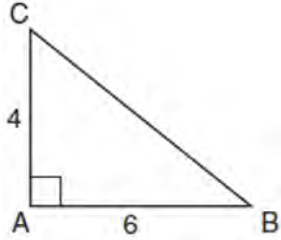# JMAP
REGENTS AT RANDOM

NY Geometry Regents Exam Questions
from Spring 2014 to August 2018

Geometry Regents at Random

1 In the diagram below, right triangle *ABC* has legs whose lengths are 4 and 6.

What is the volume of the three-dimensional object formed by continuously rotating the right triangle around $\overline{AB}$?
1) 32π
2) 48π
3) 96π
4) 144π

2 In the diagram below of triangle *MNO*, $\angle M$ and $\angle O$ are bisected by $\overline{MS}$ and $\overline{OR}$, respectively. Segments *MS* and *OR* intersect at *T*, and $m\angle N = 40°$.
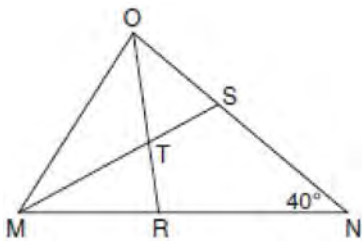
If $m\angle TMR = 28°$, the measure of angle *OTS* is
1) 40°
2) 50°
3) 60°
4) 70°

3 Given $\triangle ABC \cong \triangle DEF$, which statement is *not* always true?
1) $\overline{BC} \cong \overline{DF}$
2) $m\angle A = m\angle D$
3) area of $\triangle ABC =$ area of $\triangle DEF$
4) perimeter of $\triangle ABC =$ perimeter of $\triangle DEF$

4 A water glass can be modeled by a truncated right cone (a cone which is cut parallel to its base) as shown below.
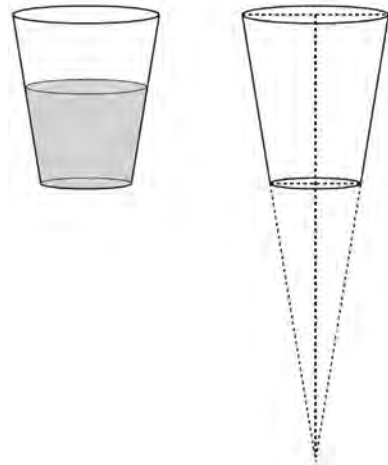

The diameter of the top of the glass is 3 inches, the diameter at the bottom of the glass is 2 inches, and the height of the glass is 5 inches. The base with a diameter of 2 inches must be parallel to the base with a diameter of 3 inches in order to find the height of the cone. Explain why. Determine and state, in inches, the height of the larger cone. Determine and state, to the *nearest tenth of a cubic inch*, the volume of the water glass.

5 The diagram shows rectangle *ABCD*, with diagonal $\overline{BD}$.
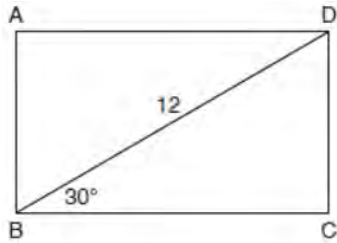
What is the perimeter of rectangle *ABCD*, to the *nearest tenth*?
1) 28.4
2) 32.8
3) 48.0
4) 62.4

6 Which rotation about its center will carry a regular decagon onto itself?
1) 54°
2) 162°
3) 198°
4) 252°

7 If $\triangle ABC$ is dilated by a scale factor of 3, which statement is true of the image $\triangle A'B'C'$?
1) $3A'B' = AB$
2) $B'C' = 3BC$
3) $m\angle A' = 3(m\angle A)$
4) $3(m\angle C') = m\angle C$

8 Which transformation would *not* carry a square onto itself?
1) a reflection over one of its diagonals
2) a 90° rotation clockwise about its center
3) a 180° rotation about one of its vertices
4) a reflection over the perpendicular bisector of one side

9 Point *Q* is on $\overline{MN}$ such that $MQ:QN = 2:3$. If *M* has coordinates $(3,5)$ and *N* has coordinates $(8,-5)$, the coordinates of *Q* are
1) $(5,1)$
2) $(5,0)$
3) $(6,-1)$
4) $(6,0)$

10 Parallelogram *HAND* is drawn below with diagonals $\overline{HN}$ and $\overline{AD}$ intersecting at *S*.
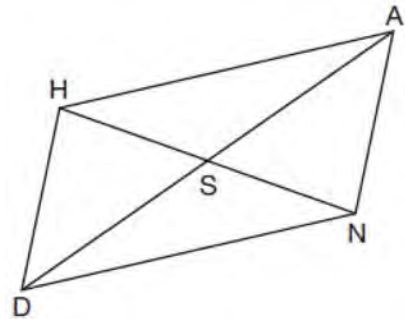
Which statement is always true?
1) $AN = \frac{1}{2}AD$

2) $AS = \frac{1}{2}AD$

3) $\angle AHS \cong \angle ANS$
4) $\angle HDS \cong \angle NDS$

11 Kevin's work for deriving the equation of a circle is shown below.

$$x^2 + 4x = -(y^2 - 20)$$

STEP 1 $x^2 + 4x = -y^2 + 20$

STEP 2 $x^2 + 4x + 4 = -y^2 + 20 - 4$

STEP 3 $(x + 2)^2 = -y^2 + 20 - 4$

STEP 4 $(x + 2)^2 + y^2 = 16$

In which step did he make an error in his work?
1) Step 1
2) Step 2
3) Step 3
4) Step 4

12 The diagram below shows two figures. Figure A is a right triangular prism and figure B is an oblique triangular prism. The base of figure A has a height of 5 and a length of 8 and the height of prism A is 14. The base of figure B has a height of 8 and a length of 5 and the height of prism B is 14.
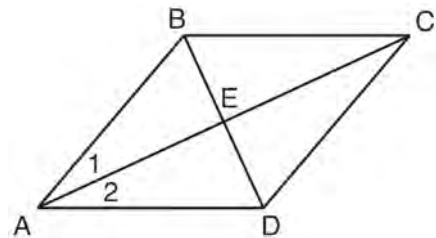
Figure A   **Figure B**
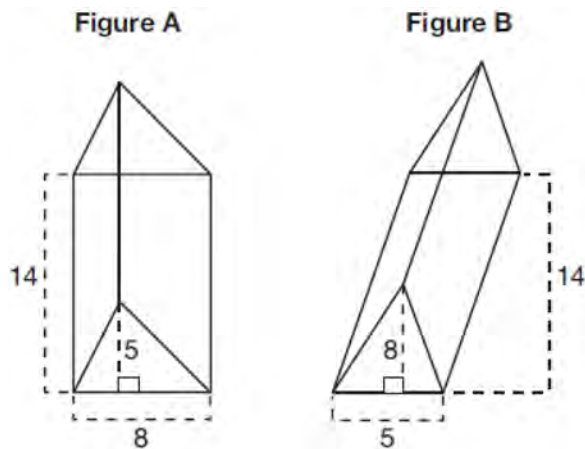
Use Cavalieri's Principle to explain why the volumes of these two triangular prisms are equal.

13 Quadrilateral PQRS has vertices P(−2,3), Q(3,8), R(4,1), and S(−1,−4). Prove that PQRS is a rhombus. Prove that PQRS is *not* a square. [The use of the set of axes below is optional.]
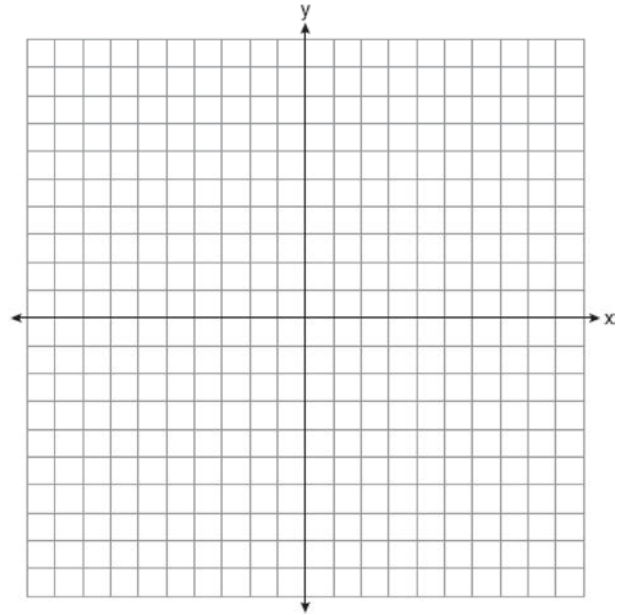
14 Given: Quadrilateral ABCD with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and $\angle 1 \cong \angle 2$
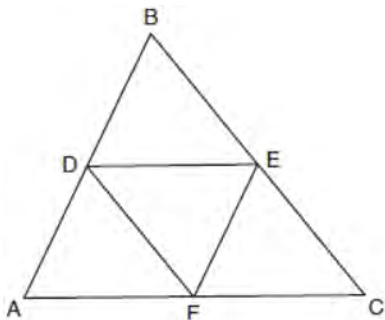

Prove: $\triangle ACD$ is an isosceles triangle and $\triangle AEB$ is a right triangle

3

15 Which equation represents the line that passes through the point $(-2,2)$ and is parallel to $y = \frac{1}{2}x + 8$?

1) $y = \frac{1}{2}x$

2) $y = -2x - 3$

3) $y = \frac{1}{2}x + 3$

4) $y = -2x + 3$

16 In the diagram below, $\overline{DE}$, $\overline{DF}$, and $\overline{EF}$ are midsegments of $\triangle ABC$.

The perimeter of quadrilateral $ADEF$ is equivalent to

1) $AB + BC + AC$

2) $\frac{1}{2}AB + \frac{1}{2}AC$

3) $2AB + 2AC$

4) $AB + AC$

17 Under which transformation would $\triangle A'B'C'$, the image of $\triangle ABC$, *not* be congruent to $\triangle ABC$?

1) reflection over the *y*-axis

2) rotation of 90° clockwise about the origin

3) translation of 3 units right and 2 units down

4) dilation with a scale factor of 2 centered at the origin

18 Directed line segment *PT* has endpoints whose coordinates are $P(-2,1)$ and $T(4,7)$. Determine the coordinates of point *J* that divides the segment in the ratio 2 to 1. [The use of the set of axes below is optional.]
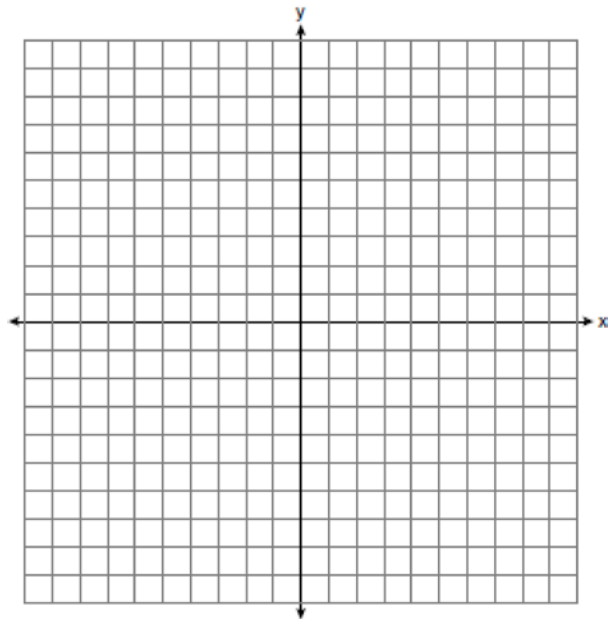
19 In right triangle *ABC*, hypotenuse $\overline{AB}$ has a length of 26 cm, and side $\overline{BC}$ has a length of 17.6 cm. What is the measure of angle *B*, to the *nearest degree*?

1) 48°

2) 47°

3) 43°

4) 34°

20 Given: Right triangle *ABC* with right angle at *C*. If $\sin A$ increases, does $\cos B$ increase or decrease? Explain why.

21 The equation of a circle is $x^2 + y^2 - 12y + 20 = 0$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(0,6)$ and radius 4
2) center $(0,-6)$ and radius 4
3) center $(0,6)$ and radius 16
4) center $(0,-6)$ and radius 16

22 Which transformation would result in the perimeter of a triangle being different from the perimeter of its image?
1) $(x,y) \rightarrow (y,x)$
2) $(x,y) \rightarrow (x,-y)$
3) $(x,y) \rightarrow (4x,4y)$
4) $(x,y) \rightarrow (x+2,y-5)$

23 New streetlights will be installed along a section of the highway. The posts for the streetlights will be 7.5 m tall and made of aluminum. The city can choose to buy the posts shaped like cylinders or the posts shaped like rectangular prisms. The cylindrical posts have a hollow core, with aluminum 2.5 cm thick, and an outer diameter of 53.4 cm. The rectangular-prism posts have a hollow core, with aluminum 2.5 cm thick, and a square base that measures 40 cm on each side. The density of aluminum is 2.7 g/cm3, and the cost of aluminum is $0.38 per kilogram. If all posts must be the same shape, which post design will cost the town less? How much money will be saved per streetlight post with the less expensive design?

24 Point P is on segment AB such that $AP:PB$ is $4:5$. If A has coordinates $(4,2)$, and B has coordinates $(22,2)$, determine and state the coordinates of P.

25 In the diagram below, $\overleftrightarrow{FE}$ bisects $\overline{AC}$ at B, and $\overleftrightarrow{GE}$ bisects $\overline{BD}$ at C.
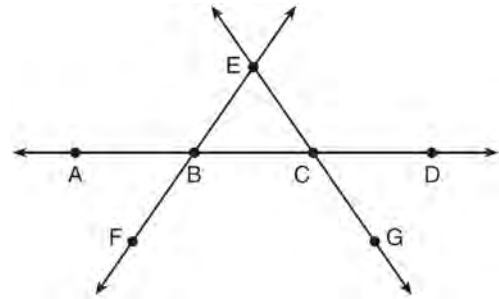
Which statement is always true?
1) $\overline{AB} \cong \overline{DC}$
2) $\overline{FB} \cong \overline{EB}$
3) $\overleftrightarrow{BD}$ bisects $\overline{GE}$ at C.
4) $\overleftrightarrow{AC}$ bisects $\overline{FE}$ at B.

26 A right hexagonal prism is shown below. A two-dimensional cross section that is perpendicular to the base is taken from the prism.
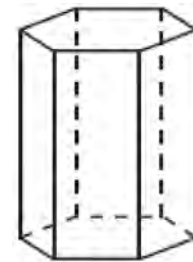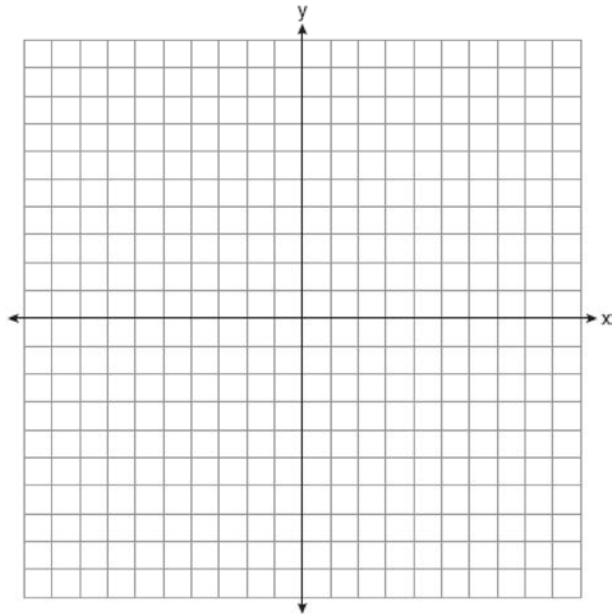

Which figure describes the two-dimensional cross section?
1) triangle
2) rectangle
3) pentagon
4) hexagon

5

27 Line n is represented by the equation $3x + 4y = 20$. Determine and state the equation of line p, the image of line n, after a dilation of scale factor $\frac{1}{3}$ centered at the point $(4,2)$. [The use of the set of axes below is optional.] Explain your answer.

28 The equation of a circle is $x^2 + y^2 + 6y = 7$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(0,3)$ and radius 4
2) center $(0,-3)$ and radius 4
3) center $(0,3)$ and radius 16
4) center $(0,-3)$ and radius 16

29 Randy's basketball is in the shape of a sphere with a maximum circumference of 29.5 inches. Determine and state the volume of the basketball, to the *nearest cubic inch*.

30 The diagram below shows parallelogram $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E.
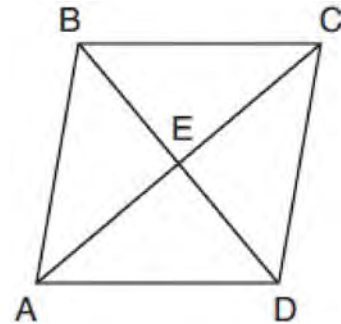
What additional information is sufficient to prove that parallelogram $ABCD$ is also a rhombus?
1) $\overline{BD}$ bisects $\overline{AC}$.
2) $\overline{AB}$ is parallel to $\overline{CD}$.
3) $\overline{AC}$ is congruent to $\overline{BD}$.
4) $\overline{AC}$ is perpendicular to $\overline{BD}$.

31 In circle O shown below, diameter $\overline{AC}$ is perpendicular to $\overline{CD}$ at point C, and chords $\overline{AB}$, $\overline{BC}$, $\overline{AE}$, and $\overline{CE}$ are drawn.
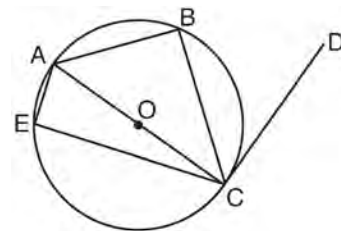

Which statement is *not* always true?
1) $\angle ACB \cong \angle BCD$
2) $\angle ABC \cong \angle ACD$
3) $\angle BAC \cong \angle DCB$
4) $\angle CBA \cong \angle AEC$

32 A storage tank is in the shape of a cylinder with a hemisphere on the top. The highest point on the inside of the storage tank is 13 meters above the floor of the storage tank, and the diameter inside the cylinder is 8 meters. Determine and state, to the *nearest cubic meter*, the total volume inside the storage tank.

13 m

8 m
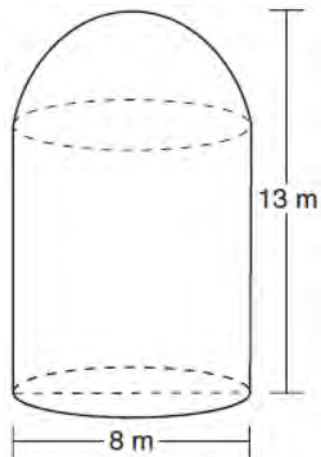
33 Triangle $A'B'C'$ is the image of $\triangle ABC$ after a dilation followed by a translation. Which statement(s) would always be true with respect to this sequence of transformations?

    I. $\triangle ABC \cong \triangle A'B'C'$
    II. $\triangle ABC \sim \triangle A'B'C'$
    III. $\overline{AB} \parallel \overline{A'B'}$
    IV. $AA' = BB'$

1) II, only
2) I and II
3) II and III
4) II, III, and IV

34 A parallelogram must be a rhombus if its diagonals
1) are congruent
2) bisect each other
3) do not bisect its angles
4) are perpendicular to each other

35 A barrel of fuel oil is a right circular cylinder where the inside measurements of the barrel are a diameter of 22.5 inches and a height of 33.5 inches. There are 231 cubic inches in a liquid gallon. Determine and state, to the *nearest tenth*, the gallons of fuel that are in a barrel of fuel oil.

36 The water tower in the picture below is modeled by the two-dimensional figure beside it. The water tower is composed of a hemisphere, a cylinder, and a cone. Let C be the center of the hemisphere and let D be the center of the base of the cone.

Source: http://en.wikipedia.org
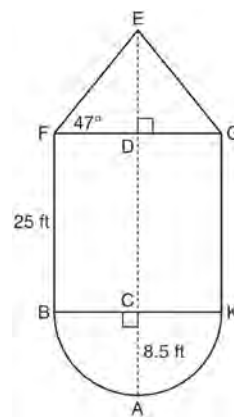
If $AC = 8.5$ feet, $BF = 25$ feet, and m$\angle EFD = 47°$, determine and state, to the *nearest cubic foot*, the volume of the water tower. The water tower was constructed to hold a maximum of 400,000 pounds of water. If water weighs 62.4 pounds per cubic foot, can the water tower be filled to 85% of its volume and *not* exceed the weight limit? Justify your answer.

37 After a reflection over a line, $\triangle A'B'C'$ is the image of $\triangle ABC$. Explain why triangle ABC is congruent to triangle $\triangle A'B'C'$.

7

38 Parallelogram *ABCD* has coordinates $A(0,7)$ and $C(2,1)$. Which statement would prove that *ABCD* is a rhombus?
1) The midpoint of $\overline{AC}$ is $(1,4)$.
2) The length of $\overline{BD}$ is $\sqrt{40}$.
3) The slope of $\overline{BD}$ is $\frac{1}{3}$.
4) The slope of $\overline{AB}$ is $\frac{1}{3}$.

39 The equation of a circle is $x^2 + y^2 - 6y + 1 = 0$. What are the coordinates of the center and the length of the radius of this circle?
1) center $(0,3)$ and radius $= 2\sqrt{2}$
2) center $(0,-3)$ and radius $= 2\sqrt{2}$
3) center $(0,6)$ and radius $= \sqrt{35}$
4) center $(0,-6)$ and radius $= \sqrt{35}$

40 The ratio of similarity of $\triangle BOY$ to $\triangle GRL$ is $1:2$. If $BO = x+3$ and $GR = 3x-1$, then the length of $\overline{GR}$ is
1) 5
2) 7
3) 10
4) 20

41 A farmer has 64 feet of fence to enclose a rectangular vegetable garden. Which dimensions would result in the biggest area for this garden?
1) the length and the width are equal
2) the length is 2 more than the width
3) the length is 4 more than the width
4) the length is 6 more than the width

42 During an experiment, the same type of bacteria is grown in two petri dishes. Petri dish *A* has a diameter of 51 mm and has approximately 40,000 bacteria after 1 hour. Petri dish *B* has a diameter of 75 mm and has approximately 72,000 bacteria after 1 hour.
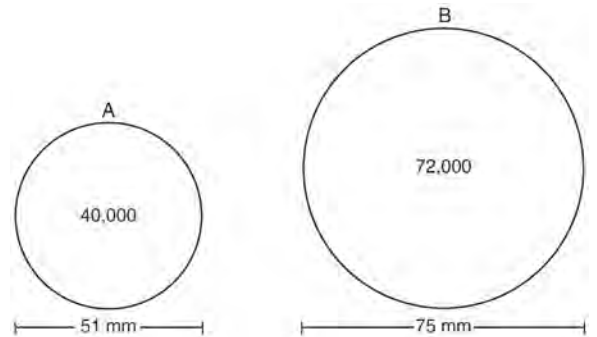
Determine and state which petri dish has the greater population density of bacteria at the end of the first hour.

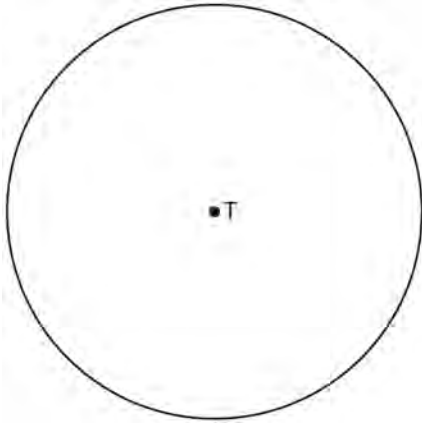43 Given the right triangle in the diagram below, what is the value of *x*, to the *nearest foot*?
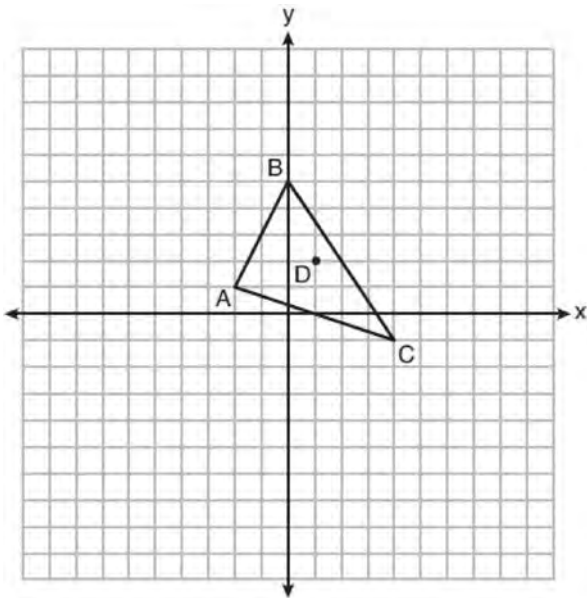

1) 11
2) 17
3) 18
4) 22

8
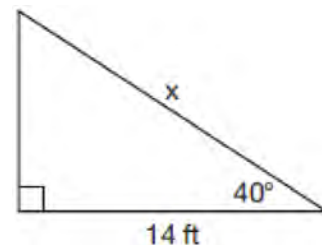
44 Use a compass and straightedge to construct an inscribed square in circle T shown below. [Leave all construction marks.]

45 Triangle ABC and point $D(1,2)$ are graphed on the set of axes below.

Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$, after a dilation of scale factor 2 centered at point D.

46 In the coordinate plane, the vertices of $\triangle RST$ are $R(6,-1)$, $S(1,-4)$, and $T(-5,6)$. Prove that $\triangle RST$ is a right triangle. State the coordinates of point P such that quadrilateral $RSTP$ is a rectangle. Prove that your quadrilateral $RSTP$ is a rectangle. [The use of the set of axes below is optional.]
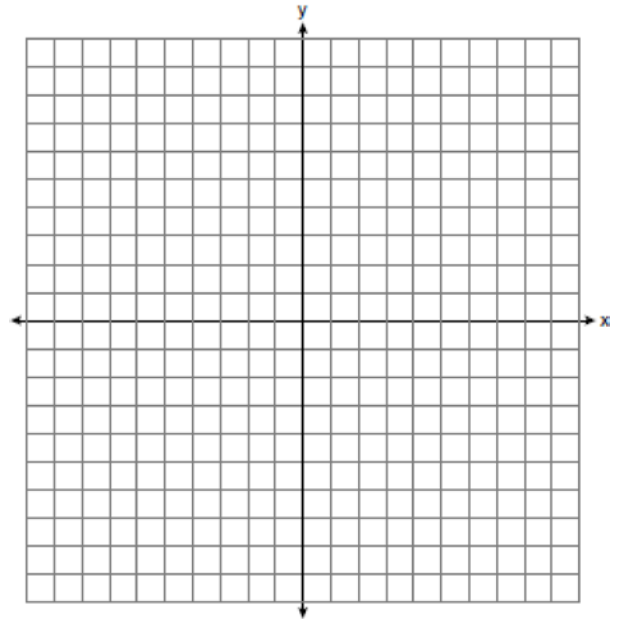
47 What is an equation of a line that is perpendicular to the line whose equation is $2y = 3x - 10$ and passes through $(-6,1)$?

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

2) $y = -\frac{2}{3}x - 3$

3) $y = \frac{2}{3}x + 1$

4) $y = \frac{2}{3}x + 10$

48 Line segment RW has endpoints $R(-4,5)$ and $W(6,20)$. Point P is on $\overline{RW}$ such that $RP{:}PW$ is 2:3. What are the coordinates of point P?
1) $(2,9)$
2) $(0,11)$
3) $(2,14)$
4) $(10,2)$

49 A gallon of paint will cover approximately 450 square feet. An artist wants to paint all the outside surfaces of a cube measuring 12 feet on each edge. What is the *least* number of gallons of paint he must buy to paint the cube?
1) 1
2) 2
3) 3
4) 4

50 Quadrilaterals *BIKE* and *GOLF* are graphed on the set of axes below.
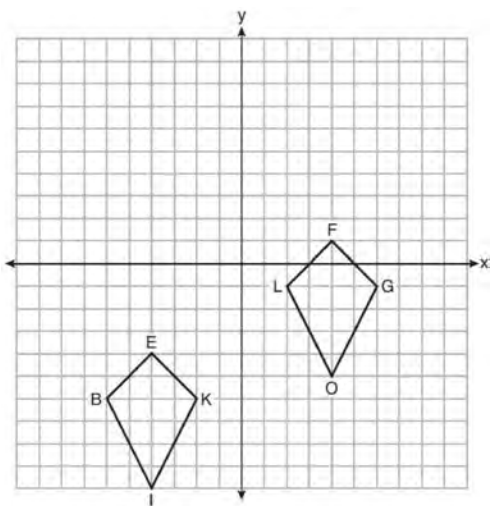
Describe a sequence of transformations that maps quadrilateral *BIKE* onto quadrilateral *GOLF*.

51 The base of a pyramid is a rectangle with a width of 4.6 cm and a length of 9 cm. What is the height, in centimeters, of the pyramid if its volume is 82.8 cm³?
1) 6
2) 2
3) 9
4) 18

52 In the diagram below, $\overline{CD}$ is the altitude drawn to the hypotenuse $\overline{AB}$ of right triangle ABC.
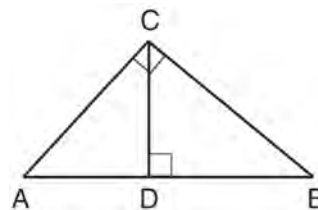
Which lengths would *not* produce an altitude that measures $6\sqrt{2}$?
1) $AD = 2$ and $DB = 36$
2) $AD = 3$ and $AB = 24$
3) $AD = 6$ and $DB = 12$
4) $AD = 8$ and $AB = 17$

53 Line segment NY has endpoints $N(-11,5)$ and $Y(5,-7)$. What is the equation of the perpendicular bisector of $\overline{NY}$?
1) $y + 1 = \dfrac{4}{3}(x + 3)$
2) $y + 1 = -\dfrac{3}{4}(x + 3)$
3) $y - 6 = \dfrac{4}{3}(x - 8)$
4) $y - 6 = -\dfrac{3}{4}(x - 8)$

54 The graph below shows two congruent triangles, ABC and $A'B'C'$.
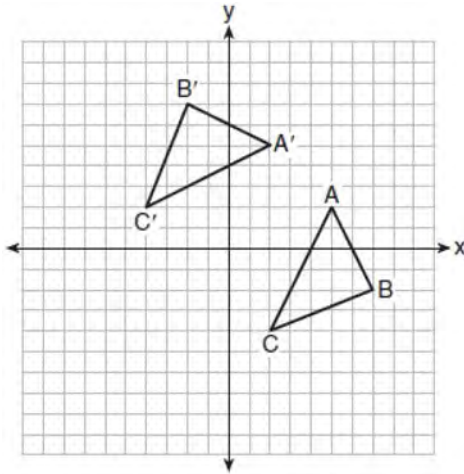
Which rigid motion would map $\triangle ABC$ onto $\triangle A'B'C'$?
1) a rotation of 90 degrees counterclockwise about the origin
2) a translation of three units to the left and three units up
3) a rotation of 180 degrees about the origin
4) a reflection over the line $y = x$

55 Given: Parallelogram $ABCD$ with diagonal $\overline{AC}$ drawn
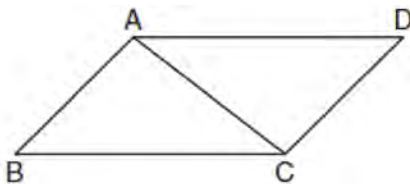
Prove: $\triangle ABC \cong \triangle CDA$

56 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle A intercepts an arc of length π, and angle B intercepts an arc of length $\dfrac{13\pi}{8}$.
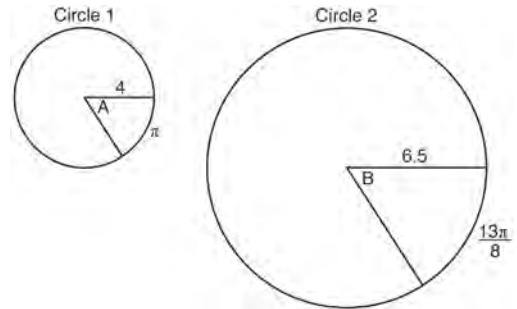
Dominic thinks that angles A and B have the same radian measure. State whether Dominic is correct or not. Explain why.

57 In scalene triangle ABC shown in the diagram below, $m\angle C = 90°$.
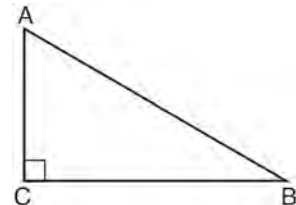
Which equation is always true?
1) $\sin A = \sin B$
2) $\cos A = \cos B$
3) $\cos A = \sin C$
4) $\sin A = \cos B$

58 Two right triangles must be congruent if
1) an acute angle in each triangle is congruent
2) the lengths of the hypotenuses are equal
3) the corresponding legs are congruent
4) the areas are equal

11

59 A flagpole casts a shadow 16.60 meters long. Tim stands at a distance of 12.45 meters from the base of the flagpole, such that the e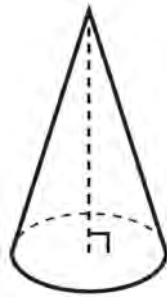nd of Tim's shadow meets the end of the flagpole's shadow. If Tim is 1.65 meters tall, determine and state the height of the flagpole to the *nearest tenth of a meter*.

60 William is drawing pictures of cross sections of the right circular cone below.

Which drawing can *not* be a cross section of a cone?

1)

2)

3)

4)

61 In the diagram below of circle O with diameter $\overline{BC}$ and radius $\overline{OA}$, chord $\overline{DC}$ is parallel to chord $\overline{BA}$.
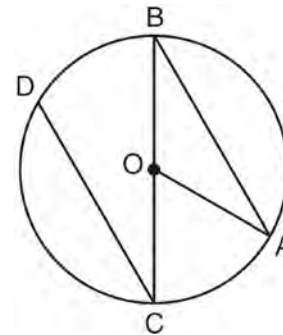
If m$\angle BCD = 30°$, determine and state m$\angle AOB$.

62 The graph below shows $\triangle ABC$ and its image, $\triangle A"B"C"$.

Describe a sequence of rigid motions which would map $\triangle ABC$ onto $\triangle A"B"C"$.

12

63 In square *GEOM*, the coordinates of *G* are $(2,-2)$ and the coordinates of *O* are $(-4,2)$. Determine and state the coordinates of vertices *E* and *M*. [The use of the set of axes below is optional.]
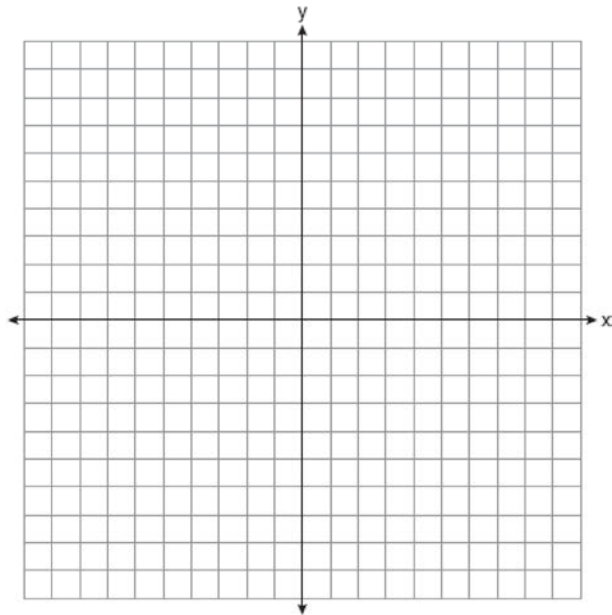
64 In quadrilateral *ABCD*, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, and $\overline{BF}$ and $\overline{DE}$ are perpendicular to diagonal $\overline{AC}$ at points *F* and *E*.

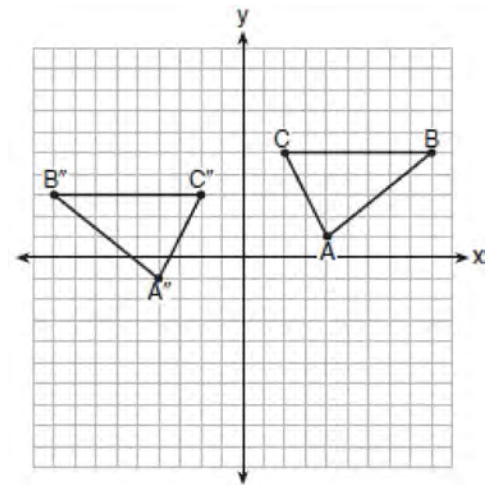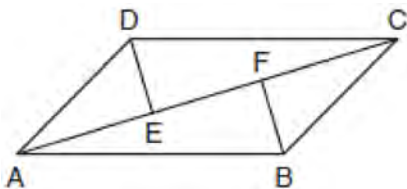

Prove: $\overline{AE} \cong \overline{CF}$

65 In the diagram below of circle *O*, the area of the shaded sector *AOC* is 12π in² and the length of $\overline{OA}$ is 6 inches. Determine and state m∠*AOC*.
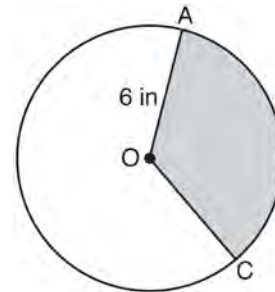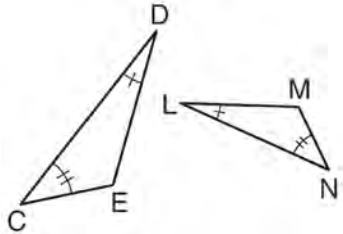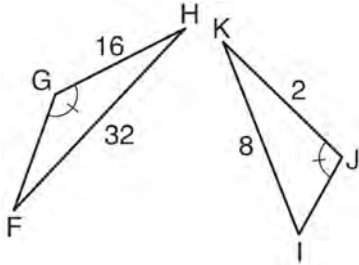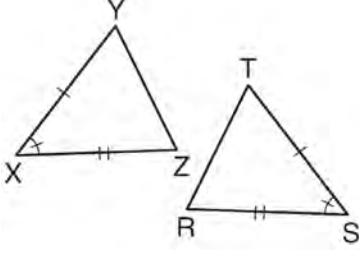
66 Quadrilateral *ABCD* is inscribed in circle *O*, as shown below.
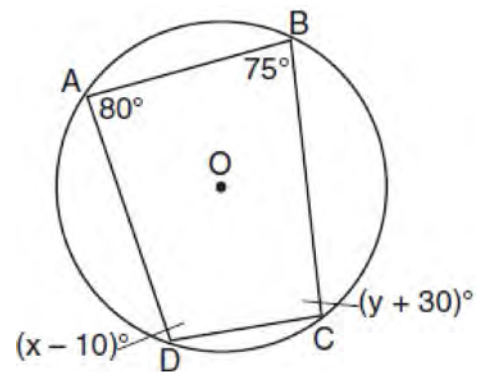
If m∠*A* = 80°, m∠*B* = 75°, m∠*C* = $(y + 30)$°, and m∠*D* = $(x - 10)$°, which statement is true?
1) *x* = 85 and *y* = 50
2) *x* = 90 and *y* = 45
3) *x* = 110 and *y* = 75
4) *x* = 115 and *y* = 70

13

67 Using the information given below, which set of triangles can *not* be proven similar?

1)

2)

3)

4)

68 Freda, who is training to use a radar system, detects an airplane flying at a constant speed and heading in a straight line to pass directly over her location. She sees the airplane at an angle of elevation of 15° and notes that it is maintaining a constant altitude of 6250 feet. One minute later, she sees the airplane at an angle of elevation of 52°. How far has the airplane traveled, to the *nearest foot*? Determine and state the speed of the airplane, to the *nearest mile per hour*.

69 Shae has recently begun kickboxing and purchased training equipment as modeled in the diagram below. The total weight of the bag, pole, and unfilled base is 270 pounds. The cylindrical base is 18 inches tall with a diameter of 20 inches. The dry sand used to fill the base weighs 95.46 lbs per cubic foot.
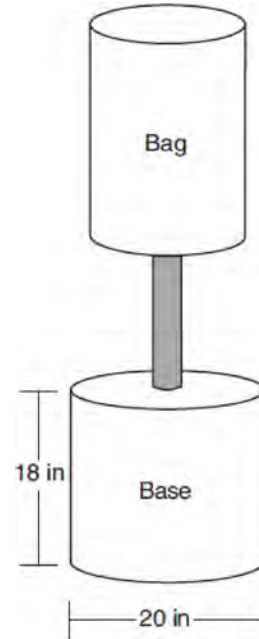
To the *nearest pound*, determine and state the total weight of the training equipment if the base is filled to 85% of its capacity.
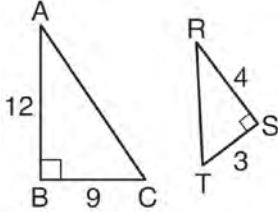
70 A line that passes through the points whose coordinates are $(1,1)$ and $(5,7)$ is dilated by a scale factor of 3 and centered at the origin. The image of the line
1) is perpendicular to the original line
2) is parallel to the original line
3) passes through the origin
4) is the original line

71 In the diagram below, $\triangle ERM \sim \triangle JTM$.
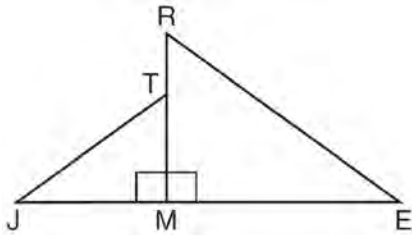
Which statement is always true?

1) $\cos J = \dfrac{RM}{RE}$

2) $\cos R = \dfrac{JM}{JT}$

3) $\tan T = \dfrac{RM}{EM}$

4) $\tan E = \dfrac{TM}{JM}$

72 What is an equation of circle O shown in the graph below?
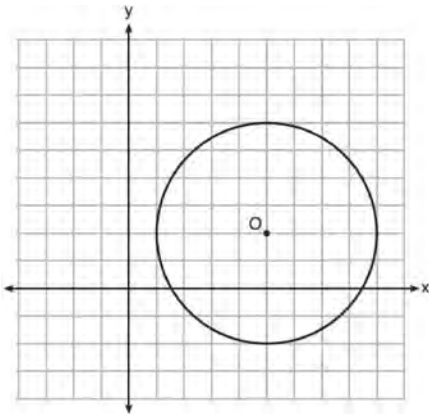
1) $x^2 + 10x + y^2 + 4y = -13$

2) $x^2 - 10x + y^2 - 4y = -13$

3) $x^2 + 10x + y^2 + 4y = -25$

4) $x^2 - 10x + y^2 - 4y = -25$

73 The pyramid shown below has a square base, a height of 7, and a volume of 84.
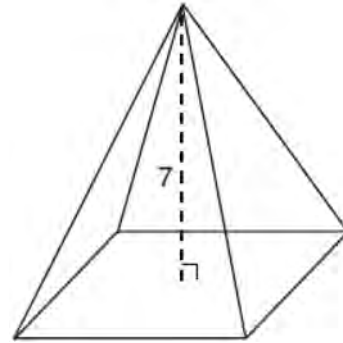
What is the length of the side of the base?

1) 6
2) 12
3) 18
4) 36

74 The regular polygon below is rotated about its center.
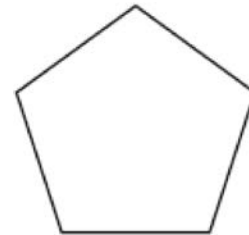
Which angle of rotation will carry the figure onto itself?

1) 60°
2) 108°
3) 216°
4) 540°

75 In the diagram below, $m\overset{\frown}{ABC} = 268°$.
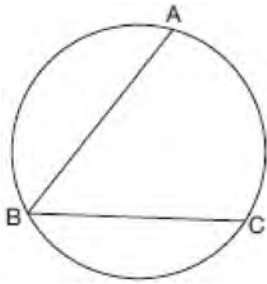
What is the number of degrees in the measure of $\angle ABC$?
1) 134°
2) 92°
3) 68°
4) 46°

76 As graphed on the set of axes below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a sequence of transformations.
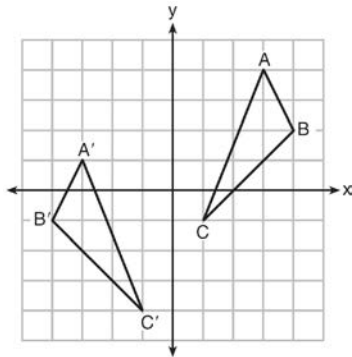
Is $\triangle A'B'C'$ congruent to $\triangle ABC$? Use the properties of rigid motion to explain your answer.

77 In circle O, secants $\overline{ADB}$ and $\overline{AEC}$ are drawn from external point A such that points D, B, E, and C are on circle O. If $AD = 8$, $\underline{AE} = 6$, and EC is 12 more than BD, the length of $\overline{BD}$ is
1) 6
2) 22
3) 36
4) 48

78 In the diagram below, line m is parallel to line n. Figure 2 is the image of Figure 1 after a reflection over line m. Figure 3 is the image of Figure 2 after a reflection over line n.
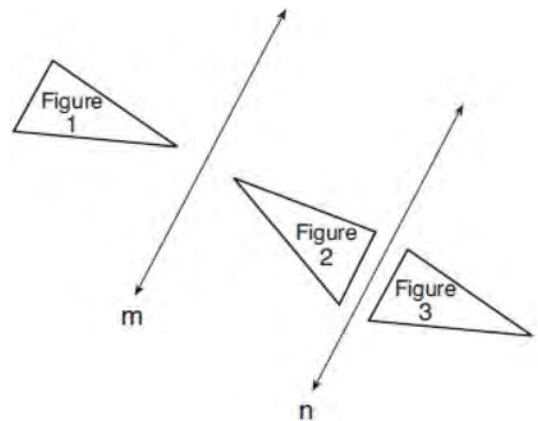
Which single transformation would carry Figure 1 onto Figure 3?
1) a dilation
2) a rotation
3) a reflection
4) a translation

79 The vertices of $\triangle JKL$ have coordinates $J(5,1)$, $K(-2,-3)$, and $L(-4,1)$. Under which transformation is the image $\triangle J'K'L'$ *not* congruent to $\triangle JKL$?
1) a translation of two units to the right and two units down
2) a counterclockwise rotation of 180 degrees around the origin
3) a reflection over the *x*-axis
4) a dilation with a scale factor of 2 and centered at the origin

80 In a right triangle, the acute angles have the relationship $\sin(2x+4) = \cos(46)$. What is the value of *x*?
1) 20
2) 21
3) 24
4) 25

81 Directed line segment *DE* has endpoints $D(-4,-2)$ and $E(1,8)$. Point *F* divides $\overline{DE}$ such that $DF:FE$ is 2:3. What are the coordinates of *F*?
1) (-3.0)
2) $(-2,2)$
3) $(-1,4)$
4) $(2,4)$

82 A designer needs to create perfectly circular necklaces. The necklaces each need to have a radius of 10 cm. What is the largest number of necklaces that can be made from 1000 cm of wire?
1) 15
2) 16
3) 31
4) 32

83 In quadrilateral *BLUE* shown below, $\overline{BE} \cong \overline{UL}$.
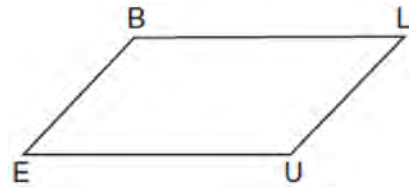
Which information would be sufficient to prove quadrilateral *BLUE* is a parallelogram?
1) $\overline{BL} \parallel \overline{EU}$
2) $\overline{LU} \parallel \overline{BE}$
3) $\overline{BE} \cong \overline{BL}$
4) $\overline{LU} \cong \overline{EU}$

84 Which figure always has exactly four lines of reflection that map the figure onto itself?
1) square
2) rectangle
3) regular octagon
4) equilateral triangle

85 In $\triangle CED$ as shown below, points *A* and *B* are located on sides $\overline{CE}$ and $\overline{ED}$, respectively. Line segment *AB* is drawn such that $AE = 3.75$, $AC = 5$, $EB = 4.5$, and $BD = 6$.
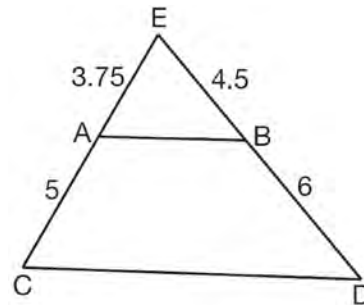
Explain why $\overline{AB}$ is parallel to $\overline{CD}$.

