# JMAP
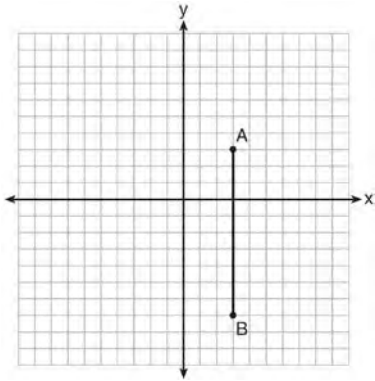# REGENTS BY TYPE

The NY Geometry Regents Exam Questions
from Spring 2014 to August 2018 Sorted by Type

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# Geometry Multiple Choice Regents Exam Questions

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

2 Which object is formed when right triangle $RST$ shown below is rotated around leg $\overline{RS}$?
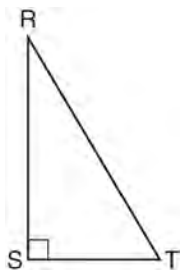


1) a pyramid with a square base
2) an isosceles triangle
3) a right triangle
4) a cone

3 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) $(6,0)$

4 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) $\overline{AB} \cong \overline{BC}$
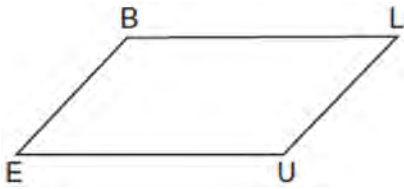3) $\overline{AC} \perp \overline{DB}$
4) $\overline{AC}$ bisects $\angle DCB$

5 In scalene triangle $ABC$ shown in the diagram below, $m\angle C = 90°$.
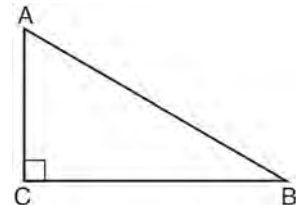


Which equation is always true?

1) $\sin A = \sin B$
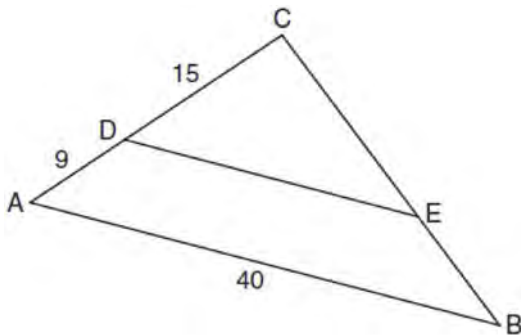2) $\cos A = \cos B$
3) $\cos A = \sin C$
4) $\sin A = \cos B$

6  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)  $\overline{LU} \cong \overline{EU}$

7  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

8  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

9  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*?
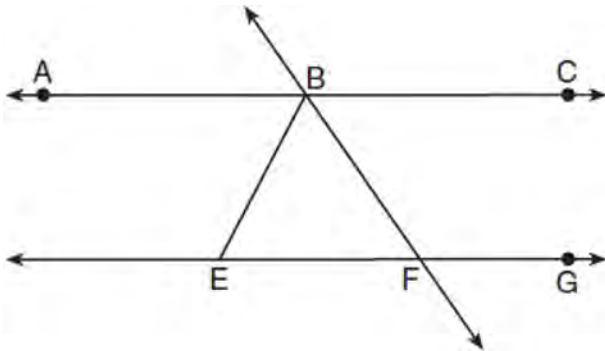1)  $(-3.0)$
2)  $(-2,2)$
3)  $(-1,4)$
4)  $(2,4)$

10  As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.
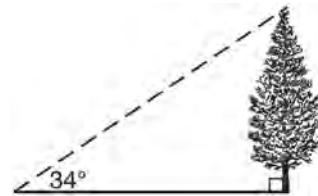


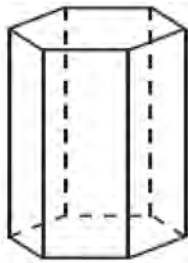If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?
1)  29.7
2)  16.6
3)  13.5
4)  11.2

2

11 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°

12 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

13 Under which transformation would △A'B'C', the image of △ABC, *not* be congruent to △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

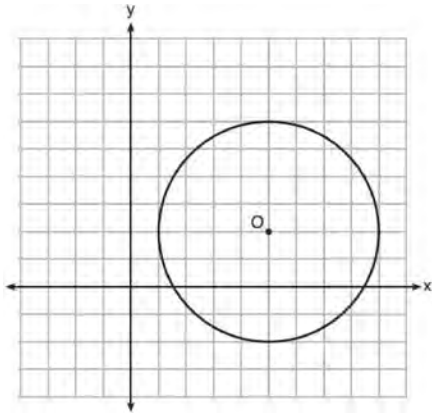14 Using the information given below, which set of triangles can *not* be proven similar?



1)



2)



3)



4)

3

15 What is an equation of circle $O$ shown in the graph below?



1) $x^2 + 10x + y^2 + 4y = -13$
2) $x^2 - 10x + y^2 - 4y = -13$
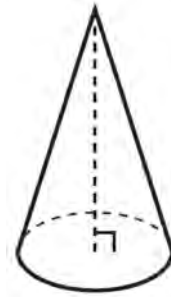3) $x^2 + 10x + y^2 + 4y = -25$
4) $x^2 - 10x + y^2 - 4y = -25$

16 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) $3(m\angle C') = m\angle C$

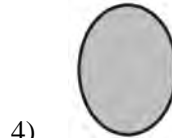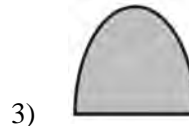17 The ratio of similarity of $\triangle BOY$ to $\triangle GRL$ is $1:2$. If $BO = x + 3$ and $GR = 3x - 1$, then the length of $\overline{GR}$ is
1) 5
2) 7
3) 10
4) 20

18 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) 
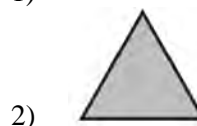
19 Quadrilateral $ABCD$ has diagonals $\overline{AC}$ and $\overline{BD}$. Which information is *not* sufficient to prove $ABCD$ is a parallelogram?
1) $\overline{AC}$ and $\overline{BD}$ bisect each other.
2) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \cong \overline{AD}$
3) $\overline{AB} \cong \overline{CD}$ and $\overline{AB} \parallel \overline{CD}$
4) $\overline{AB} \cong \overline{CD}$ and $\overline{BC} \parallel \overline{AD}$

4

20 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."
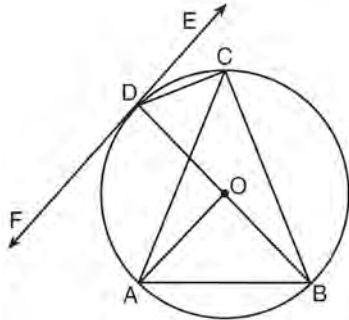


Which angle is Sam referring to?
1) $\angle AOB$
2) $\angle BAC$
3) $\angle DCB$
4) $\angle FDB$

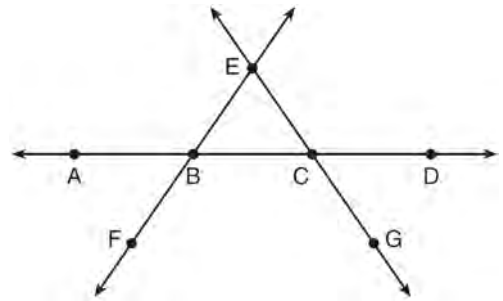21 The center of circle $Q$ has coordinates $(3, -2)$. If circle $Q$ passes through $R(7, 1)$, what is the length of its diameter?
1) 50
2) 25
3) 10
4) 5

22 Which regular polygon has a minimum rotation of $45°$ to carry the polygon onto itself?
1) octagon
2) decagon
3) hexagon
4) pentagon

23 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 $B$.

24 Line segment $EA$ is the perpendicular bisector of $\overline{ZT}$, and $\overline{ZE}$ and $\overline{TE}$ are drawn.
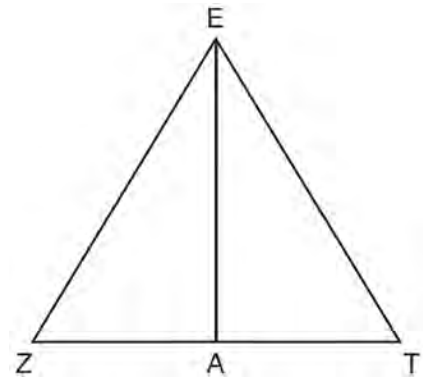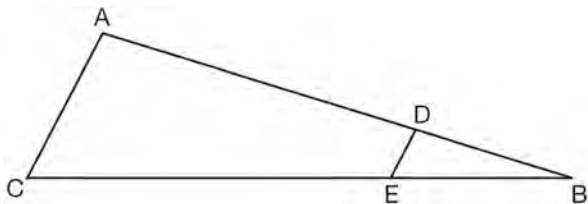


Which conclusion can *not* be proven?
1) $\overline{EA}$ bisects angle $ZET$.
2) Triangle $EZT$ is equilateral.
3) $\overline{EA}$ is a median of triangle $EZT$.
4) Angle $Z$ is congruent to angle $T$.

25  In the diagram of $\triangle ABC$, points $D$ and $E$ are on $\overline{AB}$ and $\overline{CB}$, respectively, such that $\overline{AC} \parallel \overline{DE}$.



If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of $\overline{AC}$?
1)  8
2)  12
3)  16
4)  72

26  In the diagram below, a sequence of rigid motions maps $ABCD$ onto $JKLM$.
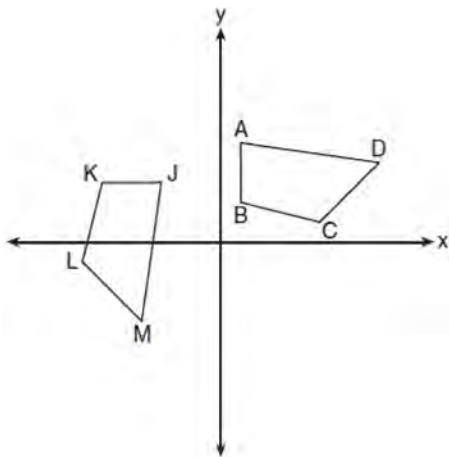


If m$\angle A = 82°$, m$\angle B = 104°$, and m$\angle L = 121°$, the measure of $\angle M$ is
1)  53°
2)  82°
3)  104°
4)  121°

27  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

28  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

29  In the diagram below of right triangle $AED$, $\overline{BC} \parallel \overline{DE}$.
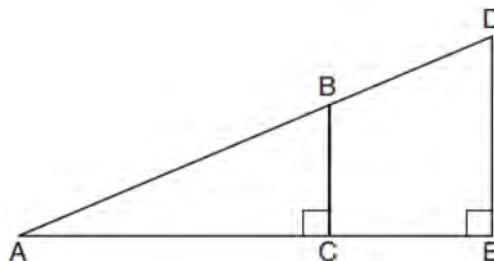


Which statement is always true?
1)  $\dfrac{AC}{BC} = \dfrac{DE}{AE}$

2)  $\dfrac{AB}{AD} = \dfrac{BC}{DE}$

3)  $\dfrac{AC}{CE} = \dfrac{BC}{DE}$

4)  $\dfrac{DE}{BC} = \dfrac{DB}{AB}$

6

30 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

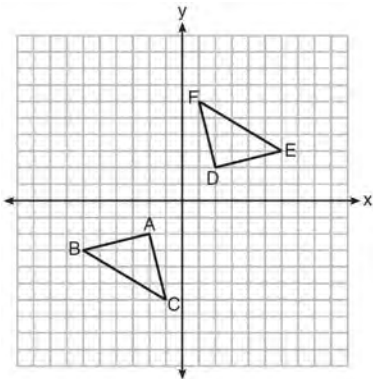31 The line $3y = -2x + 8$ is transformed by a dilation centered at the origin. Which linear equation could be its image?
1) $2x + 3y = 5$
2) $2x - 3y = 5$
3) $3x + 2y = 5$
4) $3x - 2y = 5$

32 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

33 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) $\sin \angle A = \cos \angle B$

34 In the diagram of right triangle *ABC* shown below, $AB = 14$ and $AC = 9$.
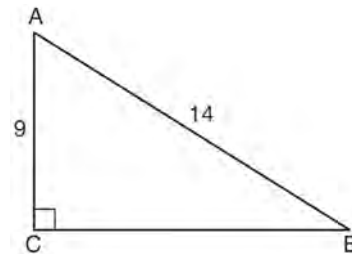


What is the measure of $\angle A$, to the *nearest degree*?
1) 33
2) 40
3) 50
4) 57

35 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

36 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

37 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

38 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 $\triangle DEF$

39 Quadrilateral *ABCD* is inscribed in circle *O*, as shown below.
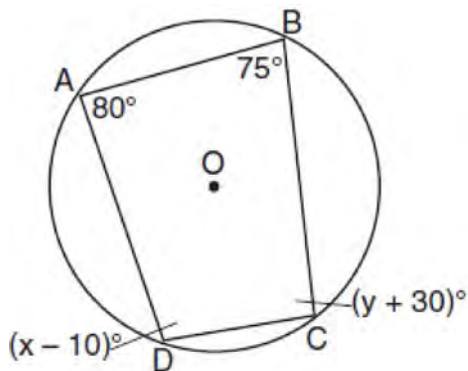


If $m\angle A = 80°$, $m\angle B = 75°$, $m\angle C = (y + 30)°$, and $m\angle D = (x - 10)°$, which statement is true?
1) $x = 85$ and $y = 50$
2) $x = 90$ and $y = 45$
3) $x = 110$ and $y = 75$
4) $x = 115$ and $y = 70$

40 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.
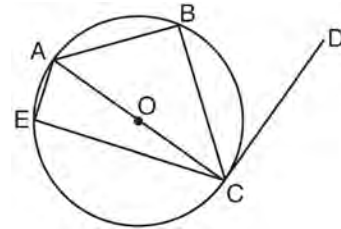


Which statement is *not* always true?
1) $\angle ACB \cong \angle BCD$
2) $\angle ABC \cong \angle ACD$
3) $\angle BAC \cong \angle DCB$
4) $\angle CBA \cong \angle AEC$

41 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) $(x,y) \rightarrow (x+2,y-5)$

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

8

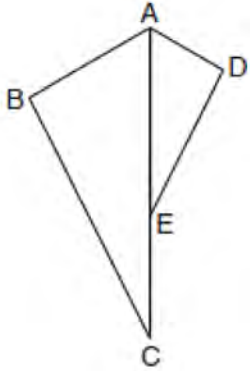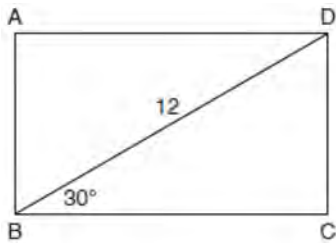43 In the diagram below, $\triangle ADE$ is the image of $\triangle ABC$ after a reflection over the line $AC$ followed by a dilation of scale factor $\dfrac{AE}{AC}$ centered at point $A$.

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) $m\angle ACB \cong \dfrac{1}{2}m\angle DAB$

44 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

45 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 $SRZ$.
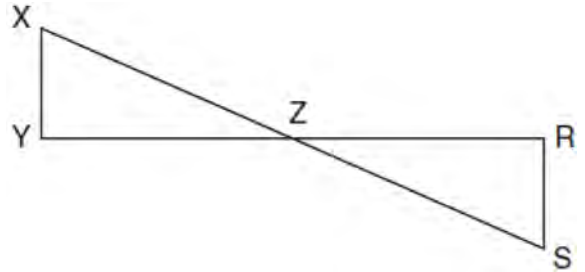
Which statement is always true?
1) $(XY)(SR) = (XZ)(RZ)$
2) $\triangle XYZ \cong \triangle SRZ$
3) $\overline{XS} \cong \overline{YR}$
4) $\dfrac{XY}{SR} = \dfrac{YZ}{RZ}$

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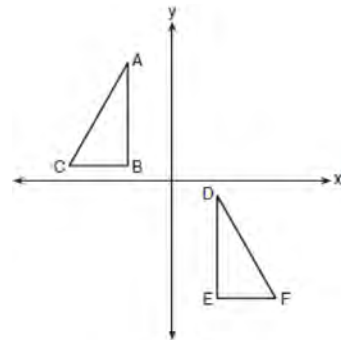
Which sequence of transformations maps $\triangle ABC$ onto $\triangle DEF$?
1) a reflection over the x-axis followed by a translation
2) a reflection over the y-axis followed by a translation
3) a rotation of 180° about the origin followed by a translation
4) a counterclockwise rotation of 90° about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

9

47 In the diagram below of circle $O$, the area of the shaded sector $LOM$ is $2\pi$ cm$^2$.



If the length of $\overline{NL}$ is 6 cm, what is m$\angle N$?
1) 10°
2) 20°
3) 40°
4) 80°

48 Triangle $DAN$ is graphed on the set of axes below. The vertices of $\triangle DAN$ have coordinates $D(-6,-1)$, $A(6,3)$, and $N(-3,10)$.
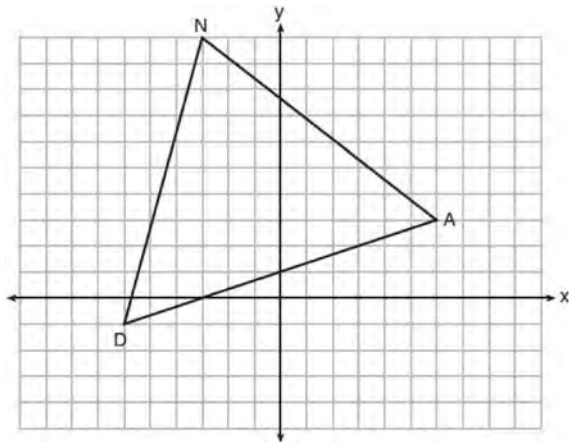


What is the area of $\triangle DAN$?
1) 60
2) 120
3) $20\sqrt{13}$
4) $40\sqrt{13}$

