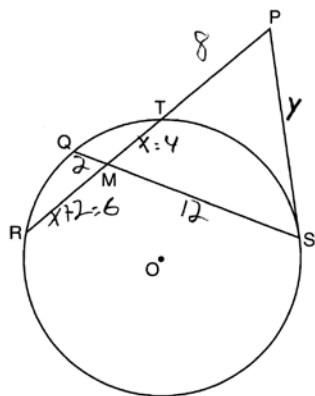
$$x(x + 2) = 12 \cdot 2. \quad \overline{RT} = 6 + 4 = 10. \quad y \cdot y = 18 \cdot 8$$

$$x^2 + 2x - 24 = 0 \qquad\qquad y^2 = 144$$

$$(x + 6)(x - 4) = 0 \qquad\qquad y = 12$$

$$x = 4$$

PTS: 4   REF: 061237ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: tangent and secant

618 ANS:

$$V = \pi r^2 h \quad . \quad L = 2\pi rh = 2\pi \cdot 5\sqrt{2} \cdot 12 \approx 533.1$$

$$600\pi = \pi r^2 \cdot 12$$

$$50 = r^2$$

$$\sqrt{25}\sqrt{2} = r$$

$$5\sqrt{2} = r$$

PTS: 4   REF: 011236ge   STA: G.G.14   TOP: Volume and Lateral Area

619 ANS: 2   PTS: 2   REF: 081108ge   STA: G.G.54
TOP: Reflections   KEY: basic

620 ANS: 3   PTS: 2   REF: 011202ge   STA: G.G.21
TOP: Centroid, Orthocenter, Incenter and Circumcenter

621 ANS: 4

$$x^2 - 6x + 2x - 3 = 9x + 27$$

$$x^2 - 4x - 3 = 9x + 27$$

$$x^2 - 13x - 30 = 0$$

$$(x - 15)(x + 2) = 0$$

$$x = 15, -2$$

PTS: 2   REF: 061225ge   STA: G.G.32   TOP: Exterior Angle Theorem

622 ANS: 3   PTS: 2   REF: 011116ge   STA: G.G.71
TOP: Equations of Circles

623 ANS: 3   PTS: 2   REF: 061210ge   STA: G.G.71
TOP: Equations of Circles

624 ANS:
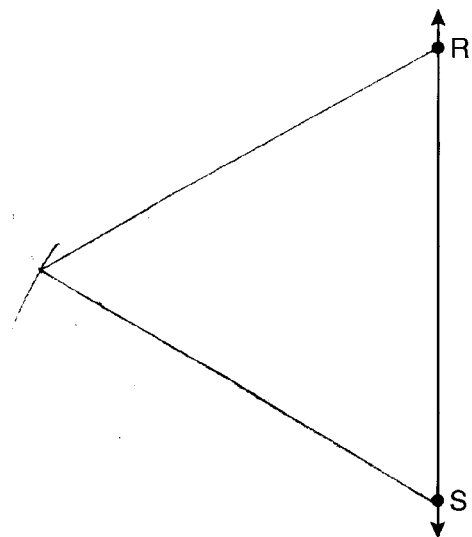
PTS: 2   REF: 061130ge   STA: G.G.20   TOP: Constructions

625 ANS:

$m_{\overline{AB}} = \left(\dfrac{-6+2}{2}, \dfrac{-2+8}{2} \right) = D(2,3)$ $m_{\overline{BC}} = \left(\dfrac{2+6}{2}, \dfrac{8+-2}{2} \right) = E(4,3)$ $F(0,-2)$. To prove that $ADEF$ is a

parallelogram, show that both pairs of opposite sides of the parallelogram are parallel by showing the opposite

sides have the same slope: $m_{\overline{AD}} = \dfrac{3--2}{-2--6} = \dfrac{5}{4}$ $\overline{AF} \,\|\, \overline{DE}$ because all horizontal lines have the same slope. $ADEF$

$$m_{FE} = \dfrac{3--2}{4-0} = \dfrac{5}{4}$$

is not a rhombus because not all sides are congruent. $AD = \sqrt{5^2 + 4^2} = \sqrt{41}$ $AF = 6$

PTS: 6   REF: 081138ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

626 ANS: 2

$d = \sqrt{(-1-7)^2 + (9-4)^2} = \sqrt{64+25} = \sqrt{89}$

PTS: 2   REF: 061109ge   STA: G.G.67   TOP: Distance

KEY: general

627 ANS: 3

$\sqrt{5^2 + 12^2} = 13$

PTS: 2   REF: 061116ge   STA: G.G.39   TOP: Special Parallelograms

628 ANS: 3   PTS: 2   REF: 081208ge   STA: G.G.27

TOP: Quadrilateral Proofs

629 ANS: 4   PTS: 2   REF: 061213ge   STA: G.G.5

TOP: Planes

630 ANS: 3   PTS: 2   REF: 061122ge   STA: G.G.56

TOP: Identifying Transformations

631 ANS: 4

$d = \sqrt{(-5-3)^2 + (4-(-6))^2} = \sqrt{64+100} = \sqrt{164} = \sqrt{4}\sqrt{41} = 2\sqrt{41}$

PTS: 2   REF: 011121ge   STA: G.G.67   TOP: Distance

KEY: general

632 ANS: 2

$V = \dfrac{4}{3} \pi r^3 = \dfrac{4}{3} \pi \cdot 3^3 = 36\pi$

PTS: 2   REF: 061112ge   STA: G.G.16   TOP: Volume and Surface Area

633 ANS: 3

$x^2 + 7^2 = (x+1)^2$ $x + 1 = 25$

$x^2 + 49 = x^2 + 2x + 1$

$\qquad 48 = 2x$

$\qquad 24 = x$

PTS: 2   REF: 081127ge   STA: G.G.48   TOP: Pythagorean Theorem

634 ANS: 4

$$m = \frac{-A}{B} = \frac{-3}{2}. \quad y = mx + b$$

$$-1 = \left(\frac{-3}{2}\right)(2) + b$$

$$-1 = -3 + b$$

$$2 = b$$

PTS: 2   REF: 061226ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

635 ANS: 3   PTS: 2   REF: 061111ge   STA: G.G.38

TOP: Parallelograms

636 ANS: 1
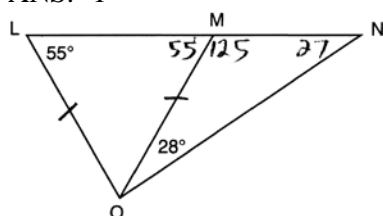
PTS: 2   REF: 061211ge   STA: G.G.31   TOP: Isosceles Triangle Theorem