17

86 On the graph below, point $A(3,4)$ and $\overline{BC}$ with coordinates $B(4,3)$ and $C(2,1)$ are graphed.
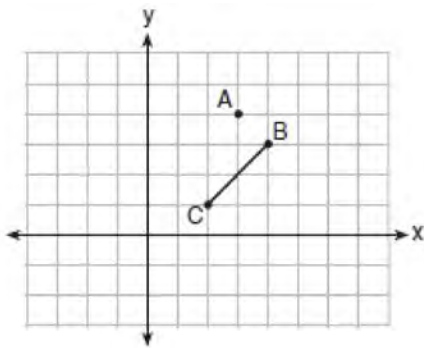
What are the coordinates of B' and C' after $\overline{BC}$ undergoes a dilation centered at point A with a scale factor of 2?

1) $B'(5,2)$ and $C'(1,-2)$
2) $B'(6,1)$ and $C'(0,-1)$
3) $B'(5,0)$ and $C'(1,-2)$
4) $B'(5,2)$ and $C'(3,0)$

87 Triangle ABC is graphed on the set of axes below. Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a reflection over the line $x = 1$.
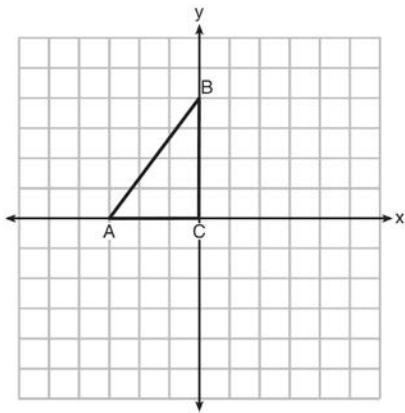
88 The map of a campground is shown below. Campsite C, first aid station F, and supply station S lie along a straight path. The path from the supply station to the tower, T, is perpendicular to the path from the supply station to the campsite. The length of path $\overline{FS}$ is 400 feet. The angle formed by path $\overline{TF}$ and path $\overline{FS}$ is 72°. The angle formed by path $\overline{TC}$ and path $\overline{CS}$ is 55°.

Campground Map
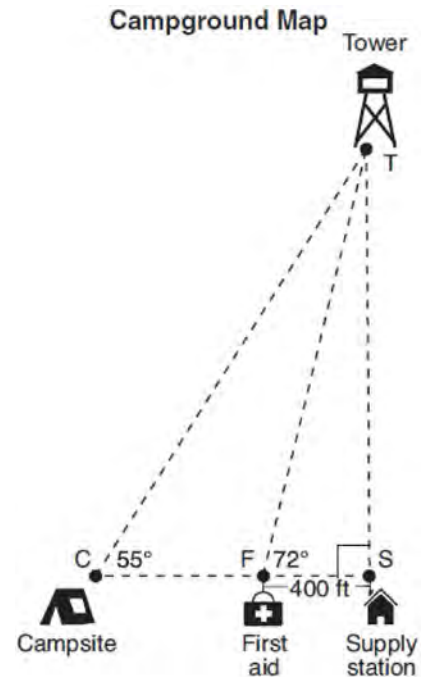
Determine and state, to the *nearest foot*, the distance from the campsite to the tower.

89 Which regular polygon has a minimum rotation of 45° to carry the polygon onto itself?

1) octagon
2) decagon
3) hexagon
4) pentagon

90 In the diagram below, the line of sight from the park ranger station, P, to the lifeguard chair, L, on the beach of a lake is perpendicular to the path joining the campground, C, and the first aid station, F. The campground is 0.25 mile from the lifeguard chair. The straight paths from both the campground and first aid station to the park ranger station are perpendicular.
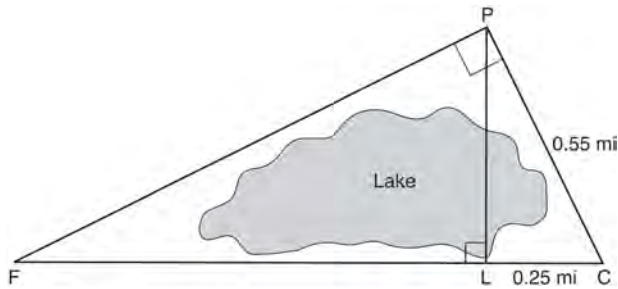
If the path from the park ranger station to the campground is 0.55 mile, determine and state, to the *nearest hundredth of a mile*, the distance between the park ranger station and the lifeguard chair. Gerald believes the distance from the first aid station to the campground is at least 1.5 miles. Is Gerald correct? Justify your answer.

91 A water cup in the shape of a cone has a height of 4 inches and a maximum diameter of 3 inches. What is the volume of the water in the cup, to the *nearest tenth of a cubic inch*, when the cup is filled to half its height?
1) 1.2
2) 3.5
3) 4.7
4) 14.1

92 Triangle $A'B'C'$ is the image of triangle ABC after a translation of 2 units to the right and 3 units up. Is triangle ABC congruent to triangle $A'B'C'$? Explain why.

93 The endpoints of one side of a regular pentagon are $(-1,4)$ and $(2,3)$. What is the perimeter of the pentagon?
1) $\sqrt{10}$
2) $5\sqrt{10}$
3) $5\sqrt{2}$
4) $25\sqrt{2}$

94 An equation of a line perpendicular to the line represented by the equation $y = -\frac{1}{2}x - 5$ and passing through $(6,-4)$ is
1) $y = -\frac{1}{2}x + 4$
2) $y = -\frac{1}{2}x - 1$
3) $y = 2x + 14$
4) $y = 2x - 16$

95 A circle with a radius of 5 was divided into 24 congruent sectors. The sectors were then rearranged, as shown in the diagram below.
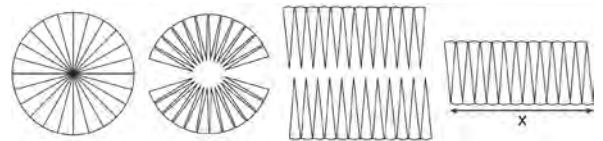
To the *nearest integer*, the value of x is
1) 31
2) 16
3) 12
4) 10

96 On the set of axes below, rectangle *ABCD* can be proven congruent to rectangle *KLMN* using which transformation?
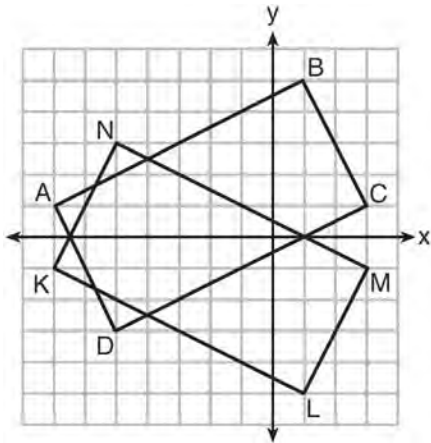
1) rotation
2) translation
3) reflection over the *x*-axis
4) reflection over the *y*-axis

97 In the diagram of $\triangle RST$ below, $m\angle T = 90°$, $RS = 65$, and $ST = 60$.
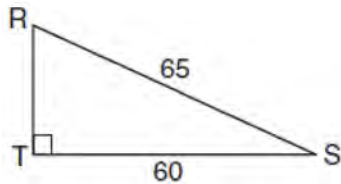
What is the measure of $\angle S$, to the *nearest degree*?
1) 23°
2) 43°
3) 47°
4) 67°

98 Triangle *ABC*, with vertices at *A*(0,0), *B*(3,5), and *C*(0,5), is graphed on the set of axes shown below.
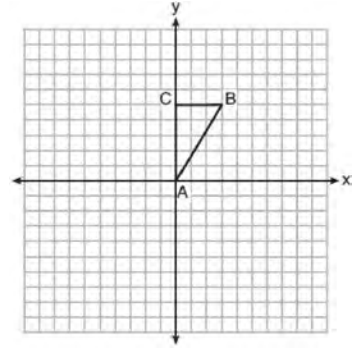
Which figure is formed when $\triangle ABC$ is rotated continuously about $\overline{BC}$?

1)
2)
3)
4)
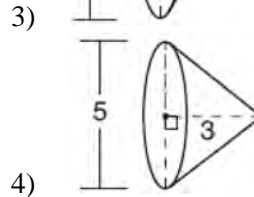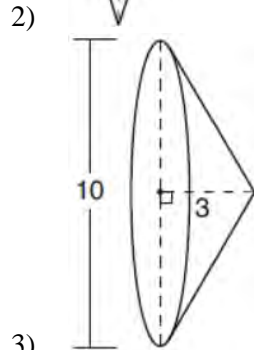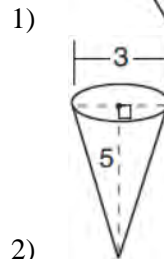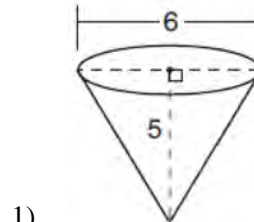
99 Line segment CD is the altitude drawn to hypotenuse $\overline{EF}$ in right triangle ECF. If $EC = 10$ and $EF = 24$, then, to the *nearest tenth*, ED is
1) 4.2
2) 5.4
3) 15.5
4) 21.8

100 A solid metal prism has a rectangular base with sides of 4 inches and 6 inches, and a height of 4 inches. A hole in the shape of a cylinder, with a radius of 1 inch, is drilled through the entire length of the rectangular prism.
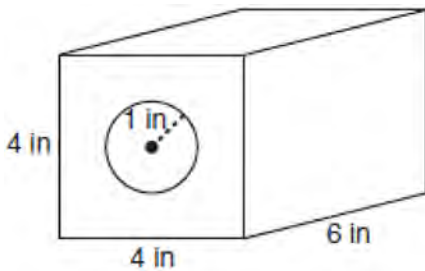
What is the approximate volume of the remaining solid, in cubic inches?
1) 19
2) 77
3) 93
4) 96

101 The equation of a circle is $x^2 + y^2 - 6x + 2y = 6$. What are the coordinates of the center and the length of the radius of the circle?
1) center $(-3, 1)$ and radius 4
2) center $(3, -1)$ and radius 4
3) center $(-3, 1)$ and radius 16
4) center $(3, -1)$ and radius 16

102 Using a compass and straightedge, construct the median to side $\overline{AC}$ in $\triangle ABC$ below. [Leave all construction marks.]
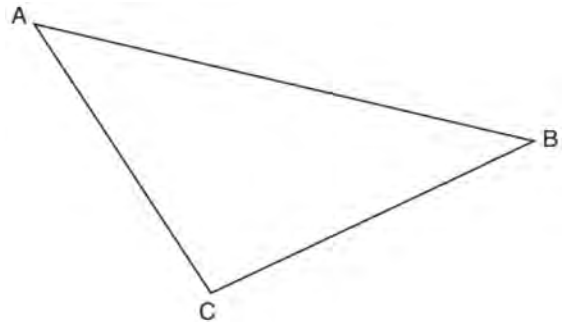
103 In the diagram below, $\overline{DB}$ and $\overline{AF}$ intersect at point C, and $\overline{AD}$ and $\overline{FBE}$ are drawn.
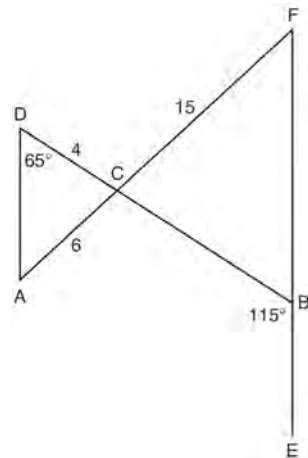
If $AC = 6$, $DC = 4$, $FC = 15$, $m\angle D = 65°$, and $m\angle CBE = 115°$, what is the length of $\overline{CB}$?
1) 10
2) 12
3) 17
4) 22.5

104 In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.
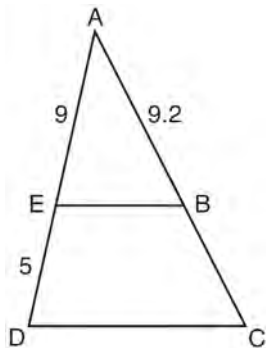
What is the length of $\overline{AC}$, to the *nearest tenth*?
1) 5.1
2) 5.2
3) 14.3
4) 14.4

105 The diagram below shows circle O with diameter $\overline{AB}$. Using a compass and straightedge, construct a square that is inscribed in circle O. [Leave all construction marks.]
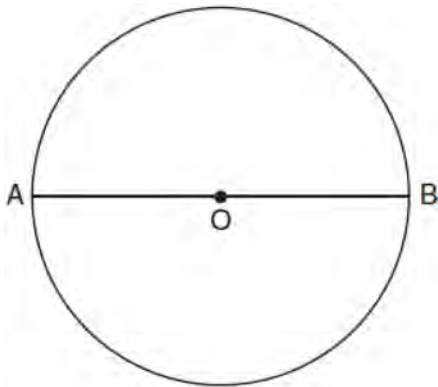
106 Triangle DAN is graphed on the set of axes below. The vertices of $\triangle DAN$ have coordinates $D(-6,-1)$, $A(6,3)$, and $N(-3,10)$.
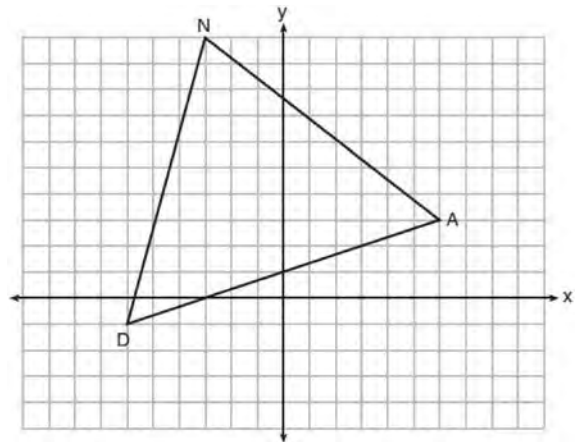
What is the area of $\triangle DAN$?
1) 60
2) 120
3) $20\sqrt{13}$
4) $40\sqrt{13}$

107 Which object is formed when right triangle RST shown below is rotated around leg $\overline{RS}$?
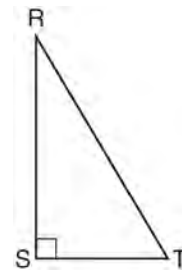
1) a pyramid with a square base
2) an isosceles triangle
3) a right triangle
4) a cone

22

108 In the diagram below, $\overline{CD}$ is the image of $\overline{AB}$ after a dilation of scale factor k with center E.
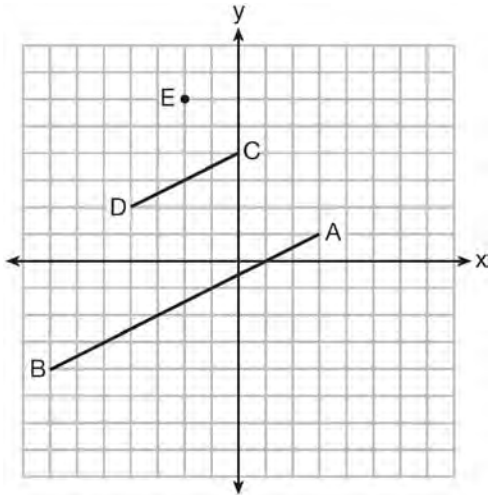
Which ratio is equal to the scale factor k of the dilation?

1) $\dfrac{EC}{EA}$

2) $\dfrac{BA}{EA}$

3) $\dfrac{EA}{BA}$

4) $\dfrac{EA}{EC}$

109 In the diagram below, $\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects $\overline{GT}$ at A.
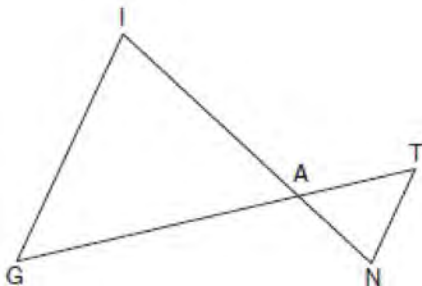
Prove: $\triangle GIA \sim \triangle TNA$

110 In $\triangle RST$ shown below, altitude $\overline{SU}$ is drawn to $\overline{RT}$ at U.
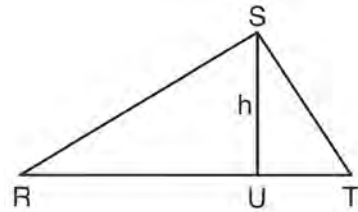
If $SU = h$, $UT = 12$, and $RT = 42$, which value of h will make $\triangle RST$ a right triangle with $\angle RST$ as a right angle?

1) $6\sqrt{3}$

2) $6\sqrt{10}$

3) $6\sqrt{14}$

4) $6\sqrt{35}$

111 The graph below shows $\overline{AB}$, which is a chord of circle O. The coordinates of the endpoints of $\overline{AB}$ are $A(3,3)$ and $B(3,-7)$. The distance from the midpoint of $\overline{AB}$ to the center of circle O is 2 units.
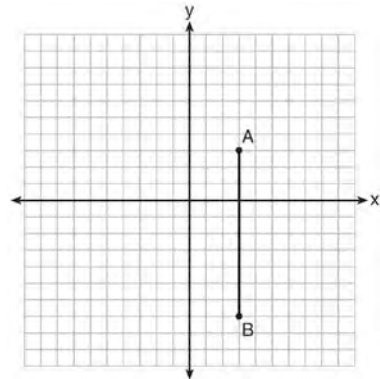
What could be a correct equation for circle O?

1) $(x-1)^2 + (y+2)^2 = 29$

2) $(x+5)^2 + (y-2)^2 = 29$

3) $(x-1)^2 + (y-2)^2 = 25$

4) $(x-5)^2 + (y+2)^2 = 25$

23

112 In the diagram below, $\triangle ABC$ has vertices $A(4,5)$, $B(2,1)$, and $C(7,3)$.
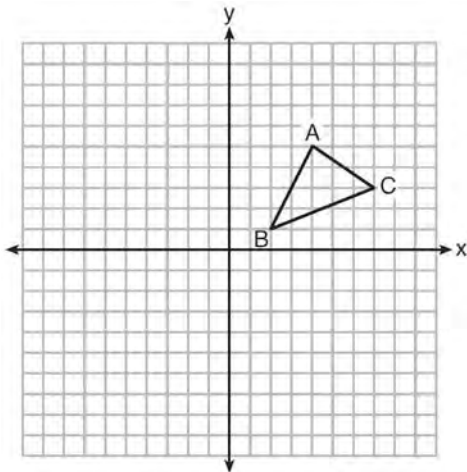
What is the slope of the altitude drawn from A to $\overline{BC}$?

1) $\dfrac{2}{5}$

2) $\dfrac{3}{2}$

3) $-\dfrac{1}{2}$

4) $-\dfrac{5}{2}$

113 Skye says that the two triangles below are congruent. Margaret says that the two triangles are similar.
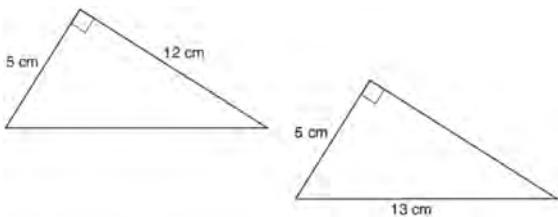
Are Skye and Margaret both correct? Explain why.

114 In the diagram below, $\overline{EF}$ intersects $\overline{AB}$ and $\overline{CD}$ at G and H, respectively, and $\overline{GI}$ is drawn such that $\overline{GH} \cong \overline{IH}$.
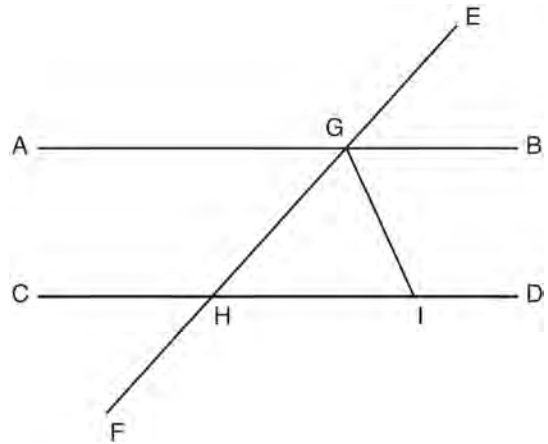
If m$\angle EGB = 50°$ and m$\angle DIG = 115°$, explain why $\overline{AB} \parallel \overline{CD}$.

115 In the diagram below, $\overline{AB} \parallel \overrightarrow{DEF}$, $\overline{AE}$ and $\overline{BD}$ intersect at C, m$\angle B = 43°$, and m$\angle CEF = 152°$.
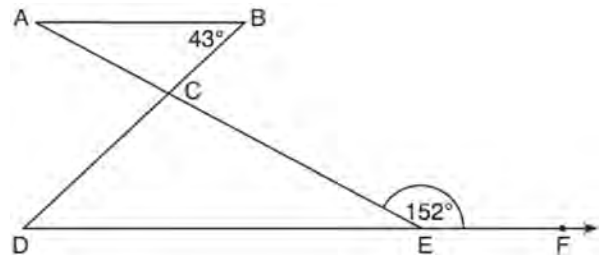
Which statement is true?
1) m$\angle D = 28°$
2) m$\angle A = 43°$
3) m$\angle ACD = 71°$
4) m$\angle BCE = 109°$

116 In the diagram below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a transformation.
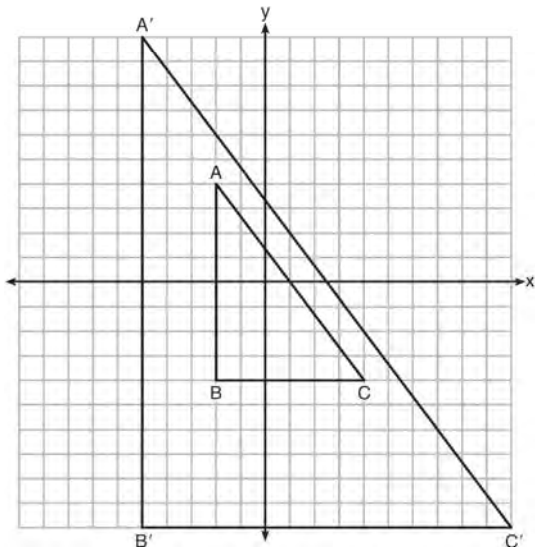
Describe the transformation that was performed. Explain why $\triangle A'B'C' \sim \triangle ABC$.

117 In triangle SRK below, medians $\overline{SC}$, $\overline{KE}$, and $\overline{RL}$ intersect at M.
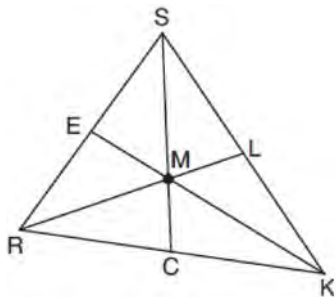
Which statement must always be true?
1) $3(MC) = SC$
2) $MC = \dfrac{1}{3}(SM)$
3) $RM = 2MC$
4) $SM = KM$

118 Quadrilateral $ABCD$ is graphed on the set of axes below.
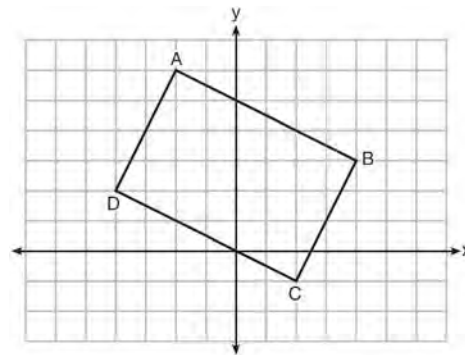
When $ABCD$ is rotated $90°$ in a counterclockwise direction about the origin, its image is quadrilateral $A'B'C'D'$. Is distance preserved under this rotation, and which coordinates are correct for the given vertex?
1) no and $C'(1,2)$
2) no and $D'(2,4)$
3) yes and $A'(6,2)$
4) yes and $B'(-3,4)$

119 Line MN is dilated by a scale factor of 2 centered at the point $(0,6)$. If $\overleftrightarrow{MN}$ is represented by $y = -3x + 6$, which equation can represent $\overleftrightarrow{M'N'}$, the image of $\overleftrightarrow{MN}$?
1) $y = -3x + 12$
2) $y = -3x + 6$
3) $y = -6x + 12$
4) $y = -6x + 6$

120 A ladder leans against a building. The top of the ladder touches the building 10 feet above the ground. The foot of the ladder is 4 feet from the building. Find, to the *nearest degree*, the angle that the ladder makes with the level ground.

25

121 In the diagram below, a sequence of rigid motions maps *ABCD* onto *JKLM*.
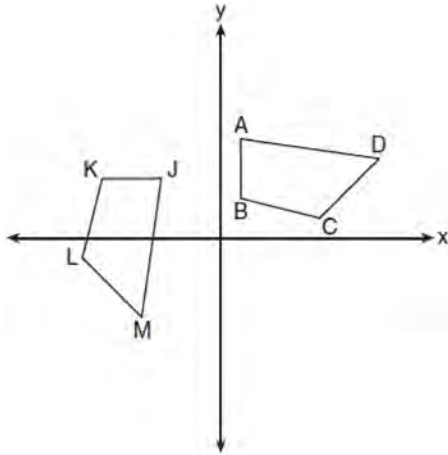
If m∠*A* = 82°, m∠*B* = 104°, and m∠*L* = 121°, the measure of ∠*M* is
1) 53°
2) 82°
3) 104°
4) 121°

122 A plane intersects a hexagonal prism. The plane is perpendicular to the base of the prism. Which two-dimensional figure is the cross section of the plane intersecting the prism?
1) triangle
2) trapezoid
3) hexagon
4) rectangle

123 Quadrilateral *ABCD* has diagonals $\overline{AC}$ and $\overline{BD}$. Which information is *not* sufficient to prove *ABCD* is a parallelogram?
1) $\overline{AC}$ and $\overline{BD}$ bisect each other.
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$
4) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

124 In the diagram of right triangle *ABC* shown below, *AB* = 14 and *AC* = 9.
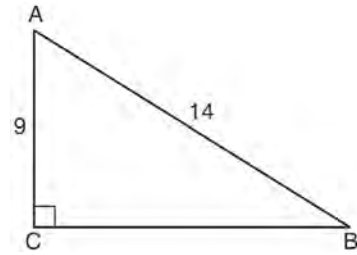
What is the measure of ∠*A*, to the *nearest degree*?
1) 33
2) 40
3) 50
4) 57

125 A candle maker uses a mold to make candles like the one shown below.
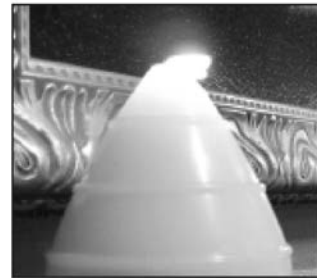
The height of the candle is 13 cm and the circumference of the candle at its widest measure is 31.416 cm. Use modeling to approximate how much wax, to the *nearest cubic centimeter*, is needed to make this candle. Justify your answer.

126 Determine and state, in terms of π, the area of a sector that intercepts a 40° arc of a circle with a radius of 4.5.

26

127 The coordinates of the endpoints of $\overline{AB}$ are $A(-6,-5)$ and $B(4,0)$. Point P is on $\overline{AB}$. Determine and state the coordinates of point P, such that $AP:PB$ is $2:3$. [The use of the set of axes below is optional.]
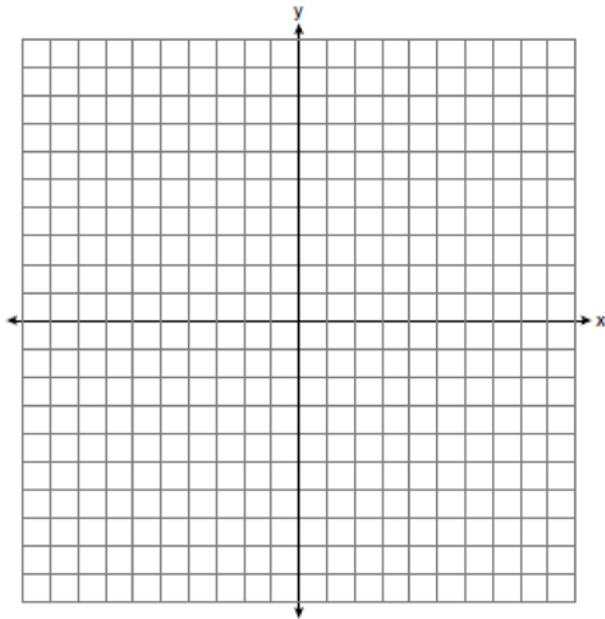
128 In parallelogram $ABCD$, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at E. Which statement does *not* prove parallelogram $ABCD$ is a rhombus?
1) $\overline{AC} \cong \overline{DB}$
2) $\overline{AB} \cong \overline{BC}$
3) $\overline{AC} \perp \overline{DB}$
4) $\overline{AC}$ bisects $\angle DCB$

129 Bob places an 18-foot ladder 6 feet from the base of his house and leans it up against the side of his house. Find, to the *nearest degree*, the measure of the angle the bottom of the ladder makes with the ground.

130 A three-inch line segment is dilated by a scale factor of 6 and centered at its midpoint. What is the length of its image?
1) 9 inches
2) 2 inches
3) 15 inches
4) 18 inches

131 A fabricator is hired to make a 27-foot-long solid metal railing for the stairs at the local library. The railing is modeled by the diagram below. The railing is 2.5 inches high and 2.5 inches wide and is comprised of a rectangular prism and a half-cylinder.
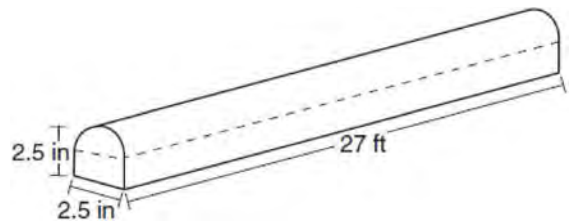
How much metal, to the *nearest cubic inch*, will the railing contain?
1) 151
2) 795
3) 1808
4) 2025

132 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?
1) $(3,-2)$ and 36
2) $(3,-2)$ and 6
3) $(-3,2)$ and 36
4) $(-3,2)$ and 6

133 What is an equation of the line that passes through the point $(6,8)$ and is perpendicular to a line with equation $y = \frac{3}{2}x + 5$?

1) $y - 8 = \frac{3}{2}(x - 6)$

2) $y - 8 = -\frac{2}{3}(x - 6)$

3) $y + 8 = \frac{3}{2}(x + 6)$

4) $y + 8 = -\frac{2}{3}(x + 6)$

134 Triangles *ABC* and *DEF* are drawn below.
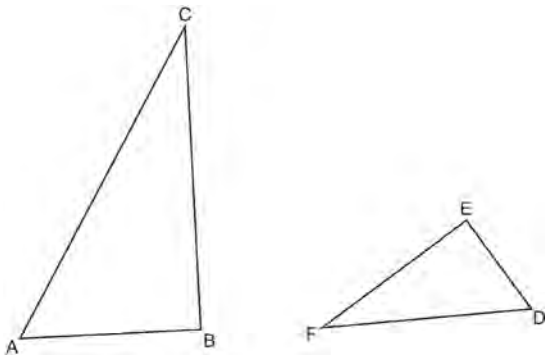
If $AB = 9$, $BC = 15$, $DE = 6$, $EF = 10$, and $\angle B \cong \angle E$, which statement is true?

1) $\angle CAB \cong \angle DEF$

2) $\dfrac{AB}{CB} = \dfrac{FE}{DE}$

3) $\triangle ABC \sim \triangle DEF$

4) $\dfrac{AB}{DE} = \dfrac{FE}{CB}$

135 Which statement is sufficient evidence that $\triangle DEF$ is congruent to $\triangle ABC$?
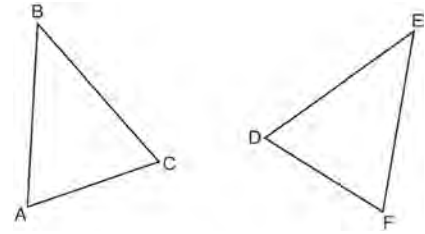
1) $AB = DE$ and $BC = EF$
2) $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3) There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4) There is a sequence of rigid motions that maps point *A* onto point *D*, $\overline{AB}$ onto $\overline{DE}$, and $\angle B$ onto $\angle E$.

136 Cathy wants to determine the height of the flagpole shown in the diagram below. She uses a survey instrument to measure the angle of elevation to the top of the flagpole, and determines it to be 34.9°. She walks 8 meters closer and determines the new measure of the angle of elevation to be 52.8°. At each measurement, the survey instrument is 1.7 meters above the ground.
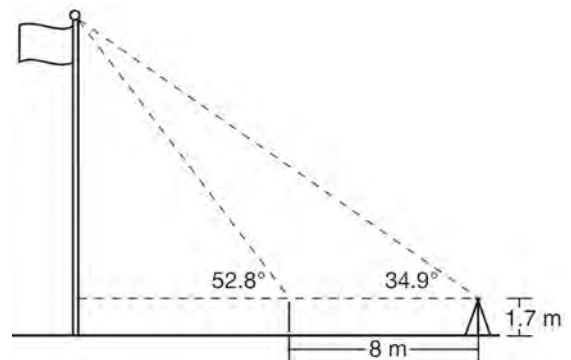
Determine and state, to the *nearest tenth of a meter*, the height of the flagpole.

137 In the diagram below, secants $\overline{RST}$ and $\overline{RQP}$, drawn from point R, intersect circle O at S, T, Q, and P.
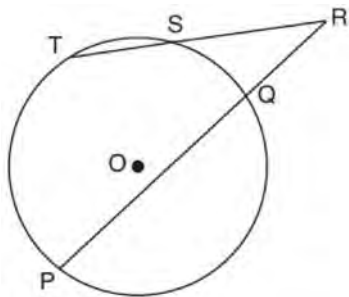
If $RS = 6$, $ST = 4$, and $RP = 15$, what is the length of $\overline{RQ}$?

138 As shown in the diagram below, a regular pyramid has a square base whose side measures 6 inches.

6 in
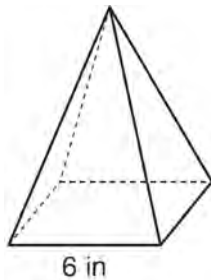
If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is
1) 72
2) 144
3) 288
4) 432

139 Line segment EA is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.
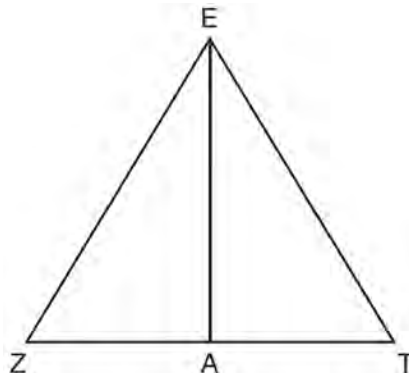
Which conclusion can *not* be proven?
1) $\overline{EA}$ bisects angle ZET.
2) Triangle EZT is equilateral.
3) $\overline{EA}$ is a median of triangle EZT.
4) Angle Z is congruent to angle T.

140 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?
1) $\tan \angle A = \tan \angle B$
2) $\sin \angle A = \sin \angle B$
3) $\cos \angle A = \tan \angle B$
4) $\sin \angle A = \cos \angle B$

141 A hemispherical water tank has an inside diameter of 10 feet. If water has a density of 62.4 pounds per cubic foot, what is the weight of the water in a full tank, to the *nearest pound*?
1) 16,336
2) 32,673
3) 130,690
4) 261,381

142 A circle whose center is the origin passes through the point $(-5,12)$. Which point also lies on this circle?
1) $(10,3)$
2) $(-12,13)$
3) $(11,2\sqrt{12})$
4) $(-8,5\sqrt{21})$

143 Which set of statements would describe a parallelogram that can always be classified as a rhombus?

    I. Diagonals are perpendicular bisectors of each other.

    II. Diagonals bisect the angles from which they are drawn.

    III. Diagonals form four congruent isosceles right triangles.
1) I and II
2) I and III
3) II and III
4) I, II, and III

144 In the diagram below, $\triangle ABC \sim \triangle DEC$.
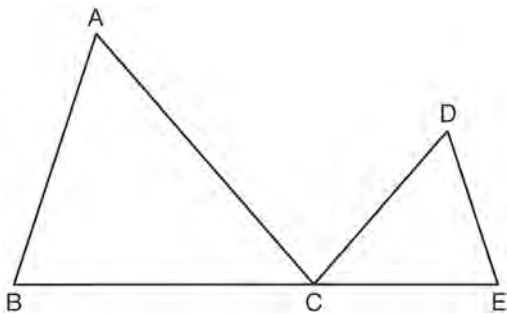
If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?
1) 12.5
2) 14.0
3) 14.8
4) 17.5

145 In the diagram of right triangle ADE below, $\overline{BC} \parallel \overline{DE}$.
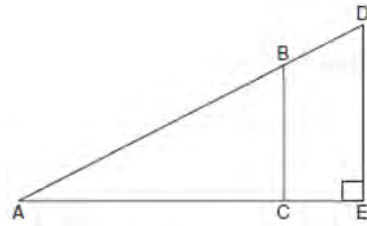
Which ratio is always equivalent to the sine of $\angle A$?
1) $\dfrac{AD}{DE}$
2) $\dfrac{AE}{AD}$
3) $\dfrac{BC}{AB}$
4) $\dfrac{AB}{AC}$

146 In the diagram below, $\overline{AB} \parallel \overline{DFC}$, $\overline{EDA} \parallel \overline{CBG}$, and $\overline{EFB}$ and $\overline{AG}$ are drawn.
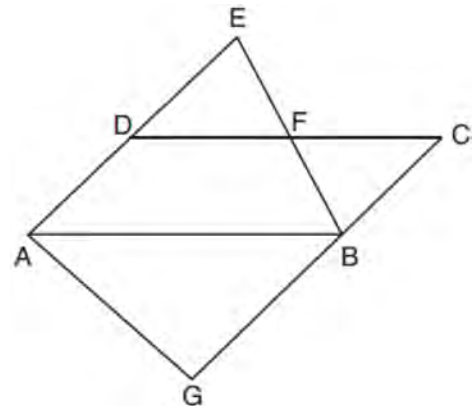
Which statement is always true?
1) $\triangle DEF \cong \triangle CBF$
2) $\triangle BAG \cong \triangle BAE$
3) $\triangle BAG \sim \triangle AEB$
4) $\triangle DEF \sim \triangle AEB$

147 Using a compass and straightedge, construct the line of reflection over which triangle *RST* reflects onto triangle *R'S'T'*. [Leave all construction marks.]
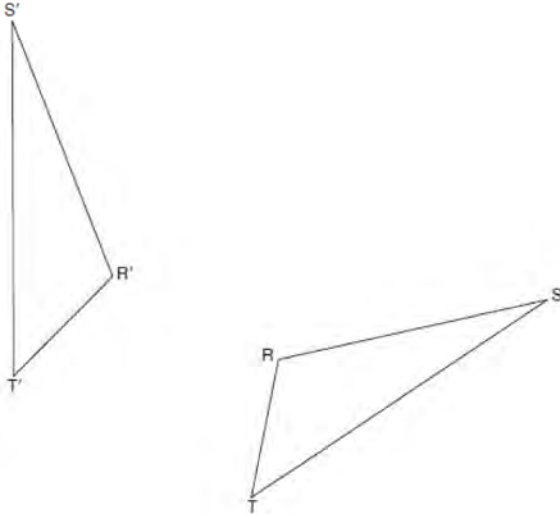
148 In the diagram of circle *A* shown below, chords $\overline{CD}$ and $\overline{EF}$ intersect at *G*, and chords $\overline{CE}$ and $\overline{FD}$ are drawn.
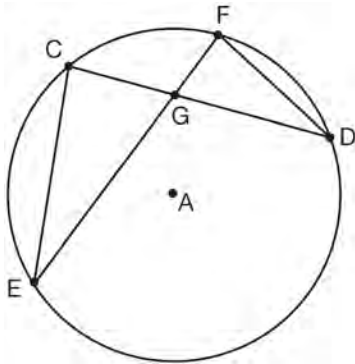
Which statement is *not* always true?
1) $\overline{CG} \cong \overline{FG}$
2) $\angle CEG \cong \angle FDG$
3) $\dfrac{CE}{EG} = \dfrac{FD}{DG}$
4) $\triangle CEG \sim \triangle FDG$

149 In the diagram below, $\triangle ADE$ is the image of $\triangle ABC$ after a reflection over the line *AC* followed by a dilation of scale factor $\dfrac{AE}{AC}$ centered at point *A*.
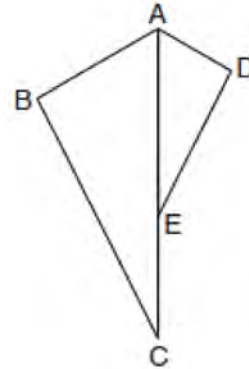
Which statement must be true?
1) $m\angle BAC \cong m\angle AED$
2) $m\angle ABC \cong m\angle ADE$
3) $m\angle DAE \cong \dfrac{1}{2}m\angle BAC$
4) $m\angle ACB \cong \dfrac{1}{2}m\angle DAB$

150 A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?
1) $(8.5)^3 - \pi(8)^2(8)$
2) $(8.5)^3 - \pi(4)^2(8)$
3) $(8.5)^3 - \dfrac{1}{3}\pi(8)^2(8)$
4) $(8.5)^3 - \dfrac{1}{3}\pi(4)^2(8)$

31

151 A fish tank in the shape of a rectangular prism has dimensions of 14 inches, 16 inches, and 10 inches. The tank contains 1680 cubic inches of water. What percent of the fish tank is empty?
1) 10
2) 25
3) 50
4) 75

152 In the diagram below of circle O, $GO = 8$ and $m\angle GOJ = 60°$.
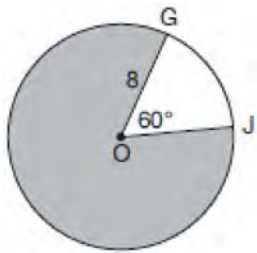
What is the area, in terms of π, of the shaded region?
1) $\dfrac{4\pi}{3}$
2) $\dfrac{20\pi}{3}$
3) $\dfrac{32\pi}{3}$
4) $\dfrac{160\pi}{3}$

153 A 20-foot support post leans against a wall, making a 70° angle with the ground. To the *nearest tenth of a foot*, how far up the wall will the support post reach?
1) 6.8
2) 6.9
3) 18.7
4) 18.8

154 The greenhouse pictured below can be modeled as a rectangular prism with a half-cylinder on top. The rectangular prism is 20 feet wide, 12 feet high, and 45 feet long. The half-cylinder has a diameter of 20 feet.
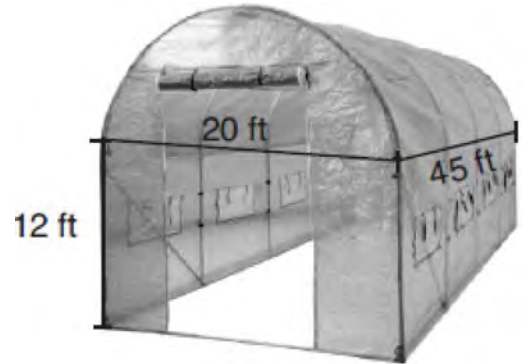
To the *nearest cubic foot*, what is the volume of the greenhouse?
1) 17,869
2) 24,937
3) 39,074
4) 67,349

155 In the diagram below of circle O, $\overline{OB}$ and $\overline{OC}$ are radii, and chords $\overline{AB}$, $\overline{BC}$, and $\overline{AC}$ are drawn.
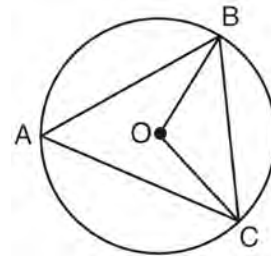
Which statement must always be true?
1) $\angle BAC \cong \angle BOC$
2) $m\angle BAC = \dfrac{1}{2} m\angle BOC$
3) $\triangle BAC$ and $\triangle BOC$ are isosceles.
4) The area of $\triangle BAC$ is twice the area of $\triangle BOC$.

32

156 As shown in the diagram below, an island (*I*) is due north of a marina (*M*). A boat house (*H*) is 4.5 miles due west of the marina. From the boat house, the island is located at an angle of 54° from the marina.
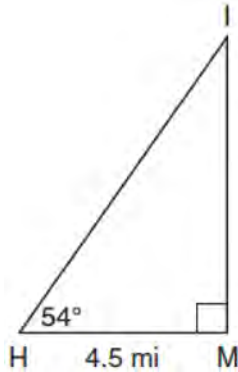
Determine and state, to the *nearest tenth of a mile*, the distance from the boat house (*H*) to the island (*I*). Determine and state, to the *nearest tenth of a mile*, the distance from the island (*I*) to the marina (*M*).