49 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

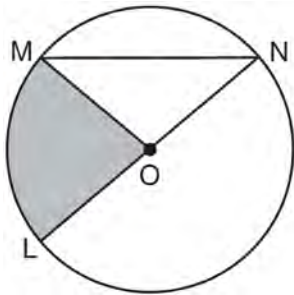50 In the diagram below, $\overline{AB} \parallel \overline{DFC}$, $\overline{EDA} \parallel \overline{CBG}$, and $\overline{EFB}$ and $\overline{AG}$ are drawn.
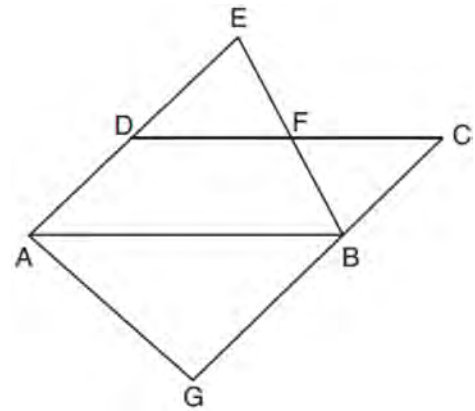


Which statement is always true?
1) $\triangle DEF \cong \triangle CBF$
2) $\triangle BAG \cong \triangle BAE$
3) $\triangle BAG \sim \triangle AEB$
4) $\triangle DEF \sim \triangle AEB$

51 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°

10

52 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

53 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) $\sin B$

54 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?
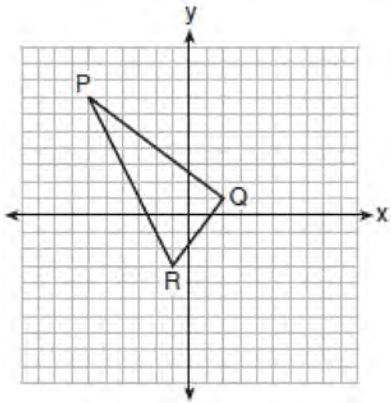1) center $(0,6)$ and radius 4
2) center $(0,-6)$ and radius 4
3) center $(0,6)$ and radius 16
4) center $(0,-6)$ and radius 16

55 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) $(8.5)^3 - \dfrac{1}{3}\pi(4)^2(8)$

56 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

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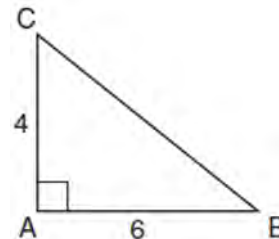


What is the volume of the three-dimensional object formed by continuously rotating the right triangle around $\overline{AB}$?
1) $32\pi$
2) $48\pi$
3) $96\pi$
4) $144\pi$

58 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

59 The graph below shows two congruent triangles, $ABC$ and $A'B'C'$.
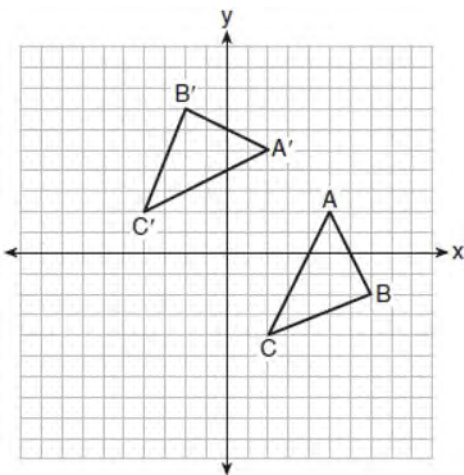


Which rigid motion would map $\triangle ABC$ onto $\triangle A'B'C'$?

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 $y = x$

60 In $\triangle ABC$ shown below, side $\overline{AC}$ is extended to point $D$ with m$\angle DAB = (180 - 3x)°$, m$\angle B = (6x - 40)°$, and m$\angle C = (x + 20)°$.
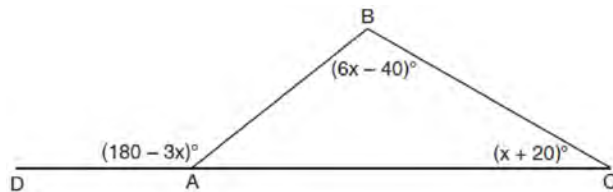


What is m$\angle BAC$?

1)   20°
2)   40°
3)   60°
4)   80°

61 In $\triangle SCU$ shown below, points $T$ and $O$ are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment $OT$ is drawn so that $\angle C \cong \angle OTU$.
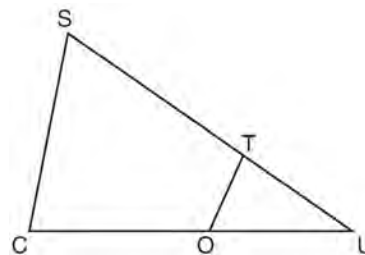


If $TU = 4$, $OU = 5$, and $OC = 7$, what is the length of $\overline{ST}$?

1)   5.6
2)   8.75
3)   11
4)   15

62  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)
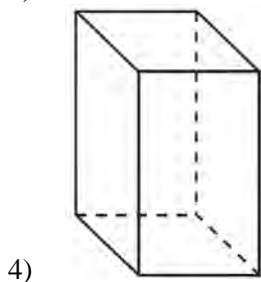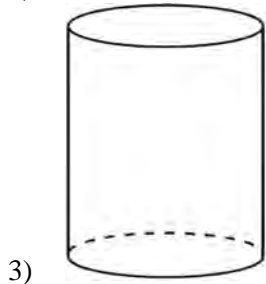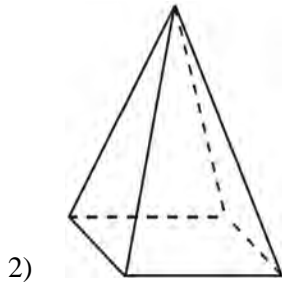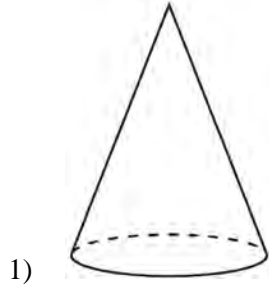
63  Parallelogram *HAND* is drawn below with diagonals $\overline{HN}$ and $\overline{AD}$ intersecting at *S*.
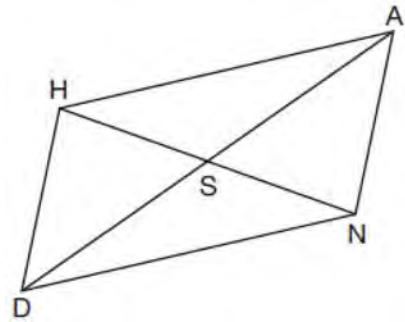
Which statement is always true?

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

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

3)  $\angle AHS \cong \angle ANS$

4)  $\angle HDS \cong \angle NDS$

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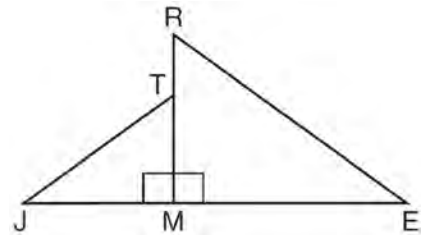
Which statement is always true?

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

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

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

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

65 In the diagram below, congruent figures 1, 2, and 3 are drawn.
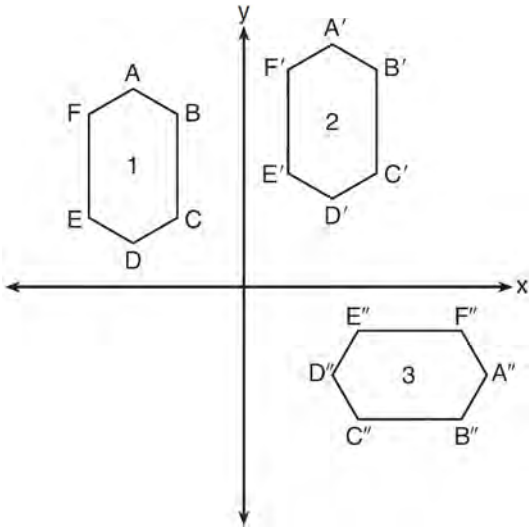


Which sequence of transformations maps figure 1 onto figure 2 and then figure 2 onto figure 3?
1) a reflection followed by a translation
2) a rotation followed by a translation
3) a translation followed by a reflection
4) a translation followed by a rotation

66 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.

67 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

68 The pyramid shown below has a square base, a height of 7, and a volume of 84.
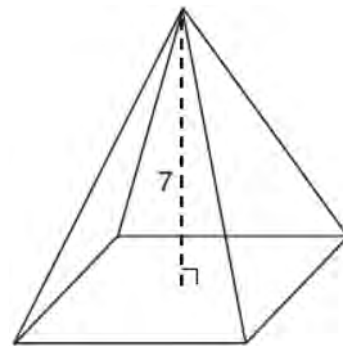


What is the length of the side of the base?
1) 6
2) 12
3) 18
4) 36

69 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

14

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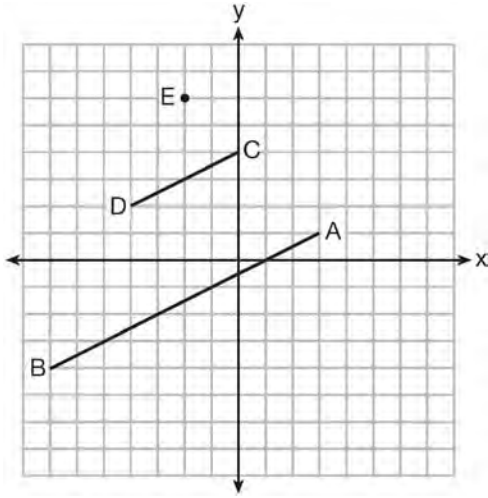
Which ratio is equal to the scale factor $k$ of the dilation?

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

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

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

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

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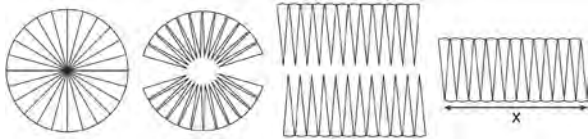
To the *nearest integer*, the value of $x$ is
1) 31
2) 16
3) 12
4) 10

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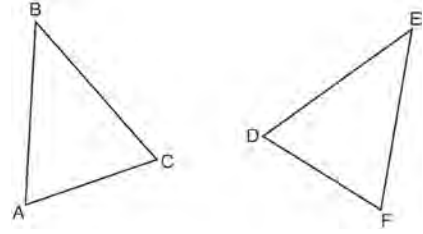
1) $AB = DE$ and $BC = EF$
2) $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3) There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4) There is a sequence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

73 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.
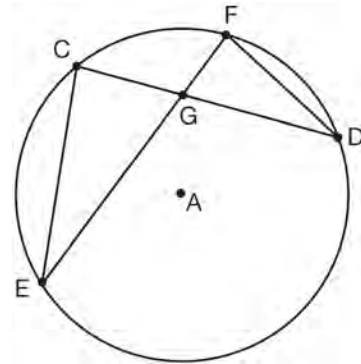
Which statement is *not* always true?
1) $\overline{CG} \cong \overline{FG}$
2) $\angle CEG \cong \angle FDG$
3) $\dfrac{CE}{EG} = \dfrac{FD}{DG}$
4) $\triangle CEG \sim \triangle FDG$

15

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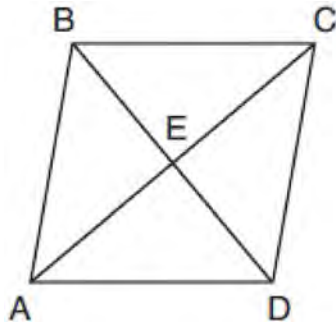
What additional information is sufficient to prove that parallelogram $ABCD$ is also a rhombus?
1) $\overline{BD}$ bisects $\overline{AC}$.
2) $\overline{AB}$ is parallel to $\overline{CD}$.
3) $\overline{AC}$ is congruent to $\overline{BD}$.
4) $\overline{AC}$ is perpendicular to $\overline{BD}$.

75 Given the right triangle in the diagram below, what is the value of $x$, to the *nearest foot*?
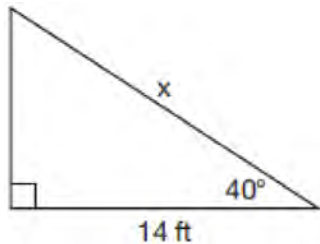
1) 11
2) 17
3) 18
4) 22

76 In the diagram below, $\overline{DB}$ and $\overline{AF}$ intersect at point $C$, and $\overline{AD}$ and $\overline{FBE}$ are drawn.
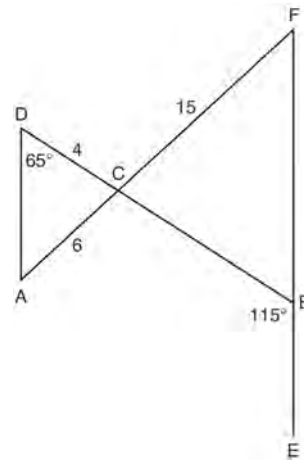
If $AC = 6$, $DC = 4$, $FC = 15$, $m\angle D = 65°$, and $m\angle CBE = 115°$, what is the length of $\overline{CB}$?
1) 10
2) 12
3) 17
4) 22.5

77 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
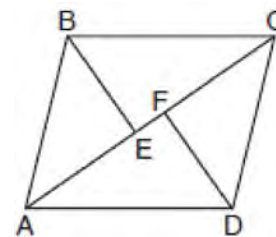
1) square
2) rhombus
3) rectangle
4) parallelogram

16

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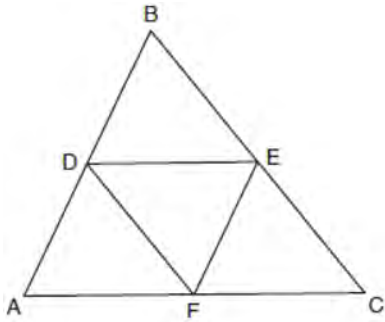


The perimeter of quadrilateral *ADEF* is equivalent to

1)  $AB + BC + AC$

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

3)  $2AB + 2AC$

4)  $AB + AC$

79  Steve drew line segments *ABCD*, *EFG*, *BF*, and *CF* as shown in the diagram below. Scalene $\triangle BFC$ is formed.
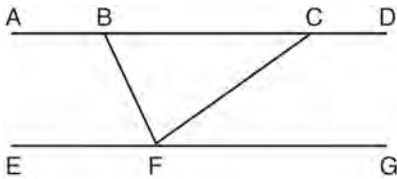


Which statement will allow Steve to prove $\overline{ABCD} \parallel \overline{EFG}$?

1)  $\angle CFG \cong \angle FCB$
2)  $\angle ABF \cong \angle BFC$
3)  $\angle EFB \cong \angle CFB$
4)  $\angle CBF \cong \angle GFC$

80  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

81  In the diagram below, $\triangle ABC$ has vertices $A(4,5)$, $B(2,1)$, and $C(7,3)$.
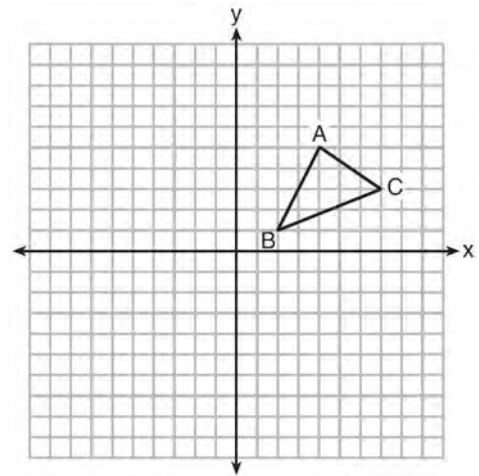


What is the slope of the altitude drawn from *A* to $\overline{BC}$?

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

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

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

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

17

82 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

83 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 $\frac{1}{3}$.

84 Which sequence of transformations will map $\triangle ABC$ onto $\triangle A'B'C'$?
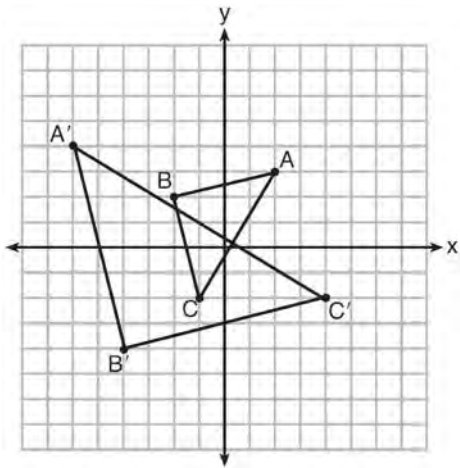


1) reflection and translation
2) rotation and reflection
3) translation and dilation
4) dilation and rotation

85 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) $\frac{8\pi}{3}$
2) $\frac{16\pi}{3}$
3) $\frac{32\pi}{3}$
4) $\frac{64\pi}{3}$

86 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 $m\angle N = 40°$.
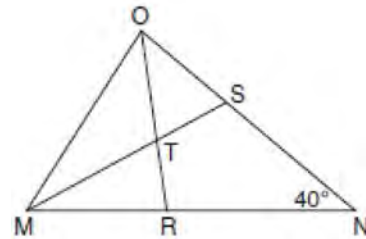


If $m\angle TMR = 28°$, the measure of angle *OTS* is
1) 40°
2) 50°
3) 60°
4) 70°

87 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) $(x,y) \rightarrow (x+2,y+3)$

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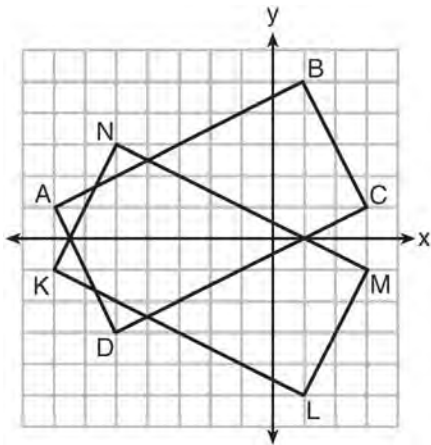
1) rotation
2) translation
3) reflection over the *x*-axis
4) reflection over the *y*-axis

89 Kelly is completing a proof based on the figure below.
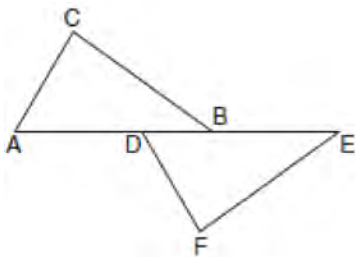
She was given that $\angle A \cong \angle EDF$, and has already proven $\overline{AB} \cong \overline{DE}$. Which pair of corresponding parts and triangle congruency method would *not* prove $\triangle ABC \cong \triangle DEF$?