637 ANS: 1   PTS: 2   REF: 061113ge   STA: G.G.63

TOP: Parallel and Perpendicular Lines

638 ANS: 4

$$m_{\perp} = -\frac{1}{3}. \quad y = mx + b$$

$$6 = -\frac{1}{3}(-9) + b$$

$$6 = 3 + b$$

$$3 = b$$

PTS: 2   REF: 061215ge   STA: G.G.64   TOP: Parallel and Perpendicular Lines

639 ANS: 3

$$\frac{3}{8+3+4} \times 180 = 36$$

PTS: 2   REF: 011210ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

640 ANS: 3   PTS: 2   REF: 081227ge   STA: G.G.42

TOP: Midsegments

641 ANS:
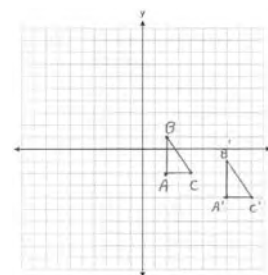
$A'(7,-4), B'(7,-1). C'(9,-4).$ The areas are equal because translations preserve distance.

PTS: 4   REF: 011235ge   STA: G.G.55   TOP: Properties of Transformations

642 ANS: 2   PTS: 2   REF: 011203ge   STA: G.G.73
    TOP: Equations of Circles

643 ANS:

$$V = \frac{4}{3}\pi \cdot 9^3 = 972\pi$$

PTS: 2   REF: 081131ge   STA: G.G.16   TOP: Volume and Surface Area

644 ANS:
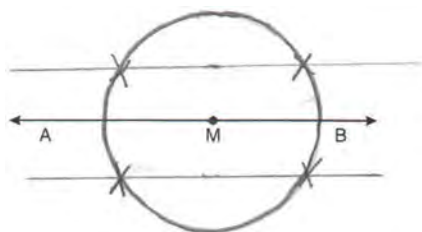
PTS: 2   REF: 011230ge   STA: G.G.22   TOP: Locus

645 ANS: 1   PTS: 2   REF: 011112ge   STA: G.G.39
    TOP: Special Parallelograms

646 ANS: 3

$$\frac{7x}{4} = \frac{7}{x}. \quad 7(2) = 14$$

$$7x^2 = 28$$

$$x = 2$$

PTS: 2   REF: 061120ge   STA: G.G.45   TOP: Similarity
KEY: basic

647 ANS: 1   PTS: 2   REF: 061214ge   STA: G.G.21
    TOP: Centroid, Orthocenter, Incenter and Circumcenter

648 ANS: 4
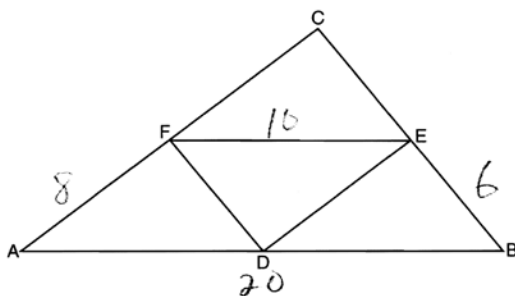
20 + 8 + 10 + 6 = 44.

PTS: 2   REF: 061211ge   STA: G.G.42   TOP: Midsegments

649 ANS: 3
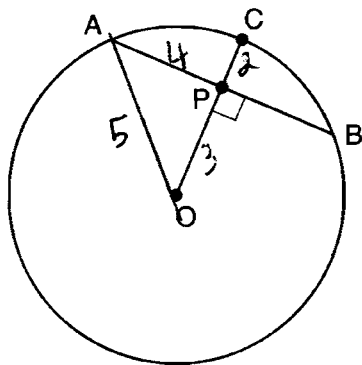
PTS: 2   REF: 011112ge   STA: G.G.49   TOP: Chords

650 ANS: 2

$6x + 42 = 18x - 12$

$54 = 12x$

$x = \dfrac{54}{12} = 4.5$

PTS: 2   REF: 011201ge   STA: G.G.35   TOP: Parallel Lines and Transversals

651 ANS: 2   PTS: 2   REF: 081202ge   STA: G.G.55
TOP: Properties of Transformations

652 ANS: 2   PTS: 2   REF: 081117ge   STA: G.G.23
TOP: Locus

653 ANS:
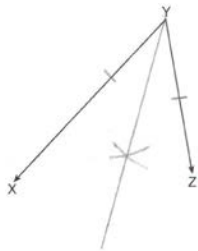
PTS: 2   REF: 011233ge   STA: G.G.17   TOP: Constructions

654 ANS: 1

$7x + 4 = 2(2x + 5)$. $PM = 2(2) + 5 = 9$

$7x + 4 = 4x + 10$

$3x = 6$

$x = 2$

PTS: 2 REF: 011226ge STA: G.G.43 TOP: Centroid

655 ANS:
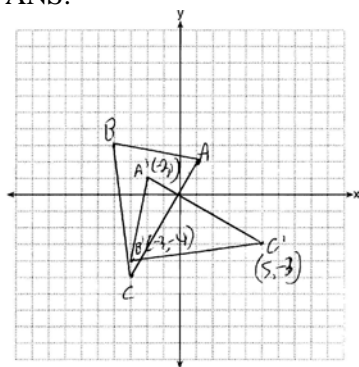
$A'(-2, 1)$, $B'(-3, -4)$, and $C'(5, -3)$

PTS: 2 REF: 081230ge STA: G.G.54 TOP: Rotations

656 ANS: 2 PTS: 2 REF: 061126ge STA: G.G.59

TOP: Properties of Transformations

657 ANS: 3

The slope of $9x - 3y = 27$ is $m = \dfrac{-A}{B} = \dfrac{-9}{-3} = 3$, which is the opposite reciprocal of $-\dfrac{1}{3}$.