157 A carpenter leans an extension ladder against a house to reach the bottom of a window 30 feet above the ground. As shown in the diagram below, the ladder makes a 70° angle with the ground. To the *nearest foot*, determine and state the length of the ladder.
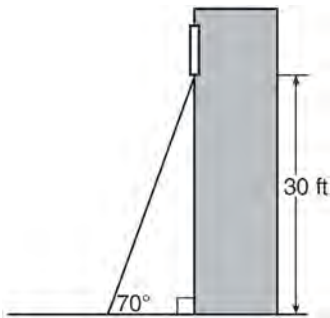
158 A gas station has a cylindrical fueling tank that holds the gasoline for its pumps, as modeled below. The tank holds a maximum of 20,000 gallons of gasoline and has a length of 34.5 feet.
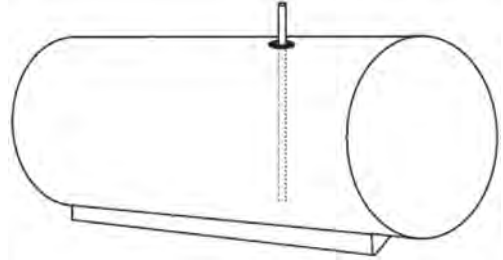
A metal pole is used to measure how much gas is in the tank. To the *nearest tenth of a foot*, how long does the pole need to be in order to reach the bottom of the tank and still extend one foot outside the tank? Justify your answer. [1 ft³=7.48 gallons]

159 Which transformation of $\overline{OA}$ would result in an image parallel to $\overline{OA}$?
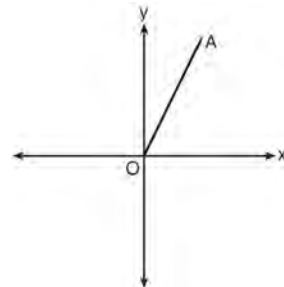
1) a translation of two units down
2) a reflection over the *x*-axis
3) a reflection over the *y*-axis
4) a clockwise rotation of 90° about the origin

33

160 The line $3y = -2x + 8$ is transformed by a dilation centered at the origin. Which linear equation could be its image?
1) $2x + 3y = 5$
2) $2x - 3y = 5$
3) $3x + 2y = 5$
4) $3x - 2y = 5$

161 Triangle RST is graphed on the set of axes below.
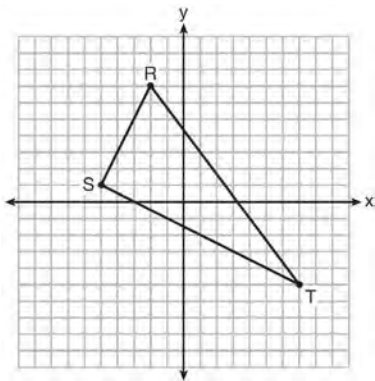
How many square units are in the area of $\triangle RST$?
1) $9\sqrt{3} + 15$
2) $9\sqrt{5} + 15$
3) 45
4) 90

162 In right triangle ABC, $m\angle C = 90°$. If $\cos B = \dfrac{5}{13}$, which function also equals $\dfrac{5}{13}$?
1) $\tan A$
2) $\tan B$
3) $\sin A$
4) $\sin B$

163 In the diagram below of circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E.
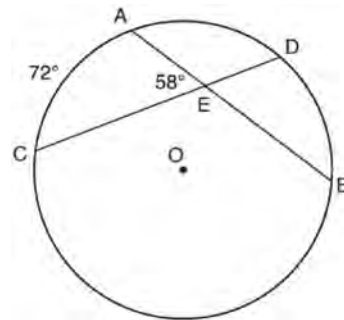
If $m\overarc{AC} = 72°$ and $m\angle AEC = 58°$, how many degrees are in $m\overarc{DB}$?
1) $108°$
2) $65°$
3) $44°$
4) $14°$

164 In the diagram below, $\overline{DC}$, $\overline{AC}$, $\overline{DOB}$, $\overline{CB}$, and $\overline{AB}$ are chords of circle O, $\overleftrightarrow{FDE}$ is tangent at point D, and radius $\overline{AO}$ is drawn. Sam decides to apply this theorem to the diagram: "An angle inscribed in a semi-circle is a right angle."
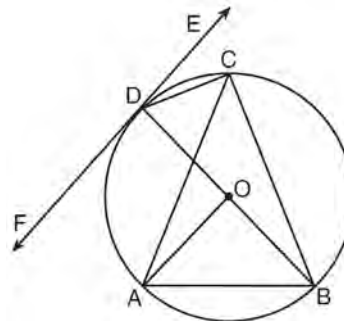
Which angle is Sam referring to?
1) $\angle AOB$
2) $\angle BAC$
3) $\angle DCB$
4) $\angle FDB$

165 Triangle *ABC* and triangle *ADE* are graphed on the set of axes below.
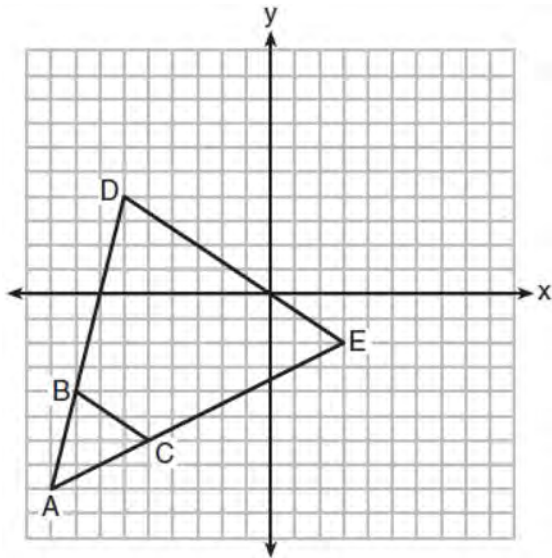
Describe a transformation that maps triangle *ABC* onto triangle *ADE*. Explain why this transformation makes triangle *ADE* similar to triangle *ABC*.

166 The diagram below shows two similar triangles.
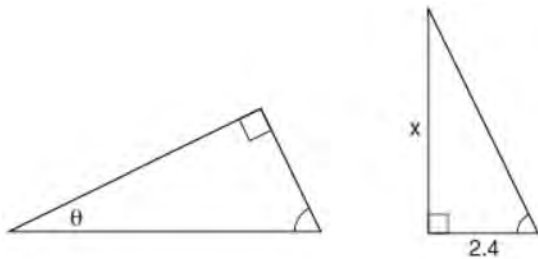
If $\tan \theta = \dfrac{3}{7}$, what is the value of *x*, to the *nearest tenth*?

1) 1.2
2) 5.6
3) 7.6
4) 8.8

167 When instructed to find the length of $\overline{HJ}$ in right triangle *HJG*, Alex wrote the equation $\sin 28° = \dfrac{HJ}{20}$ while Marlene wrote $\cos 62° = \dfrac{HJ}{20}$. Are both students' equations correct? Explain why.
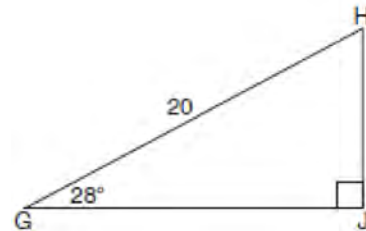
168 Triangle *ABC* has vertices at $A(-5,2)$, $B(-4,7)$, and $C(-2,7)$, and triangle *DEF* has vertices at $D(3,2)$, $E(2,7)$, and $F(0,7)$. Graph and label $\triangle ABC$ and $\triangle DEF$ on the set of axes below. Determine and state the single transformation where $\triangle DEF$ is the image of $\triangle ABC$. Use your transformation to explain why $\triangle ABC \cong \triangle DEF$.
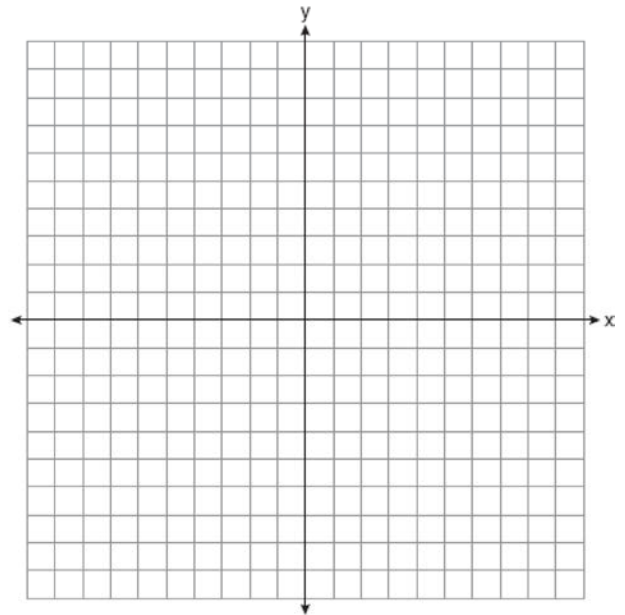
169 Triangle *XYZ* is shown below. Using a compass and straightedge, on the line below, construct and label $\triangle ABC$, such that $\triangle ABC \cong \triangle XYZ$. [Leave all construction marks.] Based on your construction, state the theorem that justifies why $\triangle ABC$ is congruent to $\triangle XYZ$.

171 In the diagram below, the circle has a radius of 25 inches. The area of the *unshaded* sector is 500π in^2.
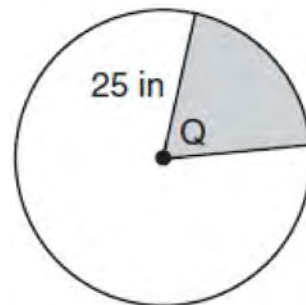
Determine and state the degree measure of angle *Q*, the central angle of the shaded sector.

172 What is an equation of a line which passes through $(6,9)$ and is perpendicular to the line whose equation is $4x - 6y = 15$?

1) $y - 9 = -\dfrac{3}{2}(x - 6)$

2) $y - 9 = \dfrac{2}{3}(x - 6)$

3) $y + 9 = -\dfrac{3}{2}(x + 6)$

4) $y + 9 = \dfrac{2}{3}(x + 6)$

170 Given: $\overline{RS}$ and $\overline{TV}$ bisect each other at point *X*
$\overline{TR}$ and $\overline{SV}$ are drawn

Prove: $\overline{TR} \parallel \overline{SV}$

173 In right triangle *ABC* shown below, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. Explain why $\triangle ABC \sim \triangle ACD$.
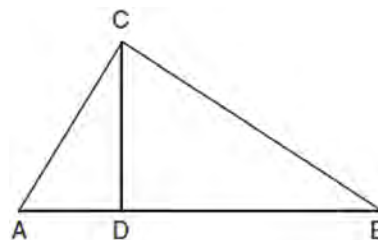
174 Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$.
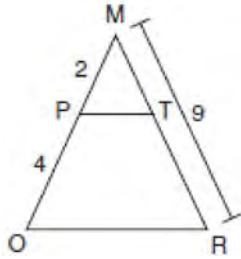
What is the length of $\overline{TR}$?
1) 4.5
2) 5
3) 3
4) 6

175 A man was parasailing above a lake at an angle of elevation of 32° from a boat, as modeled in the diagram below.
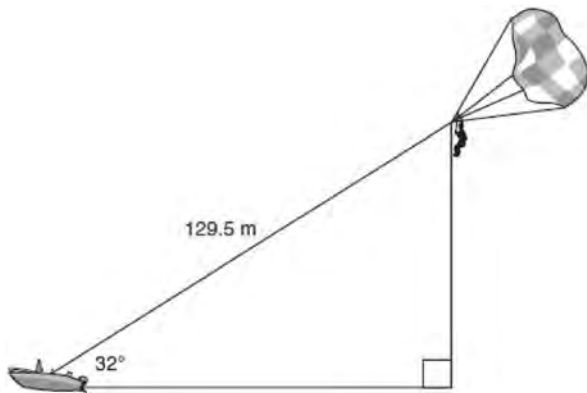
If 129.5 meters of cable connected the boat to the parasail, approximately how many meters above the lake was the man?
1) 68.6
2) 80.9
3) 109.8
4) 244.4

176 In the diagram of $\triangle ABC$ below, $\overline{DE}$ is parallel to $\overline{AB}$, $CD = 15$, $AD = 9$, and $AB = 40$.
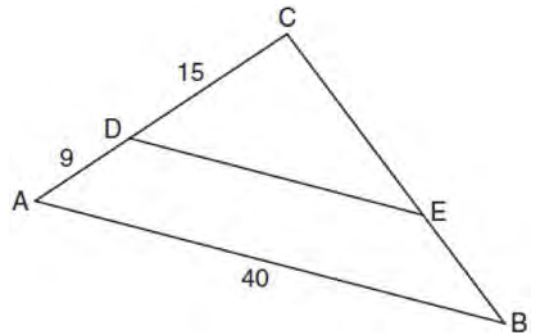
The length of $\overline{DE}$ is
1) 15
2) 24
3) 25
4) 30

177 Triangle ABC has vertices with coordinates $A(-1,-1)$, $B(4,0)$, and $C(0,4)$. Prove that $\triangle ABC$ is an isosceles triangle but *not* an equilateral triangle. [The use of the set of axes below is optional.]
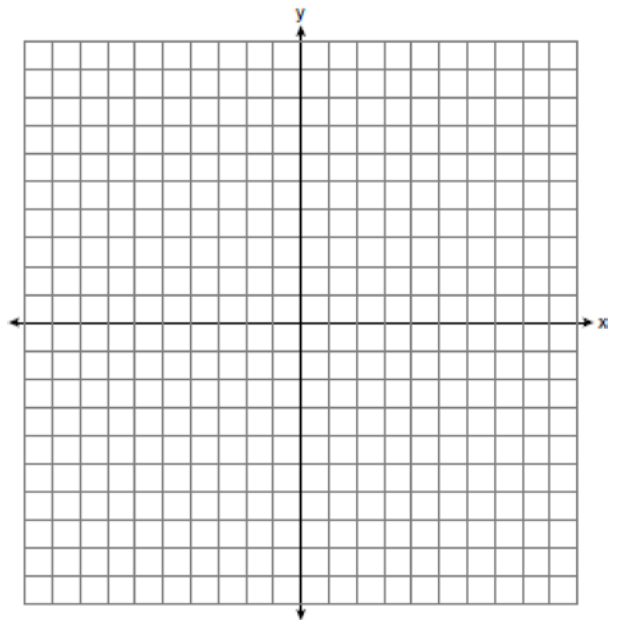
178 On the set of axes below, the vertices of $\triangle PQR$ have coordinates $P(-6,7)$, $Q(2,1)$, and $R(-1,-3)$.
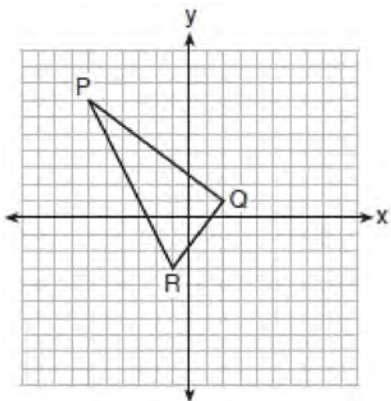
What is the area of $\triangle PQR$?
1) 10
2) 20
3) 25
4) 50

179 In the diagram below of right triangle AED, $\overline{BC} \parallel \overline{DE}$.
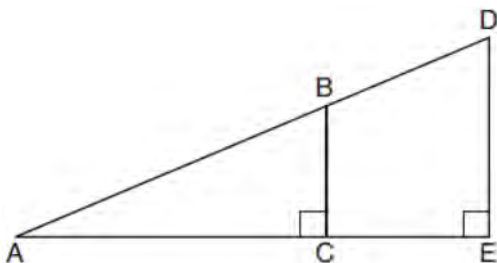
Which statement is always true?
1) $\dfrac{AC}{BC} = \dfrac{DE}{AE}$
2) $\dfrac{AB}{AD} = \dfrac{BC}{DE}$
3) $\dfrac{AC}{CE} = \dfrac{BC}{DE}$
4) $\dfrac{DE}{BC} = \dfrac{DB}{AB}$

180 Steve drew line segments $ABCD$, EFG, BF, and CF as shown in the diagram below. Scalene $\triangle BFC$ is formed.
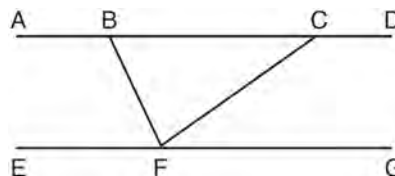
Which statement will allow Steve to prove $\overline{ABCD} \parallel \overline{EFG}$?
1) $\angle CFG \cong \angle FCB$
2) $\angle ABF \cong \angle BFC$
3) $\angle EFB \cong \angle CFB$
4) $\angle CBF \cong \angle GFC$

181 Rectangle $A'B'C'D'$ is the image of rectangle $ABCD$ after a dilation centered at point A by a scale factor of $\dfrac{2}{3}$. Which statement is correct?

1) Rectangle $A'B'C'D'$ has a perimeter that is $\dfrac{2}{3}$ the perimeter of rectangle $ABCD$.
2) Rectangle $A'B'C'D'$ has a perimeter that is $\dfrac{3}{2}$ the perimeter of rectangle $ABCD$.
3) Rectangle $A'B'C'D'$ has an area that is $\dfrac{2}{3}$ the area of rectangle $ABCD$.
4) Rectangle $A'B'C'D'$ has an area that is $\dfrac{3}{2}$ the area of rectangle $ABCD$.

182 Find the value of R that will make the equation $\sin 73° = \cos R$ true when $0° < R < 90°$. Explain your answer.

38

183 The center of circle Q has coordinates $(3, -2)$. If circle Q passes through $R(7, 1)$, what is the length of its diameter?
1) 50
2) 25
3) 10
4) 5

184 After a counterclockwise rotation about point X, scalene triangle ABC maps onto $\triangle RST$, as shown in the diagram below.
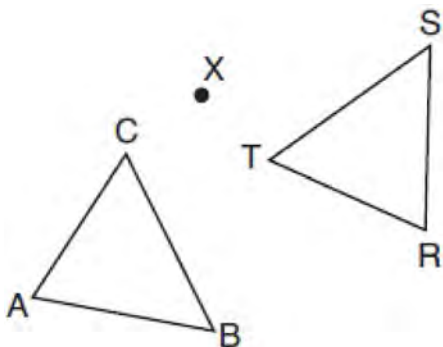
Which statement must be true?
1) $\angle A \cong \angle R$
2) $\angle A \cong \angle S$
3) $\overline{CB} \cong \overline{TR}$
4) $\overline{CA} \cong \overline{TS}$

185 Given square $RSTV$, where $RS = 9$ cm. If square $RSTV$ is dilated by a scale factor of 3 about a given center, what is the perimeter, in centimeters, of the image of $RSTV$ after the dilation?
1) 12
2) 27
3) 36
4) 108

186 Given: Parallelogram $ABCD$, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$
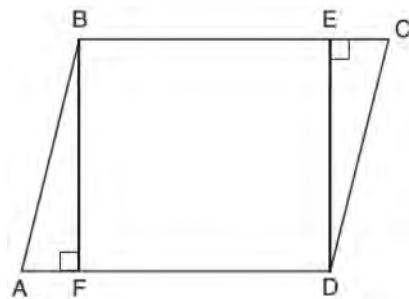
Prove: $BEDF$ is a rectangle

187 Given: Parallelogram $ANDR$ with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points W and E, respectively
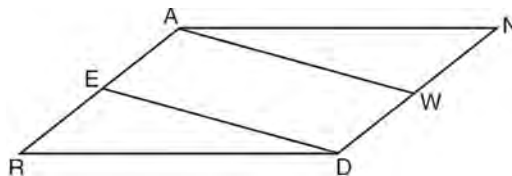
Prove that $\triangle ANW \cong \triangle DRE$. Prove that quadrilateral $AWDE$ is a parallelogram.

188 A ladder 20 feet long leans against a building, forming an angle of $71°$ with the level ground. To the *nearest foot*, how high up the wall of the building does the ladder touch the building?
1) 15
2) 16
3) 18
4) 19

189 In the diagram below, if $\triangle ABE \cong \triangle CDF$ and $\overline{AEFC}$ is drawn, then it could be proven that quadrilateral $ABCD$ is a
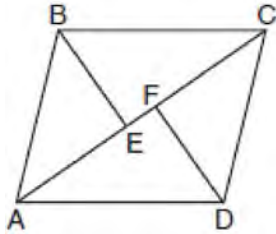
1) square
2) rhombus
3) rectangle
4) parallelogram

190 Given: Parallelogram $ABCD$, $\overline{EFG}$, and diagonal $\overline{DFB}$
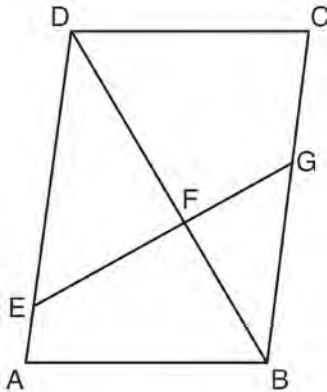
Prove: $\triangle DEF \sim \triangle BGF$

191 A parallelogram is always a rectangle if
1) the diagonals are congruent
2) the diagonals bisect each other
3) the diagonals intersect at right angles
4) the opposite angles are congruent

192 Which figure can have the same cross section as a sphere?

1)

2)

3)

4)
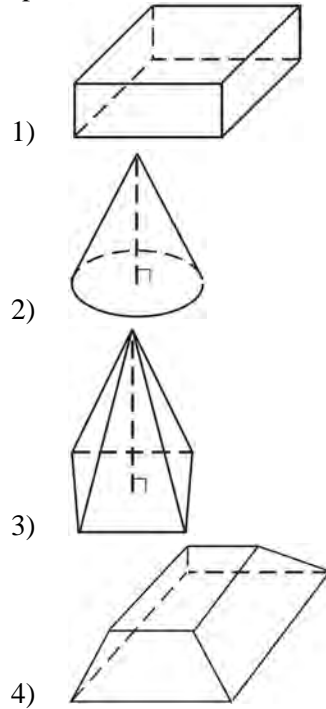
193 Identify which sequence of transformations could map pentagon $ABCDE$ onto pentagon $A''B''C''D''E''$, as shown below.
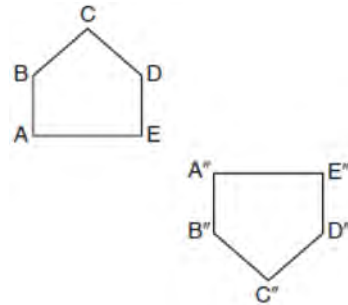
1) dilation followed by a rotation
2) translation followed by a rotation
3) line reflection followed by a translation
4) line reflection followed by a line reflection

40

194 In the diagram below, two concentric circles with center *O*, and radii $\overline{OC}$, $\overline{OD}$, $\overline{OGE}$, and $\overline{ODF}$ are drawn.
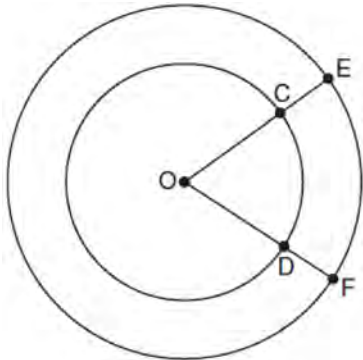
If *OC* = 4 and *OE* = 6, which relationship between the length of arc *EF* and the length of arc *CD* is always true?
1) The length of arc *EF* is 2 units longer than the length of arc *CD*.
2) The length of arc *EF* is 4 units longer than the length of arc *CD*.
3) The length of arc *EF* is 1.5 times the length of arc *CD*.
4) The length of arc *EF* is 2.0 times the length of arc *CD*.

195 In △*ABC* shown below, side $\overline{AC}$ is extended to point *D* with m∠*DAB* = (180 − 3x)°, m∠*B* = (6x − 40)°, and m∠*C* = (x + 20)°.
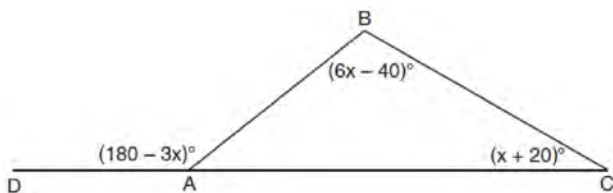
What is m∠*BAC*?
1) 20°
2) 40°
3) 60°
4) 80°

196 In the diagram below, $\overline{DE}$ divides $\overline{AB}$ and $\overline{AC}$ proportionally, m∠*C* = 26°, m∠*A* = 82°, and $\overline{DF}$ bisects ∠*BDE*.
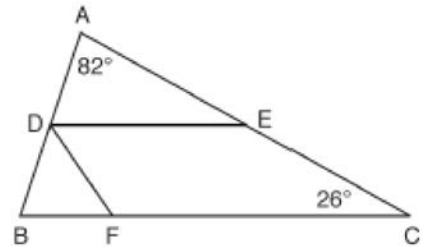
The measure of angle *DFB* is
1) 36°
2) 54°
3) 72°
4) 82°
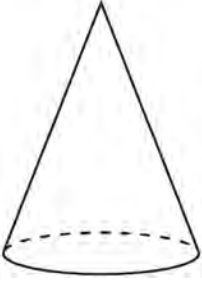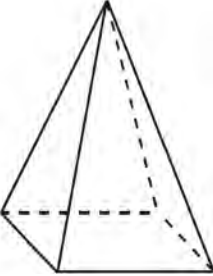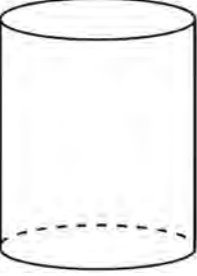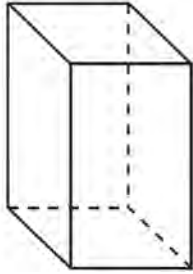
197 In circle *M* below, diameter $\overline{AC}$, chords $\overline{AB}$ and $\overline{BC}$, and radius $\overline{MB}$ are drawn.
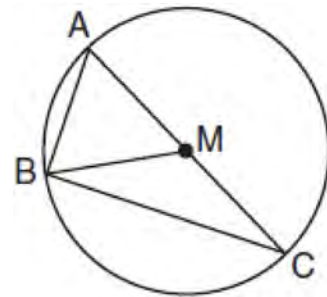
Which statement is *not* true?
1) △*ABC* is a right triangle.
2) △*ABM* is isosceles.
3) $\overset{\frown}{mBC} = m∠BMC$
4) $\overset{\frown}{mAB} = \frac{1}{2}m∠ACB$

41

198 A student has a rectangular postcard that he folds in half lengthwise. Next, he rotates it continuously about the folded edge. Which three-dimensional object below is generated by this rotation?

1)

2)

3)

4)

199 In the diagram below, $AC = 7.2$ and $CE = 2.4$.
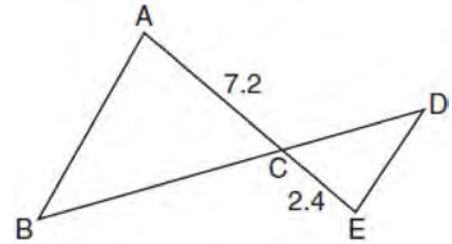
Which statement is *not* sufficient to prove $\triangle ABC \sim \triangle EDC$?

1) $\overline{AB} \parallel \overline{ED}$
2) $DE = 2.7$ and $AB = 8.1$
3) $CD = 3.6$ and $BC = 10.8$
4) $DE = 3.0$, $AB = 9.0$, $CD = 2.9$, and $BC = 8.7$

200 Which sequence of transformations will map $\triangle ABC$ onto $\triangle A'B'C'$?
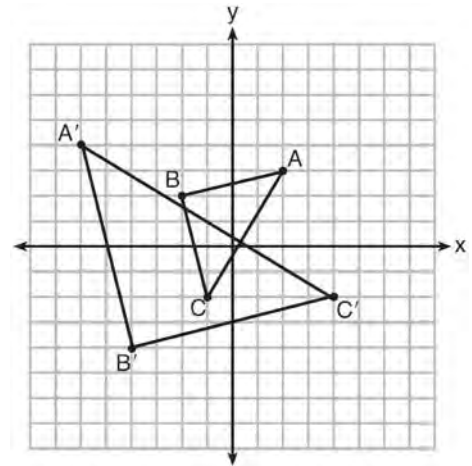
1) reflection and translation
2) rotation and reflection
3) translation and dilation
4) dilation and rotation

42

201 Given the theorem, "The sum of the measures of the interior angles of a triangle is 180°," complete the proof for this theorem.
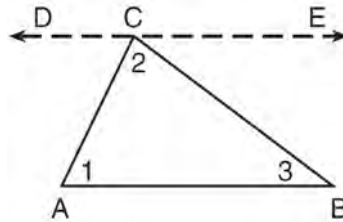
Given: $\triangle ABC$
Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$
Fill in the missing reasons below.

Statements	Reasons
(1) $\triangle ABC$	(1) Given
(2) Through point C, draw $\overleftrightarrow{DCE}$ parallel to $\overline{AB}$.	(2) _____
(3) $m\angle 1 = m\angle ACD$, $m\angle 3 = m\angle BCE$	(3) _____
(4) $m\angle ACD + m\angle 2 + m\angle BCE = 180°$	(4) _____
(5) $m\angle 1 + m\angle 2 + m\angle 3 = 180°$	(5) _____

202 In the diagram below, $\overline{AC}$ has endpoints with coordinates $A(-5,2)$ and $C(4,-10)$.
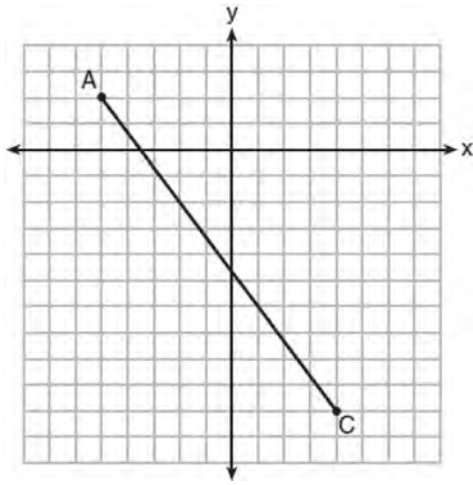
If B is a point on $\overline{AC}$ and $AB:BC = 1:2$, what are the coordinates of B?

1) $(-2,-2)$

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

3) $\left(0,-\dfrac{14}{3}\right)$

4) $(1,-6)$

203 What is the area of a sector of a circle with a radius of 8 inches and formed by a central angle that measures 60°?

1) $\dfrac{8\pi}{3}$

2) $\dfrac{16\pi}{3}$

3) $\dfrac{32\pi}{3}$

4) $\dfrac{64\pi}{3}$

204 In the diagram below of circle O, chord $\overline{DF}$ bisects chord $\overline{BC}$ at E.
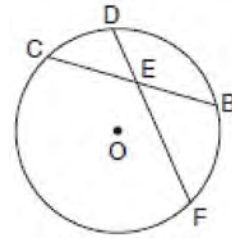
If $BC = 12$ and FE is 5 more than DE, then FE is

1) 13
2) 9
3) 6
4) 4

205 Circle O is centered at the origin. In the diagram below, a quarter of circle O is graphed.
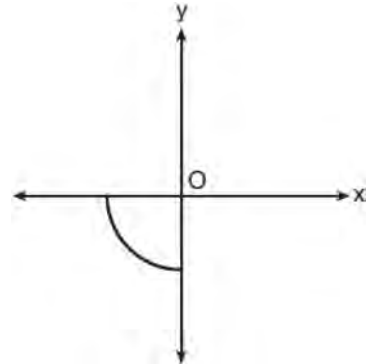
Which three-dimensional figure is generated when the quarter circle is continuously rotated about the y-axis?

1) cone
2) sphere
3) cylinder
4) hemisphere

44

206 In the diagram below, $\overline{XS}$ and $\overline{YR}$ intersect at Z. Segments XY and RS are drawn perpendicular to $\overline{YR}$ to form triangles XYZ and SRZ.
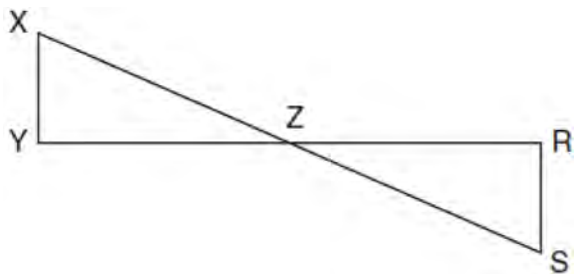
Which statement is always true?
1) $(XY)(SR) = (XZ)(RZ)$
2) $\triangle XYZ \cong \triangle SRZ$
3) $\overline{XS} \cong \overline{YR}$
4) $\dfrac{XY}{SR} = \dfrac{YZ}{RZ}$

207 The vertices of $\triangle PQR$ have coordinates $P(2,3)$, $Q(3,8)$, and $R(7,3)$. Under which transformation of $\triangle PQR$ are distance and angle measure preserved?
1) $(x,y) \rightarrow (2x,3y)$
2) $(x,y) \rightarrow (x+2,3y)$
3) $(x,y) \rightarrow (2x,y+3)$
4) $(x,y) \rightarrow (x+2,y+3)$

208 Which equation represents a line that is perpendicular to the line represented by $2x - y = 7$?
1) $y = -\dfrac{1}{2}x + 6$
2) $y = \dfrac{1}{2}x + 6$
3) $y = -2x + 6$
4) $y = 2x + 6$

209 Triangle QRS is graphed on the set of axes below.
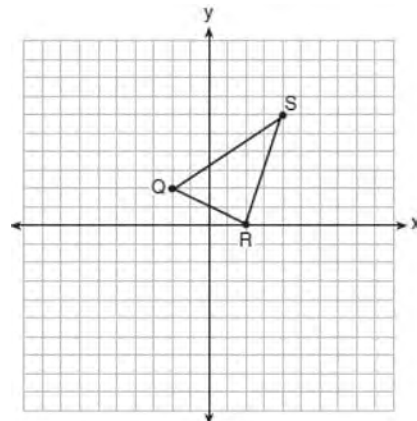
On the same set of axes, graph and label $\triangle Q'R'S'$, the image of $\triangle QRS$ after a dilation with a scale factor of $\dfrac{3}{2}$ centered at the origin. Use slopes to explain why $Q'R' \parallel QR$.

210 Seawater contains approximately 1.2 ounces of salt per liter on average. How many gallons of seawater, to the *nearest tenth of a gallon*, would contain 1 pound of salt?
1) 3.3
2) 3.5
3) 4.7
4) 13.3

211 In the two distinct acute triangles ABC and DEF, $\angle B \cong \angle E$. Triangles ABC and DEF are congruent when there is a sequence of rigid motions that maps
1) $\angle A$ onto $\angle D$, and $\angle C$ onto $\angle F$
2) $\overline{AC}$ onto $\overline{DF}$, and $\overline{BC}$ onto $\overline{EF}$
3) $\angle C$ onto $\angle F$, and $\overline{BC}$ onto $\overline{EF}$
4) point A onto point D, and $\overline{AB}$ onto $\overline{DE}$

212 Using a compass and straightedge, construct a regular hexagon inscribed in circle *O* below. Label it *ABCDEF*. [Leave all construction marks.]
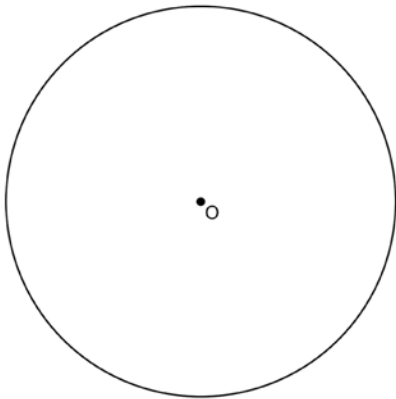
If chords $\overline{FB}$ and $\overline{FC}$ are drawn, which type of triangle, according to its angles, would $\triangle FBC$ be? Explain your answer.

213 A line segment is dilated by a scale factor of 2 centered at a point not on the line segment. Which statement regarding the relationship between the given line segment and its image is true?
1) The line segments are perpendicular, and the image is one-half of the length of the given line segment.
2) The line segments are perpendicular, and the image is twice the length of the given line segment.
3) The line segments are parallel, and the image is twice the length of the given line segment.
4) The line segments are parallel, and the image is one-half of the length of the given line segment.

214 In the diagram below, radius $\overline{OA}$ is drawn in circle *O*. Using a compass and a straightedge, construct a line tangent to circle *O* at point *A*. [Leave all construction marks.]
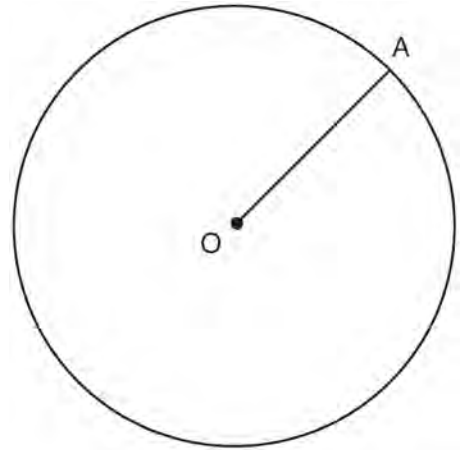
215 Describe a sequence of transformations that will map $\triangle ABC$ onto $\triangle DEF$ as shown below.
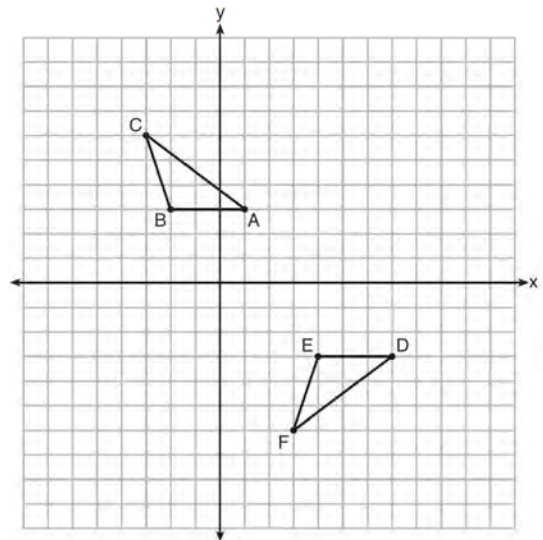
216 In the graph below, △ABC has coordinates
A(−9,2), B(−6,−6), and C(−3,−2), and △RST has
coordinates R(−2,9), S(5,6), and T(2,3).
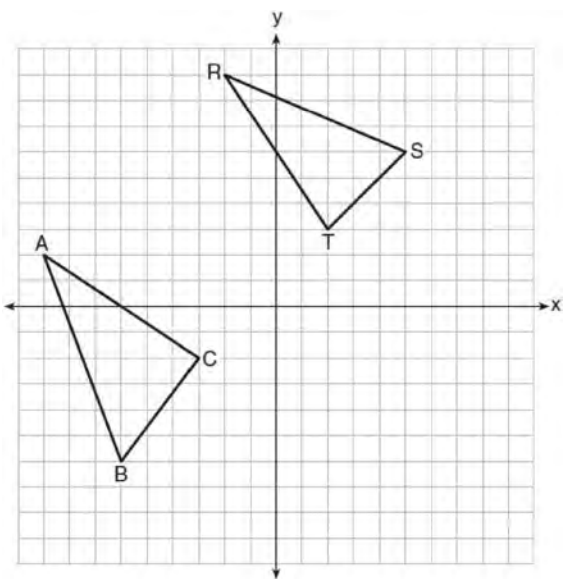
Is △ABC congruent to △RST? Use the properties
of rigid motions to explain your reasoning.

217 In the diagram below of isosceles triangle ABC,
AB ≅ CB and angle bisectors AD, BF, and CE are
drawn and intersect at X.
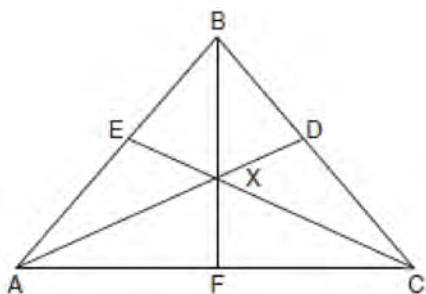
If m∠BAC = 50°, find m∠AXC.

218 In the diagram of △ABC, points D and E are on
AB and CB, respectively, such that AC ∥ DE.
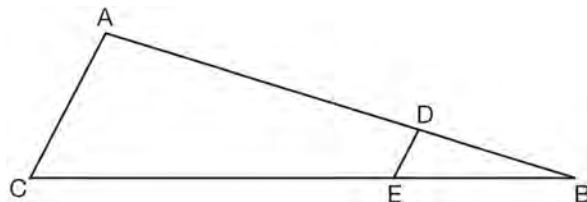
If AD = 24, DB = 12, and DE = 4, what is the
length of AC?
1) 8
2) 12
3) 16
4) 72

219 Triangle ABC and triangle DEF are graphed on the
set of axes below.
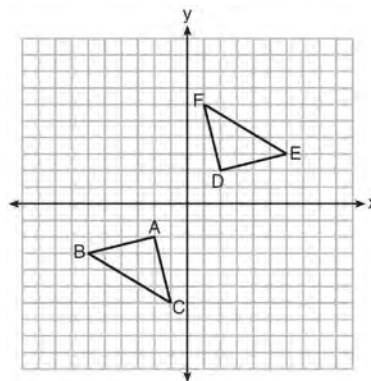
Which sequence of transformations maps triangle
ABC onto triangle DEF?
1) a reflection over the x-axis followed by a
   reflection over the y-axis
2) a 180° rotation about the origin followed by a
   reflection over the line y = x
3) a 90° clockwise rotation about the origin
   followed by a reflection over the y-axis
4) a translation 8 units to the right and 1 unit up
   followed by a 90° counterclockwise rotation
   about the origin

220 As shown in the diagram below, $\overleftrightarrow{ABC} \parallel \overleftrightarrow{EFG}$ and $\overline{BF} \cong \overline{EF}$.
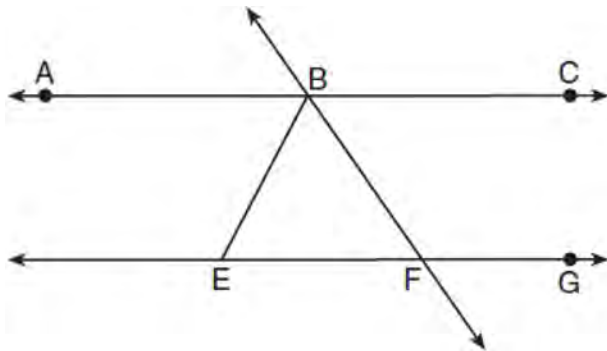
If m∠CBF = 42.5°, then m∠EBF is
1) 42.5°
2) 68.75°
3) 95°
4) 137.5°

221 In the diagram below, tangent $\overline{DA}$ and secant $\overline{DBC}$ are drawn to circle O from external point D, such that $\overset{\frown}{AC} \cong \overset{\frown}{BC}$.
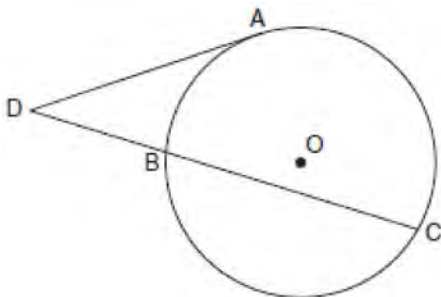
If $m\overset{\frown}{BC} = 152°$, determine and state m∠D.

222 A machinist creates a solid steel part for a wind turbine engine. The part has a volume of 1015 cubic centimeters. Steel can be purchased for $0.29 per kilogram, and has a density of 7.95 g/cm³. If the machinist makes 500 of these parts, what is the cost of the steel, to the *nearest dollar*?

223 Kelly is completing a proof based on the figure below.
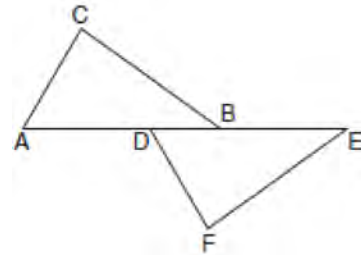
She was given that ∠A ≅ ∠EDF, and has already proven $\overline{AB} \cong \overline{DE}$. Which pair of corresponding parts and triangle congruency method would *not* prove △ABC ≅ △DEF?
1) $\overline{AC} \cong \overline{DF}$ and SAS
2) $\overline{BC} \cong \overline{EF}$ and SAS
3) ∠C ≅ ∠F and AAS
4) ∠CBA ≅ ∠FED and ASA

224 When volleyballs are purchased, they are not fully inflated. A partially inflated volleyball can be modeled by a sphere whose volume is approximately 180 in³. After being fully inflated, its volume is approximately 294 in³. To the *nearest tenth of an inch*, how much does the radius increase when the volleyball is fully inflated?

225 Molly wishes to make a lawn ornament in the form of a solid sphere. The clay being used to make the sphere weighs .075 pound per cubic inch. If the sphere's radius is 4 inches, what is the weight of the sphere, to the *nearest pound*?
1) 34
2) 20
3) 15
4) 4

226 Given: Trapezoid $JKLM$ with $\overline{JK} \parallel \overline{ML}$
Using a compass and straightedge, construct the altitude from vertex J to $\overline{ML}$. [Leave all construction marks.]
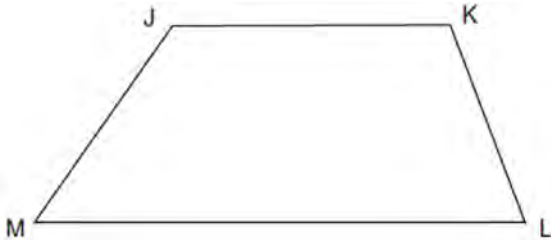
227 As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.
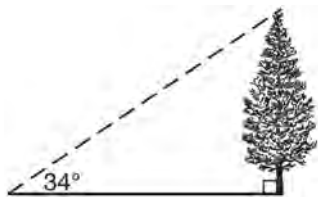
If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?
1) 29.7
2) 16.6
3) 13.5
4) 11.2

228 A shipping container is in the shape of a right rectangular prism with a length of 12 feet, a width of 8.5 feet, and a height of 4 feet. The container is completely filled with contents that weigh, on average, 0.25 pound per cubic foot. What is the weight, in pounds, of the contents in the container?
1) 1,632
2) 408
3) 102
4) 92

229 In the diagram below, $\triangle ABC \sim \triangle DEF$.
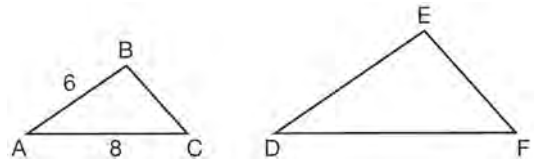
If $AB = 6$ and $AC = 8$, which statement will justify similarity by SAS?
1) $DE = 9$, $DF = 12$, and $\angle A \cong \angle D$
2) $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$
3) $DE = 36$, $DF = 64$, and $\angle C \cong \angle F$
4) $DE = 15$, $DF = 20$, and $\angle C \cong \angle F$

230 Given: Quadrilateral $ABCD$ is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at E
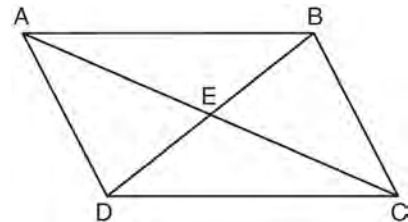
Prove: $\triangle AED \cong \triangle CEB$
Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

49

231 The diagram below shows circle O with radii $\overline{OA}$ and $\overline{OB}$. The measure of angle AOB is $120°$, and the length of a radius is 6 inches.
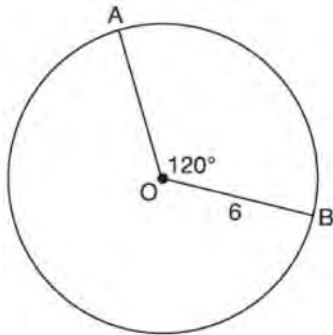
Which expression represents the length of arc AB, in inches?

1) $\dfrac{120}{360}(6\pi)$

2) $120(6)$

3) $\dfrac{1}{3}(36\pi)$

4) $\dfrac{1}{3}(12\pi)$

232 The line whose equation is $3x - 5y = 4$ is dilated by a scale factor of $\dfrac{5}{3}$ centered at the origin. Which statement is correct?

1) The image of the line has the same slope as the pre-image but a different y-intercept.
2) The image of the line has the same y-intercept as the pre-image but a different slope.
3) The image of the line has the same slope and the same y-intercept as the pre-image.
4) The image of the line has a different slope and a different y-intercept from the pre-image.

233 An ice cream waffle cone can be modeled by a right circular cone with a base diameter of 6.6 centimeters and a volume of 54.45π cubic centimeters. What is the number of centimeters in the height of the waffle cone?