1) $\overline{AC} \cong \overline{DF}$ and SAS
2) $\overline{BC} \cong \overline{EF}$ and SAS
3) $\angle C \cong \angle F$ and AAS
4) $\angle CBA \cong \angle FED$ and ASA

90 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.
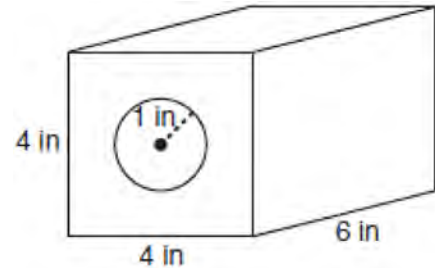
What is the approximate volume of the remaining solid, in cubic inches?

1) 19
2) 77
3) 93
4) 96

91 In the diagram below of circle *O*, chord $\overline{DF}$ bisects chord $\overline{BC}$ at *E*.
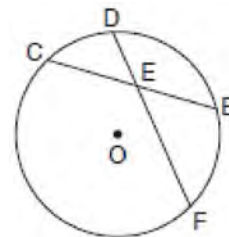
If $BC = 12$ and *FE* is 5 more than *DE*, then *FE* is
1) 13
2) 9
3) 6
4) 4

92  In the diagram below of $\triangle ABC$, $\angle ABC$ is a right angle, $AC = 12$, $AD = 8$, and altitude $\overline{BD}$ is drawn.
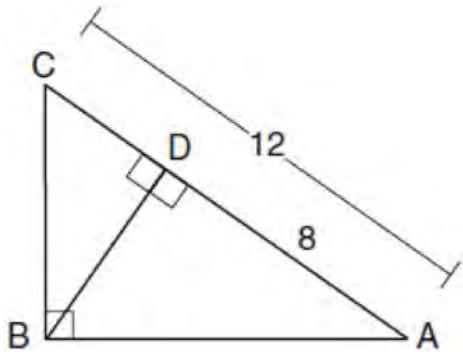


What is the length of $\overline{BC}$?

1)  $4\sqrt{2}$
2)  $4\sqrt{3}$
3)  $4\sqrt{5}$
4)  $4\sqrt{6}$

93  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)  $(10,2)$

94  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

95  In the diagram below, $AC = 7.2$ and $CE = 2.4$.
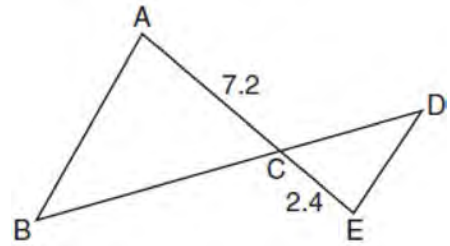


Which statement is *not* sufficient to prove $\triangle ABC \sim \triangle EDC$?

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 $BC = 8.7$

96  The diagram below shows two similar triangles.
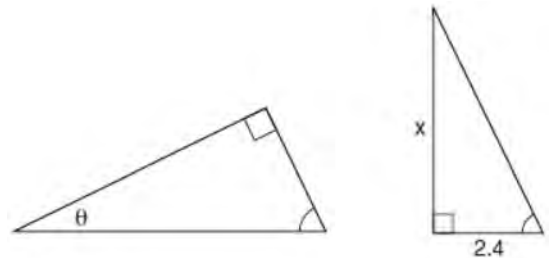


If $\tan \theta = \dfrac{3}{7}$, what is the value of $x$, to the *nearest tenth*?

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

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

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

2) Rectangle $A'B'C'D'$ has a perimeter that is $\frac{3}{2}$ the perimeter of rectangle $ABCD$.

3) Rectangle $A'B'C'D'$ has an area that is $\frac{2}{3}$ the area of rectangle $ABCD$.

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

98 In the diagram below, $\overline{DE}$ divides $\overline{AB}$ and $\overline{AC}$ proportionally, m$\angle C = 26°$, m$\angle A = 82°$, and $\overline{DF}$ bisects $\angle BDE$.
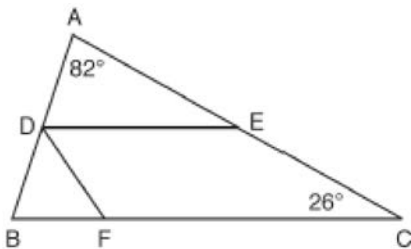


The measure of angle $DFB$ is
1) 36°
2) 54°
3) 72°
4) 82°

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

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

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

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

100 In the diagram below, $\overline{AC}$ has endpoints with coordinates $A(-5,2)$ and $C(4,-10)$.
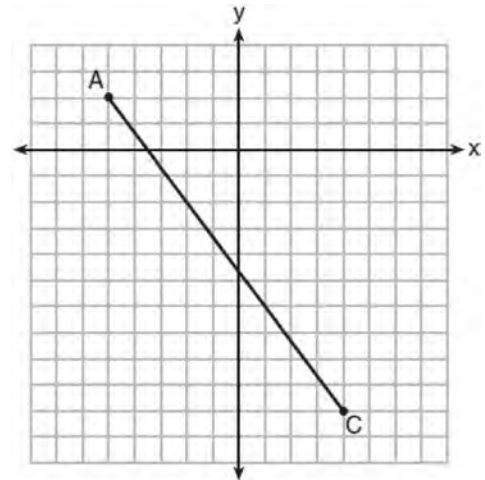


If $B$ is a point on $\overline{AC}$ and $AB:BC = 1:2$, what are the coordinates of $B$?
1) $(-2,-2)$

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

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

4) $(1,-6)$

21

101  In $\triangle RST$ shown below, altitude $\overline{SU}$ is drawn to $\overline{RT}$ at $U$.
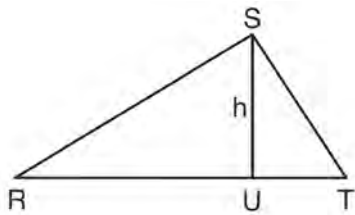


If $SU = h$, $UT = 12$, and $RT = 42$, which value of $h$ will make $\triangle RST$ a right triangle with $\angle RST$ as a right angle?

1)  $6\sqrt{3}$

2)  $6\sqrt{10}$

3)  $6\sqrt{14}$

4)  $6\sqrt{35}$

102  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)  $y - 6 = -\dfrac{3}{4}(x - 8)$

103  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

104  In the diagram below, $\overline{AB} \parallel \overrightarrow{DEF}$, $\overline{AE}$ and $\overline{BD}$ intersect at $C$, m$\angle B = 43°$, and m$\angle CEF = 152°$.
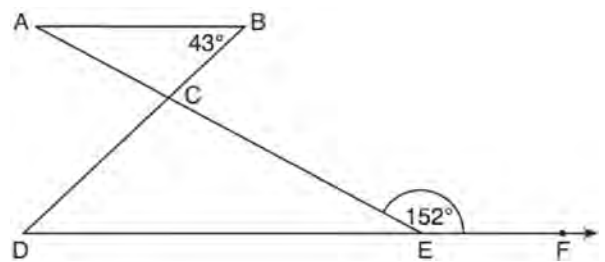


Which statement is true?
1)  m$\angle D = 28°$
2)  m$\angle A = 43°$
3)  m$\angle ACD = 71°$
4)  m$\angle BCE = 109°$

105  Circle $O$ is centered at the origin. In the diagram below, a quarter of circle $O$ is graphed.
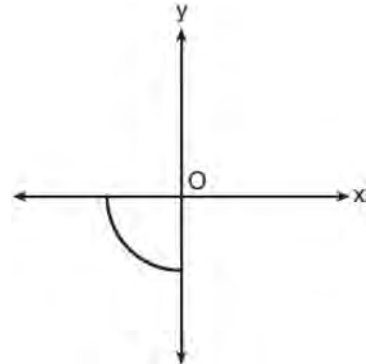


Which three-dimensional figure is generated when the quarter circle is continuously rotated about the $y$-axis?
1)  cone
2)  sphere
3)  cylinder
4)  hemisphere

22

106 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 $= \sqrt{35}$

107 In the diagram of $\triangle ADC$ below, $\overline{EB} \parallel \overline{DC}$, $AE = 9$, $ED = 5$, and $AB = 9.2$.
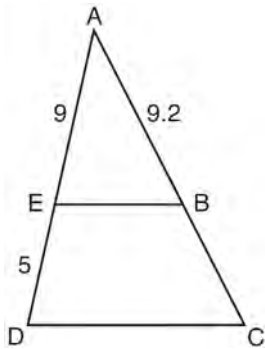


What is the length of $\overline{AC}$, to the *nearest tenth*?
1) 5.1
2) 5.2
3) 14.3
4) 14.4

108 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

109 On the graph below, point $A(3,4)$ and $\overline{BC}$ with coordinates $B(4,3)$ and $C(2,1)$ are graphed.
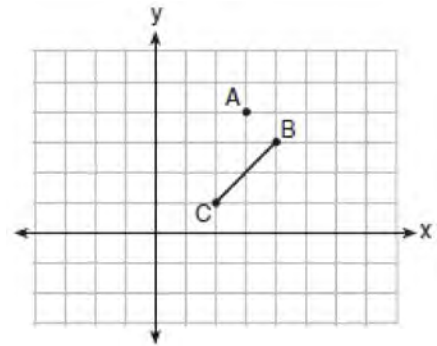


What are the coordinates of $B'$ and $C'$ after $\overline{BC}$ undergoes a dilation centered at point $A$ with a scale factor of 2?
1) $B'(5,2)$ and $C'(1,-2)$
2) $B'(6,1)$ and $C'(0,-1)$
3) $B'(5,0)$ and $C'(1,-2)$
4) $B'(5,2)$ and $C'(3,0)$

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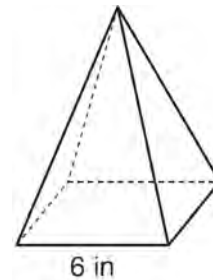


If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is
1) 72
2) 144
3) 288
4) 432

23

111 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

112 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) $y = -6x + 6$

113 In the diagram below, $\overparen{mABC} = 268°$.
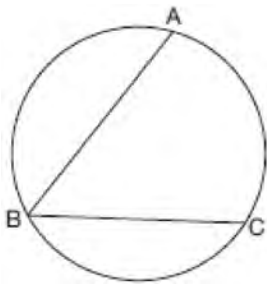


What is the number of degrees in the measure of $\angle ABC$?
1) 134°
2) 92°
3) 68°
4) 46°

114 In the diagram of right triangle $ADE$ below, $\overline{BC} \parallel \overline{DE}$.
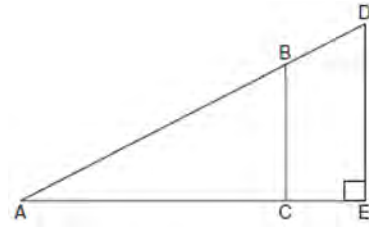


Which ratio is always equivalent to the sine of $\angle A$?
1) $\dfrac{AD}{DE}$
2) $\dfrac{AE}{AD}$
3) $\dfrac{BC}{AB}$
4) $\dfrac{AB}{AC}$

115 In the diagram of $\triangle RST$ below, $m\angle T = 90°$, $RS = 65$, and $ST = 60$.
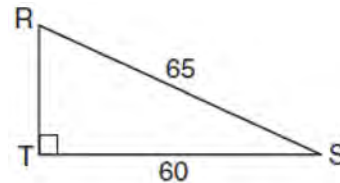


What is the measure of $\angle S$, to the *nearest degree*?
1) 23°
2) 43°
3) 47°
4) 67°

24

116 In the diagram below, two concentric circles with center $O$, and radii $\overline{OC}$, $\overline{OD}$, $\overline{OGE}$, and $\overline{ODF}$ are drawn.
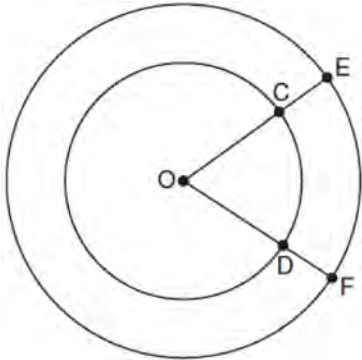


If $OC = 4$ and $OE = 6$, which relationship between the length of arc $EF$ and the length of arc $CD$ is always true?
1) The length of arc $EF$ is 2 units longer than the length of arc $CD$.
2) The length of arc $EF$ is 4 units longer than the length of arc $CD$.
3) The length of arc $EF$ is 1.5 times the length of arc $CD$.
4) The length of arc $EF$ is 2.0 times the length of arc $CD$.

117 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

118 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

119 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 $n$.
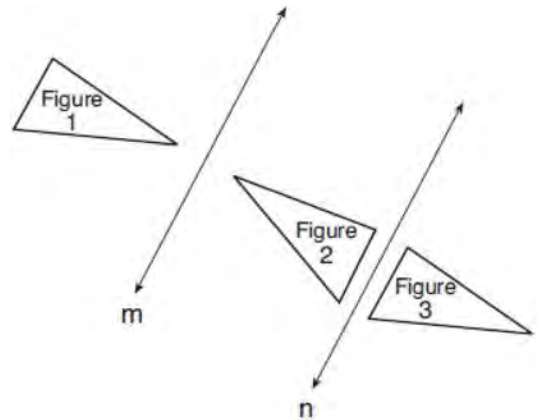


Which single transformation would carry Figure 1 onto Figure 3?
1) a dilation
2) a rotation
3) a reflection
4) a translation

25

120 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.
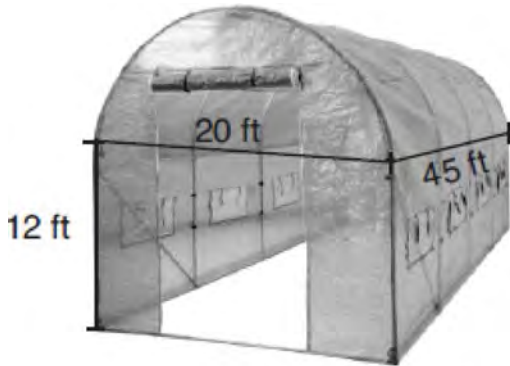


To the *nearest cubic foot*, what is the volume of the greenhouse?
1) 17,869
2) 24,937
3) 39,074
4) 67,349

121 In the diagram below, $\triangle ABC \sim \triangle DEF$.
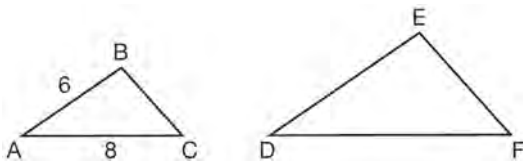


If $AB = 6$ and $AC = 8$, which statement will justify similarity by SAS?
1) $DE = 9$, $DF = 12$, and $\angle A \cong \angle D$
2) $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$
3) $DE = 36$, $DF = 64$, and $\angle C \cong \angle F$
4) $DE = 15$, $DF = 20$, and $\angle C \cong \angle F$

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



1)

2)

3)

4)
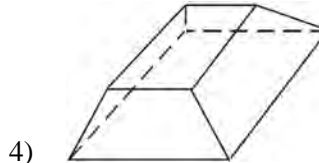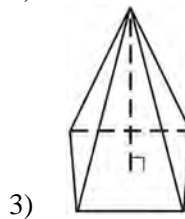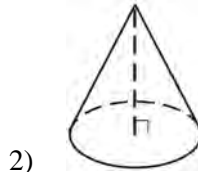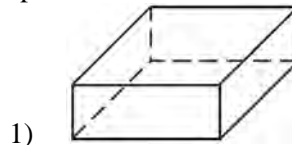
123 In the diagram below, $\overline{CD}$ is the altitude drawn to the hypotenuse $\overline{AB}$ of right triangle $ABC$.
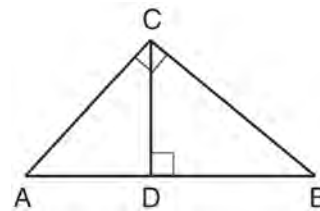


Which lengths would *not* produce an altitude that measures $6\sqrt{2}$?
1) $AD = 2$ and $DB = 36$
2) $AD = 3$ and $AB = 24$
3) $AD = 6$ and $DB = 12$
4) $AD = 8$ and $AB = 17$

26

124  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) $25\sqrt{2}$

125  Identify which sequence of transformations could map pentagon $ABCDE$ onto pentagon $A''B''C''D''E''$, as shown below.
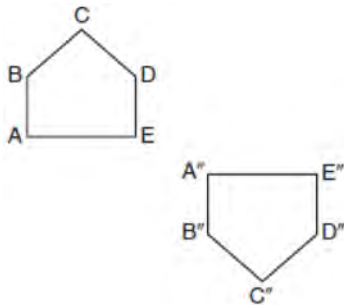


1)  dilation followed by a rotation
2)  translation followed by a rotation
3)  line reflection followed by a translation
4)  line reflection followed by a line reflection

126  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

127  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) $y = -\dfrac{2}{3}x - 5$
2) $y = -\dfrac{2}{3}x - 3$
3) $y = \dfrac{2}{3}x + 1$
4) $y = \dfrac{2}{3}x + 10$

128  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.
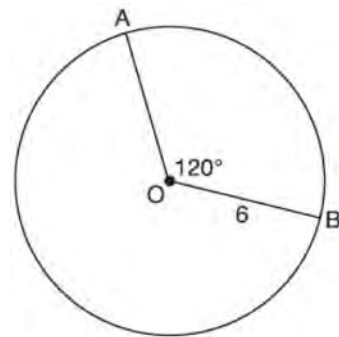


Which expression represents the length of arc $AB$, in inches?
1) $\dfrac{120}{360}(6\pi)$
2) $120(6)$
3) $\dfrac{1}{3}(36\pi)$
4) $\dfrac{1}{3}(12\pi)$

27

129 The regular polygon below is rotated about its center.
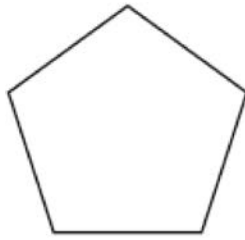


Which angle of rotation will carry the figure onto itself?
1) 60°
2) 108°
3) 216°
4) 540°

130 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 $54.45\pi$ 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) $24\dfrac{3}{4}$

131 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

132 In the diagram below, $\triangle ABC \sim \triangle DEC$.
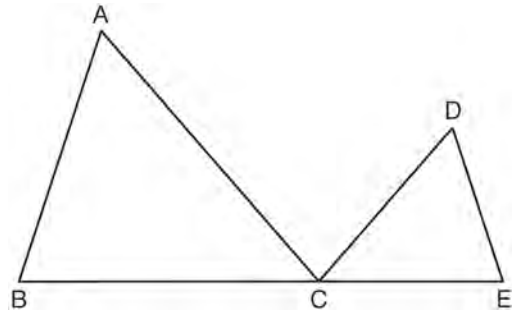


If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?
1) 12.5
2) 14.0
3) 14.8
4) 17.5

133 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) $(-8, 5\sqrt{21})$

134 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

135 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.
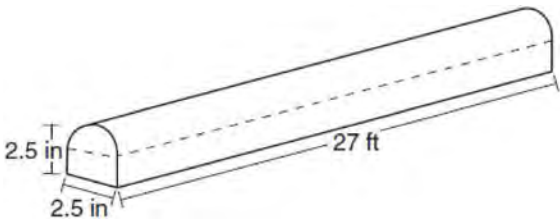


How much metal, to the *nearest cubic inch*, will the railing contain?
1) 151
2) 795
3) 1808
4) 2025

136 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 $AD = 8$, $AE = 6$, and $EC$ is 12 more than $BD$, the length of $\overline{BD}$ is
1) 6
2) 22
3) 36
4) 48

137 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

138 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.
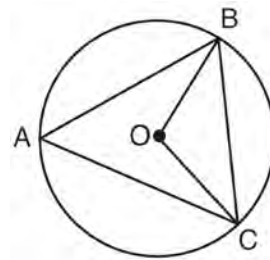


Which statement must always be true?
1) $\angle BAC \cong \angle BOC$
2) $m\angle BAC = \frac{1}{2} m\angle BOC$
3) $\triangle BAC$ and $\triangle BOC$ are isosceles.
4) The area of $\triangle BAC$ is twice the area of $\triangle BOC$.