PTS: 2 REF: 081225ge STA: G.G.62 TOP: Parallel and Perpendicular Lines

658 ANS:

$EO = 6$. $CE = \sqrt{10^2 - 6^2} = 8$

PTS: 2 REF: 011234ge STA: G.G.49 TOP: Chords

659 ANS:
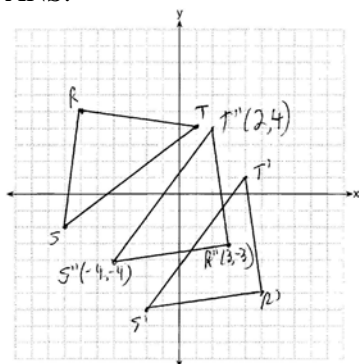
PTS: 4 REF: 081236ge STA: G.G.58 TOP: Compositions of Transformations
KEY: grids

12

660 ANS: 1 PTS: 2 REF: 011207ge STA: G.G.20
TOP: Constructions
661 ANS:
$m = \dfrac{-A}{B} = \dfrac{6}{2} = 3. \; m_\perp = -\dfrac{1}{3}.$

PTS: 2 REF: 011134ge STA: G.G.62 TOP: Parallel and Perpendicular Lines
662 ANS: 4
$\sqrt{25^2 - 7^2} = 24$

PTS: 2 REF: 081105ge STA: G.G.50 TOP: Tangents
KEY: point of tangency
663 ANS:
$\angle ACB \cong \angle AED$ is given. $\angle A \cong \angle A$ because of the reflexive property. Therefore $\triangle ABC \sim \triangle ADE$ because of AA.

PTS: 2 REF: 081133ge STA: G.G.44 TOP: Similarity Proofs
664 ANS: 2
$V = \pi r^2 h = \pi \cdot 6^2 \cdot 15 = 540\pi$

PTS: 2 REF: 011117ge STA: G.G.14 TOP: Volume and Lateral Area
665 ANS:
$\angle B$ and $\angle C$ are right angles because perpendicular lines form right angles. $\angle B \cong \angle C$ because all right angles are congruent. $\angle AEB \cong \angle DEC$ because vertical angles are congruent. $\triangle ABE \cong \triangle DCE$ because of ASA. $\overline{AB} \cong \overline{DC}$ because CPCTC.

PTS: 4 REF: 061235ge STA: G.G.27 TOP: Triangle Proofs
666 ANS: 4 PTS: 2 REF: 011208ge STA: G.G.53
TOP: Segments Intercepted by Circle KEY: two tangents
667 ANS: 4

$\begin{aligned} x + 6y &= 12 \\ 6y &= -x + 12 \\ y &= -\dfrac{1}{6}x + 2 \\ m &= -\dfrac{1}{6} \end{aligned}$ $\qquad \begin{aligned} 3(x-2) &= -y - 4 \\ -3(x-2) &= y + 4 \\ m &= -3 \end{aligned}$

PTS: 2 REF: 011119ge STA: G.G.63 TOP: Parallel and Perpendicular Lines
668 ANS: 2
$V = \dfrac{4}{3}\pi r^3 = \dfrac{4}{3}\pi \cdot \left(\dfrac{15}{2}\right)^3 \approx 1767.1$

PTS: 2 REF: 061207ge STA: G.G.16 TOP: Volume and Surface Area

669   ANS: 2

The slope of $x + 2y = 3$ is $m = \dfrac{-A}{B} = \dfrac{-1}{2}$. $m_\perp = 2$.

PTS: 2   REF: 081122ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines
670   ANS: 4   PTS: 2   REF: 011118ge   STA: G.G.25
TOP: Compound Statements   KEY: general
671   ANS: 4   PTS: 2   REF: 081101ge   STA: G.G.25
TOP: Compound Statements   KEY: conjunction
672   ANS: 3

$\dfrac{180 - 70}{2} = 55$

PTS: 2   REF: 061205ge   STA: G.G.52   TOP: Chords and Secants
673   ANS: 3   PTS: 2   REF: 081128ge   STA: G.G.39
TOP: Special Parallelograms
674   ANS: 1

$x^2 = 7(16 - 7)$

$x^2 = 63$

$x = \sqrt{9}\sqrt{7}$

$x = 3\sqrt{7}$

PTS: 2   REF: 061128ge   STA: G.G.47   TOP: Similarity
KEY: altitude
675   ANS: 2

$7x = 5x + 30$

$2x = 30$

$x = 15$

PTS: 2   REF: 061106ge   STA: G.G.35   TOP: Parallel Lines and Transversals

676 ANS:
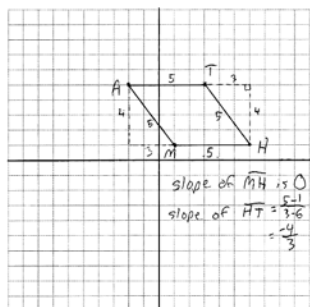
The length of each side of quadrilateral is 5. Since each side is congruent, quadrilateral *MATH* is a rhombus. The slope of $\overline{MH}$ is 0 and the slope of $\overline{HT}$ is $-\frac{4}{3}$. Since the slopes are not negative reciprocals, the sides are not perpendicular and do not form rights angles. Since adjacent sides are not perpendicular, quadrilateral *MATH* is not a square.

PTS: 6   REF: 011138ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

677 ANS: 1
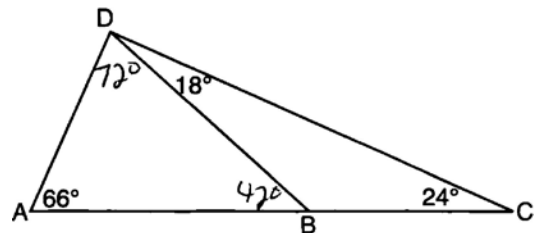
PTS: 2   REF: 081219ge   STA: G.G.34   TOP: Angle Side Relationship

678 ANS: 2   PTS: 2   REF: 081102ge   STA: G.G.29
TOP: Triangle Congruency

679 ANS:
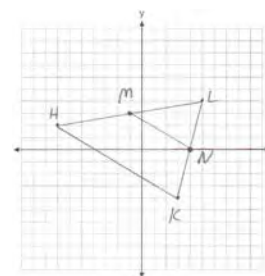
$M\left(\dfrac{-7+5}{2}, \dfrac{2+4}{2}\right) = M(-1,3)$. $N\left(\dfrac{3+5}{2}, \dfrac{-4+4}{2}\right) = N(4,0)$. $\overline{MN}$ is a midsegment.