1) $3\dfrac{3}{4}$

2) 5

3) 15

4) $24\dfrac{3}{4}$

234 In the coordinate plane, the vertices of triangle PAT are $P(-1,-6)$, $A(-4,5)$, and $T(5,-2)$. Prove that $\triangle PAT$ is an isosceles triangle. [The use of the set of axes below is optional.] State the coordinates of R so that quadrilateral $PART$ is a parallelogram. Prove that quadrilateral $PART$ is a parallelogram.
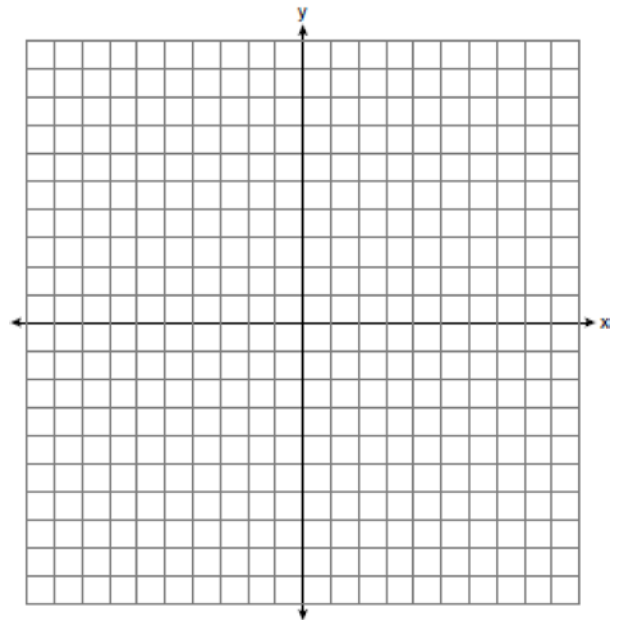
235 In $\triangle SCU$ shown below, points T and O are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.
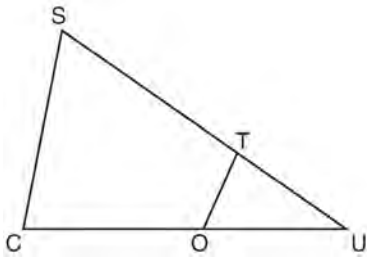
If $TU = 4$, $OU = 5$, and $OC = 7$, what is the length of $\overline{ST}$?
1) 5.6
2) 8.75
3) 11
4) 15

236 The aspect ratio (the ratio of screen width to height) of a rectangular flat-screen television is 16:9. The length of the diagonal of the screen is the television's screen size. Determine and state, to the *nearest inch*, the screen size (diagonal) of this flat-screen television with a screen height of 20.6 inches.

237 A regular pyramid has a square base. The perimeter of the base is 36 inches and the height of the pyramid is 15 inches. What is the volume of the pyramid in cubic inches?
1) 180
2) 405
3) 540
4) 1215

238 In the diagram below of circle O, the area of the shaded sector LOM is 2π cm^2.
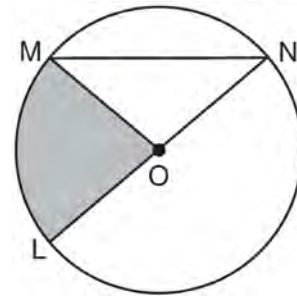
If the length of $\overline{NL}$ is 6 cm, what is m$\angle N$?
1) 10°
2) 20°
3) 40°
4) 80°

239 In the diagram below of $\triangle ABC$, $\angle ABC$ is a right angle, $AC = 12$, $AD = 8$, and altitude $\overline{BD}$ is drawn.
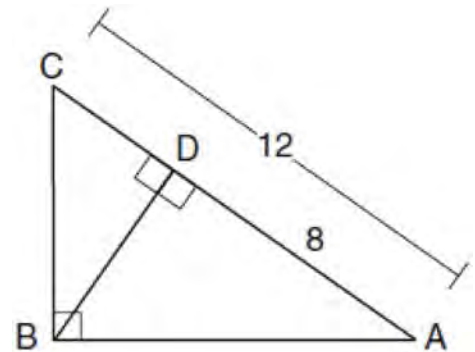
What is the length of $\overline{BC}$?
1) $4\sqrt{2}$
2) $4\sqrt{3}$
3) $4\sqrt{5}$
4) $4\sqrt{6}$

240 In the diagram below, $\overline{AF}$, and $\overline{DB}$ intersect at C, and $\overline{AD}$ and $\overline{FBE}$ are drawn such that $m\angle D = 65°$, $m\angle CBE = 115°$, $DC = 7.2$, $AC = 9.6$, and $FC = 21.6$.
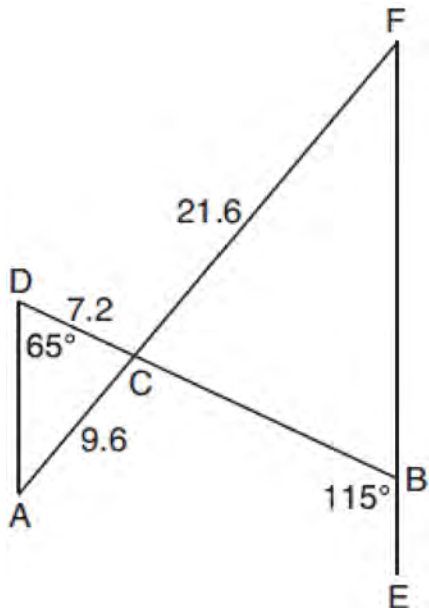
What is the length of $\overline{CB}$?
1) 3.2
2) 4.8
3) 16.2
4) 19.2

241 The diameter of a basketball is approximately 9.5 inches and the diameter of a tennis ball is approximately 2.5 inches. The volume of the basketball is about how many times greater than the volume of the tennis ball?
1) 3591
2) 65
3) 55
4) 4

242 The diagram below shows a ramp connecting the ground to a loading platform 4.5 feet above the ground. The ramp measures 11.75 feet from the ground to the top of the loading platform.
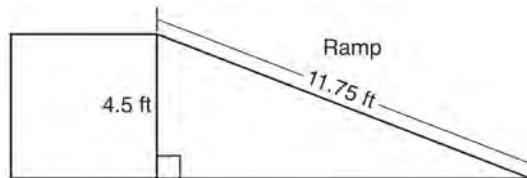
Determine and state, to the *nearest degree*, the angle of elevation formed by the ramp and the ground.

243 In the diagram below, congruent figures 1, 2, and 3 are drawn.
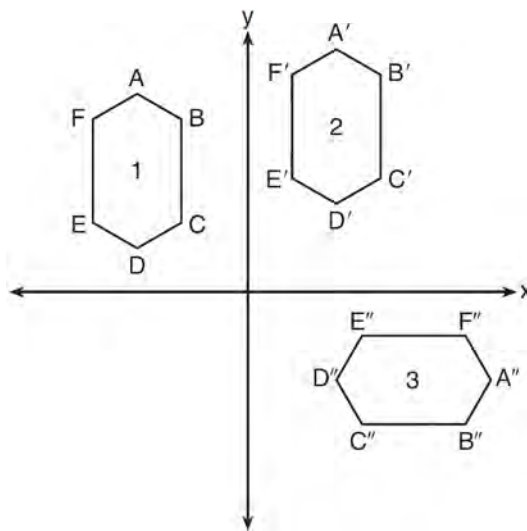
Which sequence of transformations maps figure 1 onto figure 2 and then figure 2 onto figure 3?
1) a reflection followed by a translation
2) a rotation followed by a translation
3) a translation followed by a reflection
4) a translation followed by a rotation

52

244 In the diagram below of $\triangle PQR$, $\overline{ST}$ is drawn parallel to $\overline{PR}$, $PS = 2$, $SQ = 5$, and $TR = 5$.
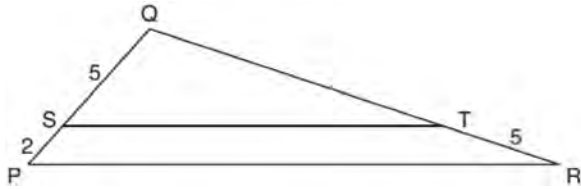
What is the length of $\overline{QR}$?
1) 7
2) 2
3) $12\dfrac{1}{2}$
4) $17\dfrac{1}{2}$

245 In the diagram below, $\triangle ABC \cong \triangle DEF$.
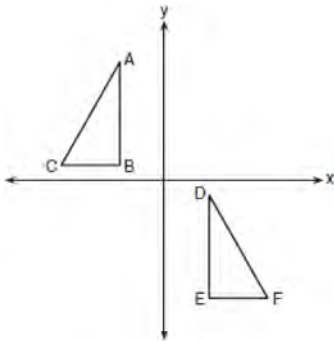
Which sequence of transformations maps $\triangle ABC$ onto $\triangle DEF$?
1) a reflection over the x-axis followed by a translation
2) a reflection over the y-axis followed by a translation
3) a rotation of 180° about the origin followed by a translation
4) a counterclockwise rotation of 90° about the origin followed by a translation

246 Line ℓ is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line ℓ is $3x - y = 4$. Determine and state an equation for line m.

247 In parallelogram $QRST$ shown below, diagonal $\overline{TR}$ is drawn, U and V are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at W.
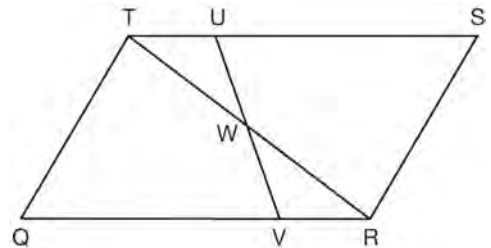
If $m\angle S = 60°$, $m\angle SRT = 83°$, and $m\angle TWU = 35°$, what is $m\angle WVQ$?
1) 37°
2) 60°
3) 72°
4) 83°

248 Triangle ABC and triangle DEF are drawn below.
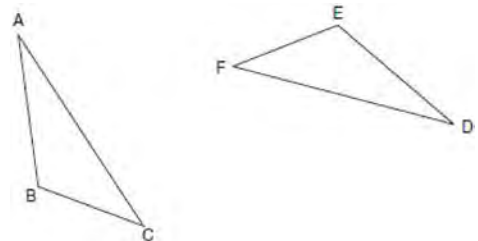
If $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, and $\angle A \cong \angle D$, write a sequence of transformations that maps triangle ABC onto triangle DEF.

53

Geometry Regents at Random

249 Tennis balls are sold in cylindrical cans with the balls stacked one on top of the other. A tennis ball has a diameter of 6.7 cm. To the *nearest cubic centimeter*, what is the minimum volume of the can that holds a stack of 4 tennis balls?
1) 236
2) 282
3) 564
4) 945

252 A child's tent can be modeled as a pyramid with a square base whose sides measure 60 inches and whose height measures 84 inches. What is the volume of the tent, to the *nearest cubic foot*?
1) 35
2) 58
3) 82
4) 175

250 Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $\overline{DB} \cong \overline{BE}$
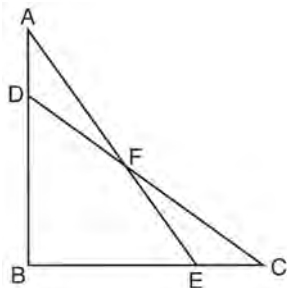
Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS $\cong$ SAS?
1) $\angle CDB \cong \angle AEB$
2) $\angle AFD \cong \angle EFC$
3) $\overline{AD} \cong \overline{CE}$
4) $\overline{AE} \cong \overline{CD}$

253 As shown in the diagram below, $\overline{AB}$ and $\overline{CD}$ intersect at E, and $\overline{AC} \parallel \overline{BD}$.
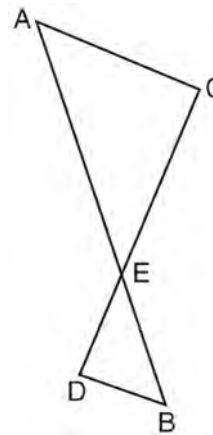
Given $\triangle AEC \sim \triangle BED$, which equation is true?
1) $\dfrac{CE}{DE} = \dfrac{EB}{EA}$
2) $\dfrac{AE}{BE} = \dfrac{AC}{BD}$
3) $\dfrac{EC}{AE} = \dfrac{BE}{ED}$
4) $\dfrac{ED}{EC} = \dfrac{AC}{BD}$

251 An equation of circle O is $x^2 + y^2 + 4x - 8y = -16$. The statement that best describes circle O is the
1) center is $(2,-4)$ and is tangent to the x-axis
2) center is $(2,-4)$ and is tangent to the y-axis
3) center is $(-2,4)$ and is tangent to the x-axis
4) center is $(-2,4)$ and is tangent to the y-axis

254 Sue believes that the two cylinders shown in the diagram below have equal volumes.
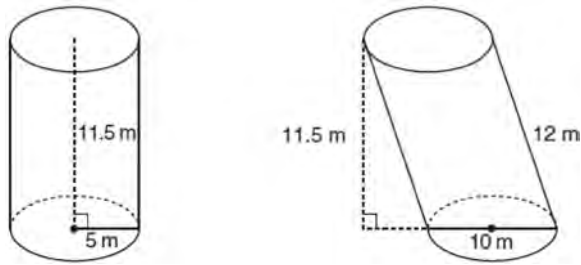
Is Sue correct? Explain why.

255 The image of $\triangle ABC$ after a dilation of scale factor k centered at point A is $\triangle ADE$, as shown in the diagram below.
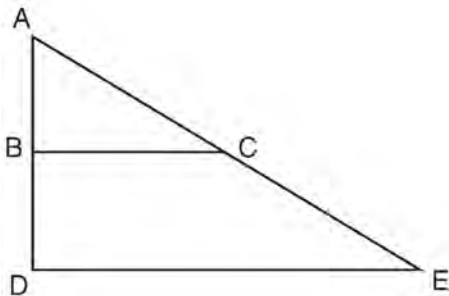
Which statement is always true?
1) $2AB = AD$
2) $\overline{AD} \perp \overline{DE}$
3) $AC = CE$
4) $\overline{BC} \parallel \overline{DE}$

256 In right triangle ABC, m$\angle A = 32°$, m$\angle B = 90°$, and $AE = 6.2$ cm. What is the length of $\overline{BC}$, to the *nearest tenth of a centimeter*?
1) 3.3
2) 3.9
3) 5.3
4) 11.7

257 In the diagram shown below, $\overline{AC}$ is tangent to circle O at A and to circle P at C, $\overline{OP}$ intersects $\overline{AC}$ at B, $OA = 4$, $AB = 5$, and $PC = 10$.
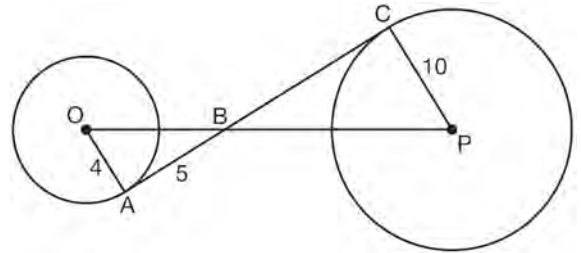
What is the length of $\overline{BC}$?
1) 6.4
2) 8
3) 12.5
4) 16

258 Given right triangles ABC and DEF where $\angle C$ and $\angle F$ are right angles, $\overline{AC} \cong \overline{DF}$ and $\overline{CB} \cong \overline{FE}$. Describe a precise sequence of rigid motions which would show $\triangle ABC \cong \triangle DEF$.
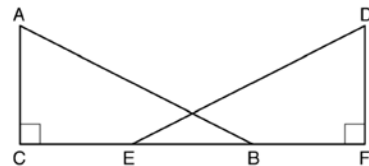
259 The line $y = 2x - 4$ is dilated by a scale factor of $\dfrac{3}{2}$ and centered at the origin. Which equation represents the image of the line after the dilation?
1) $y = 2x - 4$
2) $y = 2x - 6$
3) $y = 3x - 4$
4) $y = 3x - 6$

55

260 Construct an equilateral triangle inscribed in circle T shown below. [Leave all construction marks.]
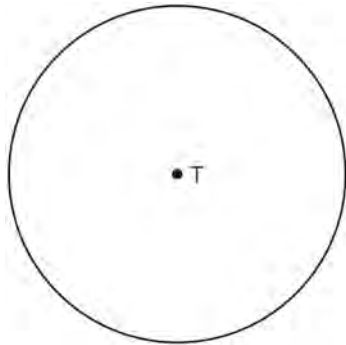
261 In isosceles $\triangle MNP$, line segment NO bisects vertex $\angle MNP$, as shown below. If $MP = 16$, find the length of $\overline{MO}$ and explain your answer.

262 Quadrilateral $MATH$ has both pairs of opposite sides congruent and parallel. Which statement about quadrilateral $MATH$ is always true?
1) $\overline{MT} \cong \overline{AH}$
2) $\overline{MT} \perp \overline{AH}$
3) $\angle MHT \cong \angle ATH$
4) $\angle MAT \cong \angle MHT$

263 If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?
1) reflection over the x-axis
2) translation to the left 5 and down 4
3) dilation centered at the origin with scale factor 2
4) rotation of $270°$ counterclockwise about the origin

264 Aliyah says that when the line $4x + 3y = 24$ is dilated by a scale factor of 2 centered at the point $(3,4)$, the equation of the dilated line is $y = -\frac{4}{3}x + 16$. Is Aliyah correct? Explain why. [The use of the set of axes below is optional.]
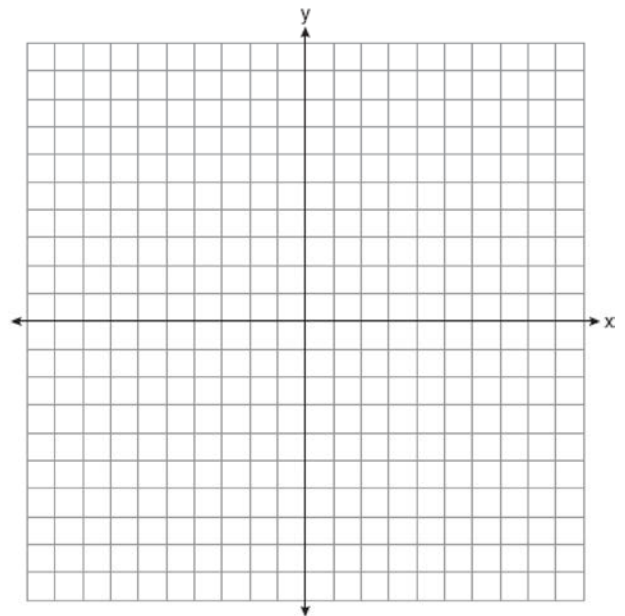
265 In the diagram below, $\overline{BC}$ is the diameter of circle A.
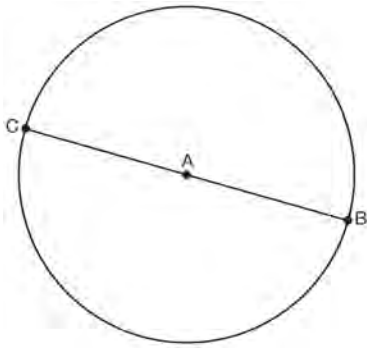
Point D, which is unique from points B and C, is plotted on circle A. Which statement must always be true?
1) $\triangle BCD$ is a right triangle.
2) $\triangle BCD$ is an isosceles triangle.
3) $\triangle BAD$ and $\triangle CBD$ are similar triangles.
4) $\triangle BAD$ and $\triangle CAD$ are congruent triangles.

266 Given: Circle O, chords $\overline{AB}$ and $\overline{CD}$ intersect at E
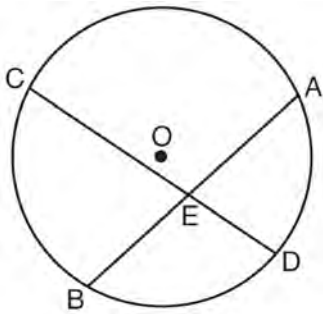
Theorem: If two chords intersect in a circle, the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord. Prove this theorem by proving $AE \cdot EB = CE \cdot ED$.

267 Using a compass and straightedge, construct and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation with a scale factor of 2 and centered at B. [Leave all construction marks.] Describe the relationship between the lengths of $\overline{AC}$ and $\overline{A'C'}$.
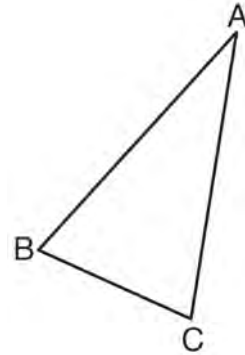
268 In $\triangle ABC$, where $\angle C$ is a right angle, $\cos A = \dfrac{\sqrt{21}}{5}$. What is $\sin B$?
1) $\dfrac{\sqrt{21}}{5}$
2) $\dfrac{\sqrt{21}}{2}$
3) $\dfrac{2}{5}$
4) $\dfrac{5}{\sqrt{21}}$

269 In the diagram below, which single transformation was used to map triangle *A* onto triangle *B*?
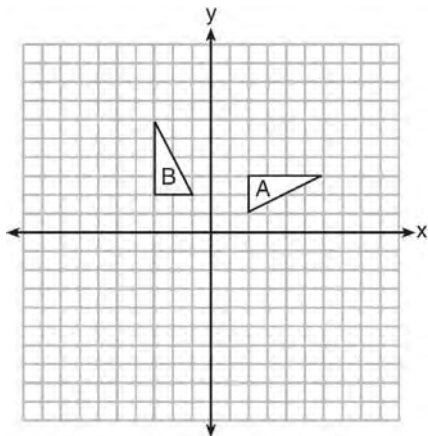
1) line reflection
2) rotation
3) dilation
4) translation

270 In the diagram of $\triangle ABC$ below, points *D* and *E* are on sides $\overline{AB}$ and $\overline{CB}$ respectively, such that $\overline{DE} \parallel \overline{AC}$.
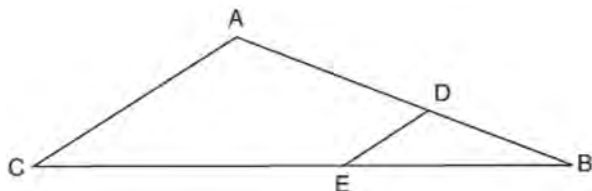
If *EB* is 3 more than *DB*, *AB* = 14, and *CB* = 21, what is the length of $\overline{AD}$?
1) 6
2) 8
3) 9
4) 12

271 The map below shows the three tallest mountain peaks in New York State: Mount Marcy, Algonquin Peak, and Mount Haystack. Mount Haystack, the shortest peak, is 4960 feet tall. Surveyors have determined the horizontal distance between Mount Haystack and Mount Marcy is 6336 feet and the horizontal distance between Mount Marcy and Algonquin Peak is 20,493 feet.
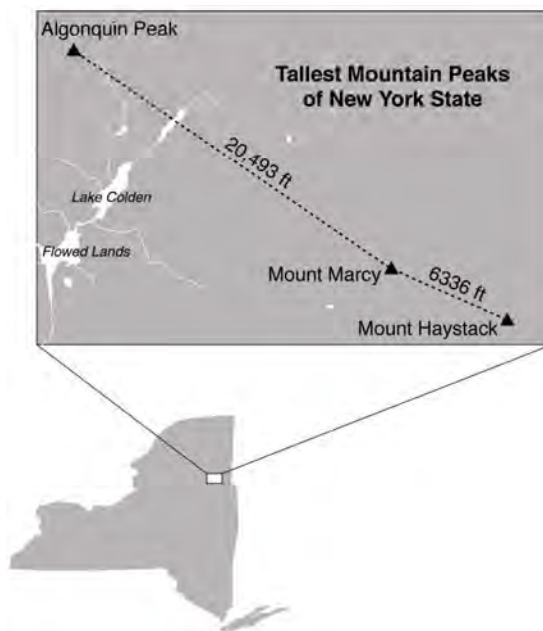
The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer.

272 In a right triangle, $\sin(40-x)° = \cos(3x)°$. What is the value of *x*?
1) 10
2) 15
3) 20
4) 25

58

273 In regular hexagon *ABCDEF* shown below, $\overline{AD}$, $\overline{BE}$, and $\overline{CF}$ all intersect at *G*.
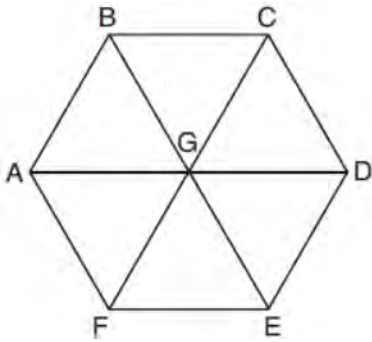
When △*ABG* is reflected over $\overline{BG}$ and then rotated 180° about point *G*, △*ABG* is mapped onto
1) △*FEG*
2) △*AFG*
3) △*CBG*
4) △*DEG*

274 A circle with a diameter of 10 cm and a central angle of 30° is drawn below.
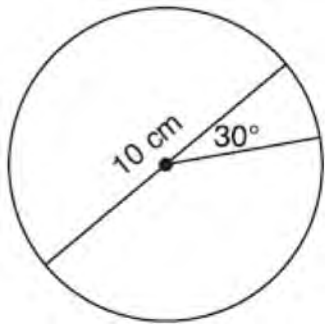
What is the area, to the *nearest tenth of a square centimeter*, of the sector formed by the 30° angle?
1) 5.2
2) 6.5
3) 13.1
4) 26.2

275 In the diagram of rhombus *PQRS* below, the diagonals $\overline{PR}$ and $\overline{QS}$ intersect at point *T*, *PR* = 16, and *QS* = 30. Determine and state the perimeter of *PQRS*.
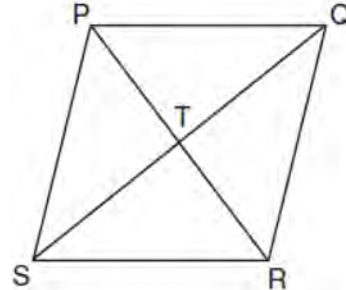
276 Using a compass and straightedge, construct an altitude of triangle *ABC* below. [Leave all construction marks.]
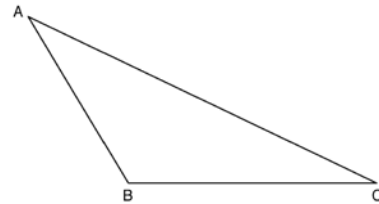
277 An isosceles right triangle whose legs measure 6 is continuously rotated about one of its legs to form a three-dimensional object. The three-dimensional object is a
1) cylinder with a diameter of 6
2) cylinder with a diameter of 12
3) cone with a diameter of 6
4) cone with a diameter of 12

278 A regular hexagon is rotated in a counterclockwise direction about its center. Determine and state the minimum number of degrees in the rotation such that the hexagon will coincide with itself.

279 In the diagram below, secant $\overline{ACD}$ and tangent $\overline{AB}$ are drawn from external point A to circle O.
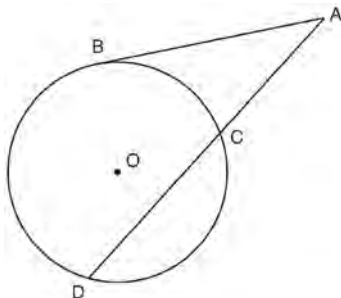
Prove the theorem: If a secant and a tangent are drawn to a circle from an external point, the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. $(AC \cdot AD = AB^2)$

280 Triangle MNP is the image of triangle JKL after a $120°$ counterclockwise rotation about point Q. If the measure of angle L is $47°$ and the measure of angle N is $57°$, determine the measure of angle M. Explain how you arrived at your answer.
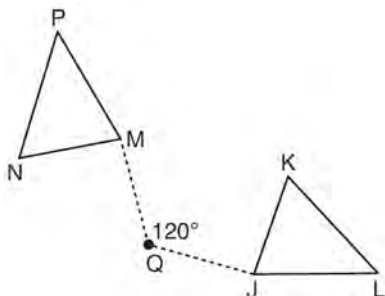
281 In the figure shown below, quadrilateral $TAEO$ is circumscribed around circle D. The midpoint of $\overline{TA}$ is R, and $\overline{HO} \cong \overline{PE}$.
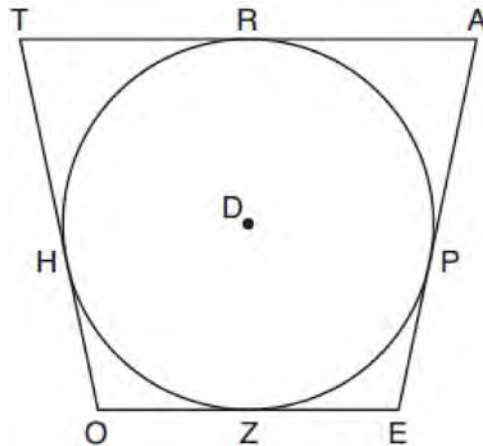
If $AP = 10$ and $EO = 12$, what is the perimeter of quadrilateral $TAEO$?
1) 56
2) 64
3) 72
4) 76

282 Which equation represents a line that is perpendicular to the line represented by $y = \frac{2}{3}x + 1$?
1) $3x + 2y = 12$
2) $3x - 2y = 12$
3) $y = \frac{3}{2}x + 2$
4) $y = -\frac{2}{3}x + 4$

283 As shown below, a canoe is approaching a lighthouse on the coastline of a lake. The front of the canoe is 1.5 feet above the water and an observer in the lighthouse is 112 feet above the water.

(Not drawn to scale)
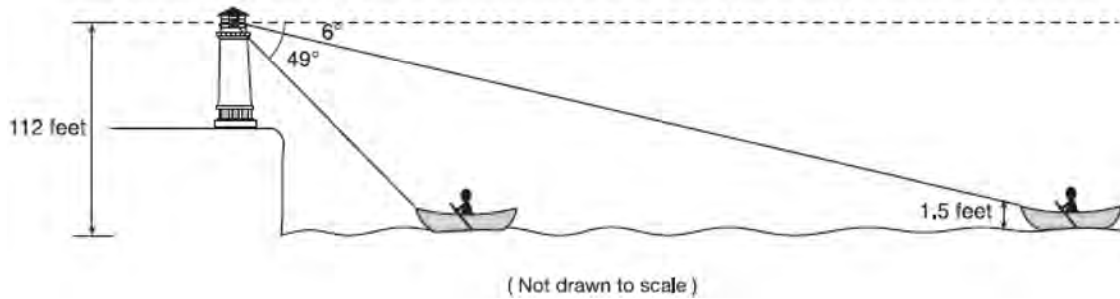
At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed at which the canoe traveled toward the lighthouse.

284 In triangle *CHR*, *O* is on $\overline{HR}$, and *D* is on $\overline{CR}$ so that $\angle H \cong \angle RDO$.
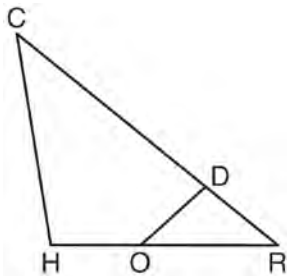
If $RD = 4$, $RO = 6$, and $OH = 4$, what is the length of $\overline{CD}$?

1) $2\dfrac{2}{3}$

2) $6\dfrac{2}{3}$

3) 11

4) 15

285 In the diagram below, quadrilateral *ABCD* is inscribed in circle *P*.
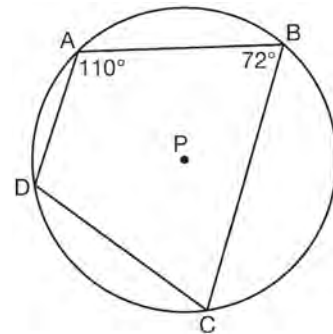
What is m$\angle ADC$?

1) 70°
2) 72°
3) 108°
4) 110°

61

286 In the diagram below, a window of a house is 15 feet above the ground. A ladder is placed against the house with its base at an angle of 75° with the ground. Determine and state the length of the ladder to the *nearest tenth of a foot*.

15 ft

75°
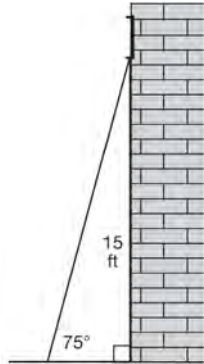
287 A snow cone consists of a paper cone completely filled with shaved ice and topped with a hemisphere of shaved ice, as shown in the diagram below. The inside diameter of both the cone and the hemisphere is 8.3 centimeters. The height of the cone is 10.2 centimeters.

8.3 cm

10.2 cm
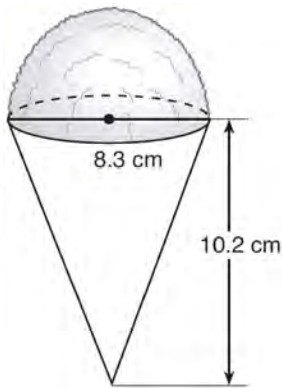
The desired density of the shaved ice is 0.697 g/cm^3, and the cost, per kilogram, of ice is $3.83. Determine and state the cost of the ice needed to make 50 snow cones.

288 If $\triangle ABC$ is mapped onto $\triangle DEF$ after a line reflection and $\triangle DEF$ is mapped onto $\triangle XYZ$ after a translation, the relationship between $\triangle ABC$ and $\triangle XYZ$ is that they are always
1) congruent and similar
2) congruent but not similar
3) similar but not congruent
4) neither similar nor congruent

289 The density of the American white oak tree is 752 kilograms per cubic meter. If the trunk of an American white oak tree has a circumference of 4.5 meters and the height of the trunk is 8 meters, what is the approximate number of kilograms of the trunk?
1) 13
2) 9694
3) 13,536
4) 30,456

290 In the diagram of parallelogram *FRED* shown below, $\overline{ED}$ is extended to *A*, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$.

F   R

A   D   E
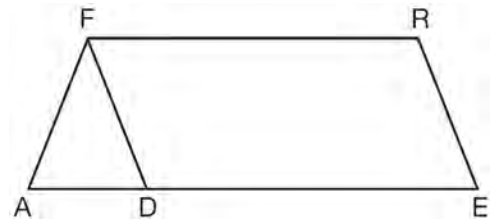
If m$\angle R = 124°$, what is m$\angle AFD$?
1) 124°
2) 112°
3) 68°
4) 56°

291 To find the distance across a pond from point B to point C, a surveyor drew the diagram below. The measurements he made are indicated on his diagram.
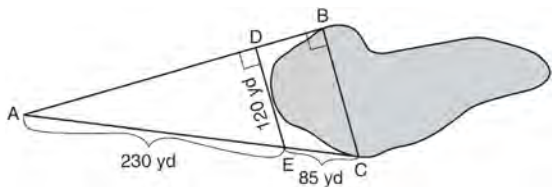
Use the surveyor's information to determine and state the distance from point B to point C, to the *nearest yard*.

292 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of $180°$ and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.
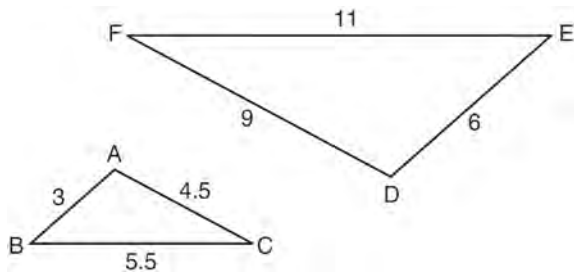
Which relationship must always be true?

1) $\dfrac{m\angle A}{m\angle D} = \dfrac{1}{2}$

2) $\dfrac{m\angle C}{m\angle F} = \dfrac{2}{1}$

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

4) $\dfrac{m\angle B}{m\angle E} = \dfrac{m\angle C}{m\angle F}$

293 In the diagram below of circle O, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overline{ADE}$, and chord $\overline{AB}$ is drawn.
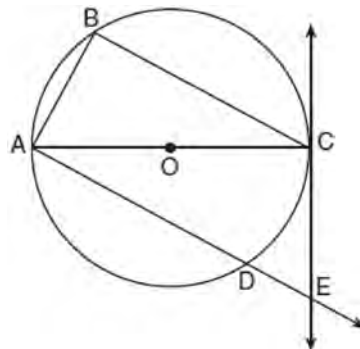
Prove: $\dfrac{BC}{CA} = \dfrac{AB}{EC}$

294 As shown in the graph below, the quadrilateral is a rectangle.
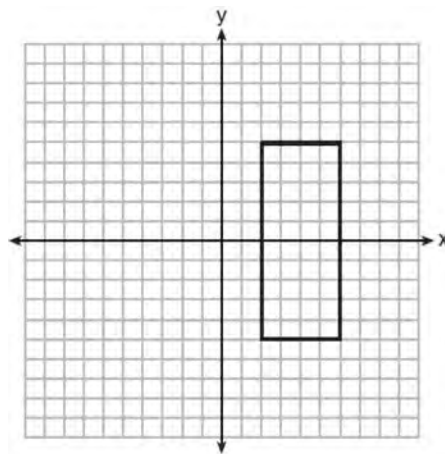
Which transformation would *not* map the rectangle onto itself?
1) a reflection over the x-axis
2) a reflection over the line $x = 4$
3) a rotation of $180°$ about the origin
4) a rotation of $180°$ about the point $(4,0)$

295 A sequence of transformations maps rectangle
ABCD onto rectangle *A"B"C"D"*, as shown in the
diagram below.
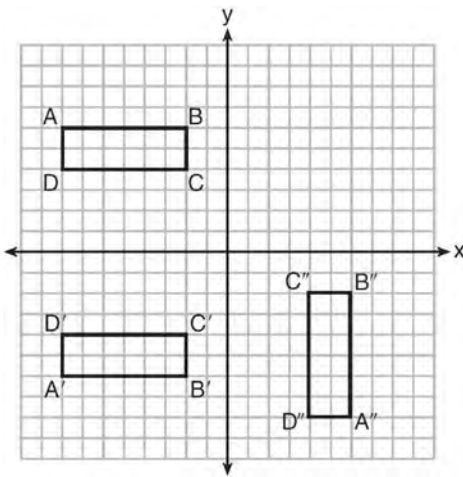
Which sequence of transformations maps *ABCD*
onto *A'B'C'D'* and then maps *A'B'C'D'* onto
A"B"C"D"?
1) a reflection followed by a rotation
2) a reflection followed by a translation
3) a translation followed by a rotation
4) a translation followed by a reflection

296 Trees that are cut down and stripped of their
branches for timber are approximately cylindrical.
A timber company specializes in a certain type of
tree that has a typical diameter of 50 cm and a
typical height of about 10 meters. The density of
the wood is 380 kilograms per cubic meter, and the
wood can be sold by mass at a rate of $4.75 per
kilogram. Determine and state the minimum
number of whole trees that must be sold to raise at
least $50,000.

297 Line $y = 3x - 1$ is transformed by a dilation with a
scale factor of 2 and centered at $(3,8)$. The line's
image is
1) $y = 3x - 8$
2) $y = 3x - 4$
3) $y = 3x - 2$
4) $y = 3x - 1$

298 Triangle *ABC* has vertices with $A(x,3)$, $B(-3,-1)$,
and $C(-1,-4)$. Determine and state a value of x
that would make triangle *ABC* a right triangle.
Justify why $\triangle ABC$ is a right triangle. [The use of
the set of axes below is optional.]
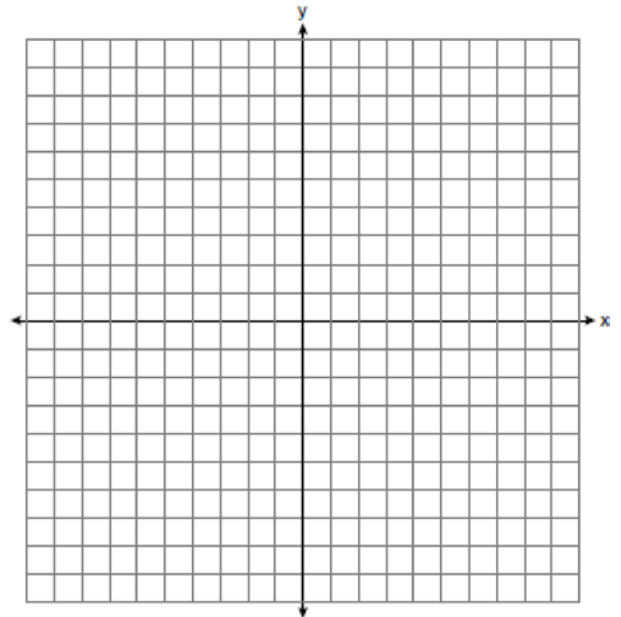
299 Triangle *RJM* has an area of 6 and a perimeter of 12. If the triangle is dilated by a scale factor of 3 centered at the origin, what are the area and perimeter of its image, triangle *R'J'M'*?
1) area of 9 and perimeter of 15
2) area of 18 and perimeter of 36
3) area of 54 and perimeter of 36
4) area of 54 and perimeter of 108

300 In the diagram below, *ABCD* is a parallelogram, $\overline{AB}$ is extended through *B* to *E*, and $\overline{CE}$ is drawn.
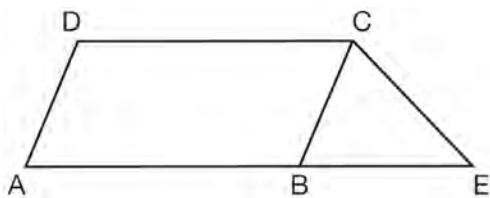
If $\overline{CE} \cong \overline{BE}$ and m∠*D* = 112°, what is m∠*E*?
1) 44°
2) 56°
3) 68°
4) 112°

301 If *ABCD* is a parallelogram, which statement would prove that *ABCD* is a rhombus?
1) ∠*ABC* ≅ ∠*CDA*
2) $\overline{AC} \cong \overline{BD}$
3) $\overline{AC} \perp \overline{BD}$
4) $\overline{AB} \perp \overline{CD}$

302 Which expression is always equivalent to sin*x* when 0° < *x* < 90°?
1) cos(90° − *x*)
2) cos(45° − *x*)
3) cos(2*x*)
4) cos*x*

303 Given: △*ABC*, $\overline{AEC}$, $\overline{BDE}$ with ∠*ABE* ≅ ∠*CBE*, and ∠*ADE* ≅ ∠*CDE*
Prove: $\overline{BDE}$ is the perpendicular bisector of $\overline{AC}$
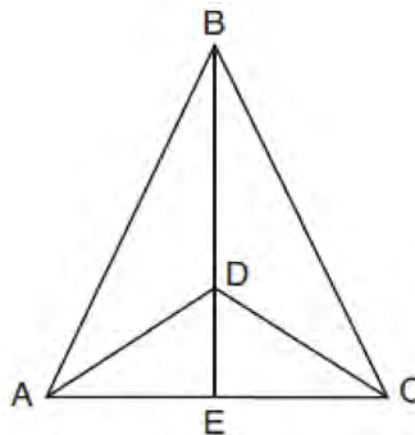
Fill in the missing statement and reasons below.

Statements	Reasons
1 △*ABC*, $\overline{AEC}$, $\overline{BDE}$ with ∠*ABE* ≅ ∠*CBE*, and ∠*ADE* ≅ ∠*CDE*	1 Given
2 $\overline{BD} \cong \overline{BD}$	2
3 ∠*BDA* and ∠*ADE* are supplementary. ∠*BDC* and ∠*CDE* are supplementary.	3 Linear pairs of angles are supplementary.
4	4 Supplements of congruent angles are congruent.
5 △*ABD* ≅ △*CBD*	5 ASA
6 $\overline{AD} \cong \overline{CD}$, $\overline{AB} \cong \overline{CB}$	6
7 $\overline{BDE}$ is the perpendicular bisector of $\overline{AC}$.	7

65

304 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*. State which type of wood the cube is made of, using the density table below.

Type of Wood	Density (g/cm³)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

305 Given $\triangle ABC$ with $m\angle B = 62°$ and side $\overline{AC}$ extended to D, as shown below.
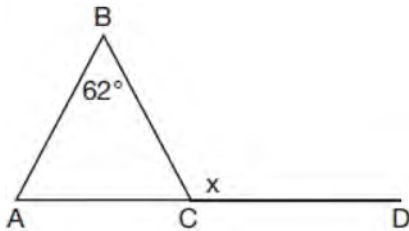
Which value of x makes $\overline{AB} \cong \overline{CB}$?
1) 59°
2) 62°
3) 118°
4) 121°

306 What are the coordinates of the center and the length of the radius of the circle represented by the equation $x^2 + y^2 - 4x + 8y + 11 = 0$?
1) center $(2, -4)$ and radius 3
2) center $(-2, 4)$ and radius 3
3) center $(2, -4)$ and radius 9
4) center $(-2, 4)$ and radius 9

307 Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ is shown in the diagram below.
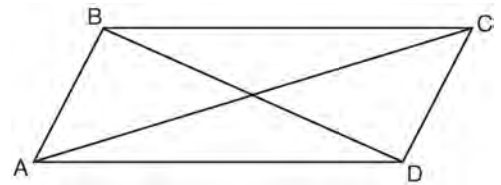
Which information is *not* enough to prove $ABCD$ is a parallelogram?
1) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{DC}$
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{DA}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$
4) $\overline{AB} \parallel \overline{DC}$ and $\overline{BC} \parallel \overline{AD}$

308 In right triangle ABC with the right angle at C, $\sin A = 2x + 0.1$ and $\cos B = 4x - 0.7$. Determine and state the value of x. Explain your answer.

309 In parallelogram *ABCD* shown below, the bisectors of ∠*ABC* and ∠*DCB* meet at *E*, a point on $\overline{AD}$.
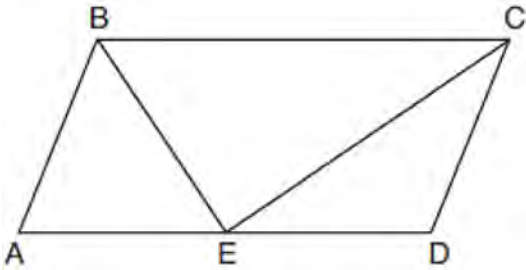
If m∠*A* = 68°, determine and state m∠*BEC*.

310 In the diagram below, △*ABC* has coordinates *A*(1,1), *B*(4,1), and *C*(4,5). Graph and label △*A"B"C"*, the image of △*ABC* after the translation five units to the right and two units up followed by the reflection over the line *y* = 0.
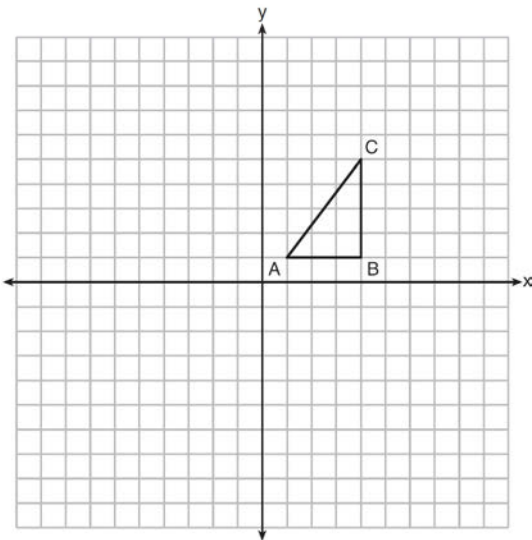
311 In circle *A* below, chord $\overline{BC}$ and diameter $\overline{DAE}$ intersect at *F*.
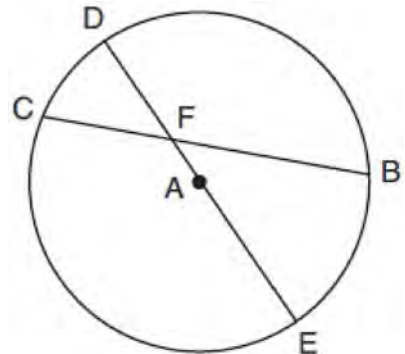
If m$\overset{\frown}{CD}$ = 46° and m$\overset{\frown}{DB}$ = 102°, what is m∠*CFE*?