139 A man was parasailing above a lake at an angle of elevation of 32° from a boat, as modeled in the diagram below.
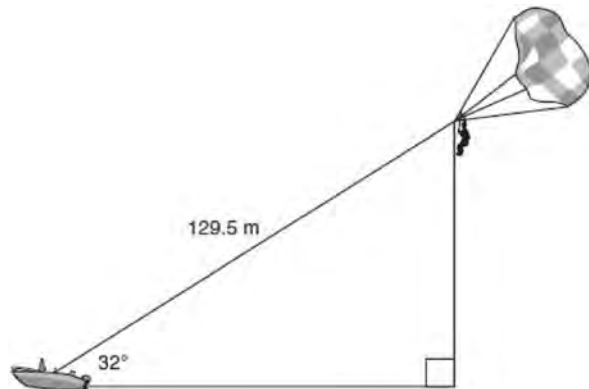


If 129.5 meters of cable connected the boat to the parasail, approximately how many meters above the lake was the man?
1) 68.6
2) 80.9
3) 109.8
4) 244.4

29

140 In the diagram below of circle $O$, $GO = 8$ and $m\angle GOJ = 60°$.
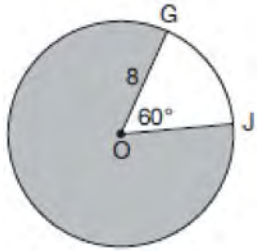


What is the area, in terms of $\pi$, of the shaded region?

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

2) $\dfrac{20\pi}{3}$

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

4) $\dfrac{160\pi}{3}$

142 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 $\overline{DE}$

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

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

2) $y = -2x - 3$

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

4) $y = -2x + 3$

141 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) $\overline{CA} \cong \overline{TS}$

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

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

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

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

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

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

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

30

145 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

146 In the diagram below of $\triangle PQR$, $\overline{ST}$ is drawn parallel to $\overline{PR}$, $PS = 2$, $SQ = 5$, and $TR = 5$.
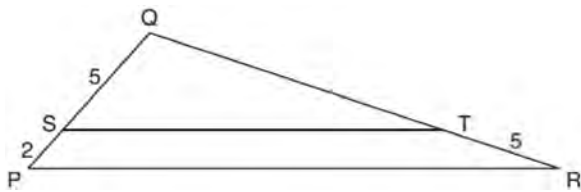


What is the length of $\overline{QR}$?
1) 7
2) 2
3) $12\frac{1}{2}$
4) $17\frac{1}{2}$

147 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

148 Quadrilateral *ABCD* is graphed on the set of axes below.
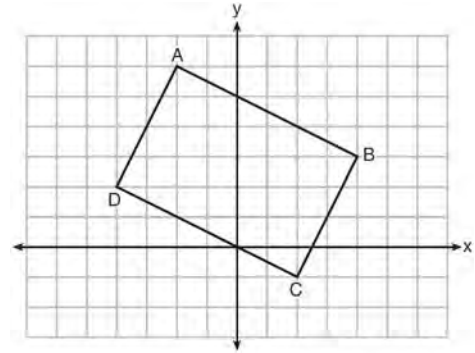


When *ABCD* is rotated 90° in a counterclockwise direction about the origin, its image is quadrilateral *A'B'C'D'*. Is distance preserved under this rotation, and which coordinates are correct for the given vertex?
1) no and $C'(1,2)$
2) no and $D'(2,4)$
3) yes and $A'(6,2)$
4) yes and $B'(-3,4)$

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

150 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

31

151  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 $FC = 21.6$.

F

21.6

D
7.2
65°
C
9.6
115° B
A
E
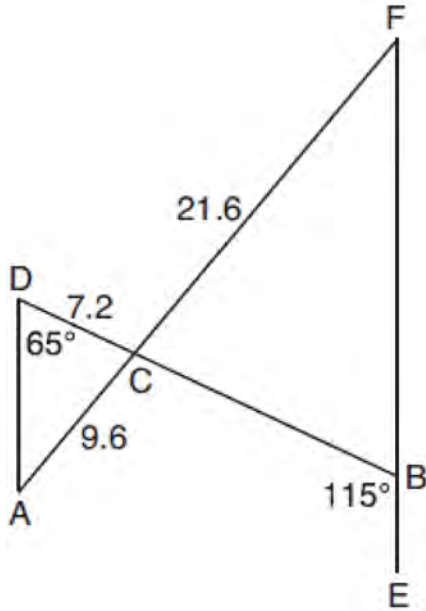
What is the length of $\overline{CB}$?
1)  3.2
2)  4.8
3)  16.2
4)  19.2

152  An equation of a line perpendicular to the line represented by the equation $y = -\dfrac{1}{2}x - 5$ and passing through $(6, -4)$ is

1)  $y = -\dfrac{1}{2}x + 4$

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

3)  $y = 2x + 14$

4)  $y = 2x - 16$

153  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

154  Triangle $RST$ is graphed on the set of axes below.

R
S
T
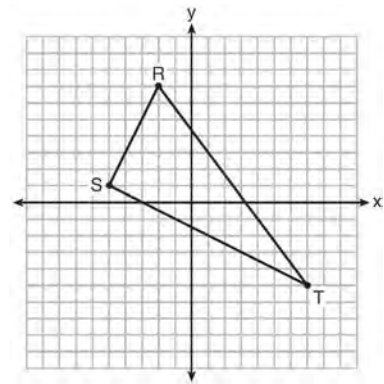
How many square units are in the area of $\triangle RST$?
1)  $9\sqrt{3} + 15$
2)  $9\sqrt{5} + 15$
3)  45
4)  90

155  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

32

156 Which transformation of $\overline{OA}$ would result in an image parallel to $\overline{OA}$?
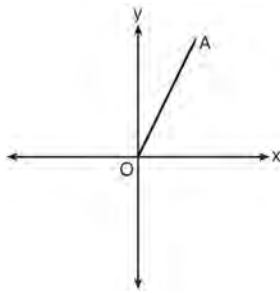


1) a translation of two units down
2) a reflection over the *x*-axis
3) a reflection over the *y*-axis
4) a clockwise rotation of 90° about the origin

157 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*.
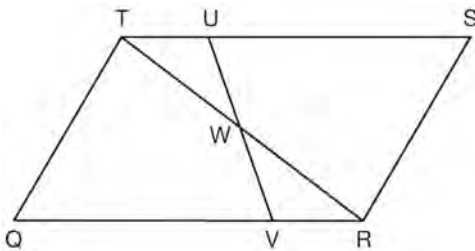


If m∠*S* = 60°, m∠*SRT* = 83°, and m∠*TWU* = 35°, what is m∠*WVQ*?
1) 37°
2) 60°
3) 72°
4) 83°

158 Given △*MRO* shown below, with trapezoid *PTRO*, *MR* = 9, *MP* = 2, and *PO* = 4.
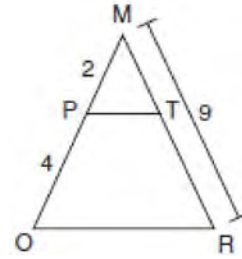


What is the length of $\overline{TR}$?
1) 4.5
2) 5
3) 3
4) 6

159 In circle *M* below, diameter $\overline{AC}$, chords $\overline{AB}$ and $\overline{BC}$, and radius $\overline{MB}$ are drawn.
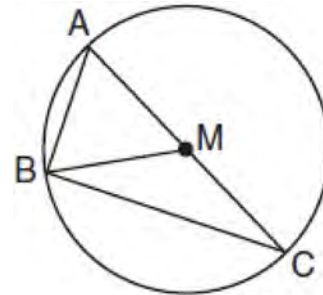


Which statement is *not* true?
1) △*ABC* is a right triangle.
2) △*ABM* is isosceles.
3) $m\overset{\frown}{BC} = m\angle BMC$
4) $m\overset{\frown}{AB} = \dfrac{1}{2}m\angle ACB$

160 The line whose equation is $3x - 5y = 4$ is dilated by a scale factor of $\frac{5}{3}$ 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.

161 In triangle $SRK$ below, medians $\overline{SC}, \overline{KE}$, and $\overline{RL}$ intersect at $M$.
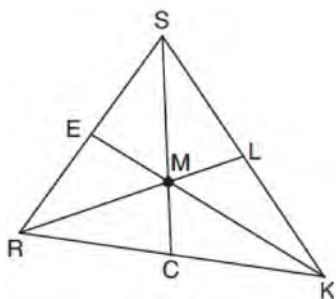


Which statement must always be true?
1) $3(MC) = SC$
2) $MC = \frac{1}{3}(SM)$
3) $RM = 2MC$
4) $SM = KM$

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

163 Triangles $ABC$ and $DEF$ are drawn below.
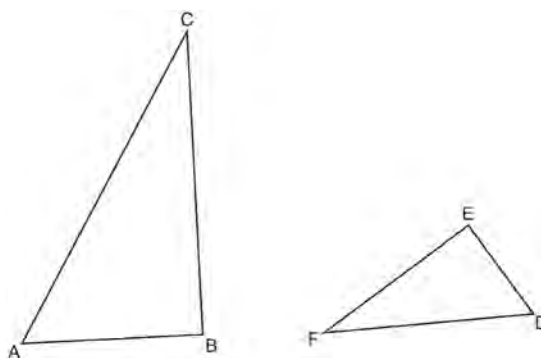


If $AB = 9$, $BC = 15$, $DE = 6$, $EF = 10$, and $\angle B \cong \angle E$, which statement is true?
1) $\angle CAB \cong \angle DEF$
2) $\dfrac{AB}{CB} = \dfrac{FE}{DE}$
3) $\triangle ABC \sim \triangle DEF$
4) $\dfrac{AB}{DE} = \dfrac{FE}{CB}$

164 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

165 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

166 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

1)

2)

3)

4)

167 Triangle *ABC*, with vertices at *A*(0,0), *B*(3,5), and *C*(0,5), is graphed on the set of axes shown below.
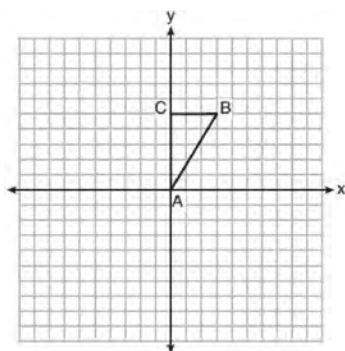
Which figure is formed when △*ABC* is rotated continuously about $\overline{BC}$?
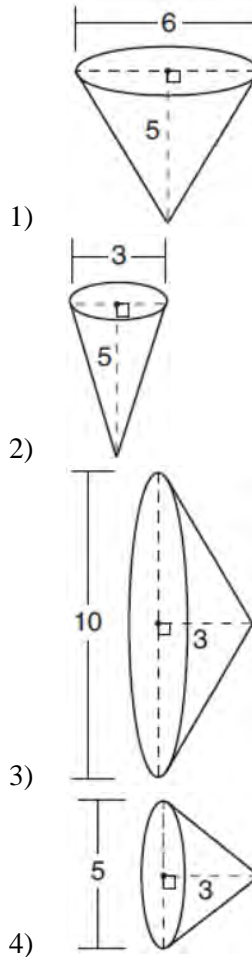
168 The line $y = 2x - 4$ is dilated by a scale factor of $\frac{3}{2}$ and centered at the origin. Which equation represents the image of the line after the dilation?

1) $y = 2x - 4$
2) $y = 2x - 6$
3) $y = 3x - 4$
4) $y = 3x - 6$

## Geometry Multiple Choice Regents Exam Questions

169  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

170  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 $EF = 11$.
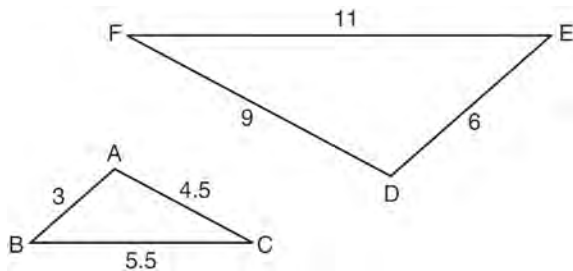


Which relationship must always be true?

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

171  The image of $\triangle ABC$ after a rotation of $90°$ clockwise about the origin is $\triangle DEF$, as shown below.
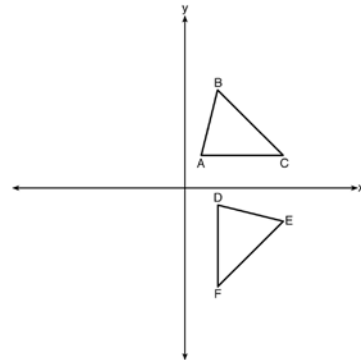


Which statement is true?

1) $\overline{BC} \cong \overline{DE}$
2) $\overline{AB} \cong \overline{DF}$
3) $\angle C \cong \angle E$
4) $\angle A \cong \angle D$

172  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

173  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

174 In the diagram below, rectangle *ABCD* has vertices whose coordinates are $A(7,1)$, $B(9,3)$, $C(3,9)$, and $D(1,7)$.
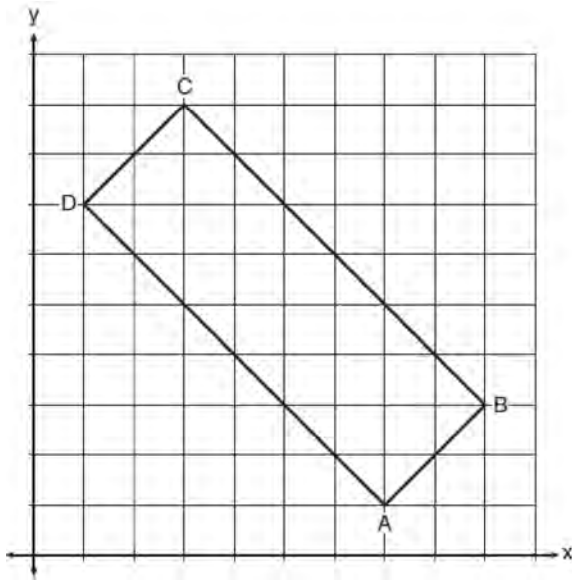


Which transformation will *not* carry the rectangle onto itself?
1) a reflection over the line $y = x$
2) a reflection over the line $y = -x + 10$
3) a rotation of 180° about the point $(6,6)$
4) a rotation of 180° about the point $(5,5)$

175 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

176 In the accompanying diagram of right triangle *ABC*, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.
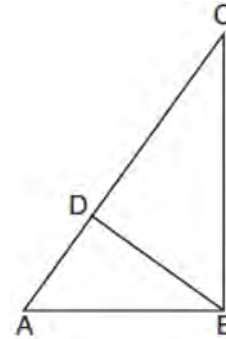


Which statement must always be true?
1) $\dfrac{AD}{AB} = \dfrac{BC}{AC}$
2) $\dfrac{AD}{AB} = \dfrac{AB}{AC}$
3) $\dfrac{BD}{BC} = \dfrac{AB}{AD}$
4) $\dfrac{AB}{BC} = \dfrac{BD}{AC}$

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

178 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

37

179 In the diagram below, $\overline{BC}$ is the diameter of circle $A$.
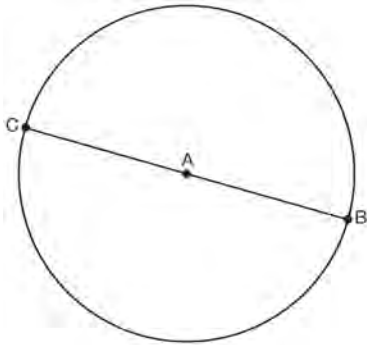


Point $D$, which is unique from points $B$ and $C$, is plotted on circle $A$. Which statement must always be true?
1) $\triangle BCD$ is a right triangle.
2) $\triangle BCD$ is an isosceles triangle.
3) $\triangle BAD$ and $\triangle CBD$ are similar triangles.
4) $\triangle BAD$ and $\triangle CAD$ are congruent triangles.