PTS: 4   REF: 011237ge   STA: G.G.42   TOP: Midsegments

680 ANS: 3
$x + 2x + 15 = 5x + 15$ $2(5) + 15 = 25$

$\quad 3x + 15 = 5x + 5$

$\quad\quad\quad 10 = 2x$

$\quad\quad\quad\; 5 = x$

PTS: 2   REF: 011127ge   STA: G.G.32   TOP: Exterior Angle Theorem

15

681 ANS: 3

The slope of $2y = x + 2$ is $\frac{1}{2}$, which is the opposite reciprocal of -2. $3 = -2(4) + b$

$$11 = b$$

PTS: 2   REF: 081228ge   STA: G.G.64   TOP: Parallel and Perpendicular Lines

682 ANS: 1

The diagonals of a parallelogram intersect at their midpoints. $M_{\overline{AC}}\left(\dfrac{1+3}{2}, \dfrac{5+(-1)}{2}\right) = (2,2)$

PTS: 2   REF: 061209ge   STA: G.G.69   TOP: Quadrilaterals in the Coordinate Plane

683 ANS:

30.
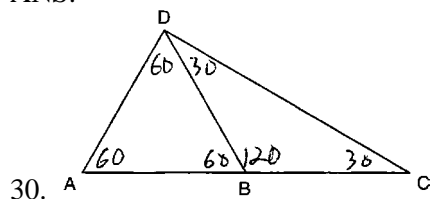
PTS: 2   REF: 011129ge   STA: G.G.31   TOP: Isosceles Triangle Theorem

684 ANS: 1

$$AB = CD$$
$$AB + BC = CD + BC$$
$$AC = BD$$

PTS: 2   REF: 081207ge   STA: G.G.27   TOP: Triangle Proofs

685 ANS:

$(5-2)180 = 540.$ $\dfrac{540}{5} = 108$ interior. $180 - 108 = 72$ exterior

PTS: 2   REF: 011131ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

686 ANS: 2

$$\dfrac{50+x}{2} = 34$$
$$50 + x = 68$$
$$x = 18$$

PTS: 2   REF: 011214ge   STA: G.G.51   TOP: Arcs Determined by Angles
KEY: inside circle

687   ANS: 3
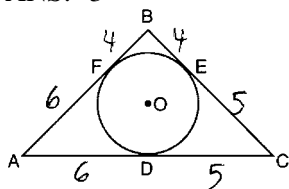
PTS: 2   REF: 011101ge   STA: G.G.53   TOP: Segments Intercepted by Circle
KEY: two tangents

688   ANS: 1

$3x + 5 + 4x - 15 + 2x + 10 = 180$. $m\angle D = 3(20) + 5 = 65$. $m\angle E = 4(20) - 15 = 65$.

$$9x = 180$$

$$x = 20$$

PTS: 2   REF: 061119ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

689   ANS:
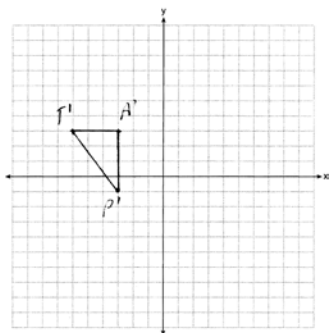
$T'(-6,3), A'(-3,3), P'(-3,-1)$

PTS: 2   REF: 061229ge   STA: G.G.61
TOP: Analytical Representations of Transformations

690   ANS: 1   PTS: 2   REF: 011128ge   STA: G.G.2
TOP: Planes

691   ANS:

32. $\dfrac{16}{20} = \dfrac{x-3}{x+5}$. $\overline{AC} = x - 3 = 35 - 3 = 32$

$$16x + 80 = 20x - 60$$

$$140 = 4x$$

$$35 = x$$

PTS: 4   REF: 011137ge   STA: G.G.46   TOP: Side Splitter Theorem

692   ANS: 2

$\dfrac{4x + 10}{2} = 2x + 5$

PTS: 2   REF: 011103ge   STA: G.G.42   TOP: Midsegments

693   ANS: 3   PTS: 2   REF: 061220ge   STA: G.G.74
TOP: Graphing Circles

694   ANS: 2
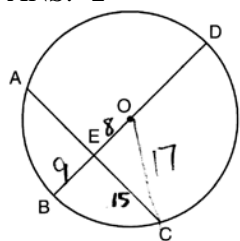
$$\sqrt{17^2 - 15^2} = 8. \ 17 - 8 = 9$$

    PTS: 2   REF: 061221ge   STA: G.G.49   TOP: Chords

695   ANS: 3   PTS: 2   REF: 081111ge   STA: G.G.32

    TOP: Exterior Angle Theorem

696   ANS: 1   PTS: 2   REF: 061110ge   STA: G.G.72

    TOP: Equations of Circles

697   ANS:
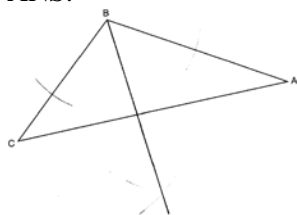
    PTS: 2   REF: 061232ge   STA: G.G.17   TOP: Constructions

698   ANS: 4

$x \cdot 4x = 6^2$. $PQ = 4x + x = 5x = 5(3) = 15$

$4x^2 = 36$

$x = 3$

    PTS: 2   REF: 011227ge   STA: G.G.47   TOP: Similarity

    KEY: altitude

699   ANS: 4   PTS: 2   REF: 061103ge   STA: G.G.60

    TOP: Identifying Transformations

700   ANS: 2

$3x + x + 20 + x + 20 = 180$

$5x = 40$

$x = 28$

    PTS: 2   REF: 081222ge   STA: G.G.31   TOP: Isosceles Triangle Theorem

701   ANS:

$\overline{OA} \cong \overline{OB}$ because all radii are equal. $\overline{OP} \cong \overline{OP}$ because of the reflexive property. $\overline{OA} \perp \overline{PA}$ and $\overline{OB} \perp \overline{PB}$ because tangents to a circle are perpendicular to a radius at a point on a circle. $\angle PAO$ and $\angle PBO$ are right angles because of the definition of perpendicular. $\angle PAO \cong \angle PBO$ because all right angles are congruent. $\triangle AOP \cong \triangle BOP$ because of HL. $\angle AOP \cong \angle BOP$ because of CPCTC.