312 In the diagram of right triangle *ABC*, $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at *D*.
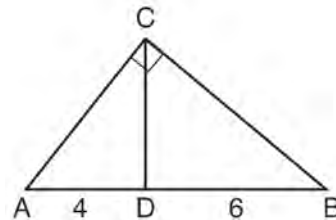
If *AD* = 4 and *DB* = 6, which length of $\overline{AC}$ makes $\overline{CD} \perp \overline{AB}$?

1) $2\sqrt{6}$
2) $2\sqrt{10}$
3) $2\sqrt{15}$
4) $4\sqrt{2}$

313 Triangle *FGH* is inscribed in circle *O*, the length of radius $\overline{OH}$ is 6, and $\overline{FH} \cong \overline{OG}$.
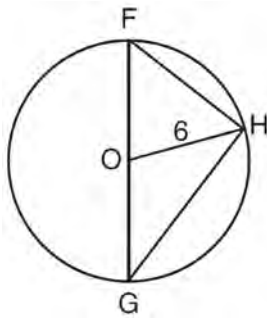
What is the area of the sector formed by angle *FOH*?
1) 2π
2) $\frac{3}{2}\pi$
3) 6π
4) 24π

314 As modeled below, a movie is projected onto a large outdoor screen. The bottom of the 60-foot-tall screen is 12 feet off the ground. The projector sits on the ground at a horizontal distance of 75 feet from the screen.
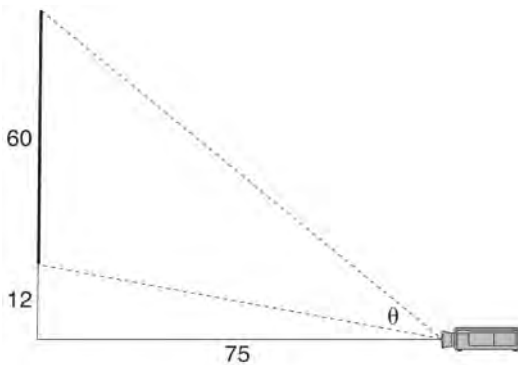
Determine and state, to the *nearest tenth of a degree*, the measure of θ, the projection angle.

315 In the accompanying diagram of right triangle *ABC*, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.
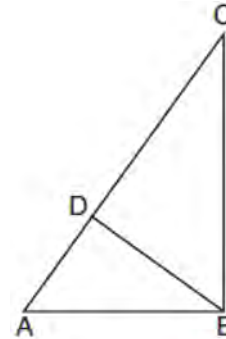
Which statement must always be true?
1) $\frac{AD}{AB} = \frac{BC}{AC}$
2) $\frac{AD}{AB} = \frac{AB}{AC}$
3) $\frac{BD}{BC} = \frac{AB}{AD}$
4) $\frac{AB}{BC} = \frac{BD}{AC}$

316 A regular pentagon is shown in the diagram below.
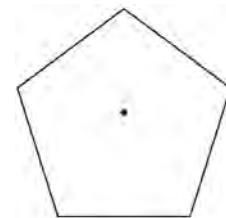
If the pentagon is rotated clockwise around its center, the minimum number of degrees it must be rotated to carry the pentagon onto itself is
1) 54°
2) 72°
3) 108°
4) 360°

317 An equilateral triangle has sides of length 20. To the *nearest tenth*, what is the height of the equilateral triangle?
1) 10.0
2) 11.5
3) 17.3
4) 23.1

318 The coordinates of the endpoints of $\overline{AB}$ are $A(-8,-2)$ and $B(16,6)$. Point P is on $\overline{AB}$. What are the coordinates of point P, such that $AP:PB$ is 3:5?
1) $(1,1)$
2) $(7,3)$
3) $(9.6,3.6)$
4) $(6.4,2.8)$

319 Prove the sum of the exterior angles of a triangle is 360°.
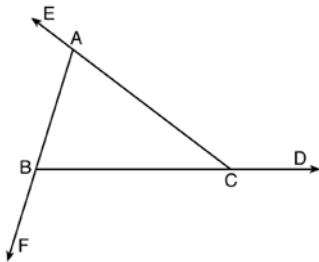
320 A two-dimensional cross section is taken of a three-dimensional object. If this cross section is a triangle, what can *not* be the three-dimensional object?
1) cone
2) cylinder
3) pyramid
4) rectangular prism

321 In the diagram below of $\triangle HAR$ and $\triangle NTY$, angles H and N are right angles, and $\triangle HAR \sim \triangle NTY$.
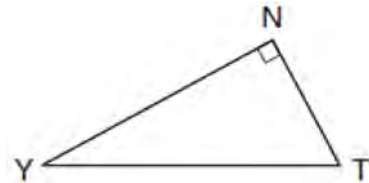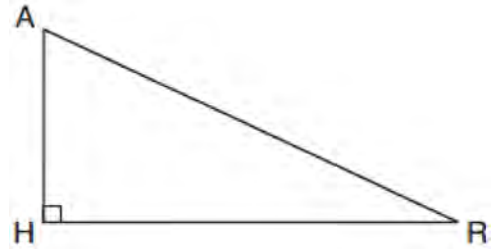
If $AR = 13$ and $HR = 12$, what is the measure of angle Y, to the *nearest degree*?
1) 23°
2) 25°
3) 65°
4) 67°

322 In the diagram below of circle O, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overset{\frown}{CD} = 130$.
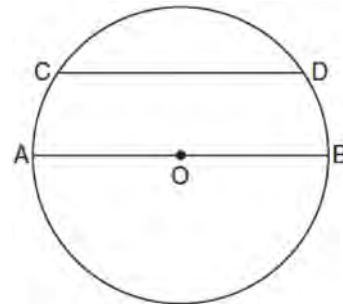
What is $m\overset{\frown}{AC}$?
1) 25
2) 50
3) 65
4) 115

69

323 Rhombus *STAR* has vertices $S(-1,2)$, $T(2,3)$, $A(3,0)$, and $R(0,-1)$. What is the perimeter of rhombus *STAR*?
1) $\sqrt{34}$
2) $4\sqrt{34}$
3) $\sqrt{10}$
4) $4\sqrt{10}$

324 In circle O, diameter $\overline{AB}$, chord $\overline{BC}$, and radius $\overline{OC}$ are drawn, and the measure of arc BC is 108°.
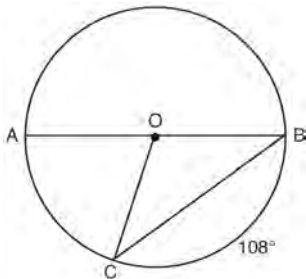
Some students wrote these formulas to find the area of sector *COB*:

Amy $\quad \dfrac{3}{10} \cdot \pi \cdot (BC)^2$

Beth $\quad \dfrac{108}{360} \cdot \pi \cdot (OC)^2$

Carl $\quad \dfrac{3}{10} \cdot \pi \cdot (\dfrac{1}{2} AB)^2$

Dex $\quad \dfrac{108}{360} \cdot \pi \cdot \dfrac{1}{2} (AB)^2$

Which students wrote correct formulas?
1) Amy and Dex
2) Beth and Carl
3) Carl and Amy
4) Dex and Beth

325 In rhombus *MATH*, the coordinates of the endpoints of the diagonal $\overline{MT}$ are $M(0,-1)$ and $T(4,6)$. Write an equation of the line that contains diagonal $\overline{AH}$. [Use of the set of axes below is optional.] Using the given information, explain how you know that your line contains diagonal $\overline{AH}$.
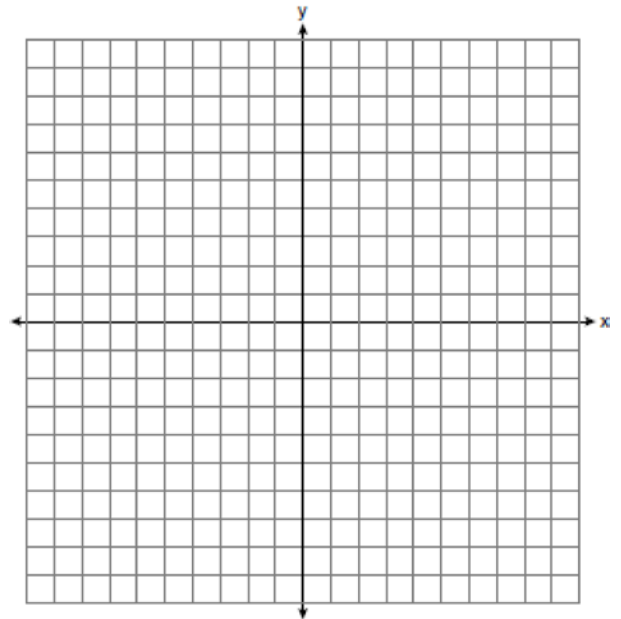
326 In the diagram below of parallelogram *ROCK*, m∠*C* is 70° and m∠*ROS* is 65°.
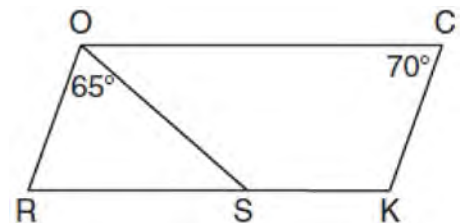
What is m∠*KSO*?
1) 45°
2) 110°
3) 115°
4) 135°

327 A right cylinder is cut perpendicular to its base. The shape of the cross section is a
1) circle
2) cylinder
3) rectangle
4) triangular prism

328 Using a compass and straightedge, construct a regular hexagon inscribed in circle O. [Leave all construction marks.]
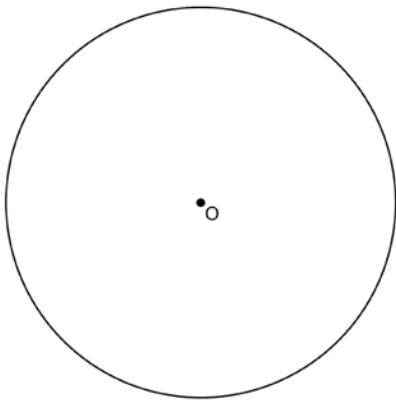
329 Line segment $A'B'$, whose endpoints are $(4,-2)$ and $(16,14)$, is the image of $\overline{AB}$ after a dilation of $\frac{1}{2}$ centered at the origin. What is the length of $\overline{AB}$?
1) 5
2) 10
3) 20
4) 40

330 In the diagram below, $\overline{AKS}$, $\overline{NKC}$, $\overline{AN}$, and $\overline{SC}$ are drawn such that $\overline{AN} \cong \overline{SC}$.
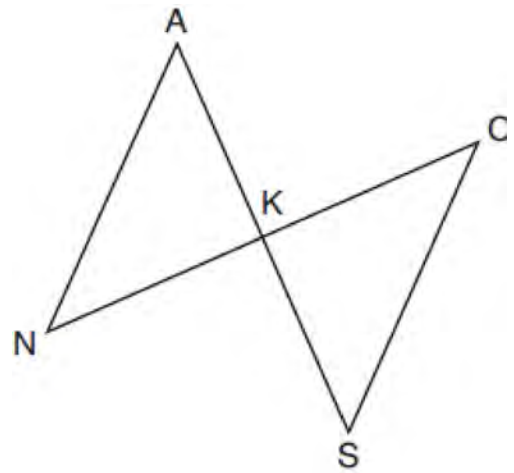
Which additional statement is sufficient to prove $\triangle KAN \cong \triangle KSC$ by AAS?
1) $\overline{AS}$ and $\overline{NC}$ bisect each other.
2) K is the midpoint of $\overline{NC}$.
3) $\overline{AS} \perp \overline{CN}$
4) $\overline{AN} \parallel \overline{SC}$

331 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points A, C, D, and F are collinear on line ℓ.
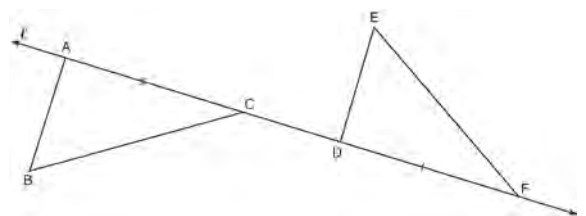
Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along ℓ, such that point D is mapped onto point A. Determine and state the location of F'. Explain your answer. Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line ℓ. Suppose that E'' is located at B. Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

71

332 Triangle PQR has vertices $P(-3,-1)$, $Q(-1,7)$, and $R(3,3)$, and points A and B are midpoints of $\overline{PQ}$ and $\overline{RQ}$, respectively. Use coordinate geometry to prove that $\overline{AB}$ is parallel to $\overline{PR}$ and is half the length of $\overline{PR}$. [The use of the set of axes below is optional.]
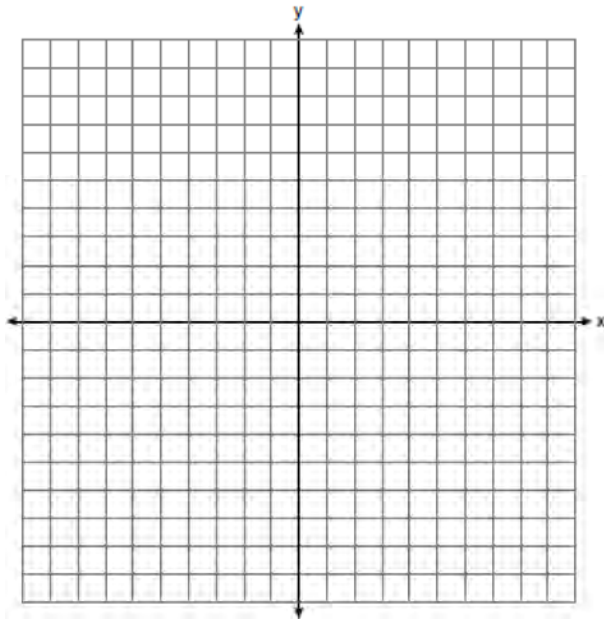
333 A triangle is dilated by a scale factor of 3 with the center of dilation at the origin. Which statement is true?
1) The area of the image is nine times the area of the original triangle.
2) The perimeter of the image is nine times the perimeter of the original triangle.
3) The slope of any side of the image is three times the slope of the corresponding side of the original triangle.
4) The measure of each angle in the image is three times the measure of the corresponding angle of the original triangle.

334 In the diagram below, $\overline{AEFB} \parallel \overline{CGD}$, and $\overline{GE}$ and $\overline{GF}$ are drawn.
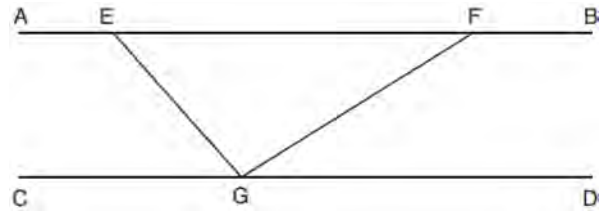
If $m\angle EFG = 32°$ and $m\angle AEG = 137°$, what is $m\angle EGF$?
1) 11°
2) 43°
3) 75°
4) 105°

335 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.
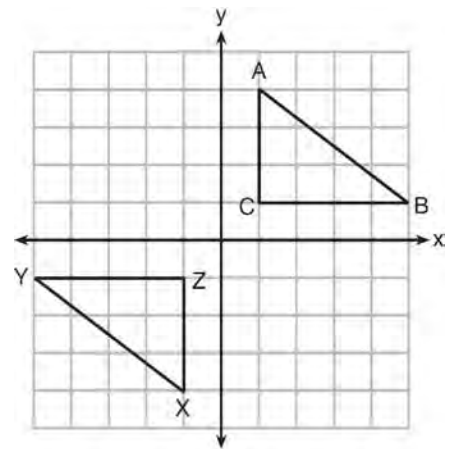
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

72

336 In the diagram below, rectangle *ABCD* has vertices whose coordinates are $A(7,1)$, $B(9,3)$, $C(3,9)$, and $D(1,7)$.
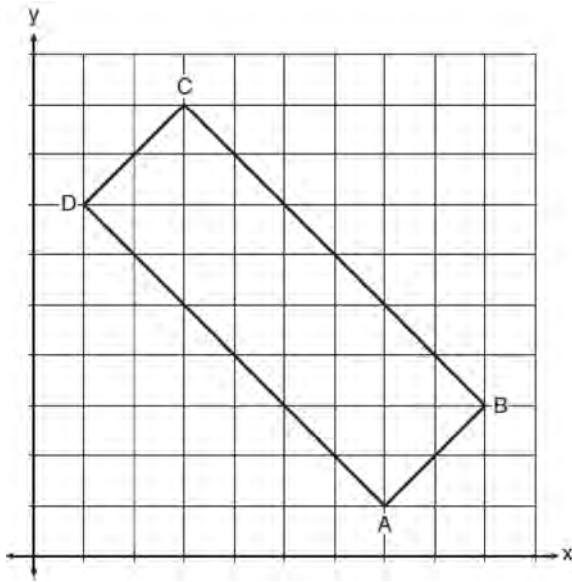
Which transformation will *not* carry the rectangle onto itself?
1) a reflection over the line $y = x$
2) a reflection over the line $y = -x + 10$
3) a rotation of 180° about the point $(6,6)$
4) a rotation of 180° about the point $(5,5)$

337 The coordinates of the vertices of $\triangle RST$ are $R(-2,-3)$, $S(8,2)$, and $T(4,5)$. Which type of triangle is $\triangle RST$?
1) right
2) acute
3) obtuse
4) equiangular

338 If the rectangle below is continuously rotated about side *w*, which solid figure is formed?

1) pyramid
2) rectangular prism
3) cone
4) cylinder

339 In the circle below, $\overline{AB}$ is a chord. Using a compass and straightedge, construct a diameter of the circle. [Leave all construction marks.]

73
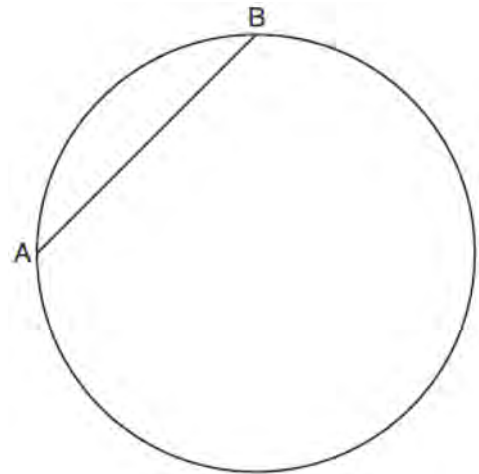
340 A rectangular in-ground pool is modeled by the prism below. The inside of the pool is 16 feet wide and 35 feet long. The pool has a shallow end and a deep end, with a sloped floor connecting the two ends. Without water, the shallow end is 9 feet long and 4.5 feet deep, and the deep end of the pool is 12.5 feet long.
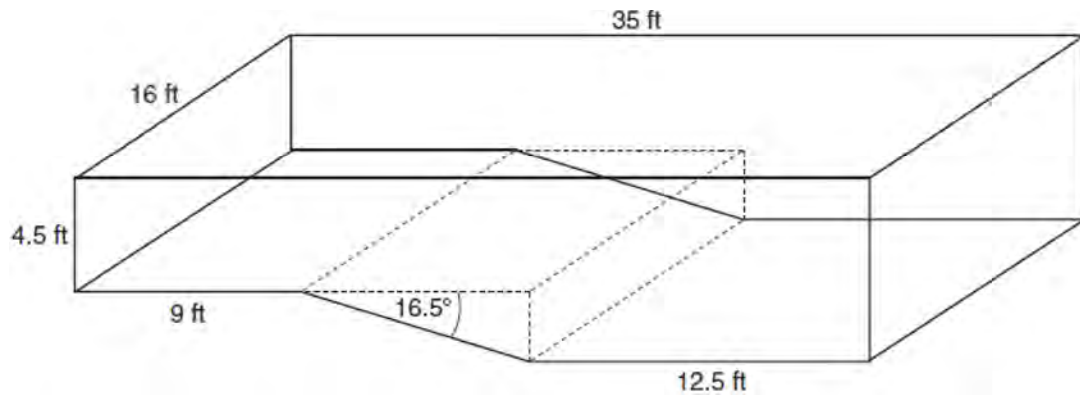
If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*? Find the volume of the inside of the pool to the *nearest cubic foot*. A garden hose is used to fill the pool. Water comes out of the hose at a rate of 10 .5 gallons per minute. How much time, to the *nearest hour*, will it take to fill the pool 6 inches from the top? [1 ft³=7.48 gallons]

341 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.
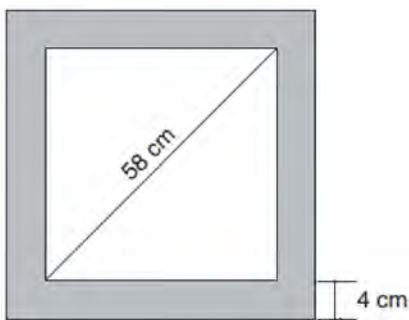
Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter*.

342 In the diagram below of right triangle ABC, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.
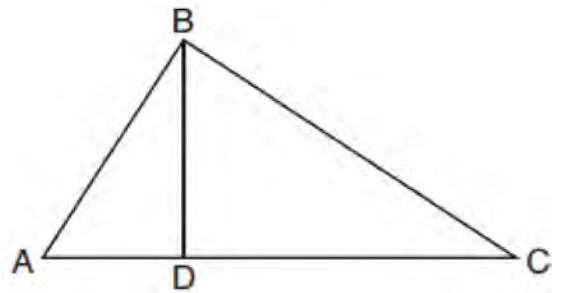
If $BD = 4$, $AD = x - 6$, and $CD = x$, what is the length of $\overline{CD}$?

1) 5
2) 2
3) 8
4) 11

343 Walter wants to make 100 candles in the shape of a cone for his new candle business. The mold shown below will be used to make the candles. Each mold will have a height of 8 inches and a diameter of 3 inches. To the *nearest cubic inch*, what will be the total volume of 100 candles?
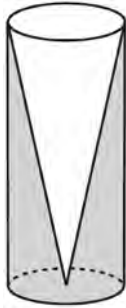
Walter goes to a hobby store to buy the wax for his candles. The wax costs $0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of $37.83 for the molds and charges $1.95 for each candle, what is Walter's profit after selling 100 candles?

344 Yolanda is making a springboard to use for gymnastics. She has 8-inch-tall springs and wants to form a 16.5° angle with the base, as modeled in the diagram below.
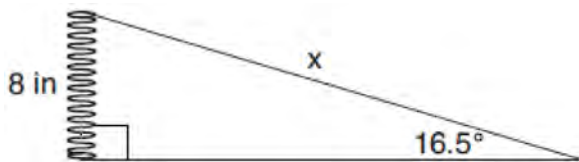
To the *nearest tenth of an inch*, what will be the length of the springboard, *x*?
1) 2.3
2) 8.3
3) 27.0
4) 28.2

345 Using a straightedge and compass, construct a square inscribed in circle *O* below. [Leave all construction marks.]
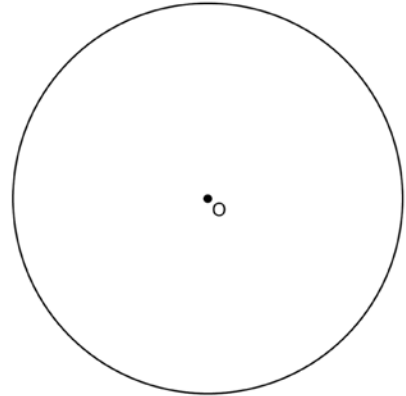
Determine the measure of the arc intercepted by two adjacent sides of the constructed square. Explain your reasoning.

346 Linda is designing a circular piece of stained glass with a diameter of 7 inches. She is going to sketch a square inside the circular region. To the *nearest tenth of an inch*, the largest possible length of a side of the square is
1) 3.5
2) 4.9
3) 5.0
4) 6.9

347 Explain why $\cos(x) = \sin(90 - x)$ for *x* such that $0 < x < 90$.

348 In triangle ABC, points D and E are on sides $\overline{AB}$ and $\overline{BC}$, respectively, such that $\overline{DE} \parallel \overline{AC}$, and $AD:DB = 3:5$.
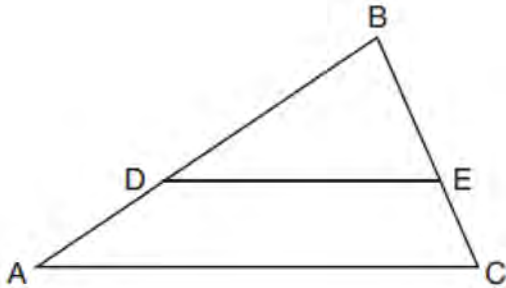
If $DB = 6.3$ and $AC = 9.4$, what is the length of DE, to the *nearest tenth*?
1) 3.8
2) 5.6
3) 5.9
4) 15.7

349 The image of $\triangle ABC$ after a rotation of 90° clockwise about the origin is $\triangle DEF$, as shown below.
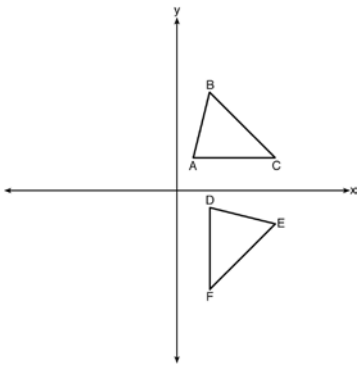
Which statement is true?
1) $\overline{BC} \cong \overline{DE}$
2) $\overline{AB} \cong \overline{DF}$
3) $\angle C \cong \angle E$
4) $\angle A \cong \angle D$

350 A parallelogram must be a rectangle when its
1) diagonals are perpendicular
2) diagonals are congruent
3) opposite sides are parallel
4) opposite sides are congruent

351 The equation of line h is $2x + y = 1$. Line m is the image of line h after a dilation of scale factor 4 with respect to the origin. What is the equation of the line m?
1) $y = -2x + 1$
2) $y = -2x + 4$
3) $y = 2x + 4$
4) $y = 2x + 1$

352 In the diagram shown below, $\overline{PA}$ is tangent to circle T at A, and secant $\overline{PBC}$ is drawn where point B is on circle T.
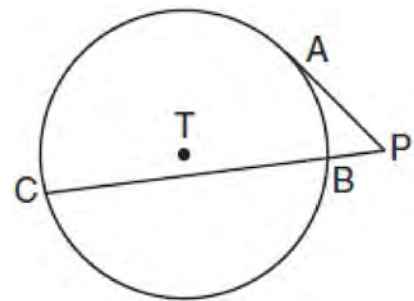
If $PB = 3$ and $BC = 15$, what is the length of $\overline{PA}$?
1) $3\sqrt{5}$
2) $3\sqrt{6}$
3) 3
4) 9

76

353 To build a handicapped-access ramp, the building code states that for every 1 inch of vertical rise in height, the ramp must extend out 12 inches horizontally, as shown in the diagram below.
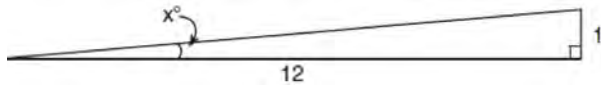
What is the angle of inclination, x, of this ramp, to the *nearest hundredth of a degree*?
1) 4.76
2) 4.78
3) 85.22
4) 85.24

354 The coordinates of the endpoints of $\overline{AB}$ are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of $\overline{AB}$, after a dilation of $\frac{1}{2}$ centered at the origin. [The use of the set of axes below is optional.]
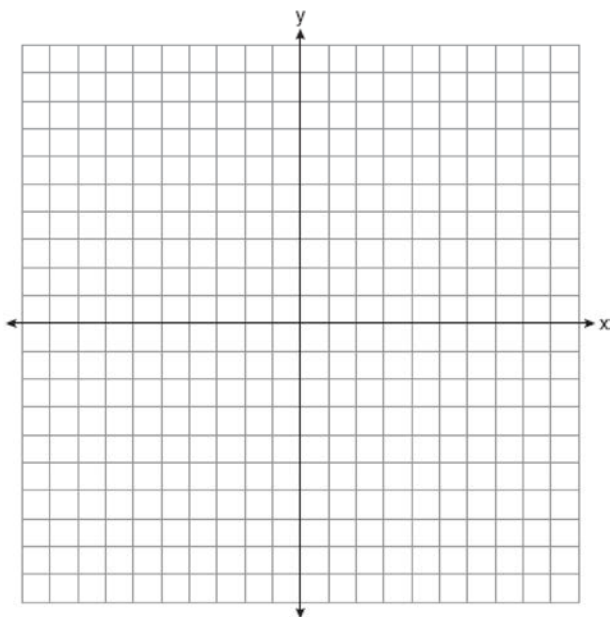
355 Given $\overline{MN}$ shown below, with $M(-6,1)$ and $N(3,-5)$, what is an equation of the line that passes through point $P(6,1)$ and is parallel to $\overline{MN}$?
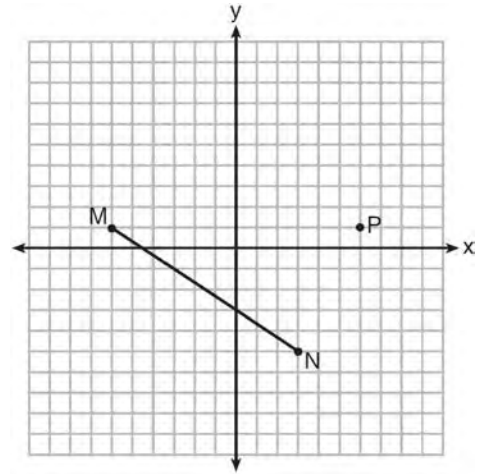
1) $y = -\frac{2}{3}x + 5$

2) $y = -\frac{2}{3}x - 3$

3) $y = \frac{3}{2}x + 7$

4) $y = \frac{3}{2}x - 8$

356 Lines AE and BD are tangent to circles O and P at A, E, B, and D, as shown in the diagram below. If $AC:CE = 5:3$, and $BD = 56$, determine and state the length of $\overline{CD}$.
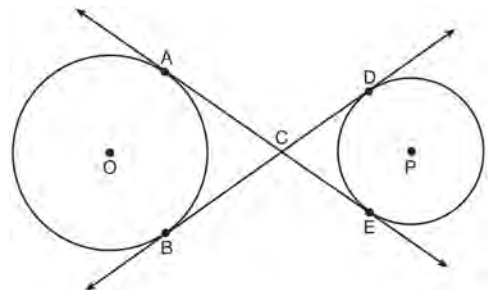
357 Quadrilateral *MATH* and its image *M"A"T"H"* are graphed on the set of axes below.
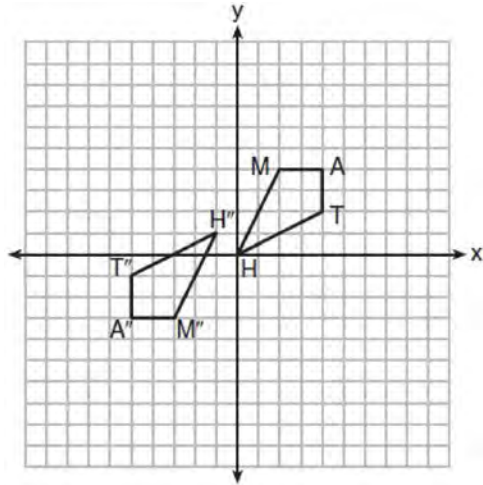
Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M"A"T"H"*.

358 In the diagram below, m∠*BDC* = 100°, m∠*A* = 50°, and m∠*DBC* = 30°.
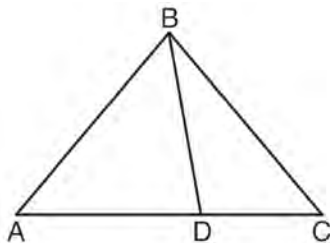
Which statement is true?
1) △*ABD* is obtuse.
2) △*ABC* is isosceles.
3) m∠*ABD* = 80°
4) △*ABD* is scalene.

359 A circle has a center at $(1,-2)$ and radius of 4. Does the point $(3.4, 1.2)$ lie on the circle? Justify your answer.

360 Kirstie is testing values that would make triangle *KLM* a right triangle when $\overline{LN}$ is an altitude, and *KM* = 16, as shown below.
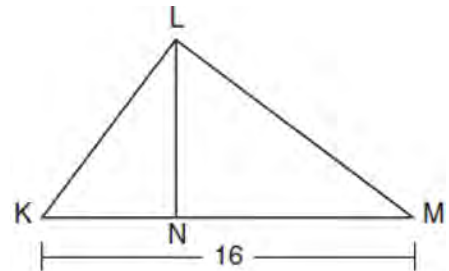
Which lengths would make triangle *KLM* a right triangle?
1) *LM* = 13 and *KN* = 6
2) *LM* = 12 and *NM* = 9
3) *KL* = 11 and *KN* = 7
4) *LN* = 8 and *NM* = 10

361 What are the coordinates of the point on the directed line segment from $K(-5,-4)$ to $L(5,1)$ that partitions the segment into a ratio of 3 to 2?
1) $(-3,-3)$
2) $(-1,-2)$
3) $\left(0, -\dfrac{3}{2}\right)$
4) $(1,-1)$

78

362   In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.
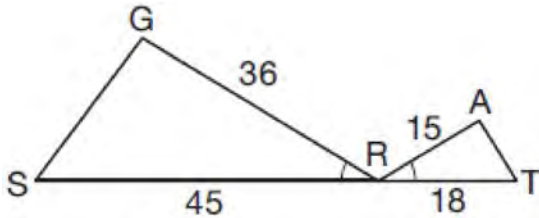
Which triangle similarity statement is correct?
1) $\triangle GRS \sim \triangle ART$ by AA.
2) $\triangle GRS \sim \triangle ART$ by SAS.
3) $\triangle GRS \sim \triangle ART$ by SSS.
4) $\triangle GRS$ is not similar to $\triangle ART$.

363   What is an equation of the perpendicular bisector of the line segment shown in the diagram below?
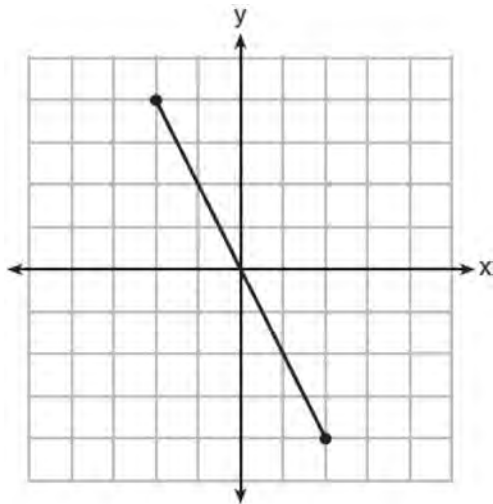
1) $y + 2x = 0$
2) $y - 2x = 0$
3) $2y + x = 0$
4) $2y - x = 0$

364   A regular decagon is rotated n degrees about its center, carrying the decagon onto itself. The value of n could be
1) $10°$
2) $150°$
3) $225°$
4) $252°$

365   In the diagram below of $\triangle ABC$, D, E, and F are the midpoints of $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$, respectively.
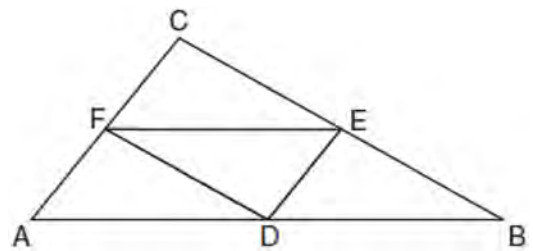
What is the ratio of the area of $\triangle CFE$ to the area of $\triangle CAB$?
1)   1:1
2)   1:2
3)   1:3
4)   1:4

366   As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was $7°$. A short time later, at point D, the angle of elevation was $16°$.
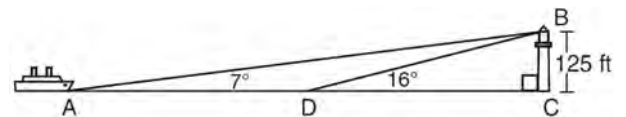
To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

79

367 In the diagram below, triangles *XYZ* and *UVZ* are drawn such that $\angle X \cong \angle U$ and $\angle XZY \cong \angle UZV$.
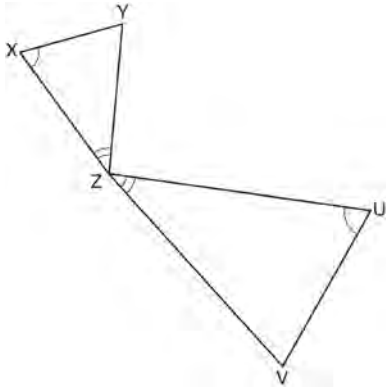
Describe a sequence of similarity transformations that shows $\triangle XYZ$ is similar to $\triangle UVZ$.

368 As shown in the diagram below, circle *A* has a radius of 3 and circle *B* has a radius of 5.
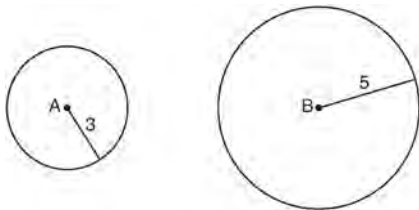
Use transformations to explain why circles *A* and *B* are similar.

369 A man who is 5 feet 9 inches tall casts a shadow of 8 feet 6 inches. Assuming that the man is standing perpendicular to the ground, what is the angle of elevation from the end of the shadow to the top of the man's head, to the *nearest tenth of a degree*?
1) 34.1
2) 34.5
3) 42.6
4) 55.9

370 In the diagram below, the circle shown has radius 10. Angle *B* intercepts an arc with a length of 2π.
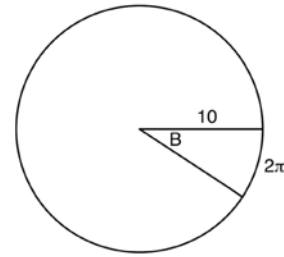
What is the measure of angle *B*, in radians?
1) $10 + 2\pi$
2) 20π
3) $\dfrac{\pi}{5}$
4) $\dfrac{5}{\pi}$

371 A bakery sells hollow chocolate spheres. The larger diameter of each sphere is 4 cm. The thickness of the chocolate of each sphere is 0.5 cm. Determine and state, to the *nearest tenth of a cubic centimeter*, the amount of chocolate in each hollow sphere. The bakery packages 8 of them into a box. If the density of the chocolate is 1.308 g/cm³, determine and state, to the *nearest gram*, the total mass of the chocolate in the box.

372 The cross section of a regular pyramid contains the altitude of the pyramid. The shape of this cross section is a
1) circle
2) square
3) triangle
4) rectangle

80

373 In the diagram below, $\overline{AD}$ intersects $\overline{BE}$ at C, and $\overline{AB} \parallel \overline{DE}$.
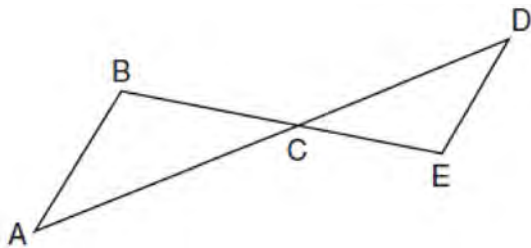
If $CD = 6.6$ cm, $DE = 3.4$ cm, $CE = 4.2$ cm, and $BC = 5.25$ cm, what is the length of $\overline{AC}$, to the *nearest hundredth of a centimeter*?
1) 2.70
2) 3.34
3) 5.28
4) 8.25

374 In the diagram below, a square is graphed in the coordinate plane.
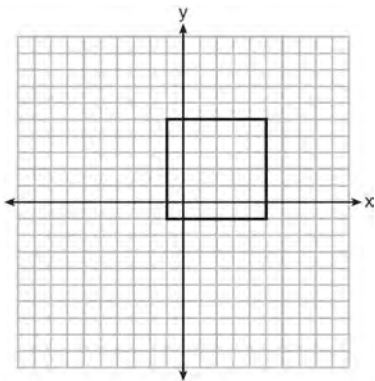
A reflection over which line does *not* carry the square onto itself?
1) $x = 5$
2) $y = 2$
3) $y = x$
4) $x + y = 4$

375 In the diagram below of circle O, diameter $\overline{AB}$ and radii $\overline{OC}$ and $\overline{OD}$ are drawn. The length of $\overline{AB}$ is 12 and the measure of $\angle COD$ is 20 degrees.
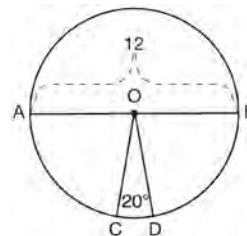
If $\overset{\frown}{AC} \cong \overset{\frown}{BD}$, find the area of sector BOD in terms of π.

376 Determine and state the coordinates of the center and the length of the radius of a circle whose equation is $x^2 + y^2 - 6x = 56 - 8y$.

377 The vertices of square $RSTV$ have coordinates $R(-1,5)$, $S(-3,1)$, $T(-7,3)$, and $V(-5,7)$. What is the perimeter of $RSTV$?
1) $\sqrt{20}$
2) $\sqrt{40}$
3) $4\sqrt{20}$
4) $4\sqrt{40}$

378 If $x^2 + 4x + y^2 - 6y - 12 = 0$ is the equation of a circle, the length of the radius is
1) 25
2) 16
3) 5
4) 4

81

379 In the diagram below, triangle *ACD* has points *B* and *E* on sides $\overline{AC}$ and $\overline{AD}$, respectively, such that $\overline{BE} \parallel \overline{CD}$, *AB* = 1, *BC* = 3.5, and *AD* = 18.
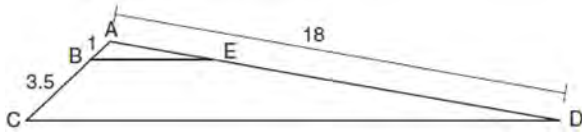
What is the length of $\overline{AE}$, to the *nearest tenth*?
1) 14.0
2) 5.1
3) 3.3
4) 4.0

380 In the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the median to $\overline{AB}$. [Leave all construction marks.]
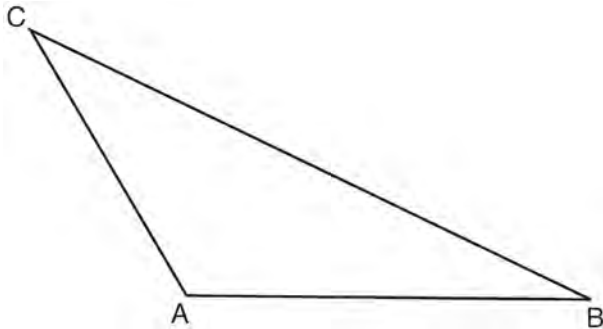
381 Segment *CD* is the perpendicular bisector of $\overline{AB}$ at *E*. Which pair of segments does *not* have to be congruent?
1) $\overline{AD},\overline{BD}$
2) $\overline{AC},\overline{BC}$
3) $\overline{AE},\overline{BE}$
4) $\overline{DE},\overline{CE}$

382 In parallelogram *ABCD* shown below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*.
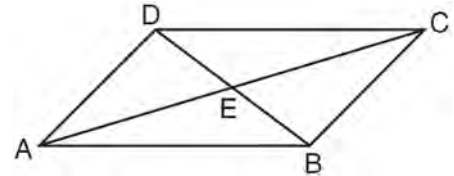
Prove: $\angle ACD \cong \angle CAB$

383 In the model below, a support wire for a telephone pole is attached to the pole and anchored to a stake in the ground 15 feet from the base of the telephone pole. Jamal places a 6-foot wooden pole under the support wire parallel to the telephone pole, such that one end of the pole is on the ground and the top of the pole is touching the support wire. He measures the distance between the bottom of the pole and the stake in the ground.
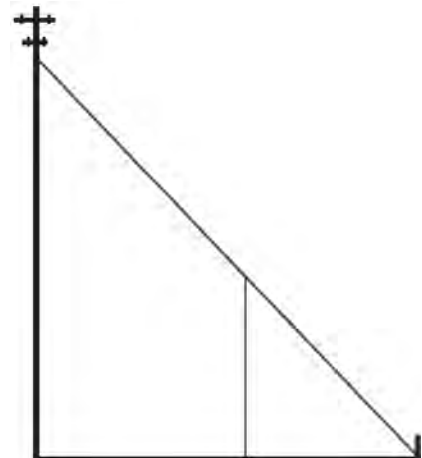
Jamal says he can approximate how high the support wire attaches to the telephone pole by using similar triangles. Explain why the triangles are similar.

82

384 In a circle with a diameter of 32, the area of a sector is $\dfrac{512\pi}{3}$. The measure of the angle of the sector, in radians, is

1) $\dfrac{\pi}{3}$

2) $\dfrac{4\pi}{3}$

3) $\dfrac{16\pi}{3}$

4) $\dfrac{64\pi}{3}$

385 The coordinates of the endpoints of directed line segment ABC are $A(-8,7)$ and $C(7,-13)$. If $AB:BC = 3:2$, the coordinates of B are
1) $(1,-5)$
2) $(-2,-1)$
3) $(-3,0)$
4) $(3,-6)$

386 The grid below shows $\triangle ABC$ and $\triangle DEF$.
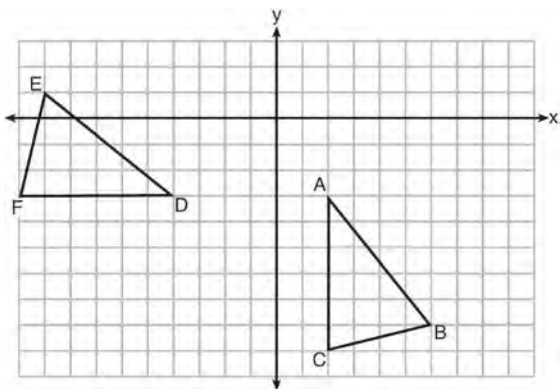
Let $\triangle A'B'C'$ be the image of $\triangle ABC$ after a rotation about point A. Determine and state the location of B' if the location of point C' is $(8,-3)$. Explain your answer. Is $\triangle DEF$ congruent to $\triangle A'B'C'$? Explain your answer.

387 A homeowner is building three steps leading to a deck, as modeled by the diagram below. All three step rises, $\overline{HA}$, $\overline{FG}$, and $\overline{DE}$, are congruent, and all three step runs, $\overline{HG}$, $\overline{FE}$, and $\overline{DC}$, are congruent. Each step rise is perpendicular to the step run it joins. The measure of $\angle CAB = 36°$ and $\angle CBA = 90°$.
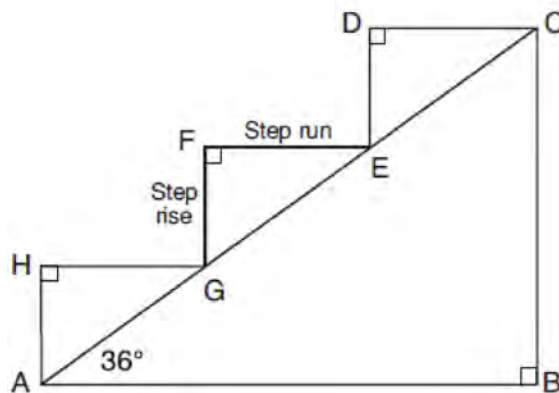
If each step run is parallel to $\overline{AB}$ and has a length of 10 inches, determine and state the length of each step rise, to the *nearest tenth of an inch*. Determine and state the length of $\overline{AC}$, to the *nearest inch*.