180 In the diagram below of $\triangle ABC$, $D$, $E$, and $F$ are the midpoints of $\overline{AB}$, $\overline{BC}$, and $\overline{CA}$, respectively.
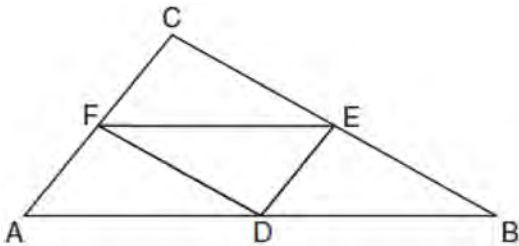


What is the ratio of the area of $\triangle CFE$ to the area of $\triangle CAB$?
1) 1:1
2) 1:2
3) 1:3
4) 1:4

181 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

182 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 $\overline{MN}$?
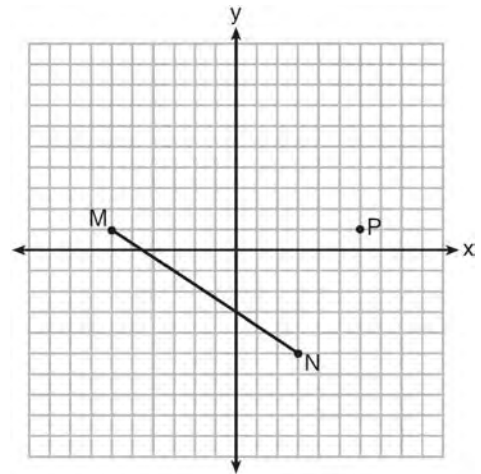


1) $y = -\frac{2}{3}x + 5$
2) $y = -\frac{2}{3}x - 3$
3) $y = \frac{3}{2}x + 7$
4) $y = \frac{3}{2}x - 8$

183  In the figure shown below, quadrilateral *TAEO* is circumscribed around circle *D*. The midpoint of $\overline{TA}$ is *R*, and $\overline{HO} \cong \overline{PE}$.
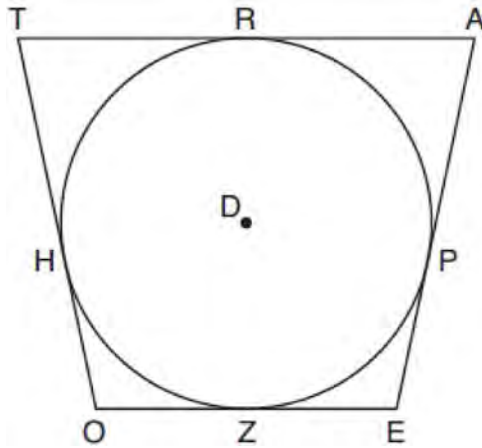


If *AP* = 10 and *EO* = 12, what is the perimeter of quadrilateral *TAEO*?
1)  56
2)  64
3)  72
4)  76

184  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

185  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°

186  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)  $y = 2x + 1$

187  In triangle *ABC*, points *D* and *E* are on sides $\overline{AB}$ and $\overline{BC}$, respectively, such that $\overline{DE} \parallel \overline{AC}$, and $AD:DB = 3:5$.
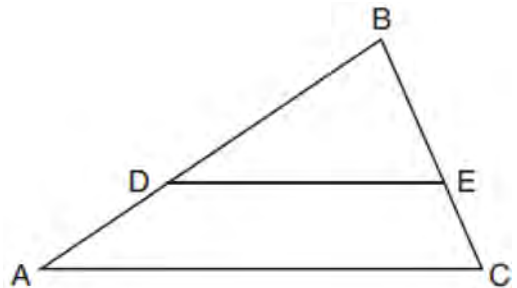


If *DB* = 6.3 and *AC* = 9.4, what is the length of *DE*, to the *nearest tenth*?
1)  3.8
2)  5.6
3)  5.9
4)  15.7

188  In the diagram below, quadrilateral *ABCD* is inscribed in circle *P*.
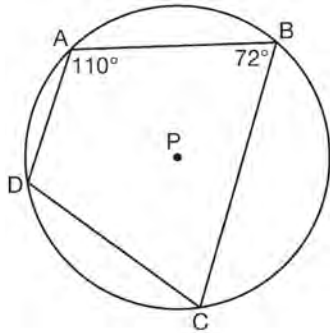


What is m∠*ADC*?
1)  70°
2)  72°
3)  108°
4)  110°

189  In the diagram below, $\overline{AEFB} \parallel \overline{CGD}$, and $\overline{GE}$ and $\overline{GF}$ are drawn.
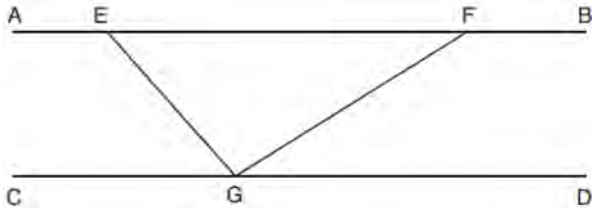


If m∠*EFG* = 32° and m∠*AEG* = 137°, what is m∠*EGF*?
1)  11°
2)  43°
3)  75°
4)  105°

190  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

191  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

192  In the diagram of △*ABC* below, points *D* and *E* are on sides $\overline{AB}$ and $\overline{CB}$ respectively, such that $\overline{DE} \parallel \overline{AC}$.
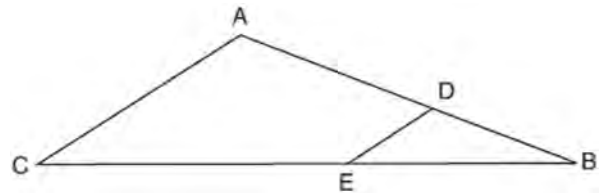


If *EB* is 3 more than *DB*, *AB* = 14, and *CB* = 21, what is the length of $\overline{AD}$?
1)  6
2)  8
3)  9
4)  12

40

193 In the diagram below of circle $O$, chord $\overline{CD}$ is parallel to diameter $\overline{AOB}$ and $m\overarc{CD} = 130$.
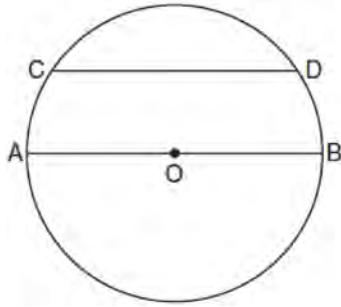


What is $m\overarc{AC}$?
1) 25
2) 50
3) 65
4) 115

194 A regular pentagon is shown in the diagram below.
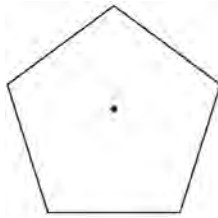


If the pentagon is rotated clockwise around its center, the minimum number of degrees it must be rotated to carry the pentagon onto itself is
1) 54°
2) 72°
3) 108°
4) 360°

195 A sequence of transformations maps rectangle $ABCD$ onto rectangle $A''B''C''D''$, as shown in the diagram below.
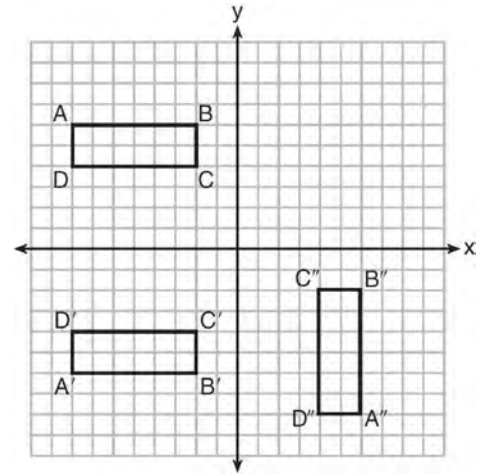


Which sequence of transformations maps $ABCD$ onto $A'B'C'D'$ and then maps $A'B'C'D'$ onto $A''B''C''D''$?
1) a reflection followed by a rotation
2) a reflection followed by a translation
3) a translation followed by a rotation
4) a translation followed by a reflection

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

41

197 As shown in the diagram below, $\overline{AB}$ and $\overline{CD}$ intersect at $E$, and $\overline{AC} \parallel \overline{BD}$.
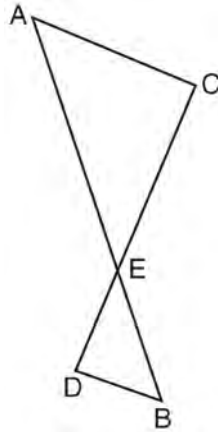


Given $\triangle AEC \sim \triangle BED$, which equation is true?

1) $\dfrac{CE}{DE} = \dfrac{EB}{EA}$

2) $\dfrac{AE}{BE} = \dfrac{AC}{BD}$

3) $\dfrac{EC}{AE} = \dfrac{BE}{ED}$

4) $\dfrac{ED}{EC} = \dfrac{AC}{BD}$

198 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

199 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) $\angle MAT \cong \angle MHT$

200 Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $\overline{DB} \cong \overline{BE}$
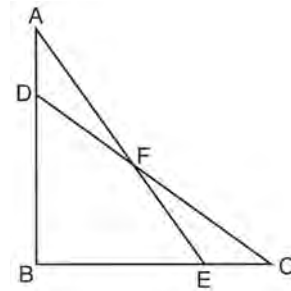


Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS $\cong$ SAS?

1) $\angle CDB \cong \angle AEB$
2) $\angle AFD \cong \angle EFC$
3) $\overline{AD} \cong \overline{CE}$
4) $\overline{AE} \cong \overline{CD}$

201 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

202 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) $(3,-6)$

203 In the diagram below, $\triangle ABC \sim \triangle ADE$.
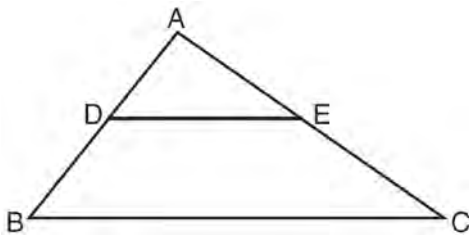


Which measurements are justified by this similarity?
1) $AD = 3$, $AB = 6$, $AE = 4$, and $AC = 12$
2) $AD = 5$, $AB = 8$, $AE = 7$, and $AC = 10$
3) $AD = 3$, $AB = 9$, $AE = 5$, and $AC = 10$
4) $AD = 2$, $AB = 6$, $AE = 5$, and $AC = 15$

204 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

205 In the diagram below, which single transformation was used to map triangle A onto triangle B?
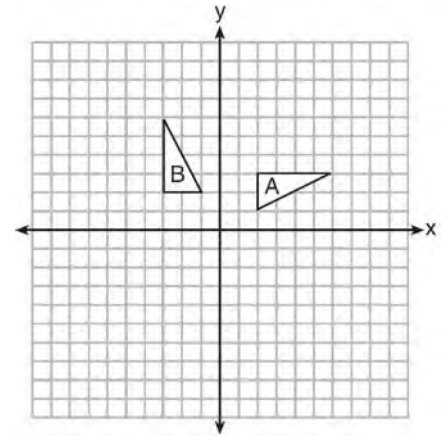


1) line reflection
2) rotation
3) dilation
4) translation

206 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

207 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) $4x + 3y = 9$

208 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.
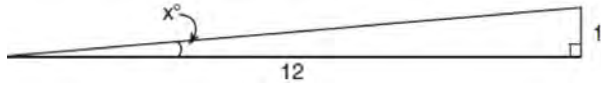


What is the angle of inclination, $x$, of this ramp, to the *nearest hundredth of a degree*?
1) 4.76
2) 4.78
3) 85.22
4) 85.24

209 Triangle $FGH$ is inscribed in circle $O$, the length of radius $\overline{OH}$ is 6, and $\overline{FH} \cong \overline{OG}$.
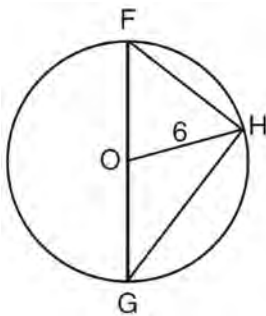


What is the area of the sector formed by angle $FOH$?
1) $2\pi$
2) $\dfrac{3}{2}\pi$
3) $6\pi$
4) $24\pi$

210 In the diagram below of circle $O$, chords $\overline{AB}$ and $\overline{CD}$ intersect at $E$.
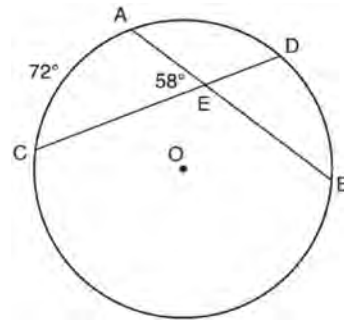


If $m\widehat{AC} = 72°$ and $m\angle AEC = 58°$, how many degrees are in $m\widehat{DB}$?
1) 108°
2) 65°
3) 44°
4) 14°

211 Given $\triangle ABC$ with $m\angle B = 62°$ and side $\overline{AC}$ extended to $D$, as shown below.
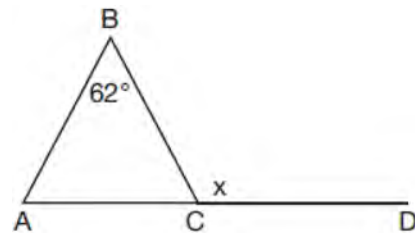


Which value of $x$ makes $\overline{AB} \cong \overline{CB}$?
1) 59°
2) 62°
3) 118°
4) 121°

212  In the diagram below of $\triangle HAR$ and $\triangle NTY$, angles $H$ and $N$ are right angles, and $\triangle HAR \sim \triangle NTY$.
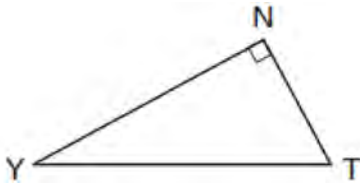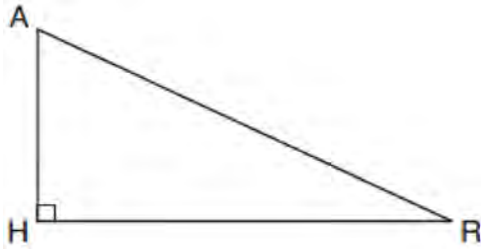


If $AR = 13$ and $HR = 12$, what is the measure of angle $Y$, to the *nearest degree*?
1)  23°
2)  25°
3)  65°
4)  67°

213  Which expression is always equivalent to $\sin x$ when $0° < x < 90°$?
1)  $\cos(90° - x)$
2)  $\cos(45° - x)$
3)  $\cos(2x)$
4)  $\cos x$

214  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

215  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

216  In triangle $CHR$, $O$ is on $\overline{HR}$, and $D$ is on $\overline{CR}$ so that $\angle H \cong \angle RDO$.
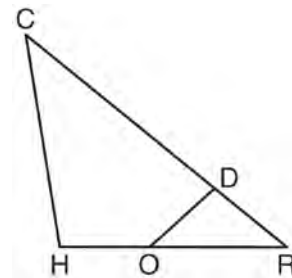


If $RD = 4$, $RO = 6$, and $OH = 4$, what is the length of $\overline{CD}$?
1)  $2\dfrac{2}{3}$
2)  $6\dfrac{2}{3}$
3)  11
4)  15

217  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

45

218 In the diagram below of right triangle $ABC$, altitude $\overline{BD}$ is drawn to hypotenuse $\overline{AC}$.
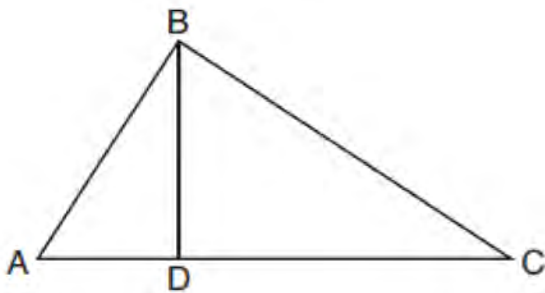


If $BD = 4$, $AD = x - 6$, and $CD = x$, what is the length of $\overline{CD}$?
1) 5
2) 2
3) 8
4) 11

219 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

220 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) $4\sqrt{40}$

221 In the diagram below, $\overline{AD}$ intersects $\overline{BE}$ at $C$, and $\overline{AB} \parallel \overline{DE}$.
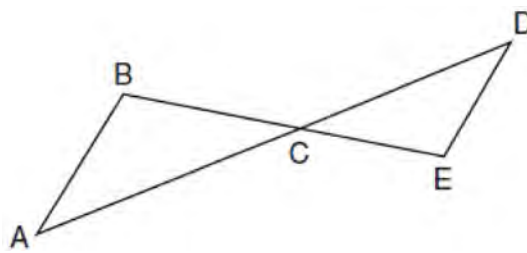


If $CD = 6.6$ cm, $DE = 3.4$ cm, $CE = 4.2$ cm, and $BC = 5.25$ cm, what is the length of $\overline{AC}$, to the *nearest hundredth of a centimeter*?
1) 2.70
2) 3.34
3) 5.28
4) 8.25

222 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

223 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) $(6, 3)$

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

225 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.

226 In $\triangle ABC$, where $\angle C$ is a right angle, $\cos A = \frac{\sqrt{21}}{5}$. What is $\sin B$?

1) $\frac{\sqrt{21}}{5}$

2) $\frac{\sqrt{21}}{2}$

3) $\frac{2}{5}$

4) $\frac{5}{\sqrt{21}}$

227 In the diagram below, m$\angle BDC = 100°$, m$\angle A = 50°$, and m$\angle DBC = 30°$.
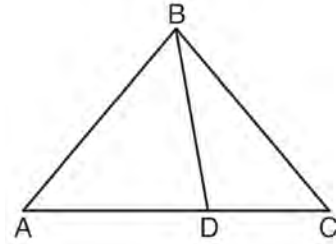


Which statement is true?

1) $\triangle ABD$ is obtuse.

2) $\triangle ABC$ is isosceles.

3) m$\angle ABD = 80°$

4) $\triangle ABD$ is scalene.

228 Kirstie is testing values that would make triangle $KLM$ a right triangle when $\overline{LN}$ is an altitude, and $KM = 16$, as shown below.
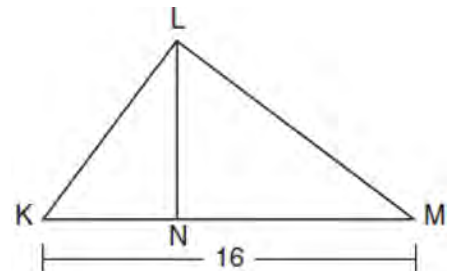


Which lengths would make triangle $KLM$ a right triangle?