    PTS: 6   REF: 061138ge   STA: G.G.27   TOP: Circle Proofs

702 ANS: 4 PTS: 2 REF: 011222ge STA: G.G.34
TOP: Angle Side Relationship
703 ANS: 3 PTS: 2 REF: 011110ge STA: G.G.21
KEY: Centroid, Orthocenter, Incenter and Circumcenter
704 ANS: 2
The diagonals of a rhombus are perpendicular. $180 - (90 + 12) = 78$

PTS: 2 REF: 011204ge STA: G.G.39 TOP: Special Parallelograms
705 ANS:

16.7. $\dfrac{x}{25} = \dfrac{12}{18}$

$18x = 300$

$x \approx 16.7$

PTS: 2 REF: 061133ge STA: G.G.46 TOP: Side Splitter Theorem
706 ANS: 4
The centroid divides each median into segments whose lengths are in the ratio $2 : 1$.

PTS: 2 REF: 081220ge STA: G.G.43 TOP: Centroid
707 ANS:
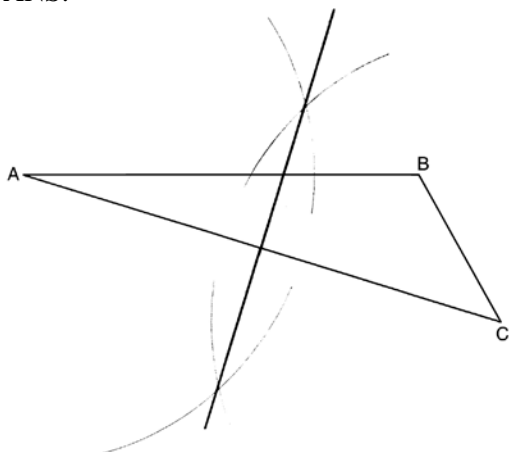
PTS: 2 REF: 081130ge STA: G.G.18 TOP: Constructions
708 ANS: 2 PTS: 2 REF: 061101ge STA: G.G.18
TOP: Constructions
709 ANS: 3

$\dfrac{5}{7} = \dfrac{10}{x}$

$5x = 70$

$x = 14$

PTS: 2 REF: 081103ge STA: G.G.46 TOP: Side Splitter Theorem
710 ANS: 2 PTS: 2 REF: 061227ge STA: G.G.56
TOP: Identifying Transformations

711 ANS: 2   PTS: 2   REF: 061208ge   STA: G.G.19
TOP: Constructions
712 ANS: 2   PTS: 2   REF: 011215ge   STA: G.G.12
TOP: Volume
713 ANS: 4

$$\sqrt{6^2 - 2^2} = \sqrt{32} = \sqrt{16}\sqrt{2} = 4\sqrt{2}$$

PTS: 2   REF: 081124ge   STA: G.G.49   TOP: Chords
714 ANS: 4   PTS: 2   REF: 081206ge   STA: G.G.30
TOP: Interior and Exterior Angles of Triangles
715 ANS: 4   PTS: 2   REF: 081106ge   STA: G.G.17
TOP: Constructions
716 ANS:

PTS: 2   REF: 081233ge   STA: G.G.19   TOP: Constructions
717 ANS:

$A'(5,-4), B'(5,1), C'(2,1), D'(2,-6); A''(5,4), B''(5,-1), C''(2,-1), D''(2,6)$

PTS: 4   REF: 061236ge   STA: G.G.58   TOP: Compositions of Transformations
KEY: grids
718 ANS:

Quadrilateral $ABCD$, $\overline{AD} \cong \overline{BC}$ and $\angle DAE \cong \angle BCE$ are given. $\overline{AD} \| \overline{BC}$ because if two lines are cut by a transversal so that a pair of alternate interior angles are congruent, the lines are parallel. $ABCD$ is a parallelogram because if one pair of opposite sides of a quadrilateral are both congruent and parallel, the quadrilateral is a parallelogram. $\overline{AE} \cong \overline{CE}$ because the diagonals of a parallelogram bisect each other. $\angle FEA \cong \angle GEC$ as vertical angles. $\triangle AEF \cong \triangle CEG$ by ASA.

PTS: 6   REF: 011238ge   STA: G.G.27   TOP: Quadrilateral Proofs
719 ANS: 2

$$M_x = \frac{7 + (-3)}{2} = 2. \quad M_Y = \frac{-1 + 3}{2} = 1.$$

PTS: 2   REF: 011106ge   STA: G.G.66   TOP: Midpoint
720 ANS: 4   PTS: 2   REF: 061118ge   STA: G.G.1
TOP: Planes

721 ANS:
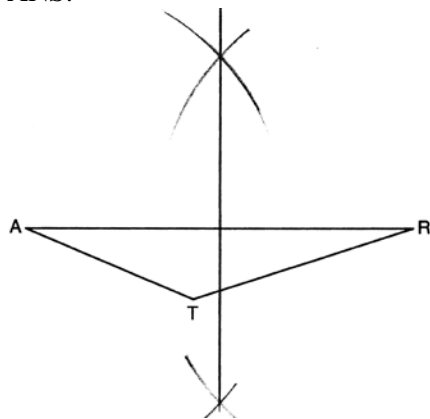
PTS: 2 REF: 011530ge STA: G.G.18 TOP: Constructions

722 ANS:

$V = \pi r^2 h = \pi(5)^2 \cdot 7 = 175\pi$

PTS: 2 REF: 081231ge STA: G.G.14 TOP: Volume and Lateral Area

723 ANS: 1

The length of the midsegment of a trapezoid is the average of the lengths of its bases. $\dfrac{x+3+5x-9}{2} = 2x+2.$