388 Given: D is the image of A after a reflection over $\overset{\longleftrightarrow}{CH}$.

$\overset{\longleftrightarrow}{CH}$ is the perpendicular bisector of $\overline{BCE}$
$\triangle ABC$ and $\triangle DEC$ are drawn
Prove: $\triangle ABC \cong \triangle DEC$
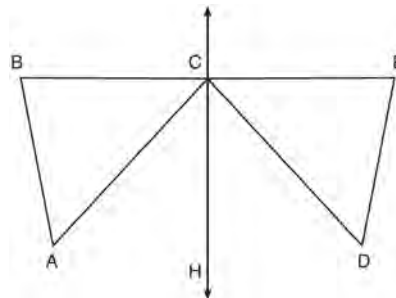
389 In the diagram of parallelogram *ABCD* below, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.
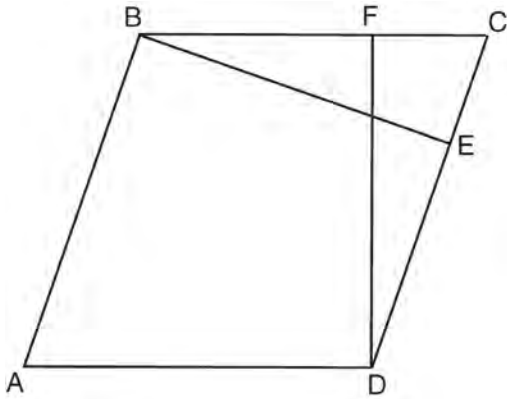
Prove *ABCD* is a rhombus.

390 Trapezoids *ABCD* and *A"B"C"D"* are graphed on the set of axes below.
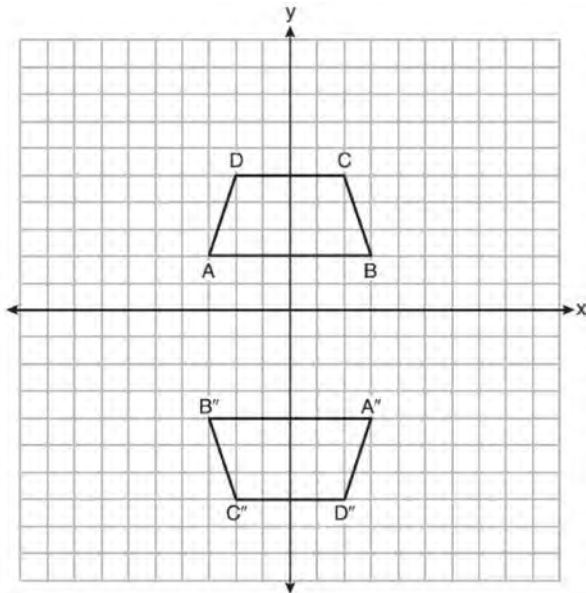
Describe a sequence of transformations that maps trapezoid *ABCD* onto trapezoid *A"B"C"D"*.

391 The Great Pyramid of Giza was constructed as a regular pyramid with a square base. It was built with an approximate volume of 2,592,276 cubic meters and a height of 146.5 meters. What was the length of one side of its base, to the *nearest meter*?
1) 73
2) 77
3) 133
4) 230

392 In the diagram of $\triangle LAC$ and $\triangle DNC$ below, $\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$.
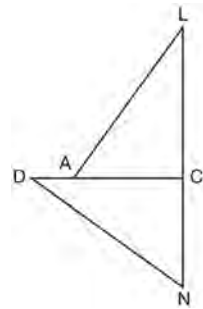
a) Prove that $\triangle LAC \cong \triangle DNC$.
b) Describe a sequence of rigid motions that will map $\triangle LAC$ onto $\triangle DNC$.

393 The diagram below shows parallelogram *LMNO* with diagonal $\overline{LN}$, m$\angle M$ = 118°, and m$\angle LNO$ = 22°.
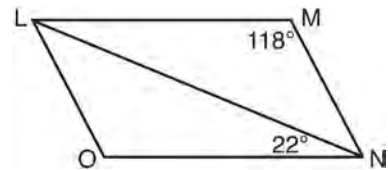
Explain why m$\angle NLO$ is 40 degrees.

394 A rectangle whose length and width are 10 and 6, respectively, is shown below. The rectangle is continuously rotated around a straight line to form an object whose volume is 150π.
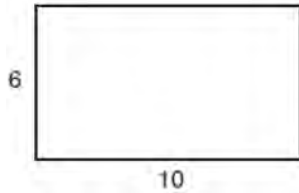
Which line could the rectangle be rotated around?
1) a long side
2) a short side
3) the vertical line of symmetry
4) the horizontal line of symmetry

395 Which transformation would *not* always produce an image that would be congruent to the original figure?
1) translation
2) dilation
3) rotation
4) reflection

396 Two stacks of 23 quarters each are shown below. One stack forms a cylinder but the other stack does not form a cylinder.
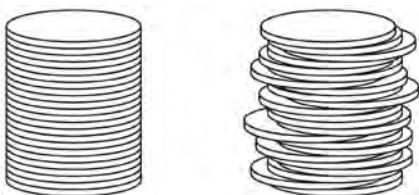
Use Cavelieri's principle to explain why the volumes of these two stacks of quarters are equal.

397 Isosceles trapezoid $ABCD$ has bases $\overline{DC}$ and $\overline{AB}$ with nonparallel legs $\overline{AD}$ and $\overline{BC}$. Segments AE, BE, CE, and DE are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.
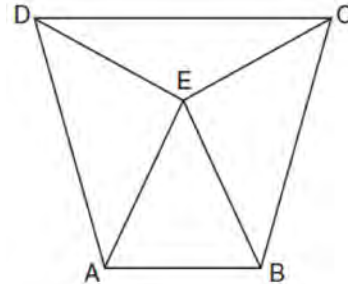
Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

398 Given: $\triangle AEC$, $\triangle DEF$, and $\overline{FE} \perp \overline{CE}$
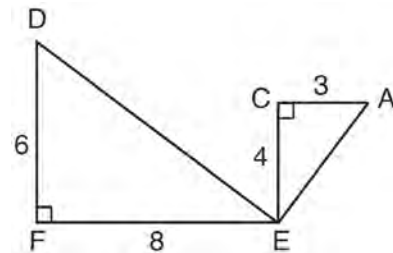
What is a correct sequence of similarity transformations that shows $\triangle AEC \sim \triangle DEF$?
1) a rotation of 180 degrees about point E followed by a horizontal translation
2) a counterclockwise rotation of 90 degrees about point E followed by a horizontal translation
3) a rotation of 180 degrees about point E followed by a dilation with a scale factor of 2 centered at point E
4) a counterclockwise rotation of 90 degrees about point E followed by a dilation with a scale factor of 2 centered at point E

399 The 2010 U.S. Census populations and population densities are shown in the table below.

State	Population Density $\left(\dfrac{\text{people}}{\text{mi}^2}\right)$	Population in 2010
Florida	350.6	18,801,310
Illinois	231.1	12,830,632
New York	411.2	19,378,102
Pennsylvania	283.9	12,702,379

Based on the table above, which list has the states' areas, in square miles, in order from largest to smallest?
1) Illinois, Florida, New York, Pennsylvania
2) New York, Florida, Illinois, Pennsylvania
3) New York, Florida, Pennsylvania, Illinois
4) Pennsylvania, New York, Florida, Illinois

400 If an equilateral triangle is continuously rotated around one of its medians, which 3-dimensional object is generated?
1) cone
2) pyramid
3) prism
4) sphere

401 In the diagram below, $\triangle ABC \sim \triangle ADE$.
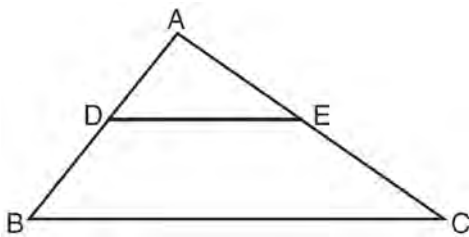
Which measurements are justified by this similarity?
1) $AD = 3$, $AB = 6$, $AE = 4$, and $AC = 12$
2) $AD = 5$, $AB = 8$, $AE = 7$, and $AC = 10$
3) $AD = 3$, $AB = 9$, $AE = 5$, and $AC = 10$
4) $AD = 2$, $AB = 6$, $AE = 5$, and $AC = 15$

402 Which point shown in the graph below is the image of point P after a counterclockwise rotation of 90° about the origin?

1) A
2) B
3) C
4) D

86
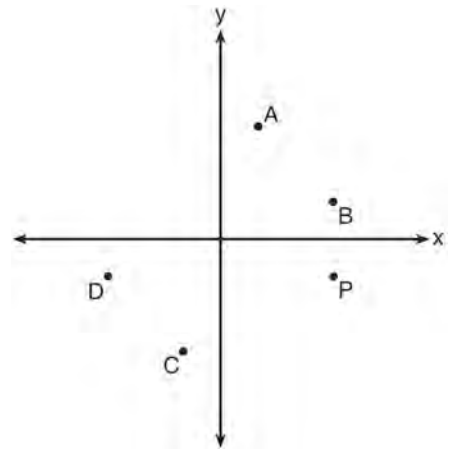
403 The vertices of quadrilateral *MATH* have coordinates $M(-4,2)$, $A(-1,-3)$, $T(9,3)$, and $H(6,8)$. Prove that quadrilateral *MATH* is a parallelogram. Prove that quadrilateral *MATH* is a rectangle. [The use of the set of axes below is optional.]
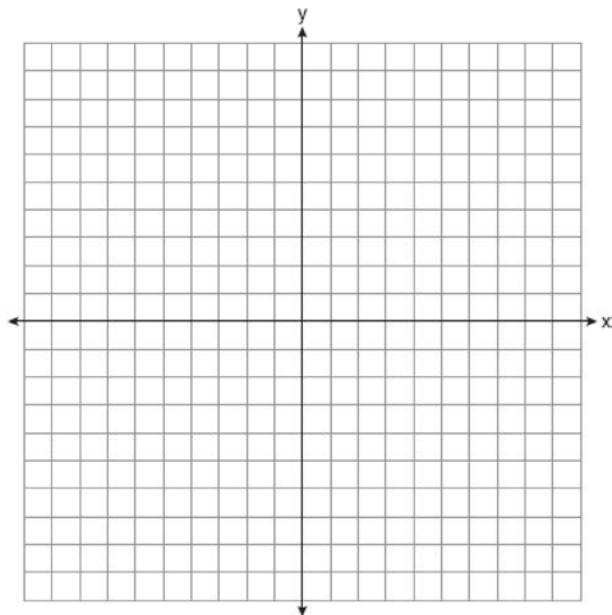
404 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and $\overline{AC}$ onto $\overline{XZ}$.
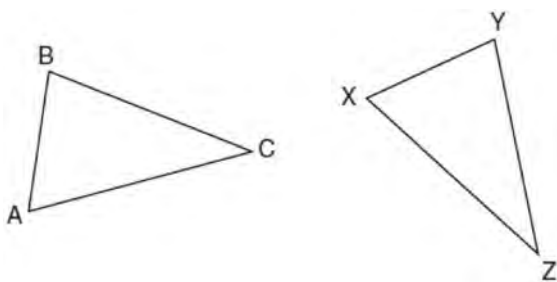
Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

405 The image of $\triangle DEF$ is $\triangle D'E'F'$. Under which transformation will he triangles *not* be congruent?
1) a reflection through the origin
2) a reflection over the line $y = x$
3) a dilation with a scale factor of 1 centered at $(2,3)$
4) a dilation with a scale factor of $\frac{3}{2}$ centered at the origin

406 In the diagram below, lines ℓ, m, n, and p intersect line r.
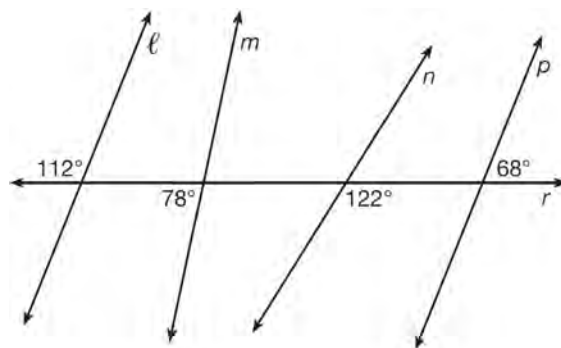
Which statement is true?
1) $\ell \parallel n$
2) $\ell \parallel p$
3) $m \parallel p$
4) $m \parallel n$

407 A quadrilateral has vertices with coordinates $(-3,1)$, $(0,3)$, $(5,2)$, and $(-1,-2)$. Which type of quadrilateral is this?
1) rhombus
2) rectangle
3) square
4) trapezoid

87

408 Triangles *RST* and *XYZ* are drawn below. If $RS = 6$, $ST = 14$, $XY = 9$, $YZ = 21$, and $\angle S \cong \angle Y$, is $\triangle RST$ similar to $\triangle XYZ$? Justify your answer.
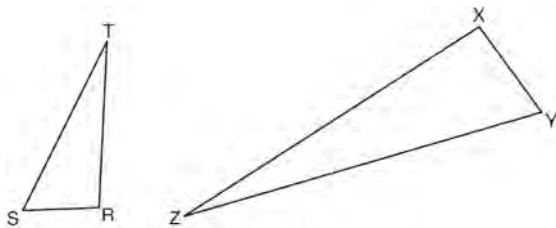
409 The diagonals of rhombus *TEAM* intersect at $P(2,1)$. If the equation of the line that contains diagonal $\overline{TA}$ is $y = -x + 3$, what is the equation of a line that contains diagonal *EM*?
1) $y = x - 1$
2) $y = x - 3$
3) $y = -x - 1$
4) $y = -x - 3$

410 Given: $\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$
Prove that $\angle YWZ$ is a right angle.
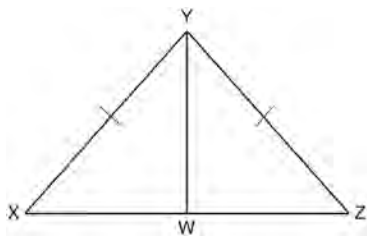
411 If $\sin(2x + 7)° = \cos(4x - 7)°$, what is the value of *x*?
1) 7
2) 15
3) 21
4) 30

412 Ian needs to replace two concrete sections in his sidewalk, as modeled below. Each section is 36 inches by 36 inches and 4 inches deep. He can mix his own concrete for $3.25 per cubic foot.
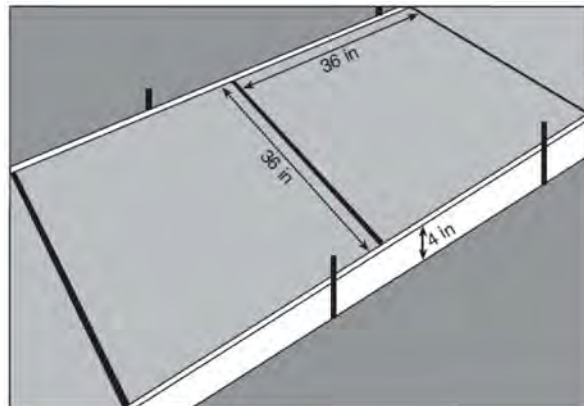
How much money will it cost Ian to replace the two concrete sections?

413 The coordinates of vertices *A* and *B* of $\triangle ABC$ are $A(3,4)$ and $B(3,12)$. If the area of $\triangle ABC$ is 24 square units, what could be the coordinates of point *C*?
1) $(3,6)$
2) $(8,-3)$
3) $(-3,8)$
4) $(6,3)$

414 A contractor needs to purchase 500 bricks. The dimensions of each brick are 5.1 cm by 10.2 cm by 20.3 cm, and the density of each brick is 1920 kg$/$m^3. The maximum capacity of the contractor's trailer is 900 kg. Can the trailer hold the weight of 500 bricks? Justify your answer.

415 In the diagram below, $\triangle ABE$ is the image of $\triangle ACD$ after a dilation centered at the origin. The coordinates of the vertices are $A(0,0)$, $B(3,0)$, $C(4.5,0)$, $D(0,6)$, and $E(0,4)$.
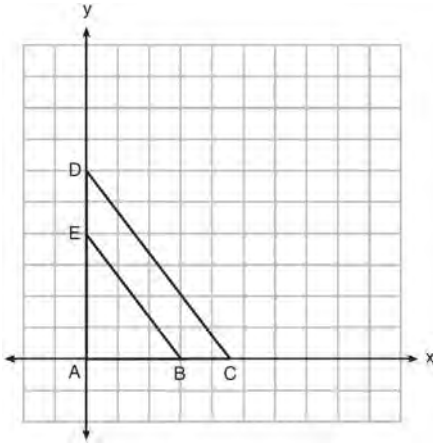
The ratio of the lengths of $\overline{BE}$ to $\overline{CD}$ is

1) $\dfrac{2}{3}$

2) $\dfrac{3}{2}$

3) $\dfrac{3}{4}$

4) $\dfrac{4}{3}$

416 The line represented by the equation $4y = 3x + 7$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?
1) $3x - 4y = 9$
2) $3x + 4y = 9$
3) $4x - 3y = 9$
4) $4x + 3y = 9$

417 In $\triangle ABC$, $\overline{BD}$ is the perpendicular bisector of $\overline{ADC}$. Based upon this information, which statements below can be proven?
I. $\overline{BD}$ is a median.
II. $\overline{BD}$ bisects $\angle ABC$.
III. $\triangle ABC$ is isosceles.
1) I and II, only
2) I and III, only
3) II and III, only
4) I, II, and III

418 A hemispherical tank is filled with water and has a diameter of 10 feet. If water weighs 62.4 pounds per cubic foot, what is the total weight of the water in a full tank, to the *nearest pound*?
1) 16,336
2) 32,673
3) 130,690
4) 261,381

419 The endpoints of $\overline{DEF}$ are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point E, if $DE:EF = 2:3$.

420 Point P is on the directed line segment from point $X(-6,-2)$ to point $Y(6,7)$ and divides the segment in the ratio $1:5$. What are the coordinates of point P?

1) $\left(4, 5\dfrac{1}{2}\right)$

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

3) $\left(-4\dfrac{1}{2}, 0\right)$

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

89

Geometry Regents at Random
Answer Section

1   ANS: 1

$V = \dfrac{1}{3}\pi(4)^2(6) = 32\pi$

PTS: 2   REF: 061718geo   NAT: G.GMD.B.4   TOP: Rotations of Two-Dimensional Objects

2   ANS: 4
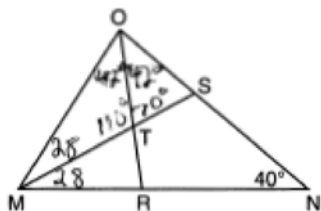
PTS: 2   REF: 061717geo   NAT: G.CO.C.10   TOP: Interior and Exterior Angles of Triangles

3   ANS: 1   PTS: 2   REF: 011703geo   NAT: G.SRT.B.5
TOP: Triangle Congruency

4   ANS:

Similar triangles are required to model and solve a proportion. $\dfrac{x+5}{1.5} = \dfrac{x}{1}$ $\dfrac{1}{3}\pi(1.5)^2(15) - \dfrac{1}{3}\pi(1)^2(10) \approx 24.9$

$$x + 5 = 1.5x$$
$$5 = .5x$$
$$10 = x$$
$$10 + 5 = 15$$

PTS: 6   REF: 061636geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

5   ANS: 2

$6 + 6\sqrt{3} + 6 + 6\sqrt{3} \approx 32.8$

PTS: 2   REF: 011709geo   NAT: G.SRT.C.8   TOP: 30-60-90 Triangles

6   ANS: 4

$\dfrac{360°}{10} = 36°$ 252° is a multiple of 36°

PTS: 2   REF: 011717geo   NAT: G.CO.A.3   TOP: Mapping a Polygon onto Itself

7   ANS: 2   PTS: 2   REF: 061516geo   NAT: G.SRT.A.2
TOP: Dilations

8   ANS: 3   PTS: 2   REF: 011815geo   NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

9 ANS: 1

$$3 + \frac{2}{5}(8-3) = 3 + \frac{2}{5}(5) = 3 + 2 = 5 \quad 5 + \frac{2}{5}(-5-5) = 5 + \frac{2}{5}(-10) = 5 - 4 = 1$$

PTS: 2   REF: 011720geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

10 ANS: 2   PTS: 2   REF: 011802geo   NAT: G.CO.C.11
TOP: Parallelograms

11 ANS: 2   PTS: 2   REF: 061603geo   NAT: G.GPE.A.1
TOP: Equations of Circles   KEY: find center and radius | completing the square

12 ANS:
Each triangular prism has the same base area. Therefore, each corresponding cross-section of the prisms will have the same area. Since the two prisms have the same height of 14, the two volumes must be the same.

PTS: 2   REF: 061727geo   NAT: G.GMD.A.1   TOP: Volume

13 ANS:

$$\overline{PQ} \ \sqrt{(8-3)^2 + (3--2)^2} = \sqrt{50} \quad \overline{QR} \ \sqrt{(1-8)^2 + (4-3)^2} = \sqrt{50} \quad \overline{RS} \ \sqrt{(-4-1)^2 + (-1-4)^2} = \sqrt{50}$$

$$\overline{PS} \ \sqrt{(-4-3)^2 + (-1--2)^2} = \sqrt{50} \quad PQRS \text{ is a rhombus because all sides are congruent. } m\overline{PQ} = \frac{8-3}{3--2} = \frac{5}{5} = 1$$

$$m\overline{QR} = \frac{1-8}{4-3} = -7 \text{ Because the slopes of adjacent sides are not opposite reciprocals, they are not perpendicular}$$
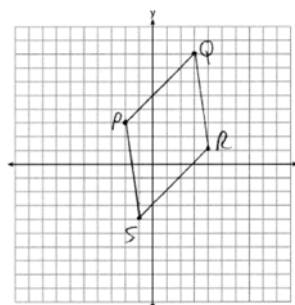
and do not form a right angle. Therefore *PQRS* is not a square.

PTS: 6   REF: 061735geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

14 ANS:
Quadrilateral *ABCD* with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and $\angle 1 \cong \angle 2$ (given); quadrilateral *ABCD* is a parallelogram (the diagonals of a parallelogram bisect each other); $\overline{AB} \parallel \overline{CD}$ (opposite sides of a parallelogram are parallel); $\angle 1 \cong \angle 3$ and $\angle 2 \cong \angle 4$ (alternate interior angles are congruent); $\angle 2 \cong \angle 3$ and $\angle 3 \cong \angle 4$ (substitution); $\triangle ACD$ is an isosceles triangle (the base angles of an isosceles triangle are congruent); $\overline{AD} \cong \overline{DC}$ (the sides of an isosceles triangle are congruent); quadrilateral *ABCD* is a rhombus (a rhombus has consecutive congruent sides); $\overline{AE} \perp \overline{BE}$ (the diagonals of a rhombus are perpendicular); $\angle BEA$ is a right angle (perpendicular lines form a right angle); $\triangle AEB$ is a right triangle (a right triangle has a right angle).

PTS: 6   REF: 061635geo   NAT: G.CO.C.11   TOP: Quadrilateral Proofs

15 ANS: 3

$y = mx + b$

$2 = \dfrac{1}{2}(-2) + b$

$3 = b$

PTS: 2   REF: 011701geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

16 ANS: 4   PTS: 2   REF: 011704geo   NAT: G.CO.C.10
TOP: Midsegments

17 ANS: 4   PTS: 2   REF: 011706geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: basic

18 ANS:
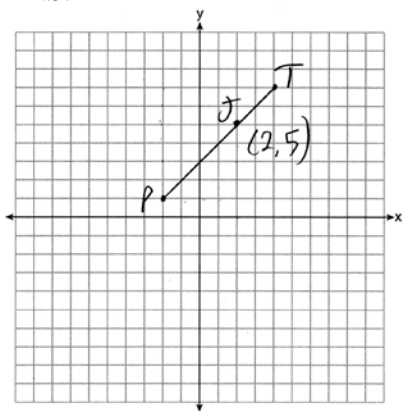
$x = \dfrac{2}{3}(4 - -2) = 4 \quad -2 + 4 = 2 \quad J(2,5)$

$y = \dfrac{2}{3}(7 - 1) = 4 \qquad 1 + 4 = 5$

PTS: 2   REF: 011627geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

19 ANS: 2

$\cos B = \dfrac{17.6}{26}$

$B \approx 47$

PTS: 2   REF: 061806geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

20 ANS:
$\cos B$ increases because $\angle A$ and $\angle B$ are complementary and $\sin A = \cos B$.

PTS: 2   REF: 011827geo   NAT: G.SRT.C.7   TOP: Cofunctions

21 ANS: 1

$x^2 + y^2 - 12y + 36 = -20 + 36$

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

PTS: 2   REF: 061712geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

22 ANS: 3   PTS: 2   REF: 011605geo   NAT: G.CO.A.2
    TOP: Analytical Representations of Transformations   KEY: basic

23 ANS:

    C: $V = \pi(26.7)^2(750) - \pi(24.2)^2(750) = 95{,}437.5\pi$

$$95{,}437.5\pi \ \text{cm}^3 \left(\frac{2.7 \text{ g}}{\text{cm}^3}\right)\left(\frac{1 \text{ kg}}{1000 \text{ g}}\right)\left(\frac{\$0.38}{\text{kg}}\right) = \$307.62$$

    P: $V = 40^2(750) - 35^2(750) = 281{,}250$ $\$307.62 - 288.56 = \$19.06$

$$281{,}250 \ \text{cm}^3 \left(\frac{2.7 \text{ g}}{\text{cm}^3}\right)\left(\frac{1 \text{ kg}}{1000 \text{ g}}\right)\left(\frac{\$0.38}{\text{kg}}\right) = \$288.56$$

    PTS: 6   REF: 011736geo   NAT: G.MG.A.2   TOP: Density

24 ANS:

$$4 + \frac{4}{9}(22-4) \quad 2 + \frac{4}{9}(2-2) \quad (12,2)$$

$$4 + \frac{4}{9}(18) \qquad 2 + \frac{4}{9}(0)$$

$$4 + 8 \qquad\qquad 2 + 0$$

$$12 \qquad\qquad\quad 2$$

    PTS: 2   REF: 061626geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

25 ANS: 1   PTS: 2   REF: 011606geo   NAT: G.CO.C.9
    TOP: Lines and Angles

26 ANS: 2   PTS: 2   REF: 011805geo   NAT: G.GMD.B.4
    TOP: Cross-Sections of Three-Dimensional Objects

27 ANS:
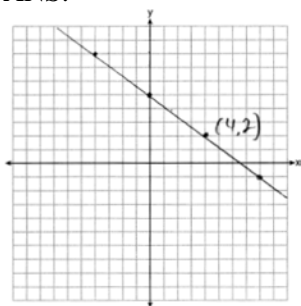
The line is on the center of dilation, so the line does not change. $p: 3x + 4y = 20$

    PTS: 2   REF: 061731geo   NAT: G.SRT.A.1   TOP: Line Dilations

28 ANS: 2

$$x^2 + y^2 + 6y + 9 = 7 + 9$$

$$x^2 + (y+3)^2 = 16$$

    PTS: 2   REF: 061514geo   NAT: G.GPE.A.1   TOP: Equations of Circles
    KEY: completing the square

29 ANS:

$$29.5 = 2\pi r \quad V = \frac{4}{3}\,\pi \cdot \left(\frac{29.5}{2\pi}\right)^3 \approx 434$$

$$r = \frac{29.5}{2\pi}$$

PTS: 2   REF: 061831geo   NAT: G.GMD.A.3   TOP: Volume
KEY: spheres

30 ANS: 4   PTS: 2   REF: 061813geo   NAT: G.CO.C.11
TOP: Special Quadrilaterals

31 ANS: 1   PTS: 2   REF: 061520geo   NAT: G.C.A.2
TOP: Chords, Secants and Tangents   KEY: mixed

32 ANS:

$$V = (\pi)(4^2)(9) + \left(\frac{1}{2}\right)\left(\frac{4}{3}\right)(\pi)\left(4^3\right) \approx 586$$

PTS: 4   REF: 011833geo   NAT: G.GMD.A.3   TOP: Volume
KEY: compositions

33 ANS: 1
NYSED accepts either (1) or (3) as a correct answer. Statement III is not true if *A, B, A'* and *B'* are collinear.

PTS: 2   REF: 061714geo   NAT: G.SRT.A.2   TOP: Compositions of Transformations
KEY: basic

34 ANS: 4   PTS: 2   REF: 011819geo   NAT: G.CO.C.11
TOP: Special Quadrilaterals

35 ANS:

$$\frac{\pi \cdot 11.25^2 \cdot 33.5}{231} \approx 57.7$$

PTS: 4   REF: 061632geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

36 ANS:

$$\tan 47 = \frac{x}{8.5} \quad \text{Cone: } V = \frac{1}{3}\,\pi(8.5)^2(9.115) \approx 689.6 \quad \text{Cylinder: } V = \pi(8.5)^2(25) \approx 5674.5 \quad \text{Hemisphere:}$$

$$x \approx 9.115$$

$$V = \frac{1}{2}\left(\frac{4}{3}\,\pi(8.5)^3\right) \approx 1286.3 \quad 689.6 + 5674.5 + 1286.3 \approx 7650 \quad \text{No, because } 7650 \cdot 62.4 = 477{,}360$$

$477{,}360 \cdot .85 = 405{,}756$, which is greater than 400,000.

PTS: 6   REF: 061535geo   NAT: G.MG.A.2   TOP: Density

37 ANS:
Reflections are rigid motions that preserve distance.

PTS: 2   REF: 061530geo   NAT: G.CO.B.7   TOP: Triangle Congruency

38 ANS: 3

$\dfrac{7-1}{0-2} = \dfrac{6}{-2} = -3$ The diagonals of a rhombus are perpendicular.

PTS: 2   REF: 011719geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane

39 ANS: 1

$x^2 + y^2 - 6y + 9 = -1 + 9$

$x^2 + (y-3)^2 = 8$

PTS: 2   REF: 011718geo   NAT: G.GPE.A.1   TOP: Equations of Circles

KEY: completing the square

40 ANS: 4

$\dfrac{1}{2} = \dfrac{x+3}{3x-1}$ $GR = 3(7) - 1 = 20$

$3x - 1 = 2x + 6$

$x = 7$

PTS: 2   REF: 011620geo   NAT: G.SRT.B.5   TOP: Similarity

KEY: basic

41 ANS: 1

$\dfrac{64}{4} = 16$ $16^2 = 256$ $2w + 2(w+2) = 64$ $15 \times 17 = 255$ $2w + 2(w+4) = 64$ $14 \times 18 = 252$ $2w + 2(w+6) = 64$

                           $w = 15$ $w = 14$ $w = 13$

$13 \times 19 = 247$

PTS: 2   REF: 011708geo   NAT: G.MG.A.3   TOP: Area of Polygons

42 ANS:

$\dfrac{40000}{\pi\left(\dfrac{51}{2}\right)^2} \approx 19.6$ $\dfrac{72000}{\pi\left(\dfrac{75}{2}\right)^2} \approx 16.3$ Dish A

PTS: 2   REF: 011630geo   NAT: G.MG.A.2   TOP: Density

43 ANS: 3

$\cos 40 = \dfrac{14}{x}$

$x \approx 18$

PTS: 2   REF: 011712geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

44 ANS:
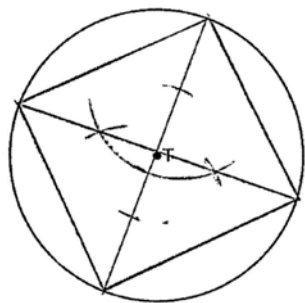
PTS: 2   REF: 061525geo   NAT: G.CO.D.13   TOP: Constructions

45 ANS:

$A(-2,1) \rightarrow (-3,-1) \rightarrow (-6,-2) \rightarrow (-5,0)$, $B(0,5) \rightarrow (-1,3) \rightarrow (-2,6) \rightarrow (-1,8)$,
$C(4,-1) \rightarrow (3,-3) \rightarrow (6,-6) \rightarrow (7,-4)$

PTS: 2   REF: 061826geo   NAT: G.SRT.A.2   TOP: Dilations

46 ANS:

$m_{\overline{TS}} = \dfrac{-10}{6} = -\dfrac{5}{3}$ $m_{\overline{SR}} = \dfrac{3}{5}$ Since the slopes of $\overline{TS}$ and $\overline{SR}$ are opposite reciprocals, they are perpendicular and

form a right angle. $\triangle RST$ is a right triangle because $\angle S$ is a right angle. $P(0,9)$ $m_{\overline{RP}} = \dfrac{-10}{6} = -\dfrac{5}{3}$ $m_{\overline{PT}} = \dfrac{3}{5}$

Since the slopes of all four adjacent sides ($\overline{TS}$ and $\overline{SR}$, $\overline{SR}$ and $\overline{RP}$, $\overline{PT}$ and $\overline{TS}$, $\overline{RP}$ and $\overline{PT}$) are opposite reciprocals, they are perpendicular and form right angles. Quadrilateral $RSTP$ is a rectangle because it has four right angles.
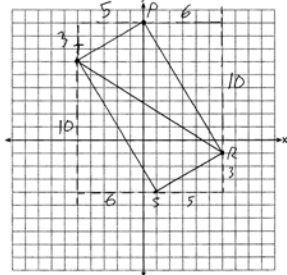
PTS: 6   REF: 061536geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

47 ANS: 2

$m = \dfrac{3}{2}$. $1 = -\dfrac{2}{3}(-6) + b$

$m_\perp = -\dfrac{2}{3}$ $1 = 4 + b$

          $-3 = b$

PTS: 2   REF: 061719geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

48 ANS: 2

$-4 + \dfrac{2}{5}(6 - -4) = -4 + \dfrac{2}{5}(10) = -4 + 4 = 0$ $5 + \dfrac{2}{5}(20 - 5) = 5 + \dfrac{2}{5}(15) = 5 + 6 = 11$

PTS: 2   REF: 061715geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

49 ANS: 2

$SA = 6 \cdot 12^2 = 864$

$\dfrac{864}{450} = 1.92$

PTS: 2   REF: 061519geo   NAT: G.MG.A.3   TOP: Surface Area

50 ANS:

Reflection across the *y*-axis, then translation up 5.

PTS: 2   REF: 061827geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: identify

51 ANS: 1

$82.8 = \dfrac{1}{3}(4.6)(9)h$

$\quad h = 6$

PTS: 2   REF: 061810geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

52 ANS: 2

$\sqrt{3 \cdot 21} = \sqrt{63} = 3\sqrt{7}$

PTS: 2   REF: 011622geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: altitude

53 ANS: 1

$m = \left(\dfrac{-11 + 5}{2}, \dfrac{5 + -7}{2} \right) = (-3, -1)$ $m = \dfrac{5 - -7}{-11 - 5} = \dfrac{12}{-16} = -\dfrac{3}{4}$ $m_{\perp} = \dfrac{4}{3}$

PTS: 2   REF: 061612geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: perpendicular bisector

54 ANS: 4   PTS: 2   REF: 011803geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: graphics

55 ANS:

Parallelogram *ABCD* with diagonal $\overline{AC}$ drawn (given). $\overline{AC} \cong \overline{AC}$ (reflexive property). $\overline{AD} \cong \overline{CB}$ and $\overline{BA} \cong \overline{DC}$ (opposite sides of a parallelogram are congruent). $\triangle ABC \cong \triangle CDA$ (SSS).

PTS: 2   REF: 011825geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

56 ANS:

$s = \theta \cdot r$ $s = \theta \cdot r$ Yes, both angles are equal.

$\pi = A \cdot 4$ $\dfrac{13\pi}{8} = B \cdot 6.5$

$\dfrac{\pi}{4} = A$

       $\dfrac{\pi}{4} = B$

PTS: 2   REF: 061629geo   NAT: G.C.B.5   TOP: Arc Length
KEY: arc length

57 ANS: 4   PTS: 2   REF: 061512geo   NAT: G.SRT.C.7
TOP: Cofunctions

58 ANS: 3

1) only proves AA; 2) need congruent legs for HL; 3) SAS; 4) only proves product of altitude and base is equal

PTS: 2   REF: 061607geo   NAT: G.SRT.B.5   TOP: Triangle Proofs
KEY: statements

59 ANS:
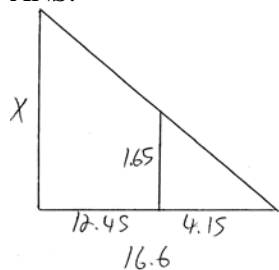
$\dfrac{1.65}{4.15} = \dfrac{x}{16.6}$

$4.15x = 27.39$

$x = 6.6$

PTS: 2   REF: 061531geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

60 ANS: 1   PTS: 2   REF: 011601geo   NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

61 ANS:
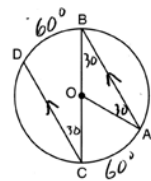
$180 - 2(30) = 120$

PTS: 2   REF: 011626geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: parallel lines

62 ANS:

$T_{0,-2} \circ r_{y\text{-axis}}$

PTS: 2   REF: 011726geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: identify

63 ANS:
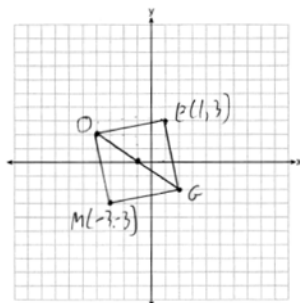
PTS: 2   REF: 011731geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

64 ANS:

Quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \| \overline{CD}$, and $\overline{BF}$ and $\overline{DE}$ are perpendicular to diagonal $\overline{AC}$ at points F and E (given). $\angle AED$ and $\angle CFB$ are right angles (perpendicular lines form right angles). $\angle AED \cong \angle CFB$ (All right angles are congruent). $ABCD$ is a parallelogram (A quadrilateral with one pair of sides congruent and parallel is a parallelogram). $\overline{AD} \| \overline{BC}$ (Opposite sides of a parallelogram are parallel). $\angle DAE \cong \angle BCF$ (Parallel lines cut by a transversal form congruent alternate interior angles). $\overline{DA} \cong \overline{BC}$ (Opposite sides of a parallelogram are congruent). $\triangle ADE \cong \triangle CBF$ (AAS). $\overline{AE} \cong \overline{CF}$ (CPCTC).

PTS: 6   REF: 011735geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

65 ANS:

$A = 6^2 \pi = 36\pi \quad 36\pi \cdot \dfrac{x}{360} = 12\pi$

$$x = 360 \cdot \dfrac{12}{36}$$

$$x = 120$$

PTS: 2   REF: 061529geo   NAT: G.C.B.5   TOP: Sectors

66 ANS: 4

Opposite angles of an inscribed quadrilateral are supplementary.

PTS: 2   REF: 011821geo   NAT: G.C.A.3   TOP: Inscribed Quadrilaterals

67 ANS: 3

1) $\dfrac{12}{9} = \dfrac{4}{3}$ 2) AA 3) $\dfrac{32}{16} \ne \dfrac{8}{2}$ 4) SAS

PTS: 2   REF: 061605geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

68 ANS:

$$\tan 15 = \frac{6250}{x} \qquad \tan 52 = \frac{6250}{y} \qquad 23325.3 - 4883 = 18442 \qquad \frac{18442 \text{ ft}}{1 \text{ min}} \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) \left(\frac{60 \text{ min}}{1 \text{ h}} \right) \approx 210$$

$$x \approx 23325.3 \qquad y \approx 4883$$

PTS: 6　　　　　REF: 061736geo　　NAT: G.SRT.C.8　　TOP: Using Trigonometry to Find a Side
KEY: advanced

69 ANS:

$$V = \pi(10)^2(18) = 1800\pi \text{ in}^3 \quad 1800\pi \text{ in}^3 \left(\frac{1 \text{ ft}^3}{12^3 \text{ in}^3} \right) = \frac{25}{24}\pi \text{ ft}^3 \quad \frac{25}{24}\pi(95.46)(0.85) \approx 266 \quad 266 + 270 = 536$$

PTS: 4　　　　　REF: 061834geo　　NAT: G.MG.A.2　　TOP: Density

70 ANS: 2　　　　PTS: 2　　　　　REF: 011610geo　　NAT: G.SRT.A.1
TOP: Line Dilations

71 ANS: 4　　　　PTS: 2　　　　　REF: 061615geo　　NAT: G.SRT.C.6
TOP: Trigonometric Ratios

72 ANS: 2

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

$$x^2 - 10x + 25 + y^2 - 4y + 4 = 16$$

$$x^2 - 10x + y^2 - 4y = -13$$

PTS: 2　　　　　REF: 061820geo　　NAT: G.GPE.A.1　　TOP: Equations of Circles
KEY: write equation, given graph

73 ANS: 1

$$84 = \frac{1}{3} \cdot s^2 \cdot 7$$

$$6 = s$$

PTS: 2　　　　　REF: 061716geo　　NAT: G.GMD.A.3　　TOP: Volume
KEY: pyramids

74 ANS: 3

$$\frac{360°}{5} = 72° \quad 216° \text{ is a multiple of } 72°$$

PTS: 2　　　　　REF: 061819geo　　NAT: G.CO.A.3　　TOP: Mapping a Polygon onto Itself

75 ANS: 4

$$\frac{1}{2}(360 - 268) = 46$$

PTS: 2　　　　　REF: 061704geo　　NAT: G.C.A.2　　TOP: Chords, Secants and Tangents
KEY: inscribed

76 ANS:
Yes. The sequence of transformations consists of a reflection and a translation, which are isometries which preserve distance and congruency.

PTS: 2 REF: 011628geo NAT: G.CO.B.7 TOP: Triangle Congruency

77 ANS: 2
$8(x + 8) = 6(x + 18)$

$8x + 64 = 6x + 108$

$2x = 44$

$x = 22$

PTS: 2 REF: 011715geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

78 ANS: 4 PTS: 2 REF: 061803geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics

79 ANS: 4 PTS: 2 REF: 061502geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic

80 ANS: 1
$2x + 4 + 46 = 90$

$2x = 40$

$x = 20$

PTS: 2 REF: 061808geo NAT: G.SRT.C.7 TOP: Cofunctions

81 ANS: 2
$-4 + \frac{2}{5}(1 - -4) = -4 + \frac{2}{5}(5) = -4 + 2 = -2$ $-2 + \frac{2}{5}(8 - -2) = -2 + \frac{2}{5}(10) = -2 + 4 = 2$

PTS: 2 REF: 061814geo NAT: G.GPE.B.6 TOP: Directed Line Segments

82 ANS: 1
$\frac{1000}{20\pi} \approx 15.9$

PTS: 2 REF: 011623geo NAT: G.GMD.A.1 TOP: Circumference

83 ANS: 2 PTS: 2 REF: 061720geo NAT: G.CO.C.11
TOP: Parallelograms

84 ANS: 1 PTS: 2 REF: 061707geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

85 ANS:
$\frac{3.75}{5} = \frac{4.5}{6}$ $\overline{AB}$ is parallel to $\overline{CD}$ because $\overline{AB}$ divides the sides proportionately.

$39.375 = 39.375$

PTS: 2 REF: 061627geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

86 ANS: 1

$B: (4-3, 3-4) \rightarrow (1,-1) \rightarrow (2,-2) \rightarrow (2+3, -2+4)$

$C: (2-3, 1-4) \rightarrow (-1,-3) \rightarrow (-2,-6) \rightarrow (-2+3, -6+4)$

PTS: 2   REF: 011713geo   NAT: G.SRT.A.1   TOP: Line Dilations

87 ANS:
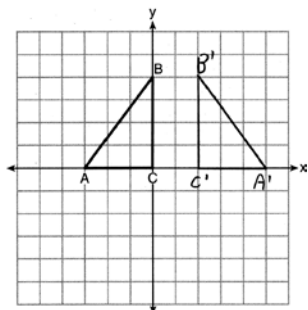
PTS: 2   REF: 011625geo   NAT: G.CO.A.5   TOP: Reflections
KEY: grids

88 ANS:

$$\tan 72 = \frac{x}{400} \qquad \sin 55 = \frac{400 \tan 72}{y}$$

$$x = 400 \tan 72 \qquad y = \frac{400 \tan 72}{\sin 55} \approx 1503$$

PTS: 4   REF: 061833geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

89 ANS: 1

$$\frac{360°}{45°} = 8$$

PTS: 2   REF: 061510geo   NAT: G.CO.A.3   TOP: Mapping a Polygon onto Itself

90 ANS:

$x = \sqrt{.55^2 - .25^2} \cong 0.49$ No, $.49^2 = .25y$ $.9604 + .25 < 1.5$

$.9604 = y$

PTS: 4   REF: 061534geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

91 ANS: 1

$$V = \frac{1}{3} \pi \left(\frac{1.5}{2}\right)^2 \left(\frac{4}{2}\right) \approx 1.2$$

PTS: 2   REF: 011724geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

92 ANS:
Yes, as translations do not change angle measurements.

PTS: 2 REF: 061825geo NAT: G.CO.B.6 TOP: Properties of Transformations
KEY: basic

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

PTS: 2 REF: 011615geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

94 ANS: 4
$m = -\dfrac{1}{2}$ $-4 = 2(6) + b$
$m_\perp = 2$ $-4 = 12 + b$
       $-16 = b$

PTS: 2 REF: 011602geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

95 ANS: 2
x is $\dfrac{1}{2}$ the circumference. $\dfrac{C}{2} = \dfrac{10\pi}{2} \approx 16$

PTS: 2 REF: 061523geo NAT: G.GMD.A.1 TOP: Circumference

96 ANS: 3 PTS: 2 REF: 061616geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics

97 ANS: 1
$\cos S = \dfrac{60}{65}$
   $S \approx 23$

PTS: 2 REF: 061713geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

98 ANS: 3 PTS: 2 REF: 061816geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

99 ANS: 1
$24x = 10^2$
$24x = 100$
   $x \approx 4.2$

PTS: 2 REF: 061823geo NAT: G.SRT.B.5 TOP: Similarity
KEY: leg

100 ANS: 2
$4 \times 4 \times 6 - \pi(1)^2(6) \approx 77$

PTS: 2 REF: 011711geo NAT: G.GMD.A.3 TOP: Volume
KEY: compositions

101 ANS: 2

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

$$x^2 - 6x + 9 + y^2 + 2y + 1 = 6 + 9 + 1$$

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

PTS: 2 REF: 011812geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

102 ANS:
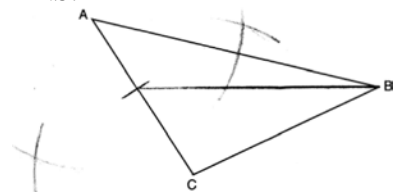
PTS: 2 REF: 061829geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

103 ANS: 1

$$\frac{f}{4} = \frac{15}{6}$$

$$f = 10$$

PTS: 2 REF: 061617geo NAT: G.CO.C.9 TOP: Lines and Angles

104 ANS: 3

$$\frac{9}{5} = \frac{9.2}{x} \quad 5.1 + 9.2 = 14.3$$

$$9x = 46$$

$$x \approx 5.1$$

PTS: 2 REF: 061511geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

105 ANS:
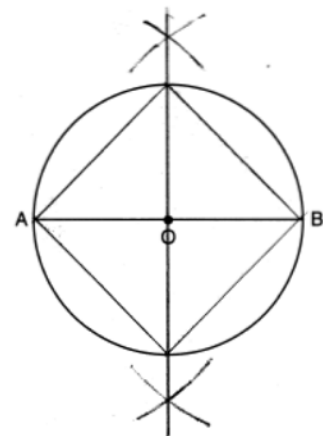
PTS: 2 REF: 011826geo NAT: G.CO.D.13 TOP: Constructions

106 ANS: 1
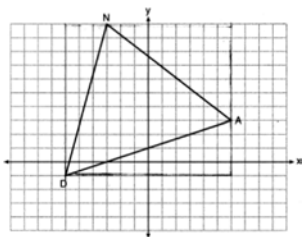
$$(12 \cdot 11) - \left(\frac{1}{2} (12 \cdot 4) + \frac{1}{2} (7 \cdot 9) + \frac{1}{2} (11 \cdot 3) \right) = 60$$

PTS: 2　　　REF: 061815geo　　NAT: G.GPE.B.7　　TOP: Polygons in the Coordinate Plane

107 ANS: 4　　　PTS: 2　　　REF: 061501geo　　NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

108 ANS: 1　　　PTS: 2　　　REF: 061518geo　　NAT: G.SRT.A.1
TOP: Line Dilations

109 ANS:
$\overline{GI}$ is parallel to $\overline{NT}$, and $\overline{IN}$ intersects at A (given); $\angle I \cong \angle N$, $\angle G \cong \angle T$ (paralleling lines cut by a transversal form congruent alternate interior angles); $\triangle GIA \sim \triangle TNA$ (AA).