1) $LM = 13$ and $KN = 6$

2) $LM = 12$ and $NM = 9$

3) $KL = 11$ and $KN = 7$

4) $LN = 8$ and $NM = 10$

229  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)  $4\sqrt{10}$

230  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

231  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 $AD = 18$.
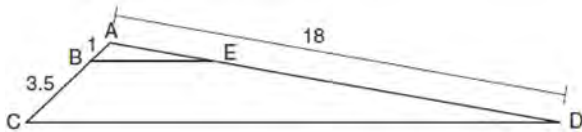


What is the length of $\overline{AE}$, to the *nearest tenth*?
1)  14.0
2)  5.1
3)  3.3
4)  4.0

232  What is an equation of the perpendicular bisector of the line segment shown in the diagram below?
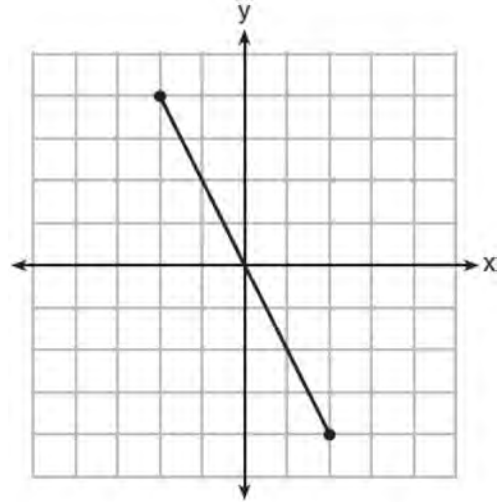


1)  $y + 2x = 0$
2)  $y - 2x = 0$
3)  $2y + x = 0$
4)  $2y - x = 0$

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



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

48

234 In the diagram below, lines $\ell$, $m$, $n$, and $p$ intersect line $r$.
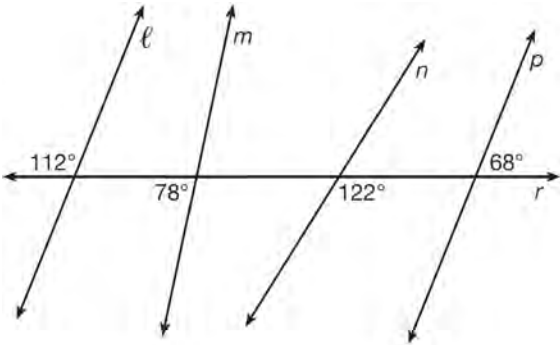


Which statement is true?
1) $\ell \parallel n$
2) $\ell \parallel p$
3) $m \parallel p$
4) $m \parallel n$

235 In the diagram of right triangle $ABC$, $\overline{CD}$ intersects hypotenuse $\overline{AB}$ at $D$.
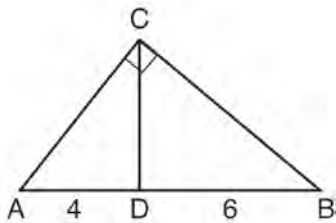


If $AD = 4$ and $DB = 6$, which length of $\overline{AC}$ makes $\overline{CD} \perp \overline{AB}$?
1) $2\sqrt{6}$
2) $2\sqrt{10}$
3) $2\sqrt{15}$
4) $4\sqrt{2}$

236 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 $E(0,4)$.
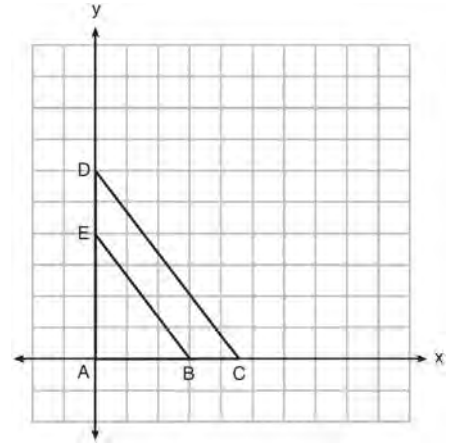


The ratio of the lengths of $\overline{BE}$ to $\overline{CD}$ is
1) $\dfrac{2}{3}$
2) $\dfrac{3}{2}$
3) $\dfrac{3}{4}$
4) $\dfrac{4}{3}$

237 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) $(6.4, 2.8)$

49

238 As shown in the graph below, the quadrilateral is a rectangle.
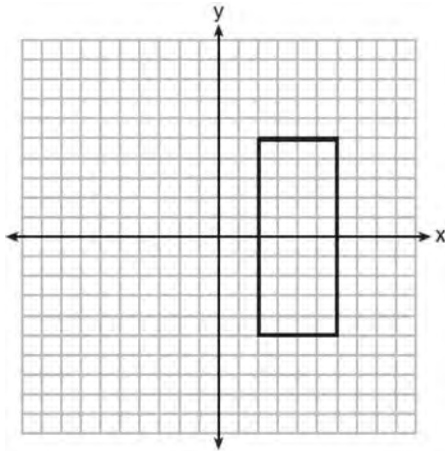


Which transformation would *not* map the rectangle onto itself?
1) a reflection over the *x*-axis
2) a reflection over the line $x = 4$
3) a rotation of 180° about the origin
4) a rotation of 180° about the point $(4,0)$

239 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

240 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

241 If $\sin(2x + 7)° = \cos(4x - 7)°$, what is the value of *x*?
1) 7
2) 15
3) 21
4) 30

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

243 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

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

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

| State | Population Density $\left(\dfrac{people}{mi^2}\right)$ | 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

246 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 $150\pi$.
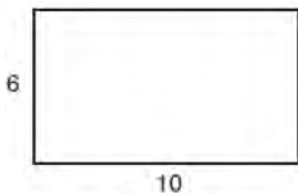


Which line could the rectangle be rotated around?
1) a long side
2) a short side
3) the vertical line of symmetry
4) the horizontal line of symmetry

247 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

248 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) $y = 3x - 1$

249 In the diagram below of parallelogram $ROCK$, m$\angle C$ is 70° and m$\angle ROS$ is 65°.
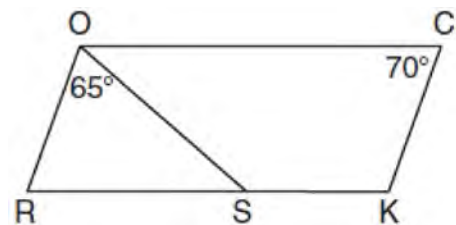


What is m$\angle KSO$?
1) 45°
2) 110°
3) 115°
4) 135°

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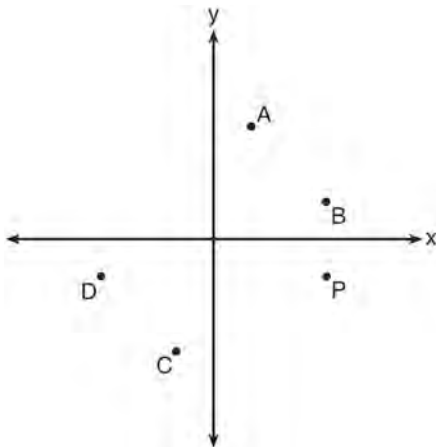


1) $A$
2) $B$
3) $C$
4) $D$

251 Quadrilateral $ABCD$ with diagonals $\overline{AC}$ and $\overline{BD}$ is shown in the diagram below.
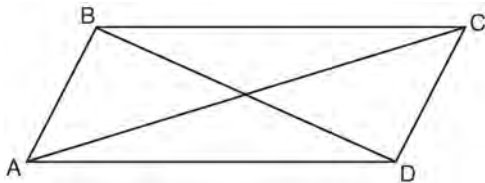


Which information is *not* enough to prove $ABCD$ is a parallelogram?

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 $\overline{BC} \parallel \overline{AD}$

252 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) $y = -x - 3$

253 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.
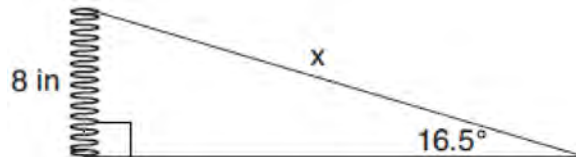


To the *nearest tenth of an inch*, what will be the length of the springboard, $x$?

1) 2.3
2) 8.3
3) 27.0
4) 28.2

254 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

255 In regular hexagon *ABCDEF* shown below, $\overline{AD}$, $\overline{BE}$, and $\overline{CF}$ all intersect at *G*.
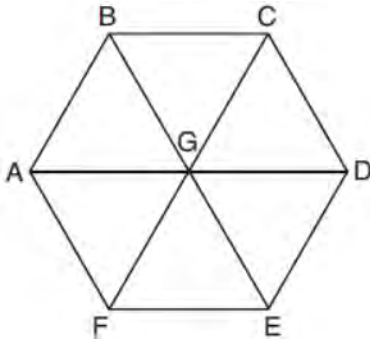


When $\triangle ABG$ is reflected over $\overline{BG}$ and then rotated 180° about point *G*, $\triangle ABG$ is mapped onto

1)  $\triangle FEG$
2)  $\triangle AFG$
3)  $\triangle CBG$
4)  $\triangle DEG$

256 In the diagram below, the circle shown has radius 10. Angle *B* intercepts an arc with a length of $2\pi$.
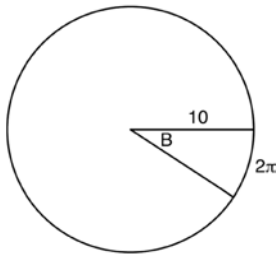


What is the measure of angle *B*, in radians?

1)  $10 + 2\pi$
2)  $20\pi$
3)  $\dfrac{\pi}{5}$
4)  $\dfrac{5}{\pi}$

257 In the diagram below, $\overline{AKS}$, $\overline{NKC}$, $\overline{AN}$, and $\overline{SC}$ are drawn such that $\overline{AN} \cong \overline{SC}$.
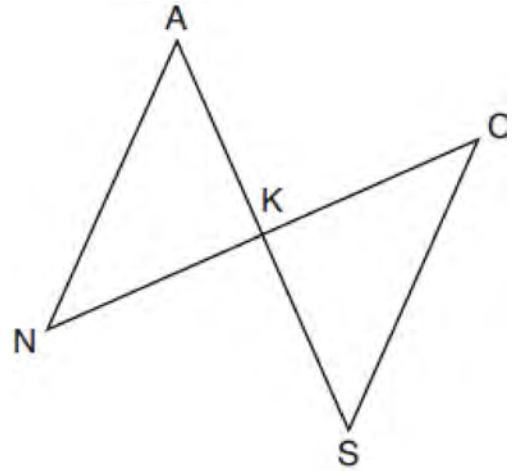


Which additional statement is sufficient to prove $\triangle KAN \cong \triangle KSC$ by AAS?

1)  $\overline{AS}$ and $\overline{NC}$ bisect each other.
2)  *K* is the midpoint of $\overline{NC}$.
3)  $\overline{AS} \perp \overline{CN}$
4)  $\overline{AN} \parallel \overline{SC}$

258 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)  $(1,-1)$

259 In circle $O$, diameter $\overline{AB}$, chord $\overline{BC}$, and radius $\overline{OC}$ are drawn, and the measure of arc $BC$ is 108°.
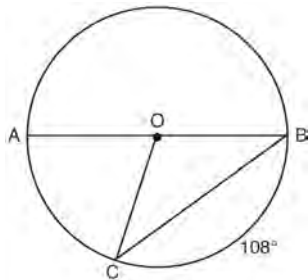


Some students wrote these formulas to find the area of sector $COB$:

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

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

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

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

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

260 In the diagram below, $ABCD$ is a parallelogram, $\overline{AB}$ is extended through $B$ to $E$, and $\overline{CE}$ is drawn.
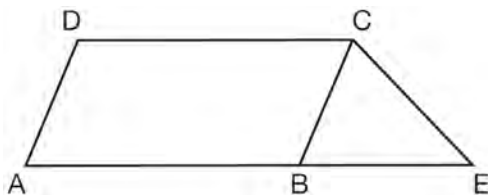


If $\overline{CE} \cong \overline{BE}$ and m$\angle D = 112°$, what is m$\angle E$?
1) 44°
2) 56°
3) 68°
4) 112°

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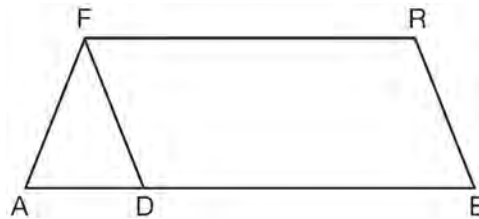


If m$\angle R = 124°$, what is m$\angle AFD$?
1) 124°
2) 112°
3) 68°
4) 56°

262 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 $T$.
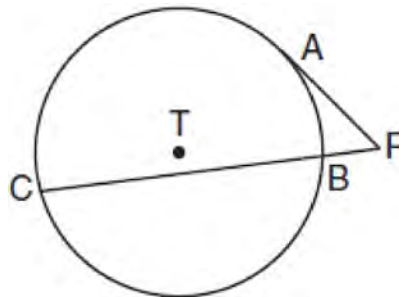


If $PB = 3$ and $BC = 15$, what is the length of $\overline{PA}$?
1) $3\sqrt{5}$
2) $3\sqrt{6}$
3) 3
4) 9

263  Given: $\triangle AEC$, $\triangle DEF$, and $\overline{FE} \perp \overline{CE}$
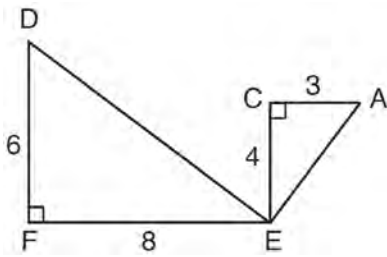


What is a correct sequence of similarity transformations that shows $\triangle AEC \sim \triangle DEF$?
1) a rotation of 180 degrees about point $E$ followed by a horizontal translation
2) a counterclockwise rotation of 90 degrees about point $E$ followed by a horizontal translation
3) a rotation of 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 $E$

264  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) $\left(4, 5\frac{1}{2}\right)$
2) $\left(-\frac{1}{2}, -4\right)$
3) $\left(-4\frac{1}{2}, 0\right)$
4) $\left(-4, -\frac{1}{2}\right)$

265  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.
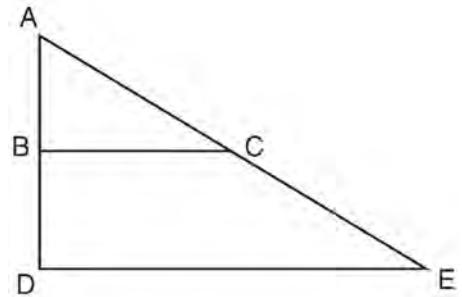


Which statement is always true?
1) $2AB = AD$
2) $\overline{AD} \perp \overline{DE}$
3) $AC = CE$
4) $\overline{BC} \parallel \overline{DE}$

266  A circle with a diameter of 10 cm and a central angle of 30° is drawn below.
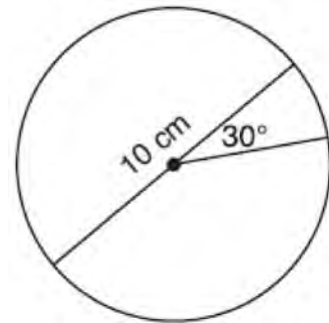


What is the area, to the *nearest tenth of a square centimeter*, of the sector formed by the 30° angle?
1) 5.2
2) 6.5
3) 13.1
4) 26.2

267 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

268 In the diagram below, a square is graphed in the coordinate plane.
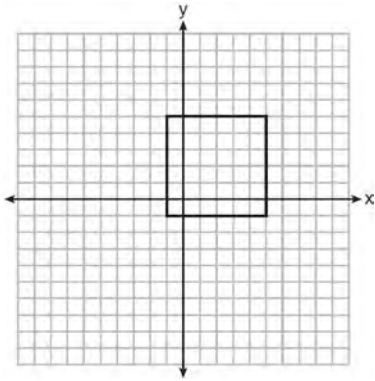


A reflection over which line does *not* carry the square onto itself?
1) $x = 5$
2) $y = 2$
3) $y = x$
4) $x + y = 4$

269 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) $\overline{DE}, \overline{CE}$

270 In the diagram below, $\angle GRS \cong \angle ART$, $GR = 36$, $SR = 45$, $AR = 15$, and $RT = 18$.
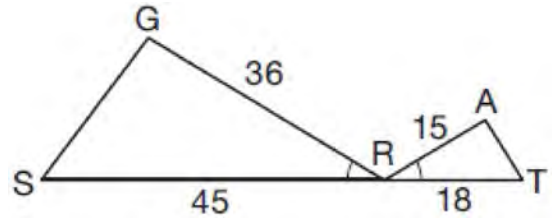


Which triangle similarity statement is correct?
1) $\triangle GRS \sim \triangle ART$ by AA.
2) $\triangle GRS \sim \triangle ART$ by SAS.
3) $\triangle GRS \sim \triangle ART$ by SSS.
4) $\triangle GRS$ is not similar to $\triangle ART$.

271 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 $PC = 10$.
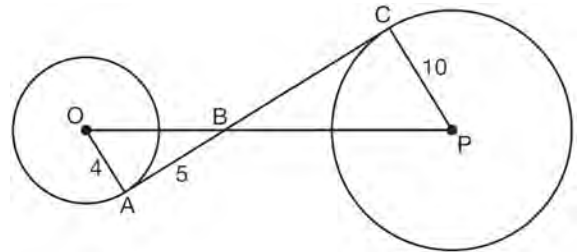


What is the length of $\overline{BC}$?
1) 6.4
2) 8
3) 12.5
4) 16

56

## Geometry 2 Point Regents Exam Questions

272  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.
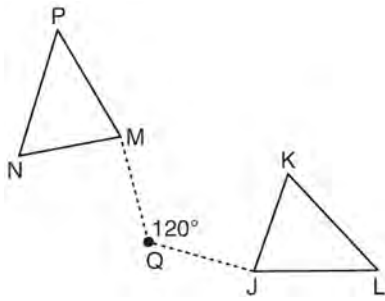
273  Quadrilaterals *BIKE* and *GOLF* are graphed on the set of axes below.
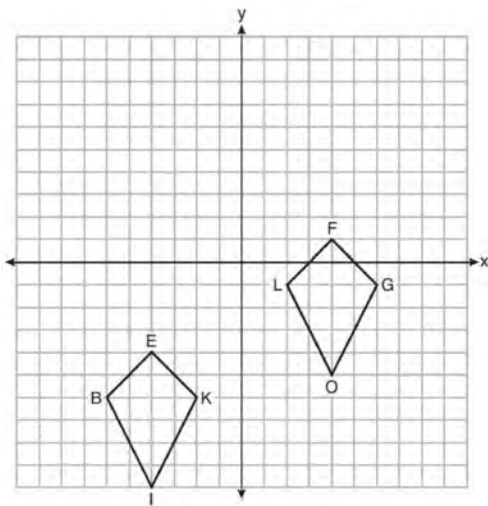
Describe a sequence of transformations that maps quadrilateral *BIKE* onto quadrilateral *GOLF*.