$$6x - 6 = 4x + 4$$
$$2x = 10$$
$$x = 5$$

PTS: 2 REF: 081221ge STA: G.G.40 TOP: Trapezoids

724 ANS: 2 PTS: 2 REF: 081212ge STA: G.G.72
TOP: Equations of Circles

725 ANS: 3

$(n - 2)180 = (5 - 2)180 = 540$

PTS: 2 REF: 011223ge STA: G.G.36 TOP: Interior and Exterior Angles of Polygons

726 ANS: 1

$1 = \dfrac{-4+x}{2}. \qquad 5 = \dfrac{3+y}{2}.$

$-4 + x = 2 \qquad 3 + y = 10$

$\quad x = 6 \qquad\qquad y = 7$

PTS: 2 REF: 081115ge STA: G.G.66 TOP: Midpoint

727 ANS: 1

$d = \sqrt{(4-1)^2 + (7-11)^2} = \sqrt{9+16} = \sqrt{25} = 5$

PTS: 2 REF: 011205ge STA: G.G.67 TOP: Distance
KEY: general

728 ANS:

11. $x^2 + 6x = x + 14.$ $6(2) - 1 = 11$

     $x^2 + 5x - 14 = 0$

     $(x + 7)(x - 2) = 0$

              $x = 2$

PTS: 2   REF: 081235ge   STA: G.G.38   TOP: Parallelograms

729 ANS: 1   PTS: 2   REF: 011120ge   STA: G.G.18
     TOP: Constructions

730 ANS:
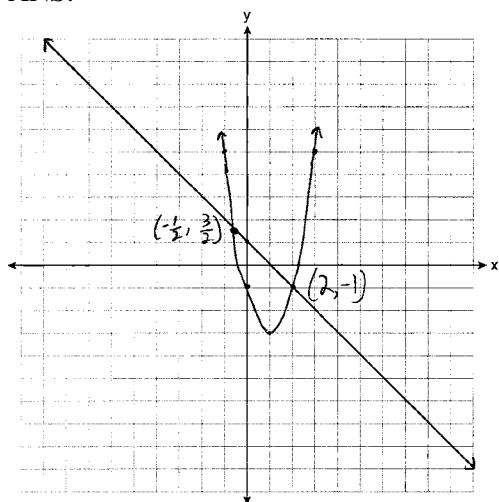
PTS: 4   REF: 061137ge   STA: G.G.70   TOP: Quadratic-Linear Systems

731 ANS: 4
     $m\angle A = 80$

PTS: 2   REF: 011115ge   STA: G.G.34   TOP: Angle Side Relationship

732 ANS: 3
     $d = \sqrt{(-1 - 4)^2 + (0 - (-3))^2} = \sqrt{25 + 9} = \sqrt{34}$

PTS: 2   REF: 061217ge   STA: G.G.67   TOP: Distance
     KEY: general

733 ANS: 4
     $y = mx + b$

     $3 = \dfrac{3}{2}(-2) + b$

     $3 = -3 + b$

     $6 = b$

PTS: 2   REF: 011114ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

734 ANS:

$(x - 5)^2 + (y + 4)^2 = 36$

PTS: 2　　　　　REF: 081132ge　　　STA: G.G.72　　　TOP: Equations of Circles

735 ANS:

The slope of $y = 2x + 3$ is 2. The slope of $2y + x = 6$ is $\dfrac{-A}{B} = \dfrac{-1}{2}$. Since the slopes are opposite reciprocals, the lines are perpendicular.

PTS: 2　　　　　REF: 011231ge　　　STA: G.G.63　　　TOP: Parallel and Perpendicular Lines

736 ANS:

$\overline{BE}$ and $\overline{AD}$ intersect at point C, $\overline{BC} \cong \overline{EC}$, $\overline{AC} \cong \overline{DC}$, $\overline{AB}$ and $\overline{DE}$ are drawn (Given). $\angle BCA \cong \angle ECD$ (Vertical Angles). $\triangle ABC \cong \triangle DEC$ (SAS).

PTS: 2　　　　　REF: 011529ge　　　STA: G.G.27　　　TOP: Triangle Proofs

737 ANS:

30. $3x + 4x + 5x = 360$. $m\widehat{LN} : m\widehat{NK} : m\widehat{KL} = 90:120:150$. $\dfrac{150 - 90}{2} = 30$

　　　　　$x = 20$

PTS: 4　　　　　REF: 061136ge　　　STA: G.G.51　　　TOP: Arcs Determined by Angles
KEY: outside circle

738 ANS: 2　　　PTS: 2　　　　　REF: 081120ge　　　STA: G.G.8
TOP: Planes

739 ANS:

No, $\angle KGH$ is not congruent to $\angle GKH$.
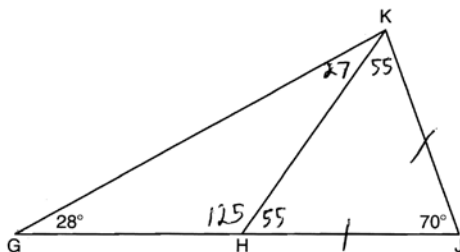
PTS: 2　　　　　REF: 081135ge　　　STA: G.G.31　　　TOP: Isosceles Triangle Theorem
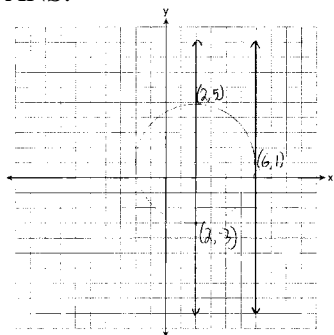
740 ANS: 1　　　PTS: 2　　　　　REF: 011122ge　　　STA: G.G.28
TOP: Triangle Congruency

741 ANS: 1　　　PTS: 2　　　　　REF: 061125ge　　　STA: G.G.39
TOP: Special Parallelograms

742 ANS:

     PTS: 4   REF: 011135ge   STA: G.G.23   TOP: Locus

743 ANS: 4

$\overline{AB}$ is a vertical line, so its perpendicular bisector is a horizontal line through the midpoint of $\overline{AB}$, which is $(0,3)$.

     PTS: 2   REF: 011225ge   STA: G.G.68   TOP: Perpendicular Bisector

744 ANS: 2

$(n-2)180 = (6-2)180 = 720. \ \dfrac{720}{6} = 120.$

     PTS: 2   REF: 081125ge   STA: G.G.37   TOP: Interior and Exterior Angles of Polygons

745 ANS: 3   PTS: 2   REF: 061218ge   STA: G.G.36

     TOP: Interior and Exterior Angles of Polygons

746 ANS: 2

$5 - 3 = 2, 5 + 3 = 8$

     PTS: 2   REF: 011228ge   STA: G.G.33   TOP: Triangle Inequality Theorem

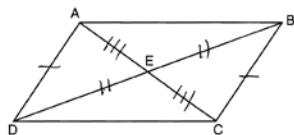747 ANS: 3   PTS: 2   REF: 081123ge   STA: G.G.12

     TOP: Volume

748 ANS:

$180 - (90 + 63) = 27$

     PTS: 2   REF: 061230ge   STA: G.G.35   TOP: Parallel Lines and Transversals

749 ANS: 3   PTS: 2   REF: 081104ge   STA: G.G.55

     TOP: Properties of Transformations

750 ANS: 3

. Opposite sides of a parallelogram are congruent and the diagonals of a parallelogram bisect each other.