PTS: 2　　　REF: 011729geo　　NAT: G.SRT.A.3　　TOP: Similarity Proofs

110 ANS: 2

$$h^2 = 30 \cdot 12$$

$$h^2 = 360$$

$$h = 6\sqrt{10}$$

PTS: 2　　　REF: 061613geo　　NAT: G.SRT.B.5　　TOP: Similarity
KEY: altitude

111 ANS: 1
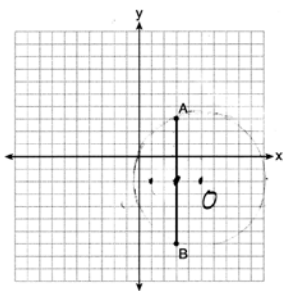
Since the midpoint of $\overline{AB}$ is $(3, -2)$, the center must be either $(5, -2)$ or $(1, -2)$.

$$r = \sqrt{2^2 + 5^2} = \sqrt{29}$$

PTS: 2　　　REF: 061623geo　　NAT: G.GPE.A.1　　TOP: Equations of Circles
KEY: other

112 ANS: 4

The slope of $\overline{BC}$ is $\frac{2}{5}$. Altitude is perpendicular, so its slope is $-\frac{5}{2}$.

PTS: 2　　　REF: 061614geo　　NAT: G.GPE.B.5　　TOP: Parallel and Perpendicular Lines
KEY: find slope of perpendicular line

113 ANS:

Yes. The triangles are congruent because of SSS $\left(5^2 + 12^2 = 13^2 \right)$. All congruent triangles are similar.

PTS: 2　　　REF: 061830geo　　NAT: G.SRT.B.5　　TOP: Triangle Congruency

114 ANS:

Since linear angles are supplementary, m$\angle GIH = 65°$. Since $\overline{GH} \cong \overline{IH}$, m$\angle GHI = 50°$ $(180 - (65 + 65))$. Since $\angle EGB \cong \angle GHI$, the corresponding angles formed by the transversal and lines are congruent and $\overline{AB} \parallel \overline{CD}$.

PTS: 4　　　REF: 061532geo　　NAT: G.CO.C.9　　TOP: Lines and Angles

115 ANS: 3　　　PTS: 2　　　REF: 061802geo　　NAT: G.CO.C.9
TOP: Lines and Angles

116 ANS:

A dilation of $\dfrac{5}{2}$ about the origin. Dilations preserve angle measure, so the triangles are similar by AA.

PTS: 4　　　REF: 061634geo　　NAT: G.SRT.A.3　　TOP: Similarity Proofs

117 ANS: 1

M is a centroid, and cuts each median 2:1.

PTS: 2　　　REF: 061818geo　　NAT: G.CO.C.10
TOP: Centroid, Orthocenter, Incenter and Circumcenter

118 ANS: 4　　　PTS: 2　　　REF: 011611geo　　NAT: G.CO.B.6
TOP: Properties of Transformations　　KEY: graphics

119 ANS: 2

The line $y = -3x + 6$ passes through the center of dilation, so the dilated line is not distinct.

PTS: 2　　　REF: 061824geo　　NAT: G.SRT.A.1　　TOP: Line Dilations

120 ANS:

$\tan x = \dfrac{10}{4}$

$x \approx 68$

PTS: 2　　　REF: 061630geo　　NAT: G.SRT.C.8　　TOP: Using Trigonometry to Find an Angle

121 ANS: 1

$360 - (82 + 104 + 121) = 53$

PTS: 2　　　REF: 011801geo　　NAT: G.CO.B.6　　TOP: Properties of Transformations
KEY: graph

122 ANS: 4　　　PTS: 2　　　REF: 011723geo　　NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

123 ANS: 4　　　PTS: 2　　　REF: 061513geo　　NAT: G.CO.C.11
TOP: Parallelograms

124 ANS: 3

$$\cos A = \frac{9}{14}$$

$$A \approx 50°$$

PTS: 2 REF: 011616geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

125 ANS:

$$C = 2\pi r \quad V = \frac{1}{3}\pi \cdot 5^2 \cdot 13 \approx 340$$

$$31.416 = 2\pi r$$

$$5 \approx r$$

PTS: 4 REF: 011734geo NAT: G.GMD.A.3 TOP: Volume
KEY: cones

126 ANS:

$$\frac{40}{360} \cdot \pi(4.5)^2 = 2.25\pi$$

PTS: 2 REF: 061726geo NAT: G.C.B.5 TOP: Sectors

127 ANS:
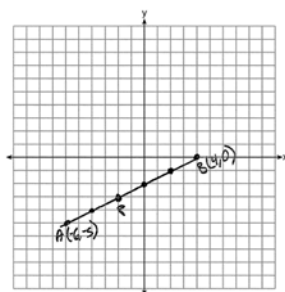
$$-6 + \frac{2}{5}(4--6) \quad -5 + \frac{2}{5}(0--5) \quad (-2,-3)$$

$$-6 + \frac{2}{5}(10) \qquad -5 + \frac{2}{5}(5)$$

$$-6 + 4 \qquad -5 + 2$$

$$-2 \qquad -3$$

PTS: 2 REF: 061527geo NAT: G.GPE.B.6 TOP: Directed Line Segments

128 ANS: 1
1) opposite sides; 2) adjacent sides; 3) perpendicular diagonals; 4) diagonal bisects angle

PTS: 2 REF: 061609geo NAT: G.CO.C.11 TOP: Special Quadrilaterals

129 ANS:

$$\cos W = \frac{6}{18}$$

$$W \approx 71$$

PTS: 2 REF: 011831geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

130 ANS: 4
$3 \times 6 = 18$

PTS: 2   REF: 061602geo   NAT: G.SRT.A.1   TOP: Line Dilations

131 ANS: 3
$2.5 \times 1.25 \times (27 \times 12) + \frac{1}{2}\pi(1.25)^2(27 \times 12) \approx 1808$

PTS: 2   REF: 061723geo   NAT: G.GMD.A.3   TOP: Volume
KEY: compositions

132 ANS: 4
$x^2 + 6x + 9 + y^2 - 4y + 4 = 23 + 9 + 4$

$\quad (x+3)^2 + (y-2)^2 = 36$

PTS: 2   REF: 011617geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

133 ANS: 2
$m = \frac{3}{2}$

$m_\perp = -\frac{2}{3}$

PTS: 2   REF: 061812geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

134 ANS: 3
$\frac{AB}{BC} = \frac{DE}{EF}$

$\frac{9}{15} = \frac{6}{10}$

$\quad 90 = 90$

PTS: 2   REF: 061515geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

135 ANS: 3   PTS: 2   REF: 061524geo   NAT: G.CO.B.7
TOP: Triangle Congruency

136 ANS:

$\tan 52.8 = \dfrac{h}{x}$

$\quad h = x\tan 52.8$

$\tan 34.9 = \dfrac{h}{x+8}$

$\quad h = (x+8)\tan 34.9$

$x\tan 52.8 = x\tan 34.9 + 8\tan 34.9 \quad \tan 52.8 \approx \dfrac{h}{9} \quad 11.86 + 1.7 \approx 13.6$

$x\tan 52.8 - x\tan 34.9 = 8\tan 34.9$

$x(\tan 52.8 - \tan 34.9) = 8\tan 34.9 \qquad\qquad\qquad x \approx 11.86$

$x = \dfrac{8\tan 34.9}{\tan 52.8 - \tan 34.9}$

$x \approx 9$

PTS: 6 REF: 011636geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

137 ANS:
$10 \cdot 6 = 15x$

$\quad x = 4$

PTS: 2 REF: 061828geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

138 ANS: 2
$V = \dfrac{1}{3} \cdot 6^2 \cdot 12 = 144$

PTS: 2 REF: 011607geo NAT: G.GMD.A.3 TOP: Volume
KEY: pyramids

139 ANS: 2
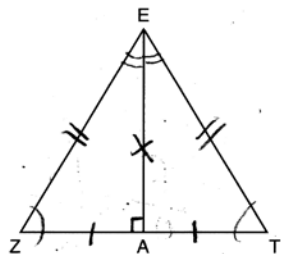
PTS: 2 REF: 061619geo NAT: G.CO.C.10 TOP: Triangle Proofs

140 ANS: 4 PTS: 2 REF: 011609geo NAT: G.SRT.C.7
TOP: Cofunctions

141 ANS: 1
$\dfrac{1}{2}\left(\dfrac{4}{3}\right)\pi \cdot 5^3 \cdot 62.4 \approx 16,336$

PTS: 2 REF: 061620geo NAT: G.MG.A.2 TOP: Density

142 ANS: 3
$\sqrt{(-5)^2 + 12^2} = \sqrt{169} \quad \sqrt{11^2 + (2\sqrt{12})^2} = \sqrt{121 + 48} = \sqrt{169}$

PTS: 2 REF: 011722geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

143 ANS: 4 PTS: 2 REF: 061711geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

144 ANS: 4

$\frac{7}{12} \cdot 30 = 17.5$

PTS: 2 REF: 061521geo NAT: G.SRT.B.5 TOP: Similarity
KEY: perimeter and area

145 ANS: 3 PTS: 2 REF: 011714geo NAT: G.SRT.C.6
TOP: Trigonometric Ratios

146 ANS: 4
AA

PTS: 2 REF: 061809geo NAT: G.SRT.A.3 TOP: Similarity Proofs

147 ANS:
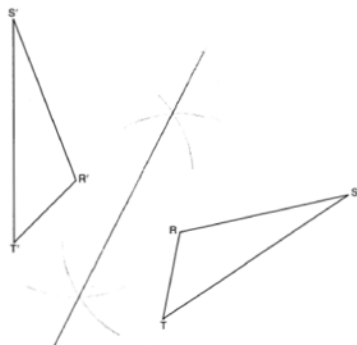
PTS: 2 REF: 011725geo NAT: G.CO.D.12 TOP: Constructions
KEY: line bisector

148 ANS: 1 PTS: 2 REF: 061508geo NAT: G.C.A.2
TOP: Chords, Secants and Tangents KEY: inscribed

149 ANS: 2 PTS: 2 REF: 011702geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

150 ANS: 4 PTS: 2 REF: 061606geo NAT: G.GMD.A.3
TOP: Volume KEY: compositions

151 ANS: 2

$14 \times 16 \times 10 = 2240 \quad \frac{2240 - 1680}{2240} = 0.25$

PTS: 2 REF: 011604geo NAT: G.GMD.A.3 TOP: Volume
KEY: prisms

152 ANS: 4

$\frac{300}{360} \cdot 8^2 \pi = \frac{160\pi}{3}$

PTS: 2 REF: 011721geo NAT: G.C.B.5 TOP: Sectors

153 ANS: 4

$$\sin 70 = \frac{x}{20}$$

$$x \approx 18.8$$

PTS: 2   REF: 061611geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: without graphics

154 ANS: 1

$$20 \cdot 12 \cdot 45 + \frac{1}{2}\pi(10)^2(45) \approx 17869$$

PTS: 2   REF: 061807geo   NAT: G.GMD.A.3   TOP: Volume
KEY: compositions

155 ANS: 2   PTS: 2   REF: 061610geo   NAT: G.C.A.2
TOP: Chords, Secants and Tangents   KEY: inscribed

156 ANS:

$$\cos 54 = \frac{4.5}{m} \quad \tan 54 = \frac{h}{4.5}$$

$$m \approx 7.7 \qquad h \approx 6.2$$

PTS: 4   REF: 011834geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

157 ANS:

$$\sin 70 = \frac{30}{L}$$

$$L \approx 32$$

PTS: 2   REF: 011629geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: graphics

158 ANS:

$$20000\,\text{g}\left(\frac{1\,\text{ft}^3}{7.48\,\text{g}}\right) = 2673.8\,\text{ft}^3 \quad 2673.8 = \pi r^2(34.5) \quad 9.9 + 1 = 10.9$$

$$r \approx 4.967$$

$$d \approx 9.9$$

PTS: 4   REF: 061734geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cylinders

159 ANS: 1   PTS: 2   REF: 061604geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: graphics

160 ANS: 1
The line $3y = -2x + 8$ does not pass through the center of dilation, so the dilated line will be distinct from
$3y = -2x + 8$. Since a dilation preserves parallelism, the line $3y = -2x + 8$ and its image $2x + 3y = 5$ are parallel,
with slopes of $-\frac{2}{3}$.

PTS: 2   REF: 061522geo   NAT: G.SRT.A.1   TOP: Line Dilations

161 ANS: 3
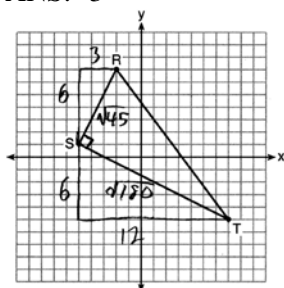
$\sqrt{45} = 3\sqrt{5}$ $a = \frac{1}{2}\left(3\sqrt{5}\right)\left(6\sqrt{5}\right) = \frac{1}{2}(18)(5) = 45$

$\sqrt{180} = 6\sqrt{5}$

PTS: 2   REF: 061622geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane
162 ANS: 3   PTS: 2   REF: 061703geo   NAT: G.SRT.C.7
TOP: Cofunctions
163 ANS: 3
$\dfrac{x + 72}{2} = 58$

$x + 72 = 116$

$\quad x = 44$

PTS: 2   REF: 061817geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: intersecting chords, angle
164 ANS: 3   PTS: 2   REF: 011621geo   NAT: G.C.A.2
TOP: Chords, Secants and Tangents   KEY: inscribed
165 ANS:
A dilation of 3 centered at *A*. A dilation preserves angle measure, so the triangles are similar.

PTS: 4   REF: 011832geo   NAT: G.SRT.A.2   TOP: Dilations
166 ANS: 2
$\tan \theta = \dfrac{2.4}{x}$

$\dfrac{3}{7} = \dfrac{2.4}{x}$

$x = 5.6$

PTS: 2   REF: 011707geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
167 ANS:
Yes, because 28° and 62° angles are complementary. The sine of an angle equals the cosine of its complement.

PTS: 2   REF: 011727geo   NAT: G.SRT.C.7   TOP: Cofunctions

168 ANS:
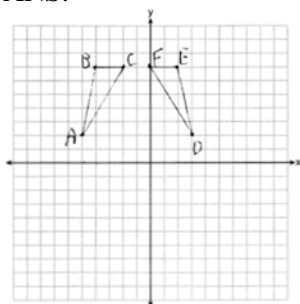
$r_{x=-1}$ Reflections are rigid motions that preserve distance, so $\triangle ABC \cong \triangle DEF$.

PTS: 4   REF: 061732geo   NAT: G.CO.A.2   TOP: Identifying Transformations
KEY: graphics

169 ANS:

$SAS \cong SAS$
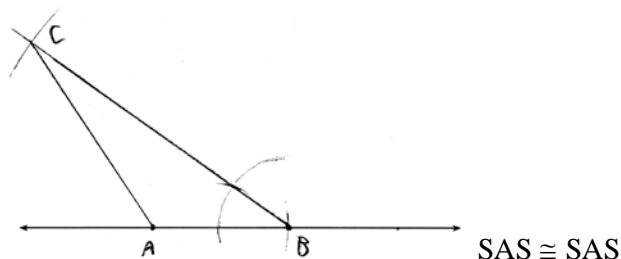
PTS: 4   REF: 011634geo   NAT: G.CO.D.12   TOP: Constructions
KEY: congruent and similar figures

170 ANS:

$\overline{RS}$ and $\overline{TV}$ bisect each other at point X; $\overline{TR}$ and $\overline{SV}$ are drawn (given); $\overline{TX} \cong \overline{XV}$ and $\overline{RX} \cong \overline{XS}$ (segment bisectors create two congruent segments); $\angle TXR \cong \angle VXS$ (vertical angles are congruent); $\triangle TXR \cong \triangle VXS$ (SAS); $\angle T \cong \angle V$ (CPCTC); $\overline{TR} \parallel \overline{SV}$ (a transversal that creates congruent alternate interior angles cuts parallel lines).

PTS: 4   REF: 061733geo   NAT: G.SRT.B.5   TOP: Triangle Proofs
KEY: proof

171 ANS:

$$\frac{Q}{360}(\pi)\left(25^2\right) = (\pi)\left(25^2\right) - 500\pi$$

$$Q = \frac{125\pi(360)}{625\pi}$$

$$Q = 72$$

PTS: 2   REF: 011828geo   NAT: G.C.B.5   TOP: Sectors

24

172 ANS: 1

$$m = \frac{-4}{-6} = \frac{2}{3}$$

$$m_\perp = -\frac{3}{2}$$

PTS: 2   REF: 011820geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of perpendicular line

173 ANS:
If an altitude is drawn to the hypotenuse of a triangle, it divides the triangle into two right triangles similar to each other and the original triangle.

PTS: 2   REF: 061729geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: altitude

174 ANS: 4

$$\frac{2}{4} = \frac{9-x}{x}$$

$$36 - 4x = 2x$$

$$x = 6$$

PTS: 2   REF: 061705geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

175 ANS: 1

$$\sin 32 = \frac{O}{129.5}$$

$$O \approx 68.6$$

PTS: 2   REF: 011804geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

176 ANS: 3

$$\frac{24}{40} = \frac{15}{x}$$

$$24x = 600$$

$$x = 25$$

PTS: 2   REF: 011813geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

177 ANS:
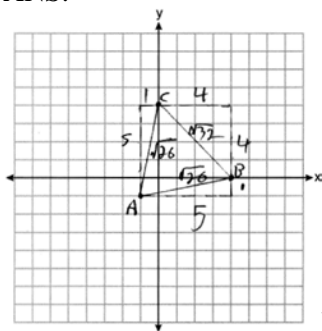
 Because $\overline{AB} \cong \overline{AC}$, $\triangle ABC$ has two congruent sides and is isosceles. Because $\overline{AB} \cong \overline{BC}$ is not true, $\triangle ABC$ has sides that are not congruent and $\triangle ABC$ is not equilateral.

PTS: 4   REF: 061832geo   NAT: G.GPE.B.4   TOP: Triangles in the Coordinate Plane

178 ANS: 3   PTS: 2   REF: 061702geo   NAT: G.GPE.B.7
TOP: Polygons in the Coordinate Plane

179 ANS: 2
$\triangle ACB \sim \triangle AED$

PTS: 2   REF: 061811geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

180 ANS: 1
Alternate interior angles

PTS: 2   REF: 061517geo   NAT: G.CO.C.9   TOP: Lines and Angles

181 ANS: 1   PTS: 2   REF: 011811geo   NAT: G.SRT.A.2
TOP: Dilations

182 ANS:
$73 + R = 90$ Equal cofunctions are complementary.

$\quad R = 17$

PTS: 2   REF: 061628geo   NAT: G.SRT.C.7   TOP: Cofunctions

183 ANS: 3
$r = \sqrt{(7-3)^2 + (1--2)^2} = \sqrt{16+9} = 5$

PTS: 2   REF: 061503geo   NAT: G.GPE.B.4   TOP: Circles in the Coordinate Plane

184 ANS: 1   PTS: 2   REF: 061801geo   NAT: G.CO.B.6
TOP: Properties of Transformations   KEY: graphics

185 ANS: 4
$9 \cdot 3 = 27$, $27 \cdot 4 = 108$

PTS: 2   REF: 061805geo   NAT: G.SRT.A.2   TOP: Dilations

186 ANS:

Parallelogram *ABCD*, $\overline{BF}\perp\overline{AFD}$, and $\overline{DE}\perp\overline{BEC}$ (given); $\overline{BC}\parallel\overline{AD}$ (opposite sides of a ▱ are ∥); $\overline{BE}\parallel\overline{FD}$ (parts of ∥ lines are ∥); $\overline{BF}\parallel\overline{DE}$ (two lines ⊥ to the same line are ∥); *BEDF* is ▱ (a quadrilateral with both pairs of opposite sides ∥ is a ▱); ∠*DEB* is a right ∠ (⊥ lines form right ∠s); *BEDF* is a rectangle (a ▱ with one right ∠ is a rectangle).

PTS: 6   REF: 061835geo   NAT: G.CO.C.11   TOP: Quadrilateral Proofs

187 ANS:

Parallelogram *ANDR* with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points *W* and *E* (Given). $\overline{AN}\cong\overline{RD}$, $\overline{AR}\cong\overline{DN}$ (Opposite sides of a parallelogram are congruent). $AE=\frac{1}{2}AR$, $WD=\frac{1}{2}DN$, so $\overline{AE}\cong\overline{WD}$ (Definition of bisect and division property of equality). $\overline{AR}\parallel\overline{DN}$ (Opposite sides of a parallelogram are parallel). *AWDE* is a parallelogram (Definition of parallelogram). $RE=\frac{1}{2}AR$, $NW=\frac{1}{2}DN$, so $\overline{RE}\cong\overline{NW}$ (Definition of bisect and division property of equality). $\overline{ED}\cong\overline{AW}$ (Opposite sides of a parallelogram are congruent). $\triangle ANW\cong\triangle DRE$ (SSS).

PTS: 6   REF: 011635geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

188 ANS: 4

$$\sin 71 = \frac{x}{20}$$

$$x = 20\sin 71 \approx 19$$

PTS: 2   REF: 061721geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: without graphics

189 ANS: 4   PTS: 2   REF: 011705geo   NAT: G.CO.C.11
TOP: Special Quadrilaterals

190 ANS:

Parallelogram *ABCD*, $\overline{EFG}$, and diagonal $\overline{DFB}$ (given); ∠*DFE* ≅ ∠*BFG* (vertical angles); $\overline{AD}\parallel\overline{CB}$ (opposite sides of a parallelogram are parallel); ∠*EDF* ≅ ∠*GBF* (alternate interior angles are congruent); $\triangle DEF \sim \triangle BGF$ (AA).

PTS: 4   REF: 061633geo   NAT: G.SRT.A.3   TOP: Similarity Proofs

191 ANS: 1   PTS: 2   REF: 011716geo   NAT: G.CO.C.11
TOP: Special Quadrilaterals

192 ANS: 2   PTS: 2   REF: 061506geo   NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

193 ANS: 3   PTS: 2   REF: 011710geo   NAT: G.CO.A.5
TOP: Compositions of Transformations   KEY: identify

194 ANS: 3

$$\frac{s_L}{s_S} = \frac{6\theta}{4\theta} = 1.5$$

PTS: 2   REF: 011824geo   NAT: G.C.B.5   TOP: Arc Length
KEY: arc length

195 ANS: 3

$6x - 40 + x + 20 = 180 - 3x$ m$\angle BAC = 180 - (80 + 40) = 60$

$\qquad 10x = 200$

$\qquad\quad x = 20$

PTS: 2   REF: 011809geo   NAT: G.CO.C.10   TOP: Exterior Angle Theorem

196 ANS: 2

$\angle B = 180 - (82 + 26) = 72$; $\angle DEC = 180 - 26 = 154$; $\angle EDB = 360 - (154 + 26 + 72) = 108$; $\angle BDF = \dfrac{108}{2} = 54$;

$\angle DFB = 180 - (54 + 72) = 54$

PTS: 2   REF: 061710geo   NAT: G.CO.C.10   TOP: Interior and Exterior Angles of Triangles

197 ANS: 4   PTS: 2   REF: 011816geo   NAT: G.C.A.2

TOP: Chords, Secants and Tangents   KEY: inscribed

198 ANS: 3   PTS: 2   REF: 061601geo   NAT: G.GMD.B.4

TOP: Rotations of Two-Dimensional Objects

199 ANS: 2

(1) AA; (3) SAS; (4) SSS. NYSED has stated that all students should be awarded credit regardless of their answer to this question.

PTS: 2   REF: 061724geo   NAT: G.SRT.B.5   TOP: Similarity

KEY: basic

200 ANS: 4   PTS: 2   REF: 061608geo   NAT: G.SRT.A.2

TOP: Compositions of Transformations   KEY: grids

201 ANS:

(2) Euclid's Parallel Postulate; (3) Alternate interior angles formed by parallel lines and a transversal are congruent; (4) Angles forming a line are supplementary; (5) Substitution

PTS: 4   REF: 011633geo   NAT: G.CO.C.10   TOP: Triangle Proofs

202 ANS: 1

$x = -5 + \dfrac{1}{3}(4 - -5) = -5 + 3 = -2 \qquad y = 2 + \dfrac{1}{3}(-10 - 2) = 2 - 4 = -2$

PTS: 2   REF: 011806geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

203 ANS: 3

$\dfrac{60}{360} \cdot 8^2 \pi = \dfrac{1}{6} \cdot 64\pi = \dfrac{32\pi}{3}$

PTS: 2   REF: 061624geo   NAT: G.C.B.5   TOP: Sectors

204 ANS: 2

$6 \cdot 6 = x(x - 5)$

$36 = x^2 - 5x$

$0 = x^2 - 5x - 36$

$0 = (x - 9)(x + 4)$

$x = 9$

PTS: 2 REF: 061708geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: intersecting chords, length

205 ANS: 4 PTS: 2 REF: 011810geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

206 ANS: 4 PTS: 2 REF: 011817geo NAT: G.SRT.B.5
TOP: Similarity KEY: basic

207 ANS: 4 PTS: 2 REF: 011808geo NAT: G.CO.A.2
TOP: Analytical Representations of Transformations KEY: basic

208 ANS: 1

$m = \dfrac{-A}{B} = \dfrac{-2}{-1} = 2$

$m_\perp = -\dfrac{1}{2}$

PTS: 2 REF: 061509geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines

209 ANS:
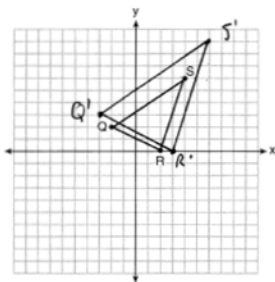
A dilation preserves slope, so the slopes of $\overline{QR}$ and $\overline{Q'R'}$ are equal. Because the slopes are equal, $Q'R' \parallel QR$.

PTS: 4 REF: 011732geo NAT: G.SRT.A.2 TOP: Dilations
KEY: grids

210 ANS: 2

$\dfrac{11}{1.2\,\text{oz}}\left(\dfrac{16\,\text{oz}}{1\,\text{lb}}\right) = \dfrac{13.\overline{3}1}{\text{lb}} \quad \dfrac{13.\overline{3}1}{\text{lb}}\left(\dfrac{1\,\text{g}}{3.785\,\text{l}}\right) \approx \dfrac{3.5\,\text{g}}{1\,\text{lb}}$

PTS: 2 REF: 061618geo NAT: G.MG.A.2 TOP: Density

211 ANS: 3

NYSED has stated that all students should be awarded credit regardless of their answer to this question.

PTS: 2 REF: 061722geo NAT: G.CO.B.7 TOP: Triangle Congruency

212 ANS:
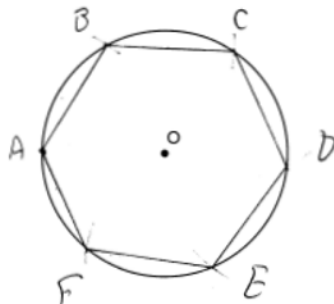
Right triangle because $\angle CBF$ is inscribed in a semi-circle.

PTS: 4 REF: 011733geo NAT: G.CO.D.13 TOP: Constructions

213 ANS: 3 PTS: 2 REF: 061706geo NAT: G.SRT.A.1

TOP: Line Dilations

214 ANS:
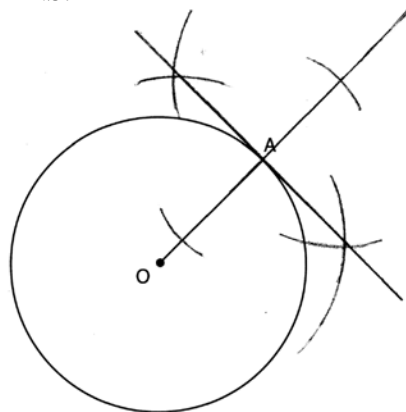
PTS: 2 REF: 061631geo NAT: G.CO.D.12 TOP: Constructions

KEY: parallel and perpendicular lines

215 ANS:

$T_{6,0} \circ r_{x\text{-axis}}$

PTS: 2 REF: 061625geo NAT: G.CO.A.5 TOP: Compositions of Transformations

KEY: identify

216 ANS:

No. Since $\overline{BC} = 5$ and $\overline{ST} = \sqrt{18}$ are not congruent, the two triangles are not congruent. Since rigid motions preserve distance, there is no rigid motion that maps $\triangle ABC$ onto $\triangle RST$.

PTS: 2 REF: 011830geo NAT: G.CO.B.7 TOP: Triangle Congruency

217 ANS:

$180 - 2(25) = 130$

PTS: 2 REF: 011730geo NAT: G.SRT.B.5 TOP: Isosceles Triangle Theorem

218 ANS: 2

$$\frac{12}{4} = \frac{36}{x}$$

$$12x = 144$$

$$x = 12$$

PTS: 2   REF: 061621geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

219 ANS: 1   PTS: 2   REF: 011608geo   NAT: G.CO.A.5
TOP: Compositions of Transformations   KEY: identify

220 ANS: 2
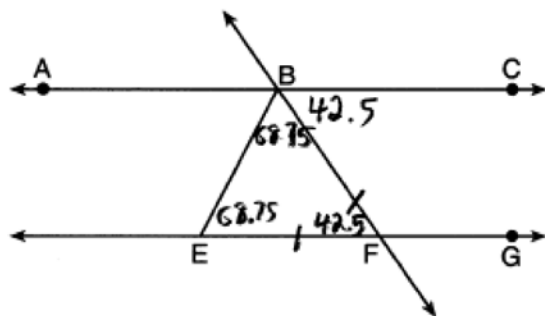
PTS: 2   REF: 011818geo   NAT: G.CO.C.9   TOP: Lines and Angles

221 ANS:

$$\frac{152 - 56}{2} = 48$$

PTS: 2   REF: 011728geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, angle

222 ANS:

$$500 \times 1015 \,\text{cc} \times \frac{\$0.29}{\text{kg}} \times \frac{7.95\,\text{g}}{\text{cc}} \times \frac{1\,\text{kg}}{1000\,\text{g}} = \$1170$$

PTS: 2   REF: 011829geo   NAT: G.MG.A.2   TOP: Density

223 ANS: 2   PTS: 2   REF: 061709geo   NAT: G.SRT.B.5
TOP: Triangle Proofs   KEY: statements

224 ANS:

$$\sqrt[3]{\frac{3V_f}{4\pi}} - \sqrt[3]{\frac{3V_p}{4\pi}} = \sqrt[3]{\frac{3(294)}{4\pi}} - \sqrt[3]{\frac{3(180)}{4\pi}} \approx 0.6$$

PTS: 2   REF: 061728geo   NAT: G.GMD.A.3   TOP: Volume
KEY: spheres

225 ANS: 2

$$\frac{4}{3}\pi \cdot 4^3 + 0.075 \approx 20$$

PTS: 2   REF: 011619geo   NAT: G.MG.A.2   TOP: Density

226 ANS:
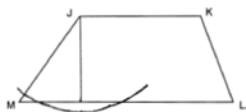
PTS: 2   REF: 061725geo   NAT: G.CO.D.12   TOP: Constructions
KEY: parallel and perpendicular lines

227 ANS: 3

$$\tan 34 = \frac{T}{20}$$

$$T \approx 13.5$$

PTS: 2   REF: 061505geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: graphics

228 ANS: 3

$$V = 12 \cdot 8.5 \cdot 4 = 408$$

$$W = 408 \cdot 0.25 = 102$$

PTS: 2   REF: 061507geo   NAT: G.MG.A.2   TOP: Density

229 ANS: 1

$$\frac{6}{8} = \frac{9}{12}$$

PTS: 2   REF: 011613geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

230 ANS:

Quadrilateral *ABCD* is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at *E* (Given). $\overline{AD} \cong \overline{BC}$ (Opposite sides of a parallelogram are congruent). $\angle AED \cong \angle CEB$ (Vertical angles are congruent). $\overline{BC} \parallel \overline{DA}$ (Definition of parallelogram). $\angle DBC \cong \angle BDA$ (Alternate interior angles are congruent). $\triangle AED \cong \triangle CEB$ (AAS). 180° rotation of $\triangle AED$ around point *E*.

PTS: 4   REF: 061533geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

231 ANS: 4

$$C = 12\pi \quad \frac{120}{360}(12\pi) = \frac{1}{3}(12\pi)$$

PTS: 2   REF: 061822geo   NAT: G.C.B.5   TOP: Arc Length
KEY: arc length

232 ANS: 1   PTS: 2   REF: 011814geo   NAT: G.SRT.A.1
TOP: Line Dilations

233 ANS: 3

$$V = \frac{1}{3} \pi r^2 h$$

$$54.45\pi = \frac{1}{3} \pi (3.3)^2 h$$

$$h = 15$$

PTS: 2   REF: 011807geo   NAT: G.GMD.A.3   TOP: Volume
KEY: cones

234 ANS:

$\triangle PAT$ is an isosceles triangle because sides $\overline{AP}$ and $\overline{AT}$ are congruent ($\sqrt{3^2 + 11^2} = \sqrt{7^2 + 9^2} = \sqrt{130}$).
$R(2,9)$. Quadrilateral $PART$ is a parallelogram because the opposite sides are parallel since they have equal slopes
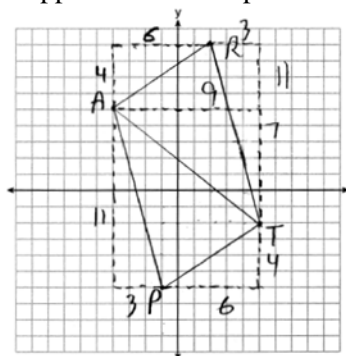
$(m_{\overline{AR}} = \frac{4}{6} = \frac{2}{3}; \ m_{\overline{PT}} = \frac{4}{6} = \frac{2}{3}; \ m_{\overline{PA}} = -\frac{11}{3}; \ m_{\overline{RT}} = -\frac{11}{3})$

PTS: 6   REF: 011835geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

235 ANS: 3

$$\frac{12}{4} = \frac{x}{5} \quad 15 - 4 = 11$$

$$x = 15$$

PTS: 2   REF: 011624geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

236 ANS:

$$\frac{16}{9} = \frac{x}{20.6} \quad D = \sqrt{36.6^2 + 20.6^2} \approx 42$$

$$x \approx 36.6$$

PTS: 4   REF: 011632geo   NAT: G.SRT.C.8   TOP: Pythagorean Theorem
KEY: without graphics

237 ANS: 2

$$V = \frac{1}{3}\left(\frac{36}{4}\right)^2 \cdot 15 = 405$$

PTS: 2   REF: 011822geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

238 ANS: 3

$$\frac{x}{360} \cdot 3^2 \pi = 2\pi \quad 180 - 80 = 100$$
$$x = 80 \quad \frac{180 - 100}{2} = 40$$

PTS: 2   REF: 011612geo   NAT: G.C.B.5   TOP: Sectors

239 ANS: 2

$$x^2 = 12(12 - 8)$$
$$x^2 = 48$$
$$x = 4\sqrt{3}$$

PTS: 2   REF: 011823geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

240 ANS: 3

$$\triangle CFB \sim \triangle CAD \quad \frac{CB}{CF} = \frac{CD}{CA}$$
$$\frac{x}{21.6} = \frac{7.2}{9.6}$$
$$x = 16.2$$

PTS: 2   REF: 061804geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

241 ANS: 3

$$\frac{\frac{4}{3}\pi\left(\frac{9.5}{2}\right)^3}{\frac{4}{3}\pi\left(\frac{2.5}{2}\right)^3} \approx 55$$

PTS: 2   REF: 011614geo   NAT: G.GMD.A.3   TOP: Volume
KEY: spheres

242 ANS:

$$\sin x = \frac{4.5}{11.75}$$
$$x \approx 23$$

PTS: 2   REF: 061528geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

243 ANS: 4   PTS: 2   REF: 061504geo   NAT: G.CO.A.5
    TOP: Compositions of Transformations   KEY: identify

244 ANS: 4

$$\frac{5}{7} = \frac{x}{x+5} \quad 12\frac{1}{2} + 5 = 17\frac{1}{2}$$

$$5x + 25 = 7x$$

$$2x = 25$$

$$x = 12\frac{1}{2}$$

    PTS: 2   REF: 061821geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

245 ANS: 2   PTS: 2   REF: 061701geo   NAT: G.CO.A.5
    TOP: Compositions of Transformations   KEY: identify

246 ANS:

$$\ell: y = 3x - 4$$

$$m: y = 3x - 8$$

    PTS: 2   REF: 011631geo   NAT: G.SRT.A.1   TOP: Line Dilations

247 ANS: 3
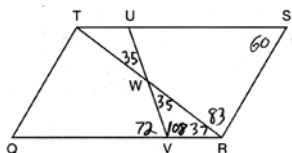
    PTS: 2   REF: 011603geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

248 ANS:

Rotate $\triangle ABC$ clockwise about point C until $\overline{DF} \parallel \overline{AC}$. Translate $\triangle ABC$ along $\overline{CF}$ so that C maps onto F.

    PTS: 2   REF: 061730geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
    KEY: identify

Geometry Regents at Random
Answer Section

249 ANS: 4

$$V = \pi \left(\frac{6.7}{2} \right)^2 (4 \cdot 6.7) \approx 945$$

   PTS: 2   REF: 081620geo   NAT: G.GMD.A.3   TOP: Volume
   KEY: cylinders
250 ANS: 3   PTS: 2   REF: 081622geo   NAT: G.SRT.B.5
   TOP: Triangle Proofs   KEY: statements
251 ANS: 4

$$x^2 + 4x + 4 + y^2 - 8y + 16 = -16 + 4 + 16$$

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

   PTS: 2   REF: 081821geo   NAT: G.GPE.A.1   TOP: Equations of Circles
   KEY: completing the square
252 ANS: 2

$$V = \frac{1}{3} \left(\frac{60}{12} \right)^2 \left(\frac{84}{12} \right) \approx 58$$

   PTS: 2   REF: 081819geo   NAT: G.GMD.A.3   TOP: Volume
   KEY: pyramids
253 ANS: 2   PTS: 2   REF: 081519geo   NAT: G.SRT.B.5
   TOP: Similarity   KEY: basic
254 ANS:
   Yes. The bases of the cylinders have the same area and the cylinders have the same height.

   PTS: 2   REF: 081725geo   NAT: G.GMD.A.1   TOP: Volume
255 ANS: 4   PTS: 2   REF: 081506geo   NAT: G.SRT.A.2
   TOP: Dilations
256 ANS: 1

$$\sin 32 = \frac{x}{6.2}$$

$$x \approx 3.3$$

   PTS: 2   REF: 081719geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
257 ANS: 3

$$5 \cdot \frac{10}{4} = \frac{50}{4} = 12.5$$

   PTS: 2   REF: 081512geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
   KEY: common tangents

258 ANS:

Translate $\triangle ABC$ along $\overline{CF}$ such that point C maps onto point F, resulting in image $\triangle A'B'C'$. Then reflect $\triangle A'B'C'$ over $\overline{DF}$ such that $\triangle A'B'C'$ maps onto $\triangle DEF$.

or

Reflect $\triangle ABC$ over the perpendicular bisector of $\overline{EB}$ such that $\triangle ABC$ maps onto $\triangle DEF$.

PTS: 2   REF: fall1408geo   NAT: G.CO.B.7   TOP: Triangle Congruency

259 ANS: 2

The line $y = 2x - 4$ does not pass through the center of dilation, so the dilated line will be distinct from $y = 2x - 4$. Since a dilation preserves parallelism, the line $y = 2x - 4$ and its image will be parallel, with slopes of 2. To obtain the y-intercept of the dilated line, the scale factor of the dilation, $\frac{3}{2}$, can be applied to the y-intercept, $(0, -4)$. Therefore, $\left(0 \cdot \frac{3}{2}, -4 \cdot \frac{3}{2} \right) \rightarrow (0, -6)$. So the equation of the dilated line is $y = 2x - 6$.

PTS: 2   REF: fall1403geo   NAT: G.SRT.A.1   TOP: Line Dilations

260 ANS:
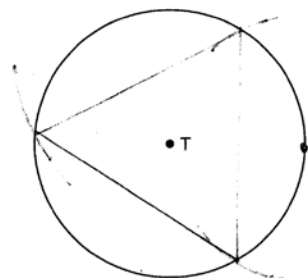
PTS: 2   REF: 081526geo   NAT: G.CO.D.13   TOP: Constructions

261 ANS:

$\triangle MNO$ is congruent to $\triangle PNO$ by SAS. Since $\triangle MNO \cong \triangle PNO$, then $\overline{MO} \cong \overline{PO}$ by CPCTC. So $\overline{NO}$ must divide $\overline{MP}$ in half, and $MO = 8$.

PTS: 2   REF: fall1405geo   NAT: G.SRT.B.5   TOP: Isosceles Triangle Theorem

262 ANS: 4   PTS: 2   REF: 081813geo   NAT: G.CO.C.11
TOP: Parallelograms

263 ANS: 3   PTS: 2   REF: 081502geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: basic

264 ANS:

No, The line $4x + 3y = 24$ passes through the center of dilation, so the dilated line is not distinct.
$4x + 3y = 24$

$3y = -4x + 24$

$y = -\frac{4}{3}x + 8$

PTS: 2   REF: 081830geo   NAT: G.SRT.A.1   TOP: Line Dilations

265 ANS: 1

The other statements are true only if $\overline{AD} \perp \overline{BC}$.

PTS: 2   REF: 081623geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: inscribed

266 ANS:

Circle *O*, chords $\overline{AB}$ and $\overline{CD}$ intersect at *E* (Given); Chords $\overline{CB}$ and $\overline{AD}$ are drawn (auxiliary lines drawn);
$\angle CEB \cong \angle AED$ (vertical angles); $\angle C \cong \angle A$ (Inscribed angles that intercept the same arc are congruent);
$\triangle BCE \sim \triangle DAE$ (AA); $\dfrac{AE}{CE} = \dfrac{ED}{EB}$ (Corresponding sides of similar triangles are proportional);
$AE \cdot EB = CE \cdot ED$ (The product of the means equals the product of the extremes).

PTS: 6   REF: 081635geo   NAT: G.SRT.B.5   TOP: Circle Proofs

267 ANS:
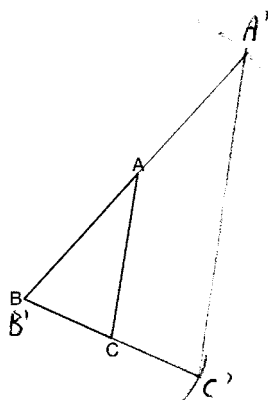
 The length of $\overline{A'C'}$ is twice $\overline{AC}$.

PTS: 4   REF: 081632geo   NAT: G.CO.D.12   TOP: Constructions
KEY: congruent and similar figures

268 ANS: 1   PTS: 2   REF: 081606geo   NAT: G.SRT.C.7
TOP: Cofunctions

269 ANS: 2   PTS: 2   REF: 081513geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: graphics

270 ANS: 2

$\dfrac{x}{x+3} = \dfrac{14}{21}$ $14 - 6 = 8$

$21x = 14x + 42$

$7x = 42$

$x = 6$

PTS: 2   REF: 081812geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

271 ANS:
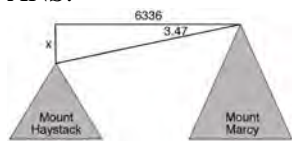
$$\tan 3.47 = \frac{M}{6336}$$

$$\tan 0.64 = \frac{A}{20,493}$$

$$M \approx 384$$

$$A \approx 229$$

$$4960 + 384 = 5344$$
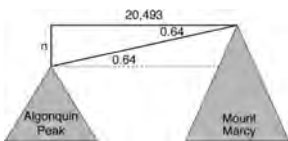
$$5344 - 229 = 5115$$

PTS: 6   REF: fall1413geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

272 ANS: 4
$$40 - x + 3x = 90$$
$$2x = 50$$
$$x = 25$$

PTS: 2   REF: 081721geo   NAT: G.SRT.C.7   TOP: Cofunctions

273 ANS: 1   PTS: 2   REF: 081804geo   NAT: G.SRT.A.2
TOP: Compositions of Transformations   KEY: grids

274 ANS: 2
$$\frac{30}{360}(5)^2(\pi) \approx 6.5$$

PTS: 2   REF: 081818geo   NAT: G.C.B.5   TOP: Sectors

275 ANS:
The four small triangles are 8-15-17 triangles. $4 \times 17 = 68$

PTS: 2   REF: 081726geo   NAT: G.CO.C.11   TOP: Special Quadrilaterals

276 ANS:
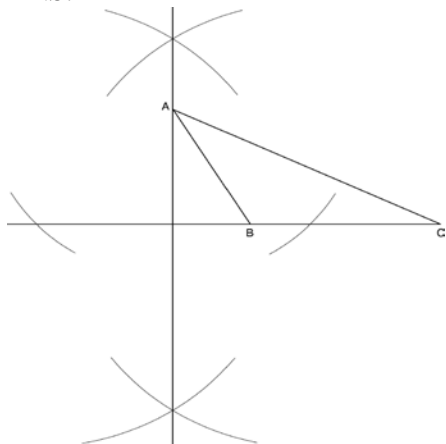
PTS: 2   REF: fall1409geo   NAT: G.CO.D.12   TOP: Constructions
KEY: parallel and perpendicular lines

277 ANS: 4   PTS: 2   REF: 081803geo   NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

278 ANS:

$$\frac{360}{6} = 60$$

PTS: 2   REF: 081627geo   NAT: G.CO.A.3   TOP: Mapping a Polygon onto Itself

279 ANS:

Circle O, secant $\overline{ACD}$, tangent $\overline{AB}$ (Given). Chords $\overline{BC}$ and $\overline{BD}$ are drawn (Auxiliary lines). $\angle A \cong \angle A$, $\overset{\frown}{BC} \cong \overset{\frown}{BC}$ (Reflexive property). $m\angle BDC = \frac{1}{2} m\overset{\frown}{BC}$ (The measure of an inscribed angle is half the measure of the intercepted arc). $m\angle CBA = \frac{1}{2} m\overset{\frown}{BC}$ (The measure of an angle formed by a tangent and a chord is half the measure of the intercepted arc). $\angle BDC \cong \angle CBA$ (Angles equal to half of the same arc are congruent). $\triangle ABC \sim \triangle ADB$ (AA). $\frac{AB}{AC} = \frac{AD}{AB}$ (Corresponding sides of similar triangles are proportional). $AC \cdot AD = AB^2$ (In a proportion, the product of the means equals the product of the extremes).

PTS: 6   REF: spr1413geo   NAT: G.SRT.B.5   TOP: Circle Proofs

280 ANS:

$M = 180 - (47 + 57) = 76$ Rotations do not change angle measurements.