274  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.
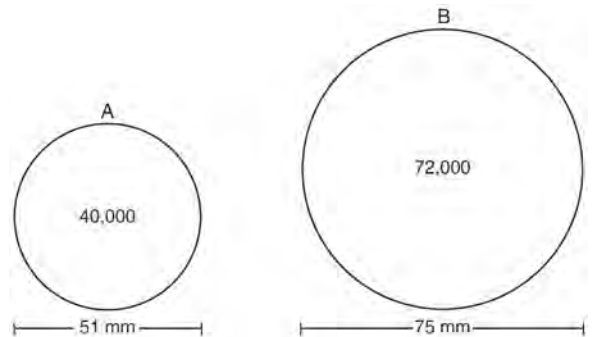
Determine and state which petri dish has the greater population density of bacteria at the end of the first hour.

275  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 $\overline{XZ}$.
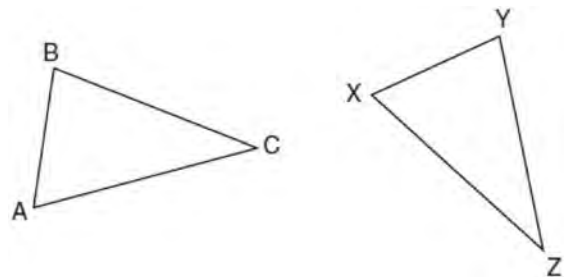
Determine and state whether $\overline{BC} \cong \overline{YZ}$. Explain why.

276 Given: Parallelogram *ABCD* with diagonal $\overline{AC}$ drawn
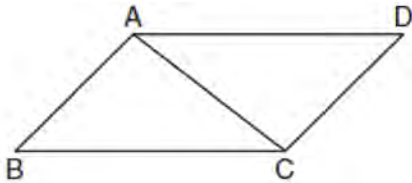


Prove: $\triangle ABC \cong \triangle CDA$

277 In the diagram below, tangent $\overline{DA}$ and secant $\overline{DBC}$ are drawn to circle *O* from external point *D*, such that $\overset{\frown}{AC} \cong \overset{\frown}{BC}$.
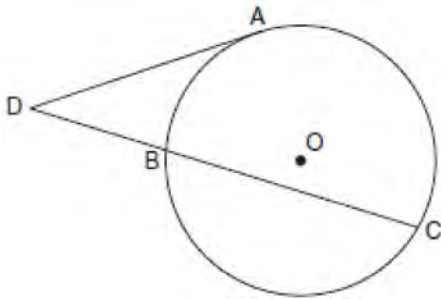


If $m\overset{\frown}{BC} = 152°$, determine and state m∠*D*.

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

279 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.

280 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.]
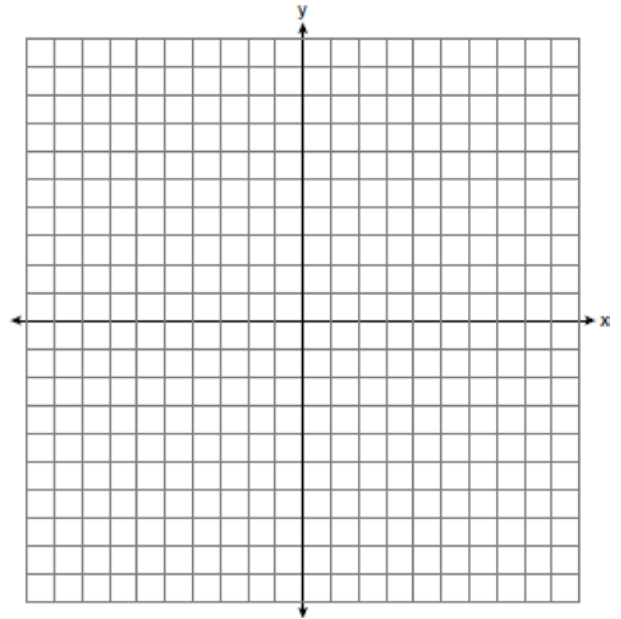


281 In the diagram below of isosceles triangle *ABC*, $\overline{AB} \cong \overline{CB}$ and angle bisectors $\overline{AD}$, $\overline{BF}$, and $\overline{CE}$ are drawn and intersect at *X*.
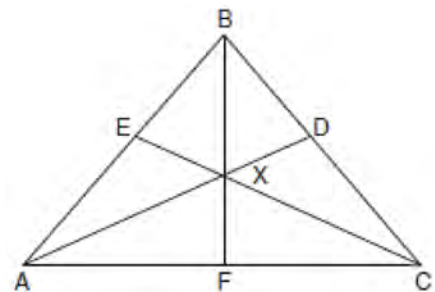


If m∠*BAC* = 50°, find m∠*AXC*.

282 In the diagram below of circle $O$ with diameter $\overline{BC}$ and radius $\overline{OA}$, chord $\overline{DC}$ is parallel to chord $\overline{BA}$.
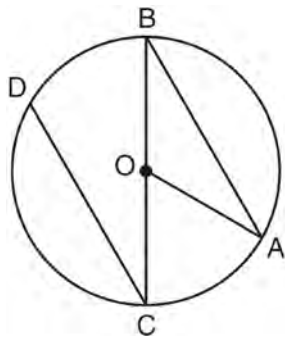


If m$\angle BCD = 30°$, determine and state m$\angle AOB$.

283 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle $A$ intercepts an arc of length $\pi$, and angle $B$ intercepts an arc of length $\frac{13\pi}{8}$.
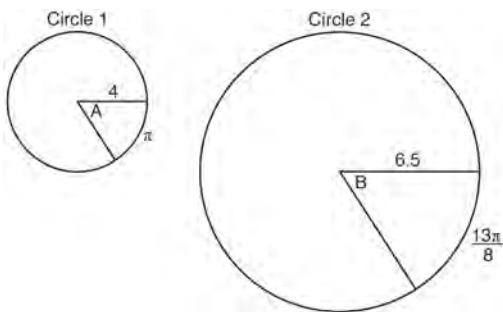


Dominic thinks that angles $A$ and $B$ have the same radian measure. State whether Dominic is correct or not. Explain why.

284 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 $x = 1$.
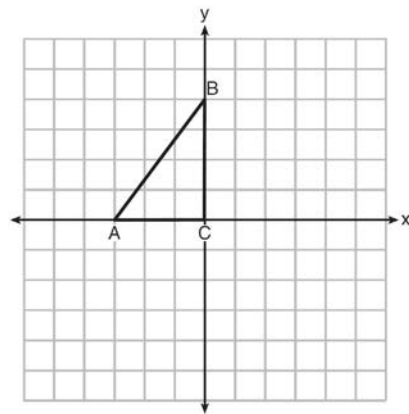


285 Line $n$ is represented by the equation $3x + 4y = 20$. Determine and state the equation of line $p$, the image of line $n$, after a dilation of scale factor $\frac{1}{3}$ centered at the point $(4,2)$. [The use of the set of axes below is optional.] Explain your answer.
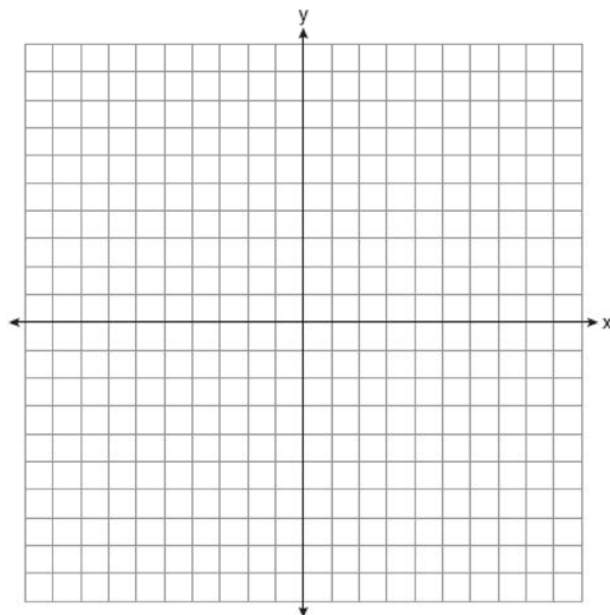
286 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.
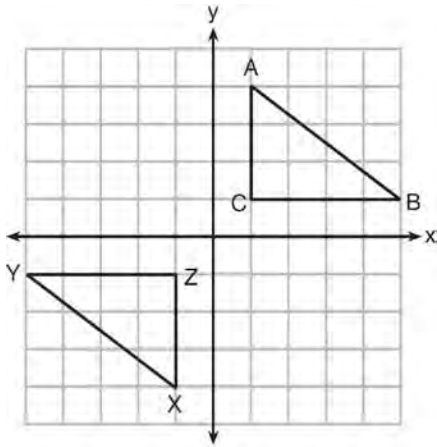
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

287 Quadrilateral *MATH* and its image *M"A"T"H"* are graphed on the set of axes below.
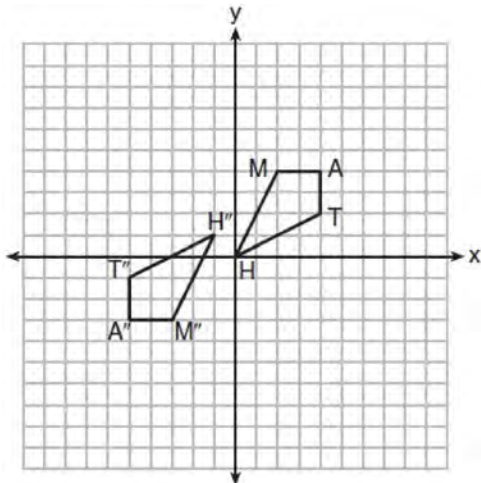
Describe a sequence of transformations that maps quadrilateral *MATH* onto quadrilateral *M"A"T"H"*.

288 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*.
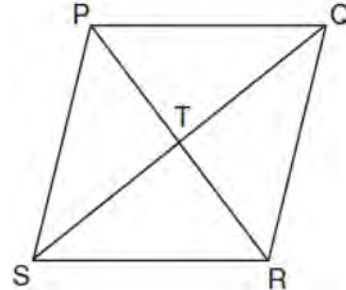
289 In isosceles $\triangle MNP$, line segment *NO* bisects vertex $\angle MNP$, as shown below. If *MP* = 16, find the length of $\overline{MO}$ and explain your answer.

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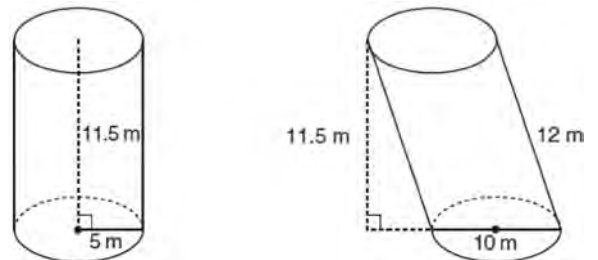
Is Sue correct? Explain why.

60

291  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.
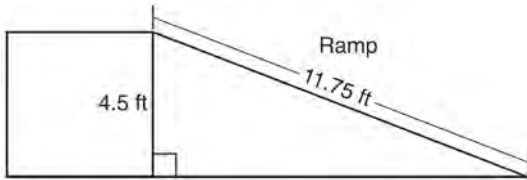
Determine and state, to the *nearest degree*, the angle of elevation formed by the ramp and the ground.

292  When volleyballs are purchased, they are not fully inflated. A partially inflated volleyball can be modeled by a sphere whose volume is approximately 180 in$^3$. After being fully inflated, its volume is approximately 294 in$^3$. To the *nearest tenth of an inch*, how much does the radius increase when the volleyball is fully inflated?

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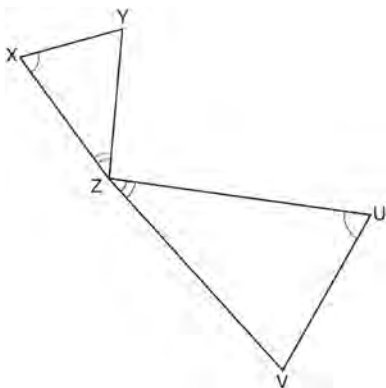
Describe a sequence of similarity transformations that shows $\triangle XYZ$ is similar to $\triangle UVZ$.

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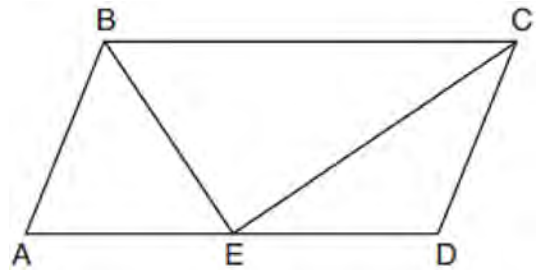
If $m\angle A = 68°$, determine and state $m\angle BEC$.

295  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.]
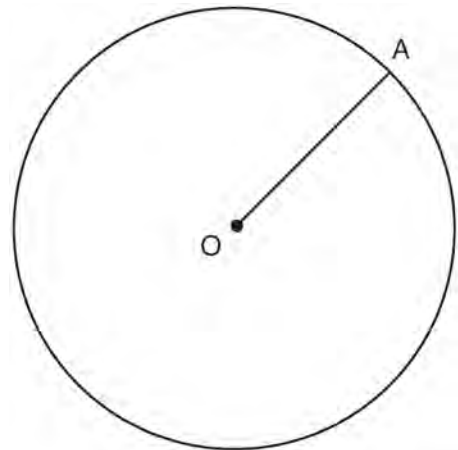
296 In the diagram below, $\triangle ABC$ has coordinates $A(1,1)$, $B(4,1)$, and $C(4,5)$. Graph and label $\triangle A''B''C''$, the image of $\triangle ABC$ after the translation five units to the right and two units up followed by the reflection over the line $y = 0$.

298 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.

299 In the graph below, $\triangle ABC$ has coordinates $A(-9,2)$, $B(-6,-6)$, and $C(-3,-2)$, and $\triangle RST$ has coordinates $R(-2,9)$, $S(5,6)$, and $T(2,3)$.
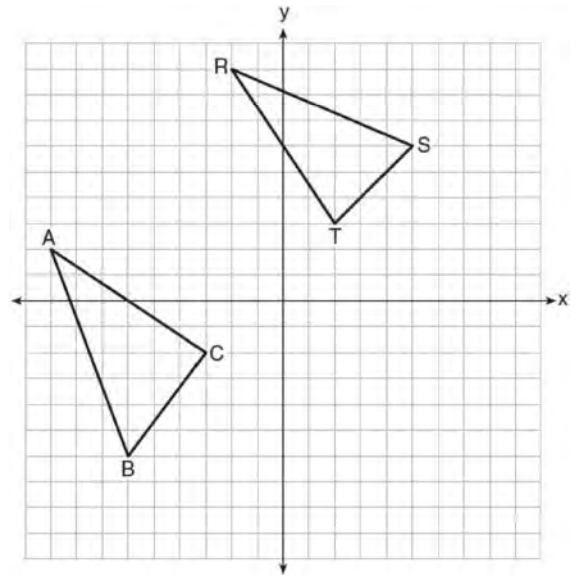
Is $\triangle ABC$ congruent to $\triangle RST$? Use the properties of rigid motions to explain your reasoning.

297 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 $\overline{CD}$.

300 Determine and state, in terms of $\pi$, the area of a sector that intercepts a 40° arc of a circle with a radius of 4.5.

301 In circle $A$ below, chord $\overline{BC}$ and diameter $\overline{DAE}$ intersect at $F$.
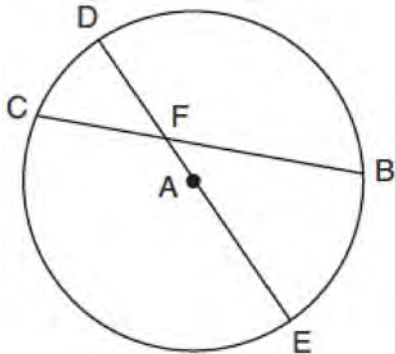


If $m\overset{\frown}{CD} = 46°$ and $m\overset{\frown}{DB} = 102°$, what is $m\angle CFE$?

302 Using a compass and straightedge, construct the median to side $\overline{AC}$ in $\triangle ABC$ below. [Leave all construction marks.]
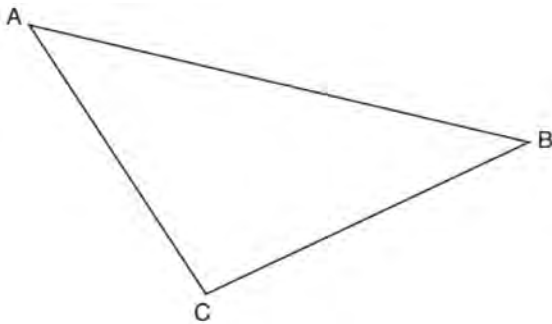


303 In right triangle $ABC$ with the right angle at $C$, $\sin A = 2x + 0.1$ and $\cos B = 4x - 0.7$. Determine and state the value of $x$. Explain your answer.