     PTS: 2   REF: 061222ge   STA: G.G.28   TOP: Triangle Congruency
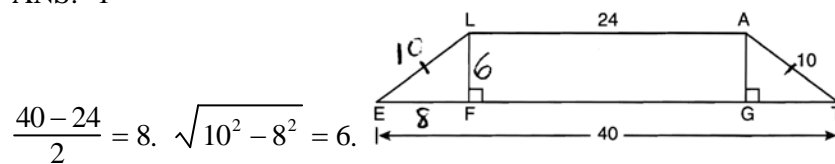
751 ANS: 2   PTS: 2   REF: 081226ge   STA: G.G.69

     TOP: Triangles in the Coordinate Plane

752 ANS: 3   PTS: 2   REF: 061224ge   STA: G.G.45

     TOP: Similarity   KEY: basic

753 ANS: 1

$$\frac{40 - 24}{2} = 8. \quad \sqrt{10^2 - 8^2} = 6.$$

PTS: 2   REF: 061204ge   STA: G.G.40   TOP: Trapezoids

754 ANS: 1
Parallel lines intercept congruent arcs.

PTS: 2   REF: 061105ge   STA: G.G.52   TOP: Chords and Secants

755 ANS: 4   PTS: 2   REF: 061203ge   STA: G.G.9
TOP: Planes

756 ANS: 3

$$180(n - 2) = n\left(180 - \frac{180(n - 2)}{n}\right)$$
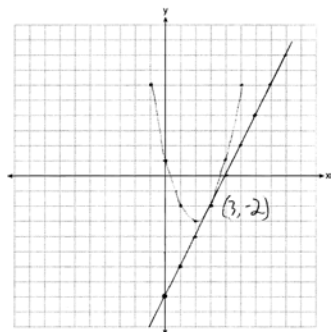
$$180n - 360 = 180n - 180n + 360$$

$$180n = 720$$

$$n = 4$$

PTS: 2   REF: 081223ge   STA: G.G.36   TOP: Interior and Exterior Angles of Polygons

757 ANS:

PTS: 6   REF: 061238ge   STA: G.G.70   TOP: Quadratic-Linear Systems
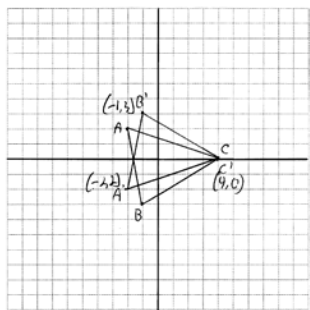
758 ANS: 2   PTS: 2   REF: 011206ge   STA: G.G.32
TOP: Exterior Angle Theorem

759 ANS:

PTS: 2   REF: 011130ge   STA: G.G.54   TOP: Reflections
KEY: grids

760 ANS: 4   PTS: 2   REF: 011108ge   STA: G.G.27
TOP: Angle Proofs

761 ANS: 3
$8^2 + 24^2 \neq 25^2$

PTS: 2   REF: 011111ge   STA: G.G.48   TOP: Pythagorean Theorem

762 ANS: 2   PTS: 2   REF: 081214ge   STA: G.G.50
TOP: Tangents   KEY: point of tangency

763 ANS: 4   PTS: 2   REF: 081216ge   STA: G.G.45
TOP: Similarity   KEY: basic

764 ANS:
$2x - 20 = x + 20$. $m\overset{\frown}{AB} = x + 20 = 40 + 20 = 60$

$\quad\quad x = 40$

PTS: 2   REF: 011229ge   STA: G.G.52   TOP: Chords and Secants

765 ANS: 3   PTS: 2   REF: 081209ge   STA: G.G.71
TOP: Equations of Circles

766 ANS: 4

$-5 = \dfrac{-3 + x}{2}$. $2 = \dfrac{6 + y}{2}$

$-10 = -3 + x \quad\quad 4 = 6 + y$

$-7 = x \quad\quad\quad -2 = y$

PTS: 2   REF: 081203ge   STA: G.G.66   TOP: Midpoint
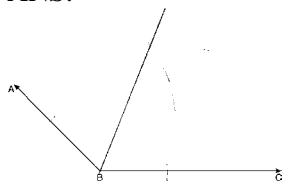
767 ANS: 4

$\dfrac{5}{2 + 3 + 5} \times 180 = 90$

PTS: 2   REF: 081119ge   STA: G.G.30   TOP: Interior and Exterior Angles of Triangles

768 ANS: 1   PTS: 2   REF: 011221ge   STA: G.G.10
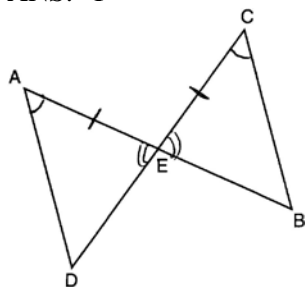TOP: Solids

769 ANS:

PTS: 2 REF: 011133ge STA: G.G.17 TOP: Constructions

770 ANS: 1

PTS: 2 REF: 081210ge STA: G.G.28 TOP: Triangle Congruency

771 ANS: 1

$$m = \left(\frac{8+0}{2}, \frac{2+6}{2}\right) = (4,4) \quad m = \frac{6-2}{0-8} = \frac{4}{-8} = -\frac{1}{2} \quad m_\perp = 2 \quad y = mx + b$$
$$4 = 2(4) + b$$
$$-4 = b$$

PTS: 2 REF: 081126ge STA: G.G.68 TOP: Perpendicular Bisector

772 ANS: 3

As originally administered, this question read, "Which fact is *not* sufficient to show that planes $\mathcal{R}$ and $\mathcal{S}$ are perpendicular?" The State Education Department stated that since a correct solution was not provided for Question 11, all students shall be awarded credit for this question.