PTS: 2   REF: 081629geo   NAT: G.CO.B.6   TOP: Properties of Transformations

281 ANS: 2
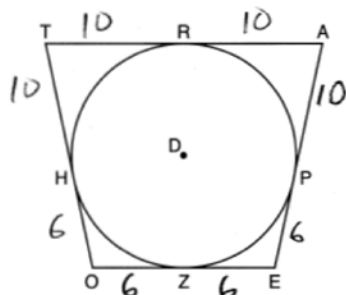
PTS: 2   REF: 081814geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: tangents drawn from common point, length

282 ANS: 1

The slope of $3x + 2y = 12$ is $-\frac{3}{2}$, which is the opposite reciprocal of $\frac{2}{3}$.

PTS: 2   REF: 081811geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines

283 ANS:

x represents the distance between the lighthouse and the canoe at 5:00; y represents the distance between the lighthouse and the canoe at 5:05. $\tan 6 = \frac{112 - 1.5}{x}$ $\tan(49 + 6) = \frac{112 - 1.5}{y}$ $\frac{1051.3 - 77.4}{5} \approx 195$

$x \approx 1051.3$ $y \approx 77.4$

PTS: 4   REF: spr1409geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: advanced

284 ANS: 3

$\dfrac{x}{10} = \dfrac{6}{4}$ $\overline{CD} = 15 - 4 = 11$

$x = 15$

PTS: 2   REF: 081612geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

285 ANS: 3   PTS: 2   REF: 081515geo   NAT: G.C.A.3
TOP: Inscribed Quadrilaterals

286 ANS:

$\sin 75 = \dfrac{15}{x}$

$x = \dfrac{15}{\sin 75}$

$x \approx 15.5$

PTS: 2   REF: 081631geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
KEY: graphics

287 ANS:

$V = \dfrac{1}{3}\pi\left(\dfrac{8.3}{2}\right)^2 (10.2) + \dfrac{1}{2} \cdot \dfrac{4}{3}\pi\left(\dfrac{8.3}{2}\right)^3 \approx 183.961 + 149.693 \approx 333.65\,\text{cm}^3$ $333.65 \times 50 = 16682.7\,\text{cm}^3$

$16682.7 \times 0.697 = 11627.8\,\text{g}$ $11.6278 \times 3.83 = \$44.53$

PTS: 6   REF: 081636geo   NAT: G.MG.A.2   TOP: Density

288 ANS: 1
Distance and angle measure are preserved after a reflection and translation.

PTS: 2   REF: 081802geo   NAT: G.CO.B.6   TOP: Properties of Transformations
KEY: basic

289 ANS: 2

$C = \pi d$ $V = \pi\left(\dfrac{2.25}{\pi}\right)^2 \cdot 8 \approx 12.8916$ $W = 12.8916 \cdot 752 \approx 9694$

$4.5 = \pi d$

$\dfrac{4.5}{\pi} = d$

$\dfrac{2.25}{\pi} = r$

PTS: 2   REF: 081617geo   NAT: G.MG.A.2   TOP: Density

290 ANS: 3
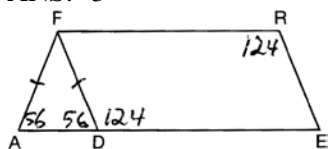
PTS: 2   REF: 081508geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

291 ANS:

$$\frac{120}{230} = \frac{x}{315}$$

$$x = 164$$

PTS: 2   REF: 081527geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

292 ANS: 4   PTS: 2   REF: 081514geo   NAT: G.SRT.A.2
TOP: Compositions of Transformations   KEY: grids

293 ANS:
Circle O, tangent $\overline{EC}$ to diameter $\overline{AC}$, chord $\overline{BC} \parallel$ secant $\overline{ADE}$, and chord $\overline{AB}$ (given); $\angle B$ is a right angle (an angle inscribed in a semi-circle is a right angle); $\overleftrightarrow{EC} \perp \overline{OC}$ (a radius drawn to a point of tangency is perpendicular to the tangent); $\angle ECA$ is a right angle (perpendicular lines form right angles); $\angle B \cong \angle ECA$ (all right angles are congruent); $\angle BCA \cong \angle CAE$ (the transversal of parallel lines creates congruent alternate interior angles); $\triangle ABC \sim \triangle ECA$ (AA); $\dfrac{BC}{CA} = \dfrac{AB}{EC}$ (Corresponding sides of similar triangles are in proportion).

PTS: 4   REF: 081733geo   NAT: G.SRT.B.5   TOP: Circle Proofs

294 ANS: 3
The x-axis and line $x = 4$ are lines of symmetry and $(4,0)$ is a point of symmetry.

PTS: 2   REF: 081706geo   NAT: G.CO.A.3   TOP: Mapping a Polygon onto Itself

295 ANS: 1   PTS: 2   REF: 081507geo   NAT: G.CO.A.5
TOP: Compositions of Transformations   KEY: identify

296 ANS:

$$r = 25\,\text{cm}\left(\frac{1\,\text{m}}{100\,\text{cm}}\right) = 0.25\,\text{m} \quad V = \pi(0.25\,\text{m})^2(10\,\text{m}) = 0.625\pi\,\text{m}^3 \quad W = 0.625\pi\,\text{m}^3\left(\frac{380\,\text{K}}{1\,\text{m}^3}\right) \approx 746.1\,K$$

$$n = \frac{\$50{,}000}{\left(\dfrac{\$4.75}{K}\right)(746.1\,\text{K})} = 14.1 \quad 15\ \text{trees}$$

PTS: 4   REF: spr1412geo   NAT: G.MG.A.2   TOP: Density

297 ANS: 4
The line $y = 3x - 1$ passes through the center of dilation, so the dilated line is not distinct.

PTS: 2   REF: 081524geo   NAT: G.SRT.A.1   TOP: Line Dilations

298 ANS:

The slopes of perpendicular line are opposite reciprocals. Since the lines are perpendicular, they form right angles
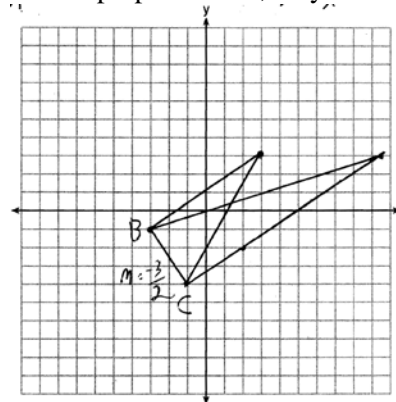
and a right triangle. $m_{\overline{BC}} = -\dfrac{3}{2}$ $-1 = \dfrac{2}{3}(-3) + b$ or $-4 = \dfrac{2}{3}(-1) + b$

$$m_{\perp} = \dfrac{2}{3}$$

$$-1 = -2 + b$$

$$1 = b$$

$$3 = \dfrac{2}{3}x + 1$$

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

$$3 = x$$

$$\dfrac{-12}{3} = \dfrac{-2}{3} + b$$

$$-\dfrac{10}{3} = b$$

$$3 = \dfrac{2}{3}x - \dfrac{10}{3}$$

$$9 = 2x - 10$$

$$19 = 2x$$

$$9.5 = x$$

PTS: 4   REF: 081533geo   NAT: G.GPE.B.4   TOP: Triangles in the Coordinate Plane

299 ANS: 3

$6 \cdot 3^2 = 54 \quad 12 \cdot 3 = 36$

PTS: 2   REF: 081823geo   NAT: G.SRT.A.2   TOP: Dilations

300 ANS: 1

$180 - (68 \cdot 2)$

PTS: 2   REF: 081624geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

301 ANS: 3

In (1) and (2), *ABCD* could be a rectangle with non-congruent sides. (4) is not possible

PTS: 2   REF: 081714geo   NAT: G.CO.C.11   TOP: Special Quadrilaterals

302 ANS: 1   PTS: 2   REF: 081504geo   NAT: G.SRT.C.7

TOP: Cofunctions

303 ANS:

2 Reflexive; 4 $\angle BDA \cong \angle BDC$; 6 CPCTC; 7 If points *B* and *D* are equidistant from the endpoints of $\overline{AC}$, then *B* and *D* are on the perpendicular bisector of $\overline{AC}$.

PTS: 4   REF: 081832geo   NAT: G.SRT.B.5   TOP: Triangle Proofs

KEY: proof

304 ANS:

$\dfrac{137.8}{6^3} \approx 0.638$ Ash

PTS: 2 REF: 081525geo NAT: G.MG.A.2 TOP: Density

305 ANS: 4
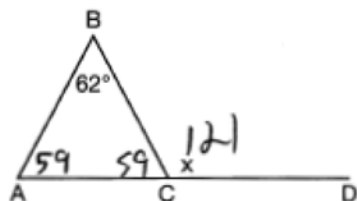
PTS: 2 REF: 081711geo NAT: G.CO.C.10 TOP: Exterior Angle Theorem

306 ANS: 1

$x^2 - 4x + 4 + y^2 + 8y + 16 = -11 + 4 + 16$

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

PTS: 2 REF: 081616geo NAT: G.GPE.A.1 TOP: Equations of Circles
KEY: completing the square

307 ANS: 3

(3) Could be a trapezoid.

PTS: 2 REF: 081607geo NAT: G.CO.C.11 TOP: Parallelograms

308 ANS:

$4x - .07 = 2x + .01$ Sin A is the ratio of the opposite side and the hypotenuse while $\cos B$ is the ratio of the adjacent

$2x = 0.8$

$x = 0.4$

side and the hypotenuse. The side opposite angle A is the same side as the side adjacent to angle B. Therefore, $\sin A = \cos B$.

PTS: 2 REF: fall1407geo NAT: G.SRT.C.7 TOP: Cofunctions

309 ANS:
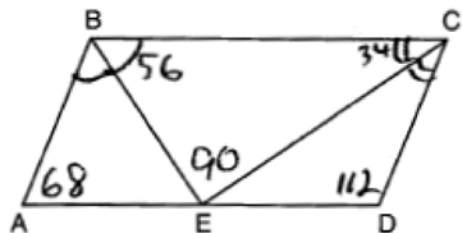
PTS: 2 REF: 081826geo NAT: G.CO.C.11 TOP: Parallelograms

310 ANS:
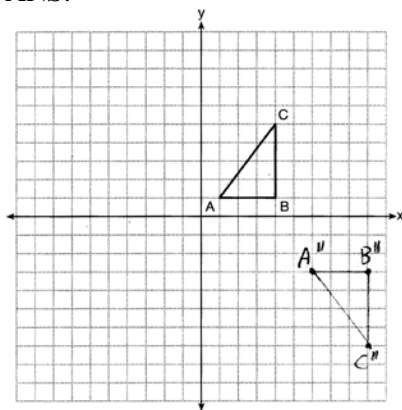
PTS: 2   REF: 081626geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: grids

311 ANS:

$$\frac{134 + 102}{2} = 118$$
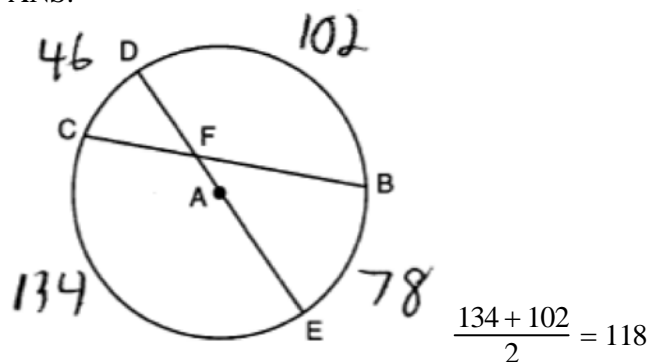
PTS: 2   REF: 081827geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: intersecting chords, angle

312 ANS: 2
$x^2 = 4 \cdot 10$

$x = \sqrt{40}$

$x = 2\sqrt{10}$

PTS: 2   REF: 081610geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

313 ANS: 3
$$\frac{60}{360} \cdot 6^2 \pi = 6\pi$$

PTS: 2   REF: 081518geo   NAT: G.C.B.5   TOP: Sectors

314 ANS:

$\tan x = \dfrac{12}{75}$ $\tan y = \dfrac{72}{75}$ $43.83 - 9.09 \approx 34.7$

$x \approx 9.09$ $y \approx 43.83$

PTS: 4   REF: 081634geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

315 ANS: 2

$\overline{AB} = 10$ since $\triangle ABC$ is a 6-8-10 triangle. $6^2 = 10x$

$$3.6 = x$$

PTS: 2   REF: 081820geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: leg

316 ANS: 2

Segments drawn from the center of the regular pentagon bisect each angle of the pentagon, and create five isosceles triangles as shown in the diagram below. Since each exterior angle equals the angles formed by the segments drawn from the center of the regular pentagon, the minimum degrees necessary to carry a regular polygon onto itself are equal to the measure of an exterior angle of the regular polygon.
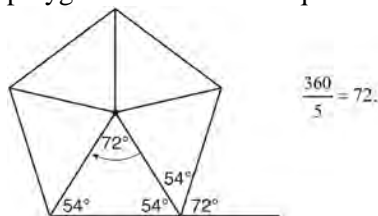
PTS: 2   REF: spr1402geo   NAT: G.CO.A.3   TOP: Mapping a Polygon onto Itself

317 ANS: 3

$\sqrt{20^2 - 10^2} \approx 17.3$

PTS: 2   REF: 081608geo   NAT: G.SRT.C.8   TOP: Pythagorean Theorem
KEY: without graphics

318 ANS: 1

$-8 + \dfrac{3}{8}(16 - -8) = -8 + \dfrac{3}{8}(24) = -8 + 9 = 1$ $-2 + \dfrac{3}{8}(6 - -2) = -2 + \dfrac{3}{8}(8) = -2 + 3 = 1$

PTS: 2   REF: 081717geo   NAT: G.GPE.B.6   TOP: Directed Line Segments

319 ANS:

As the sum of the measures of the angles of a triangle is $180°$, $m\angle ABC + m\angle BCA + m\angle CAB = 180°$. Each interior angle of the triangle and its exterior angle form a linear pair. Linear pairs are supplementary, so $m\angle ABC + m\angle FBC = 180°$, $m\angle BCA + m\angle DCA = 180°$, and $m\angle CAB + m\angle EAB = 180°$. By addition, the sum of these linear pairs is $540°$. When the angle measures of the triangle are subtracted from this sum, the result is $360°$, the sum of the exterior angles of the triangle.

PTS: 4   REF: fall1410geo   NAT: G.CO.C.10   TOP: Triangle Proofs

320 ANS: 2   PTS: 2   REF: 081701geo   NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

321 ANS: 1

$$\cos x = \frac{12}{13}$$

$$x \approx 23$$

PTS: 2   REF: 081809ai   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

322 ANS: 1

Parallel chords intercept congruent arcs. $\frac{180 - 130}{2} = 25$

PTS: 2   REF: 081704geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: parallel lines

323 ANS: 4

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

PTS: 2   REF: 081808geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

324 ANS: 2   PTS: 2   REF: 081619geo   NAT: G.C.B.5
TOP: Sectors

325 ANS:

$$M\left(\frac{4+0}{2}, \frac{6-1}{2}\right) = M\left(2, \frac{5}{2}\right) \quad m = \frac{6--1}{4-0} = \frac{7}{4} \quad m_\perp = -\frac{4}{7} \quad y - 2.5 = -\frac{4}{7}(x-2) \text{ The diagonals, } \overline{MT} \text{ and } \overline{AH}, \text{ of}$$

rhombus *MATH* are perpendicular bisectors of each other.

PTS: 4   REF: fall1411geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

326 ANS: 4
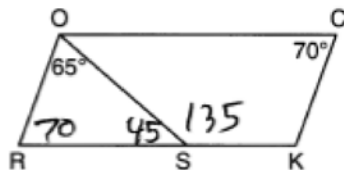
PTS: 2   REF: 081708geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

327 ANS: 3   PTS: 2   REF: 081805geo   NAT: G.GMD.B.4
TOP: Cross-Sections of Three-Dimensional Objects

328 ANS:
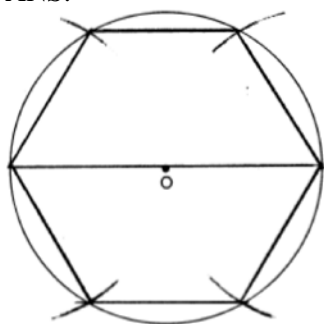
PTS: 2   REF: 081728geo NAT: G.CO.D.13 TOP: Constructions

329 ANS: 4

$$\sqrt{(32-8)^2 + (28--4)^2} = \sqrt{576+1024} = \sqrt{1600} = 40$$

PTS: 2   REF: 081621geo NAT: G.SRT.A.1 TOP: Line Dilations

330 ANS: 4   PTS: 2   REF: 081810geo NAT: G.SRT.B.5
TOP: Triangle Proofs   KEY: statements

331 ANS:
Translations preserve distance. If point *D* is mapped onto point *A*, point *F* would map onto point *C*.
$\triangle DEF \cong \triangle ABC$ as $\overline{AC} \cong \overline{DF}$ and points are collinear on line ℓ and a reflection preserves distance.

PTS: 4   REF: 081534geo NAT: G.CO.B.7 TOP: Triangle Congruency

332 ANS:
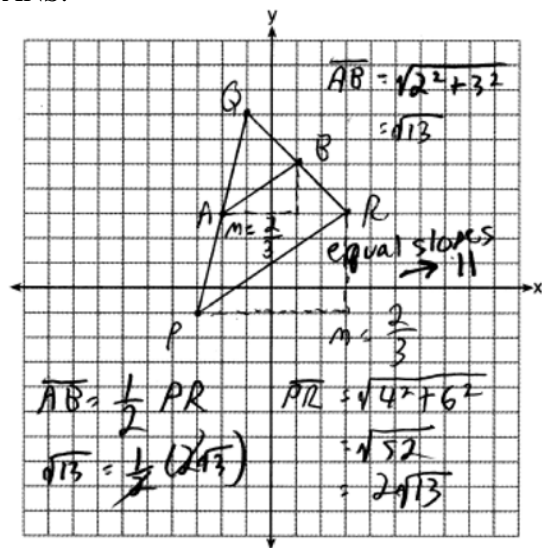
PTS: 4   REF: 081732geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

333 ANS: 1
$$3^2 = 9$$

PTS: 2   REF: 081520geo NAT: G.SRT.A.2 TOP: Dilations

334 ANS: 4   PTS: 2   REF: 081801geo NAT: G.CO.C.9
TOP: Lines and Angles

335 ANS:
The transformation is a rotation, which is a rigid motion.

PTS: 2 REF: 081530geo NAT: G.CO.B.7 TOP: Triangle Congruency

336 ANS: 3 PTS: 2 REF: 081817geo NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

337 ANS: 1
$m_{\overline{RT}} = \dfrac{5--3}{4--2} = \dfrac{8}{6} = \dfrac{4}{3}$ $m_{\overline{ST}} = \dfrac{5-2}{4-8} = \dfrac{3}{-4} = -\dfrac{3}{4}$ Slopes are opposite reciprocals, so lines form a right angle.

PTS: 2 REF: 011618geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

338 ANS: 4 PTS: 2 REF: 081503geo NAT: G.GMD.B.4
TOP: Rotations of Two-Dimensional Objects

339 ANS:
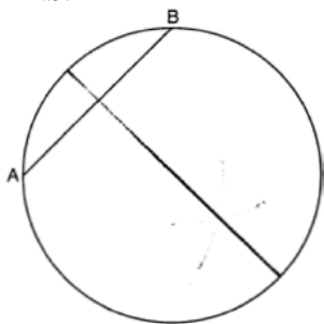
PTS: 2 REF: 081825geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

340 ANS:
$\tan 16.5 = \dfrac{x}{13.5}$ $9 \times 16 \times 4.5 = 648$ $3752 - (35 \times 16 \times .5) = 3472$

     $x \approx 4$ $13.5 \times 16 \times 4.5 = 972$ $3472 \times 7.48 \approx 25971$

$4 + 4.5 = 8.5$ $\dfrac{1}{2} \times 13.5 \times 16 \times 4 = 432$ $\dfrac{25971}{10.5} \approx 2473.4$

      $12.5 \times 16 \times 8.5 = \underline{1700}$ $\dfrac{2473.4}{60} \approx 41$

         3752

PTS: 6 REF: 081736geo NAT: G.GMD.A.3 TOP: Volume
KEY: compositions

341 ANS:
$x^2 + x^2 = 58^2$ $A = (\sqrt{1682} + 8)^2 \approx 2402.2$

   $2x^2 = 3364$

    $x = \sqrt{1682}$

PTS: 4 REF: 081734geo NAT: G.MG.A.3 TOP: Area of Polygons

342 ANS: 3

$$x(x-6) = 4^2$$

$$x^2 - 6x - 16 = 0$$

$$(x-8)(x+2) = 0$$

$$x = 8$$

PTS: 2   REF: 081807geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: altitude

343 ANS:

$$V = \frac{1}{3}\pi\left(\frac{3}{2}\right)^2 \cdot 8 \approx 18.85 \cdot 100 = 1885 \quad 1885 \cdot 0.52 \cdot 0.10 = 98.02 \quad 1.95(100) - (37.83 + 98.02) = 59.15$$

PTS: 6   REF: 081536geo   NAT: G.MG.A.2   TOP: Density

344 ANS: 4

$$\sin 16.5 = \frac{8}{x}$$

$$x \approx 28.2$$

PTS: 2   REF: 081806ai   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side

345 ANS:
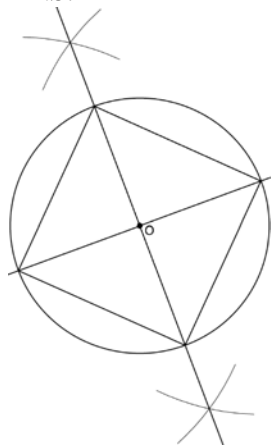
Since the square is inscribed, each vertex of the square is on the circle and the diagonals of the square are diameters of the circle. Therefore, each angle of the square is an inscribed angle in the circle that intercepts the circle at the endpoints of the diameters. Each angle of the square, which is an inscribed angle, measures 90 degrees. Therefore, the measure of the arc intercepted by two adjacent sides of the square is 180 degrees because it is twice the measure of its inscribed angle.

PTS: 4   REF: fall1412geo   NAT: G.CO.D.13   TOP: Constructions

346 ANS: 2
$$s^2 + s^2 = 7^2$$
$$2s^2 = 49$$
$$s^2 = 24.5$$
$$s \approx 4.9$$

PTS: 2   REF: 081511geo   NAT: G.SRT.C.8   TOP: Pythagorean Theorem

347 ANS:
The acute angles in a right triangle are always complementary. The sine of any acute angle is equal to the cosine of its complement.

PTS: 2   REF: spr1407geo   NAT: G.SRT.C.7   TOP: Cofunctions

348 ANS: 3
$$\frac{x}{6.3} = \frac{3}{5} \quad \frac{y}{9.4} = \frac{6.3}{6.3 + 3.78}$$
$$x = 3.78 \quad y \approx 5.9$$

PTS: 2   REF: 081816geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

349 ANS: 4
The measures of the angles of a triangle remain the same after all rotations because rotations are rigid motions which preserve angle measure.

PTS: 2   REF: fall1402geo   NAT: G.CO.B.6   TOP: Properties of Transformations
KEY: graphics

350 ANS: 2   PTS: 2   REF: 081501geo   NAT: G.CO.C.11
TOP: Special Quadrilaterals

351 ANS: 2
The given line h, $2x + y = 1$, does not pass through the center of dilation, the origin, because the y-intercept is at $(0, 1)$. The slope of the dilated line, m, will remain the same as the slope of line h, -2. All points on line h, such as $(0, 1)$, the y-intercept, are dilated by a scale factor of 4; therefore, the y-intercept of the dilated line is $(0, 4)$ because the center of dilation is the origin, resulting in the dilated line represented by the equation $y = -2x + 4$.

PTS: 2   REF: spr1403geo   NAT: G.SRT.A.1   TOP: Line Dilations

352 ANS: 2
$$x^2 = 3 \cdot 18$$
$$x = \sqrt{3 \cdot 3 \cdot 6}$$
$$x = 3\sqrt{6}$$

PTS: 2   REF: 081712geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, length

353 ANS: 1

$\tan x = \dfrac{1}{12}$

$x \approx 4.76$

PTS: 2   REF: 081715geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle

354 ANS:
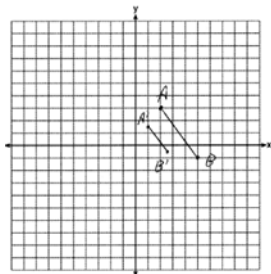
$\sqrt{(2.5-1)^2 + (-.5-1.5)^2} = \sqrt{2.25+4} = 2.5$

PTS: 2   REF: 081729geo   NAT: G.SRT.A.1   TOP: Line Dilations

355 ANS: 1

$m = -\dfrac{2}{3}$ $1 = \left(-\dfrac{2}{3}\right)6 + b$

$1 = -4 + b$

$5 = b$

PTS: 2   REF: 081510geo   NAT: G.GPE.B.5   TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

356 ANS:

$\dfrac{3}{8} \cdot 56 = 21$

PTS: 2   REF: 081625geo   NAT: G.C.A.2   TOP: Chords, Secants and Tangents
KEY: common tangents

357 ANS:

$R_{180°}$ about $\left(-\dfrac{1}{2}, \dfrac{1}{2}\right)$

PTS: 2   REF: 081727geo   NAT: G.CO.A.5   TOP: Compositions of Transformations
KEY: identify

358 ANS: 2
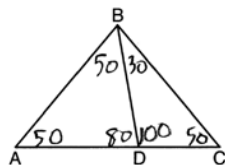
PTS: 2   REF: 081604geo   NAT: G.CO.C.10   TOP: Interior and Exterior Angles of Triangles

359 ANS:

Yes. $(x-1)^2 + (y+2)^2 = 4^2$

$(3.4-1)^2 + (1.2+2)^2 = 16$

$5.76 + 10.24 = 16$

$16 = 16$

PTS: 2 REF: 081630geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

360 ANS: 2

$12^2 = 9 \cdot 16$

$144 = 144$

PTS: 2 REF: 081718geo NAT: G.SRT.B.5 TOP: Similarity
KEY: leg

361 ANS: 4

$-5 + \dfrac{3}{5}(5--5) \quad -4 + \dfrac{3}{5}(1--4)$

$-5 + \dfrac{3}{5}(10) \qquad -4 + \dfrac{3}{5}(5)$

$-5 + 6 \qquad\qquad -4 + 3$

$1 \qquad\qquad\qquad -1$

PTS: 2 REF: spr1401geo NAT: G.GPE.B.6 TOP: Directed Line Segments

362 ANS: 4

$\dfrac{36}{45} \neq \dfrac{15}{18}$

$\dfrac{4}{5} \neq \dfrac{5}{6}$

PTS: 2 REF: 081709geo NAT: G.SRT.A.3 TOP: Similarity Proofs

363 ANS: 4

The segment's midpoint is the origin and slope is -2. The slope of a perpendicular line is $\dfrac{1}{2}$. $\quad y = \dfrac{1}{2}x + 0$

$2y = x$

$2y - x = 0$

PTS: 2 REF: 081724geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: perpendicular bisector

364 ANS: 4

$\dfrac{360°}{10} = 36°$ $252°$ is a multiple of $36°$

PTS: 2 REF: 081722geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

365 ANS: 4   PTS: 2   REF: 081716geo   NAT: G.CO.C.10
     TOP: Midsegments
366 ANS:

$\tan 7 = \dfrac{125}{x}$ $\tan 16 = \dfrac{125}{y}$ $1018 - 436 \approx 582$

   $x \approx 1018$ $y \approx 436$

     PTS: 4   REF: 081532geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find a Side
     KEY: advanced
367 ANS:
     Triangle $X'Y'Z'$ is the image of $\triangle XYZ$ after a rotation about point Z such that $\overline{ZX}$ coincides with $\overline{ZU}$. Since rotations preserve angle measure, $\overline{ZY}$ coincides with $\overline{ZV}$, and corresponding angles X and Y, after the rotation, remain congruent, so $\overline{XY} \parallel \overline{UV}$. Then, dilate $\triangle X'Y'Z'$ by a scale factor of $\dfrac{ZU}{ZX}$ with its center at point Z. Since dilations preserve parallelism, $\overline{XY}$ maps onto $\overline{UV}$. Therefore, $\triangle XYZ \sim \triangle UVZ$.

     PTS: 2   REF: spr1406geo   NAT: G.SRT.A.2   TOP: Compositions of Transformations
     KEY: grids
368 ANS:
     Circle A can be mapped onto circle B by first translating circle A along vector $\overline{AB}$ such that A maps onto B, and then dilating circle A, centered at A, by a scale factor of $\dfrac{5}{3}$. Since there exists a sequence of transformations that maps circle A onto circle B, circle A is similar to circle B.

     PTS: 2   REF: spr1404geo   NAT: G.C.A.1   TOP: Similarity Proofs
369 ANS: 1
     The man's height, 69 inches, is opposite to the angle of elevation, and the shadow length, 102 inches, is adjacent to the angle of elevation. Therefore, tangent must be used to find the angle of elevation. $\tan x = \dfrac{69}{102}$

                                        $x \approx 34.1$

     PTS: 2   REF: fall1401geo   NAT: G.SRT.C.8   TOP: Using Trigonometry to Find an Angle
370 ANS: 3

$\theta = \dfrac{s}{r} = \dfrac{2\pi}{10} = \dfrac{\pi}{5}$

     PTS: 2   REF: fall1404geo   NAT: G.C.B.5   TOP: Arc Length
     KEY: angle
371 ANS:

$\dfrac{4\pi}{3}(2^3 - 1.5^3) \approx 19.4$ $19.4 \cdot 1.308 \cdot 8 \approx 203$

     PTS: 4   REF: 081834geo   NAT: G.MG.A.2   TOP: Density
372 ANS: 3   PTS: 2   REF: 081613geo   NAT: G.GMD.B.4
     TOP: Cross-Sections of Three-Dimensional Objects

373 ANS: 4

$$\frac{6.6}{x} = \frac{4.2}{5.25}$$

$$4.2x = 34.65$$

$$x = 8.25$$

PTS: 2   REF: 081705geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

374 ANS: 1   PTS: 2   REF: 081505geo   NAT: G.CO.A.3
TOP: Mapping a Polygon onto Itself

375 ANS:

$$\frac{\left(\frac{180-20}{2}\right)}{360} \times \pi(6)^2 = \frac{80}{360} \times 36\pi = 8\pi$$

PTS: 4   REF: spr1410geo   NAT: G.C.B.5   TOP: Sectors

376 ANS:

$$x^2 - 6x + 9 + y^2 + 8y + 16 = 56 + 9 + 16 \quad (3, -4); \ r = 9$$

$$(x-3)^2 + (y+4)^2 = 81$$

PTS: 2   REF: 081731geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

377 ANS: 3

$$4\sqrt{(-1--3)^2 + (5-1)^2} = 4\sqrt{20}$$

PTS: 2   REF: 081703geo   NAT: G.GPE.B.7   TOP: Polygons in the Coordinate Plane

378 ANS: 3

$$x^2 + 4x + 4 + y^2 - 6y + 9 = 12 + 4 + 9$$

$$(x+2)^2 + (y-3)^2 = 25$$

PTS: 2   REF: 081509geo   NAT: G.GPE.A.1   TOP: Equations of Circles
KEY: completing the square

379 ANS: 4

$$\frac{1}{3.5} = \frac{x}{18-x}$$

$$3.5x = 18 - x$$

$$4.5x = 18$$

$$x = 4$$

PTS: 2   REF: 081707geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

380 ANS:
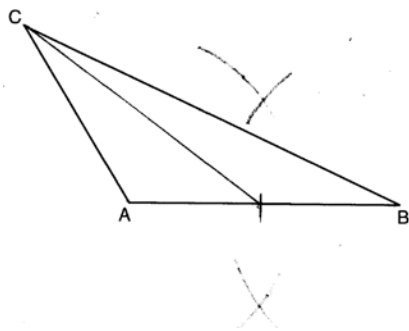
PTS: 2   REF: 081628geo   NAT: G.CO.D.12   TOP: Constructions
KEY: line bisector

381 ANS: 4   PTS: 2   REF: 081611geo   NAT: G.CO.C.9
TOP: Lines and Angles

382 ANS:

Parallelogram *ABCD*, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E* (given). $\overline{DC} \parallel \overline{AB}$; $\overline{DA} \parallel \overline{CB}$ (opposite sides of a parallelogram are parallel). $\angle ACD \cong \angle CAB$ (alternate interior angles formed by parallel lines and a transversal are congruent).

PTS: 2   REF: 081528geo   NAT: G.CO.C.11   TOP: Quadrilateral Proofs

383 ANS:
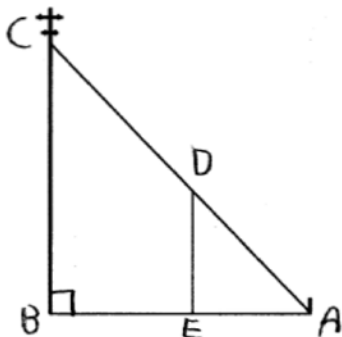
$\triangle ABC \sim \triangle AED$ by AA. $\angle DAE \cong \angle CAB$ because they are the same $\angle$. $\angle DEA \cong \angle CBA$ because they are both right $\angle$s.

PTS: 2   REF: 081829geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

384 ANS: 2

$$\frac{\dfrac{512\pi}{3}}{\left(\dfrac{32}{2}\right)^2 \pi} \cdot 2\pi = \frac{4\pi}{3}$$

PTS: 2   REF: 081723geo   NAT: G.C.B.5   TOP: Sectors

385 ANS: 1

$-8 + \dfrac{3}{5}(7 - -8) = -8 + 9 = 1 \quad 7 + \dfrac{3}{5}(-13 - 7) = 7 - 12 = -5$

PTS: 2 REF: 081815geo NAT: G.GPE.B.6 TOP: Directed Line Segments

386 ANS:

ABC − point of reflection $\to (-y, x)$ + point of reflection $\quad \triangle DEF \cong \triangle A'B'C'$ because $\triangle DEF$ is a reflection of

$A(2, -3) - (2, -3) = (0, 0) \to (0, 0) + (2, -3) = A'(2, -3)$

$B(6, -8) - (2, -3) = (4, -5) \to (5, 4) + (2, -3) = B'(7, 1)$

$C(2, -9) - (2, -3) = (0, -6) \to (6, 0) + (2, -3) = C'(8, -3)$

$\triangle A'B'C'$ and reflections preserve distance.

PTS: 4 REF: 081633geo NAT: G.CO.A.5 TOP: Rotations
KEY: grids

387 ANS:

$\tan 36 = \dfrac{x}{10} \quad \cos 36 = \dfrac{10}{y} \quad 12.3607 \times 3 \approx 37$

$x \approx 7.3 \quad y \approx 12.3607$

PTS: 4 REF: 081833geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

388 ANS:

It is given that point D is the image of point A after a reflection in line CH. It is given that $\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$ at point C. Since a bisector divides a segment into two congruent segments at its midpoint, $\overline{BC} \cong \overline{EC}$. Point E is the image of point B after a reflection over the line CH, since points B and E are equidistant from point C and it is given that $\overleftrightarrow{CH}$ is perpendicular to $\overline{BE}$. Point C is on $\overleftrightarrow{CH}$, and therefore, point C maps to itself after the reflection over $\overleftrightarrow{CH}$. Since all three vertices of triangle ABC map to all three vertices of triangle DEC under the same line reflection, then $\triangle ABC \cong \triangle DEC$ because a line reflection is a rigid motion and triangles are congruent when one can be mapped onto the other using a sequence of rigid motions.

PTS: 6 REF: spr1414geo NAT: G.CO.B.7 TOP: Triangle Congruency

389 ANS:

Parallelogram $ABCD$, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$ (given). $\angle BEC \cong \angle DFC$ (perpendicular lines form right angles, which are congruent). $\angle FCD \cong \angle BCE$ (reflexive property). $\triangle BEC \cong \triangle DFC$ (ASA). $\overline{BC} \cong \overline{CD}$ (CPCTC). $ABCD$ is a rhombus (a parallelogram with consecutive congruent sides is a rhombus).

PTS: 6 REF: 081535geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

390 ANS:

rotation 180° about the origin, translation 2 units down; rotation 180° about B, translation 6 units down and 6 units left; or reflection over x-axis, translation 2 units down, reflection over y-axis

PTS: 2 REF: 081828geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

391 ANS: 4

$$2592276 = \frac{1}{3} \cdot s^2 \cdot 146.5$$

$$230 \approx s$$

PTS: 2   REF: 081521geo   NAT: G.GMD.A.3   TOP: Volume
KEY: pyramids

392 ANS:

$\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$ (Given). $\angle LCA$ and $\angle DCN$ are right angles (Definition of perpendicular lines). $\triangle LAC$ and $\triangle DNC$ are right triangles (Definition of a right triangle). $\triangle LAC \cong \triangle DNC$ (HL). $\triangle LAC$ will map onto $\triangle DNC$ after rotating $\triangle LAC$ counterclockwise 90º about point C such that point L maps onto point D.

PTS: 4   REF: spr1408geo   NAT: G.CO.B.8   TOP: Triangle Congruency

393 ANS:

Opposite angles in a parallelogram are congruent, so m$\angle O = 118°$. The interior angles of a triangle equal 180°. $180 - (118 + 22) = 40$.

PTS: 2   REF: 061526geo   NAT: G.CO.C.11   TOP: Interior and Exterior Angles of Polygons

394 ANS: 3

$$v = \pi r^2 h \quad (1)\ 6^2 \cdot 10 = 360$$

$$150\pi = \pi r^2 h \quad (2)\ 10^2 \cdot 6 = 600$$

$$150 = r^2 h \quad (3)\ 5^2 \cdot 6 = 150$$

$$(4)\ 3^2 \cdot 10 = 900$$

PTS: 2   REF: 081713geo   NAT: G.GMD.B.4   TOP: Rotations of Two-Dimensional Objects

395 ANS: 2   PTS: 2   REF: 081602geo   NAT: G.CO.A.2
TOP: Identifying Transformations   KEY: basic

396 ANS:

Each quarter in both stacks has the same base area. Therefore, each corresponding cross-section of the stacks will have the same area. Since the two stacks of quarters have the same height of 23 quarters, the two volumes must be the same.

PTS: 2   REF: spr1405geo   NAT: G.GMD.A.1   TOP: Volume

397 ANS:

Isosceles trapezoid $ABCD$, $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$ (given); $\overline{AD} \cong \overline{BC}$ (congruent legs of isosceles trapezoid); $\angle DEA$ and $\angle CEB$ are right angles (perpendicular lines form right angles); $\angle DEA \cong \angle CEB$ (all right angles are congruent); $\angle CDA \cong \angle DCB$ (base angles of an isosceles trapezoid are congruent); $\angle CDA - \angle CDE \cong \angle DCB - \angle DCE$ (subtraction postulate); $\triangle ADE \cong \triangle BCE$ (AAS); $\overline{EA} \cong \overline{EB}$ (CPCTC);

$$\angle EDA \cong \angle ECB$$

$\triangle AEB$ is an isosceles triangle (an isosceles triangle has two congruent sides).

PTS: 6   REF: 081735geo   NAT: G.SRT.B.5   TOP: Quadrilateral Proofs

398 ANS: 4   PTS: 2   REF: 081609geo   NAT: G.SRT.A.2
    TOP: Compositions of Transformations   KEY: grids

399 ANS: 1

Illinois: $\frac{12830632}{231.1} \approx 55520$ Florida: $\frac{18801310}{350.6} \approx 53626$ New York: $\frac{19378102}{411.2} \approx 47126$ Pennsylvania:

$\frac{12702379}{283.9} \approx 44742$
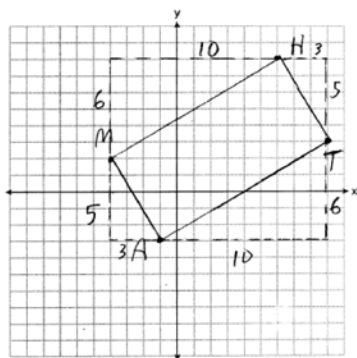
    PTS: 2   REF: 081720geo   NAT: G.MG.A.2   TOP: Density

400 ANS: 1   PTS: 2   REF: 081603geo   NAT: G.GMD.B.4
    TOP: Rotations of Two-Dimensional Objects

401 ANS: 4

$\frac{2}{6} = \frac{5}{15}$

    PTS: 2   REF: 081517geo   NAT: G.SRT.B.5   TOP: Side Splitter Theorem

402 ANS: 1   PTS: 2   REF: 081605geo   NAT: G.CO.A.5
    TOP: Rotations   KEY: grids

403 ANS:

$m_{\overline{MH}} = \frac{6}{10} = \frac{3}{5}$, $m_{\overline{AT}} = \frac{6}{10} = \frac{3}{5}$, $m_{\overline{MA}} = -\frac{5}{3}$, $m_{\overline{HT}} = -\frac{5}{3}$; $\overline{MH} \parallel \overline{AT}$ and $\overline{MA} \parallel \overline{HT}$.

MATH is a parallelogram since both sides of opposite sides are parallel. $m_{\overline{MA}} = -\frac{5}{3}$, $m_{\overline{AT}} = \frac{3}{5}$. Since the slopes

are negative reciprocals, $\overline{MA} \perp \overline{AT}$ and $\angle A$ is a right angle. *MATH* is a rectangle because it is a parallelogram with a right angle.

    PTS: 6   REF: 081835geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
    KEY: grids

404 ANS:
    Yes. $\angle A \cong \angle X$, $\angle C \cong \angle Z$, $\overline{AC} \cong \overline{XZ}$ after a sequence of rigid motions which preserve distance and angle
    measure, so $\triangle ABC \cong \triangle XYZ$ by ASA. $\overline{BC} \cong \overline{YZ}$ by CPCTC.

    PTS: 2   REF: 081730geo   NAT: G.CO.B.7   TOP: Triangle Congruency

405 ANS: 4   PTS: 2   REF: 081702geo   NAT: G.CO.A.2
    TOP: Identifying Transformations   KEY: basic

406 ANS: 2   PTS: 2   REF: 081601geo   NAT: G.CO.C.9
    TOP: Lines and Angles

407 ANS: 4

$$\frac{-2-1}{-1--3} = \frac{-3}{2} \quad \frac{3-2}{0-5} = \frac{1}{-5} \quad \frac{3-1}{0--3} = \frac{2}{3} \quad \frac{2--2}{5--1} = \frac{4}{6} = \frac{2}{3}$$

PTS: 2   REF: 081522geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: general

408 ANS:

$$\frac{6}{14} = \frac{9}{21} \quad \text{SAS}$$

$126 = 126$

PTS: 2   REF: 081529geo   NAT: G.SRT.B.5   TOP: Similarity
KEY: basic

409 ANS: 1

$m_{\overline{TA}} = -1 \quad y = mx + b$
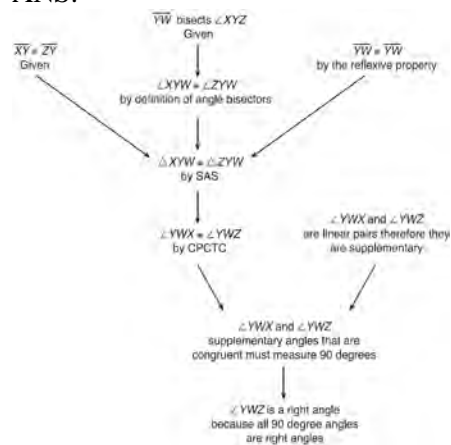
$m_{\overline{EM}} = 1 \quad 1 = 1(2) + b$

$\qquad\qquad -1 = b$

PTS: 2   REF: 081614geo   NAT: G.GPE.B.4   TOP: Quadrilaterals in the Coordinate Plane
KEY: general

410 ANS:

$\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$ (Given). $\triangle XYZ$ is isosceles (Definition of isosceles triangle). $\overline{YW}$ is an altitude of $\triangle XYZ$ (The angle bisector of the vertex of an isosceles triangle is also the altitude of that triangle). $\overline{YW} \perp \overline{XZ}$ (Definition of altitude). $\angle YWZ$ is a right angle (Definition of perpendicular lines).

PTS: 4   REF: spr1411geo   NAT: G.CO.C.10   TOP: Triangle Proofs

411 ANS: 2

$2x + 7 + 4x - 7 = 90$

$\qquad\qquad 6x = 90$

$\qquad\qquad x = 15$

PTS: 2   REF: 081824geo   NAT: G.SRT.C.7   TOP: Cofunctions

412 ANS:

$$2\left(\frac{36}{12} \times \frac{36}{12} \times \frac{4}{12}\right) \times 3.25 = 19.50$$

PTS: 2　　　　　REF: 081831geo　　NAT: G.GMD.A.3　TOP: Volume
KEY: prisms

413 ANS: 3

$$A = \frac{1}{2}ab \quad 3 - 6 = -3 = x$$

$$24 = \frac{1}{2}a(8) \quad \frac{4 + 12}{2} = 8 = y$$

$$a = 6$$

PTS: 2　　　　　REF: 081615geo　　NAT: G.GPE.B.7　TOP: Polygons in the Coordinate Plane

414 ANS:

No, the weight of the bricks is greater than 900 kg. $500 \times (5.1 \text{ cm} \times 10.2 \text{ cm} \times 20.3 \text{ cm}) = 528,003 \text{ cm}^3$.

$$528,003 \text{ cm}^3 \times \frac{1 \text{ m}^3}{100 \text{ cm}^3} = 0.528003 \text{ m}^3. \quad \frac{1920 \text{ kg}}{\text{m}^3} \times 0.528003 \text{ m}^3 \approx 1013 \text{ kg}.$$

PTS: 2　　　　　REF: fall1406geo　NAT: G.MG.A.2　TOP: Density

415 ANS: 1

$$\frac{4}{6} = \frac{3}{4.5} = \frac{2}{3}$$

PTS: 2　　　　　REF: 081523geo　　NAT: G.SRT.A.2　TOP: Dilations

416 ANS: 1

Since a dilation preserves parallelism, the line $4y = 3x + 7$ and its image $3x - 4y = 9$ are parallel, with slopes of $\frac{3}{4}$.

PTS: 2　　　　　REF: 081710geo　　NAT: G.SRT.A.1　TOP: Line Dilations

417 ANS: 4　　　　　PTS: 2　　　　REF: 081822geo　　NAT: G.CO.C.10
TOP: Medians, Altitudes and Bisectors

418 ANS: 1

$$V = \frac{\frac{4}{3}\pi\left(\frac{10}{2}\right)^3}{2} \approx 261.8 \cdot 62.4 = 16,336$$

PTS: 2　　　　　REF: 081516geo　　NAT: G.MG.A.2　TOP: Density

419 ANS:

$$\frac{2}{5} \cdot (16 - 1) = 6 \quad \frac{2}{5} \cdot (14 - 4) = 4 \quad (1 + 6, 4 + 4) = (7, 8)$$

PTS: 2　　　　　REF: 081531geo　　NAT: G.GPE.B.6　TOP: Directed Line Segments

420   ANS: 4

$x = -6 + \dfrac{1}{6}(6 - -6) = -6 + 2 = -4$ $y = -2 + \dfrac{1}{6}(7 - -2) = -2 + \dfrac{9}{6} = -\dfrac{1}{2}$

PTS: 2   REF: 081618geo   NAT: G.GPE.B.6   TOP: Directed Line Segments