PTS: 2 REF: 081211ge STA: G.G.5 TOP: Planes

773 ANS: 3 PTS: 2 REF: 081204ge STA: G.G.59
TOP: Properties of Transformations

774 ANS: 2 PTS: 2 REF: 061121ge STA: G.G.22
TOP: Locus

775 ANS: 2

$$m = \frac{-A}{B} = \frac{-4}{2} = -2 \quad y = mx + b$$
$$2 = -2(2) + b$$
$$6 = b$$

PTS: 2 REF: 081112ge STA: G.G.65 TOP: Parallel and Perpendicular Lines

776 ANS: 3

$$-5 + 3 = -2 \qquad 2 + -4 = -2$$

PTS: 2 REF: 011107ge STA: G.G.54 TOP: Translations

27

777 ANS: 2

$$m = \frac{-A}{B} = \frac{-20}{-2} = 10. \ m_\perp = -\frac{1}{10}$$

PTS: 2   REF: 061219ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

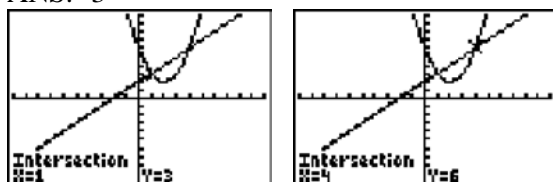778 ANS: 2   PTS: 2   REF: 081205ge   STA: G.G.17

TOP: Constructions

779 ANS: 3

PTS: 2   REF: 081118ge   STA: G.G.70   TOP: Quadratic-Linear Systems

780 ANS: 3

$y = mx + b$

$-1 = 2(2) + b$

$-5 = b$

PTS: 2   REF: 011224ge   STA: G.G.65   TOP: Parallel and Perpendicular Lines

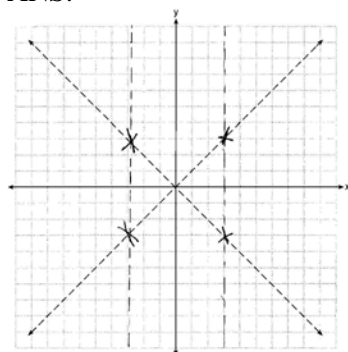781 ANS: 2   PTS: 2   REF: 061107ge   STA: G.G.32

TOP: Exterior Angle Theorem

782 ANS:

PTS: 2   REF: 081234ge   STA: G.G.23   TOP: Locus

783 ANS: 3

$7x = 5x + 30$

$2x = 30$

$x = 15$

PTS: 2   REF: 081109ge   STA: G.G.35   TOP: Parallel Lines and Transversals

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784 ANS: 4

The slope of $3x + 5y = 4$ is $m = \dfrac{-A}{B} = \dfrac{-3}{5}$. $m_\perp = \dfrac{5}{3}$.

PTS: 2   REF: 061127ge   STA: G.G.62   TOP: Parallel and Perpendicular Lines

785 ANS: 1   PTS: 2   REF: 081116ge   STA: G.G.7
TOP: Planes

786 ANS: 4   PTS: 2   REF: 081224ge   STA: G.G.21
TOP: Centroid, Orthocenter, Incenter and Circumcenter

787 ANS:
$R'(-3,-2)$, $S'(-4,4)$, and $T'(2,2)$.

PTS: 2   REF: 011232ge   STA: G.G.54   TOP: Rotations

788 ANS:

2    $\dfrac{x+2}{x} = \dfrac{x+6}{4}$

$x^2 + 6x = 4x + 8$

$x^2 + 2x - 8 = 0$

$(x+4)(x-2) = 0$

$x = 2$

PTS: 4   REF: 081137ge   STA: G.G.45   TOP: Similarity
KEY: basic

789 ANS: 2   PTS: 2   REF: 011125ge   STA: G.G.74
TOP: Graphing Circles

790 ANS: 2
$AC = BD$

$AC - BC = BD - BC$

$AB = CD$

PTS: 2   REF: 061206ge   STA: G.G.27   TOP: Line Proofs
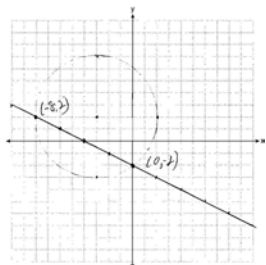
791 ANS: 4   PTS: 2   REF: 011124ge   STA: G.G.51
TOP: Arcs Determined by Angles   KEY: inscribed

792 ANS: 3   PTS: 2   REF: 011209ge   STA: G.G.44
TOP: Similarity Proofs
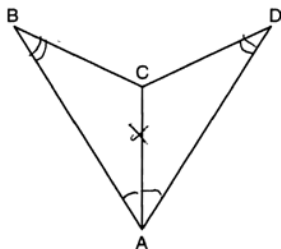
793 ANS:

PTS: 4　　　REF: 081237ge　　STA: G.G.70　　TOP: Quadratic-Linear Systems
794 ANS: 4

PTS: 2　　　REF: 081114ge　　STA: G.G.28　　TOP: Triangle Congruency
795 ANS: 3　　　PTS: 2　　　REF: 081218ge　　STA: G.G.1
TOP: Planes
796 ANS:

52, 40, 80. $360 - (56 + 112) = 192.$ $\dfrac{192 - 112}{2} = 40.$ $\dfrac{112 + 48}{2} = 80$

$$\frac{1}{4} \times 192 = 48$$

$$\frac{56 + 48}{2} = 52$$

PTS: 6　　　REF: 081238ge　　STA: G.G.51　　TOP: Arcs Determined by Angles
KEY: mixed
797 ANS:
∠B and ∠E are right angles because of the definition of perpendicular lines. ∠B ≅ ∠E because all right angles are congruent. ∠BFD and ∠DFE are supplementary and ∠ECA and ∠ACB are supplementary because of the definition of supplementary angles. ∠DFE ≅ ∠ACB because angles supplementary to congruent angles are congruent. △ABC ~ △DEF because of AA.

PTS: 4　　　REF: 011136ge　　STA: G.G.44　　TOP: Similarity Proofs
798 ANS: 2　　　PTS: 2　　　REF: 061201ge　　STA: G.G.59
TOP: Properties of Transformations