304 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 $\dfrac{1}{2}$ centered at the origin. [The use of the set of axes below is optional.]
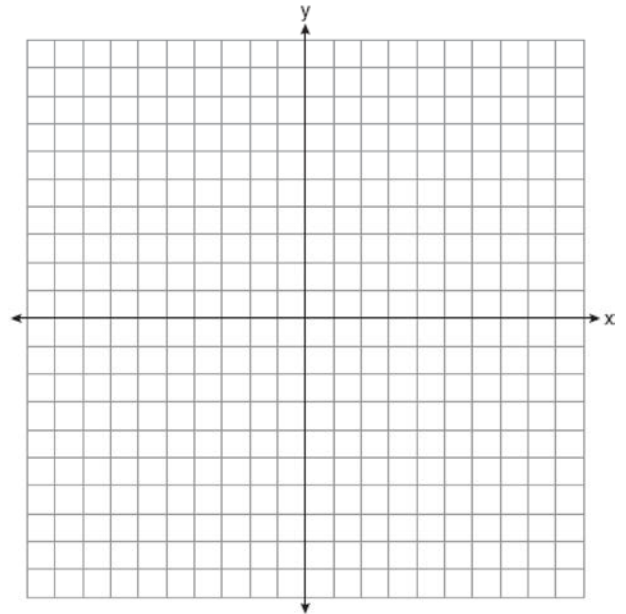


305 To find the distance across a pond from point $B$ to point $C$, a surveyor drew the diagram below. The measurements he made are indicated on his diagram.
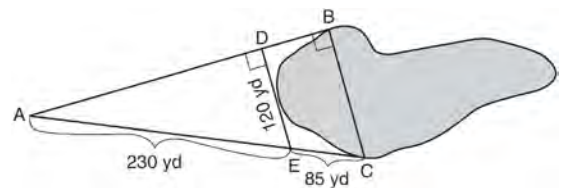


Use the surveyor's information to determine and state the distance from point $B$ to point $C$, to the *nearest yard*.

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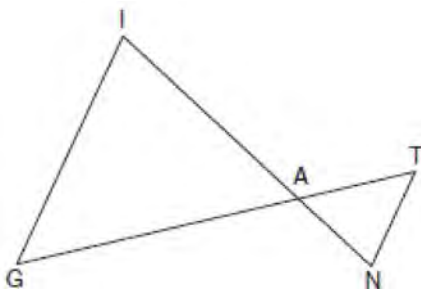
Prove: $\triangle GIA \sim \triangle TNA$

307 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.
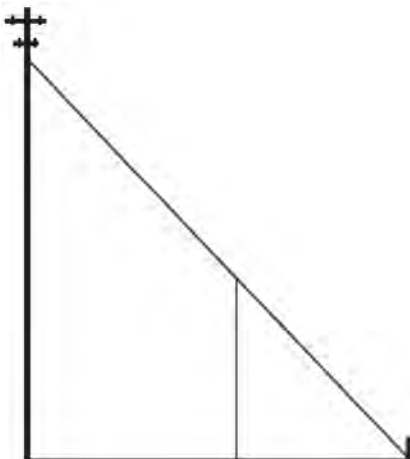
Jamal says he can approximate how high the support wire attaches to the telephone pole by using similar triangles. Explain why the triangles are similar.

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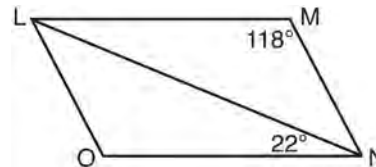
Explain why m$\angle NLO$ is 40 degrees.

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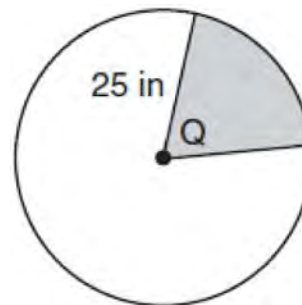
Determine and state the degree measure of angle $Q$, the central angle of the shaded sector.

310 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*.

311 Two stacks of 23 quarters each are shown below. One stack forms a cylinder but the other stack does not form a cylinder.
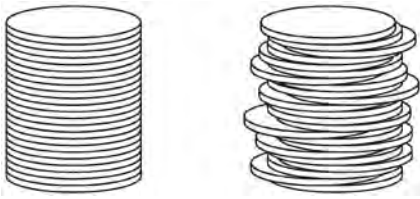


Use Cavelieri's principle to explain why the volumes of these two stacks of quarters are equal.

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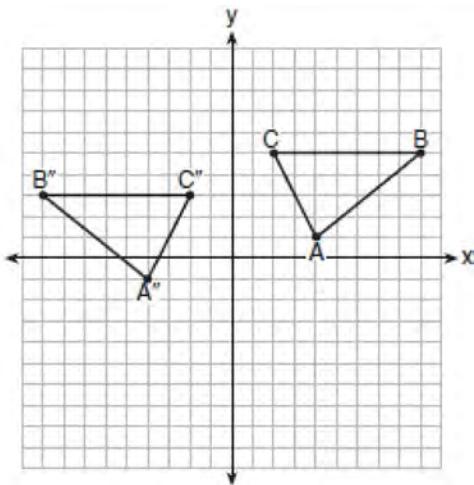


Describe a sequence of rigid motions which would map $\triangle ABC$ onto $\triangle A''B''C''$.

313 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.

314 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.
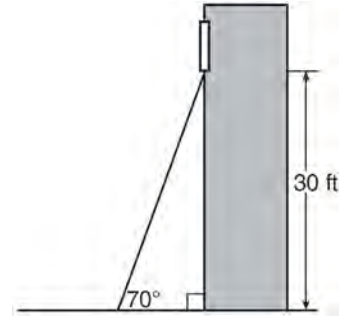


315 Trapezoids $ABCD$ and $A''B''C''D''$ are graphed on the set of axes below.
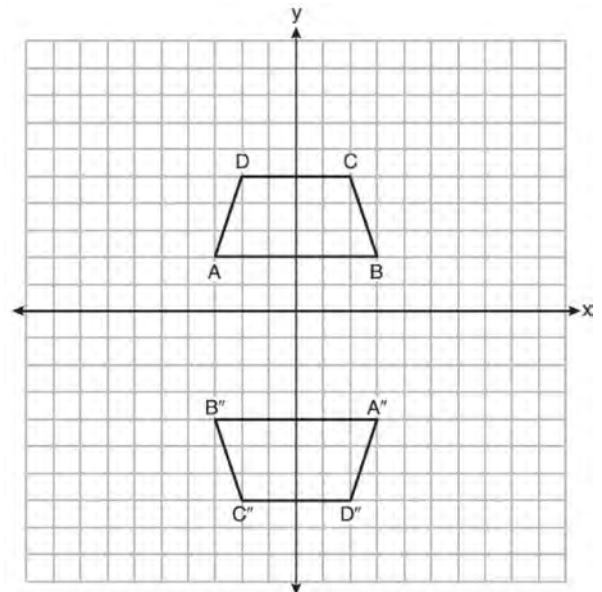


Describe a sequence of transformations that maps trapezoid $ABCD$ onto trapezoid $A''B''C''D''$.

65

316 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.]

319 Using a compass and straightedge, construct an altitude of triangle *ABC* below. [Leave all construction marks.]
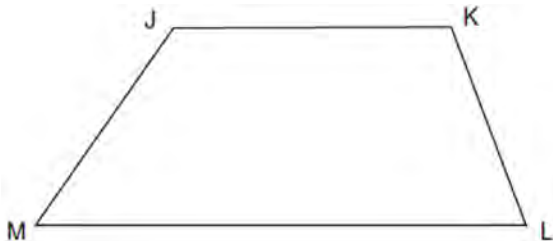
317 Triangle *ABC* and triangle *DEF* are drawn below.
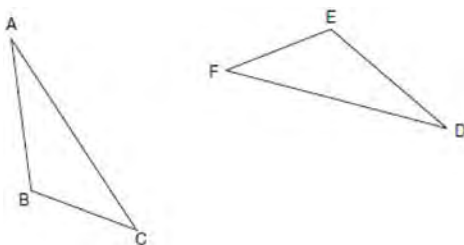
If $\overline{AB} \cong \overline{DE}$, $\overline{AC} \cong \overline{DF}$, and $\angle A \cong \angle D$, write a sequence of transformations that maps triangle *ABC* onto triangle *DEF*.
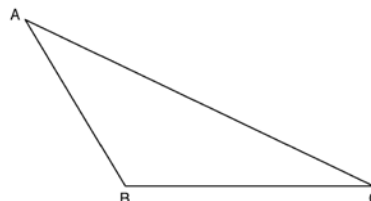
320 When instructed to find the length of $\overline{HJ}$ in right triangle *HJG*, Alex wrote the equation $\sin 28° = \dfrac{HJ}{20}$ while Marlene wrote $\cos 62° = \dfrac{HJ}{20}$.
Are both students' equations correct? Explain why.

318 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.
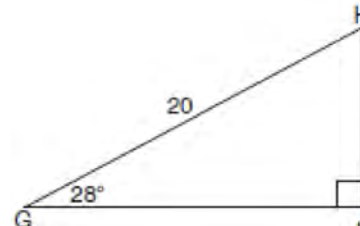
321 Given right triangles *ABC* and *DEF* where $\angle C$ and $\angle F$ are right angles, $\overline{AC} \cong \overline{DF}$ and $\overline{CB} \cong \overline{FE}$.
Describe a precise sequence of rigid motions which would show $\triangle ABC \cong \triangle DEF$.

66
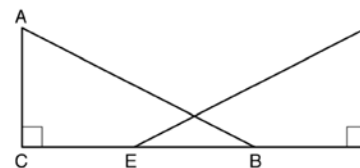
322 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*. State which type of wood the cube is made of, using the density table below.

| 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 |

323 As graphed on the set of axes below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a sequence of transformations.
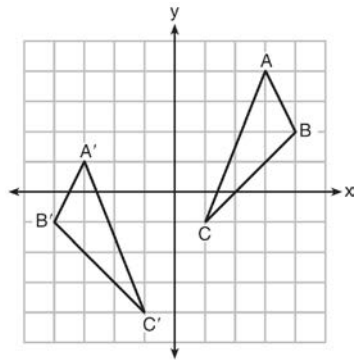


Is $\triangle A'B'C'$ congruent to $\triangle ABC$? Use the properties of rigid motion to explain your answer.

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

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

326 In the diagram below of circle $O$, the area of the shaded sector $AOC$ is $12\pi$ in² and the length of $\overline{OA}$ is 6 inches. Determine and state m$\angle AOC$.
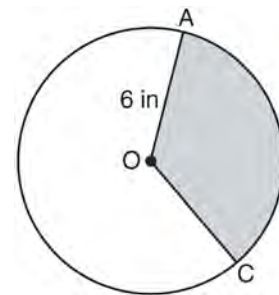


327 A circle has a center at $(1, -2)$ and radius of 4. Does the point $(3.4, 1.2)$ lie on the circle? Justify your answer.

328 Using a compass and straightedge, construct the line of reflection over which triangle *RST* reflects onto triangle *R'S'T'*. [Leave all construction marks.]

331 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.

332 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.]
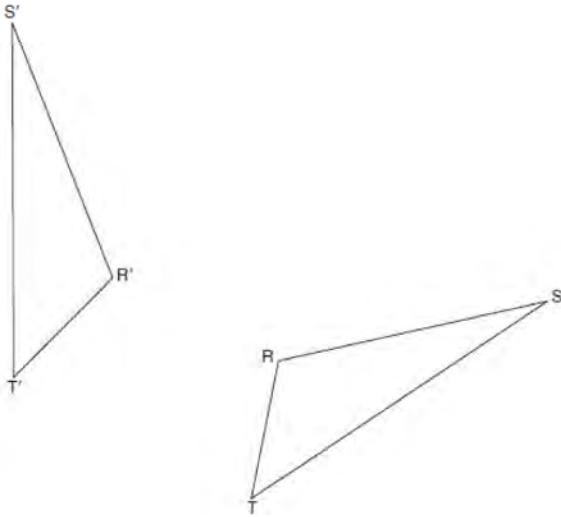
329 Construct an equilateral triangle inscribed in circle *T* shown below. [Leave all construction marks.]
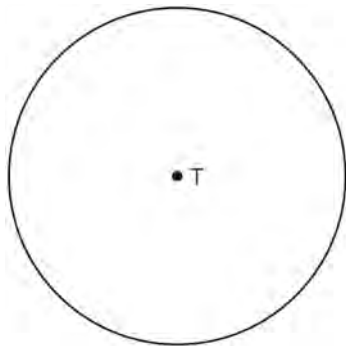
330 Explain why $\cos(x) = \sin(90 - x)$ for *x* such that $0 < x < 90$.
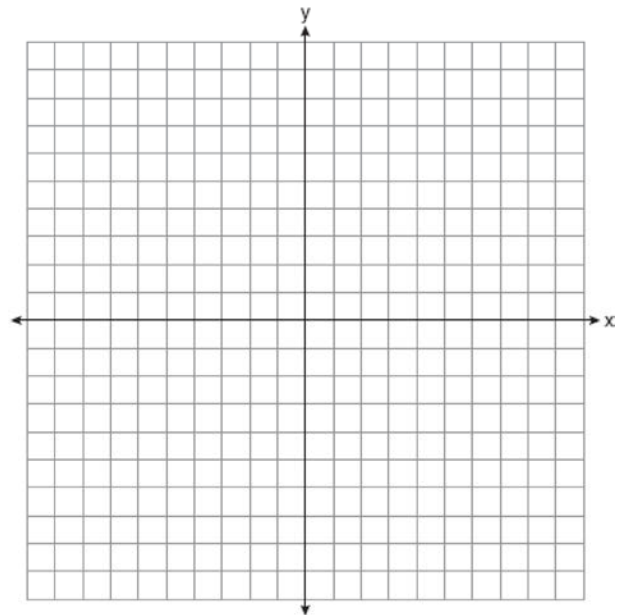
333  Skye says that the two triangles below are congruent. Margaret says that the two triangles are similar.

5 cm   12 cm

5 cm

13 cm
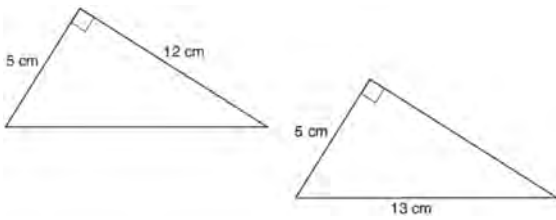
Are Skye and Margaret both correct? Explain why.

334  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.

335  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°
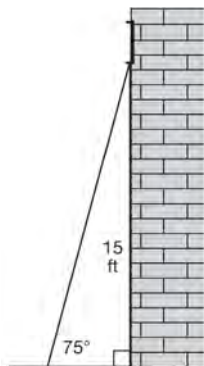
336  In parallelogram *ABCD* shown below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at *E*.
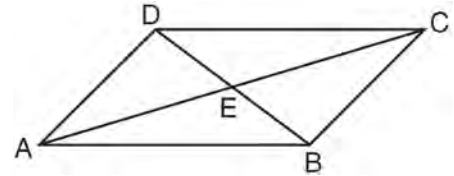
Prove: $\angle ACD \cong \angle CAB$

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

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

B

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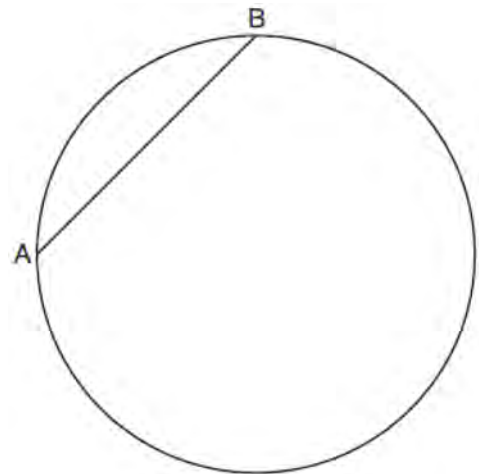
339  In $\triangle CED$ as shown below, points $A$ and $B$ are located on sides $\overline{CE}$ and $\overline{ED}$, respectively.  Line segment $AB$ is drawn such that $AE = 3.75$, $AC = 5$, $EB = 4.5$, and $BD = 6$.
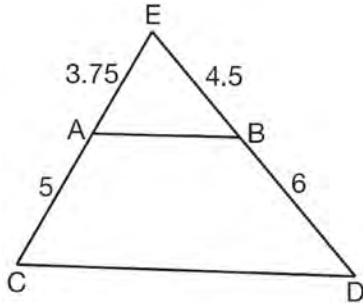


Explain why $\overline{AB}$ is parallel to $\overline{CD}$.

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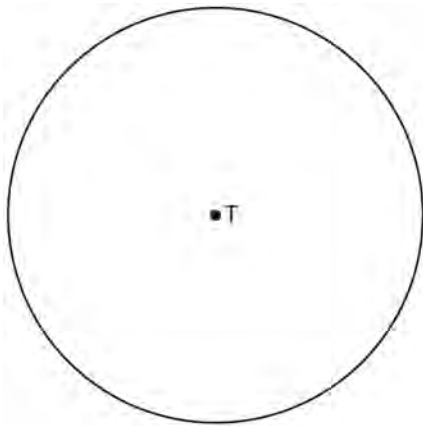


341  A machinist creates a solid steel part for a wind turbine engine.  The part has a volume of 1015 cubic centimeters.  Steel can be purchased for $0.29 per kilogram, and has a density of 7.95 g/cm³.  If the machinist makes 500 of these parts, what is the cost of the steel, to the *nearest dollar*?

342  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.

343  In the diagram below, secants $\overline{RST}$ and $\overline{RQP}$, drawn from point $R$, intersect circle $O$ at $S$, $T$, $Q$, and $P$.
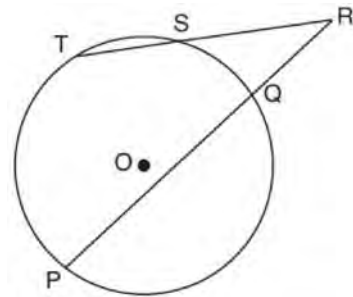


If $RS = 6$, $ST = 4$, and $RP = 15$, what is the length of $\overline{RQ}$?

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

70

345 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 $P$.

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

347 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 end 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*.

348 In the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the median to $\overline{AB}$. [Leave all construction marks.]
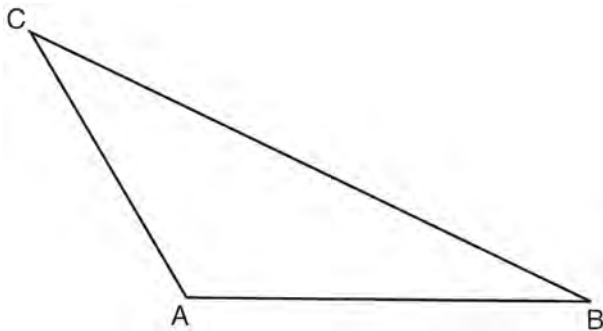


349 Using a compass and straightedge, construct a regular hexagon inscribed in circle $O$. [Leave all construction marks.]
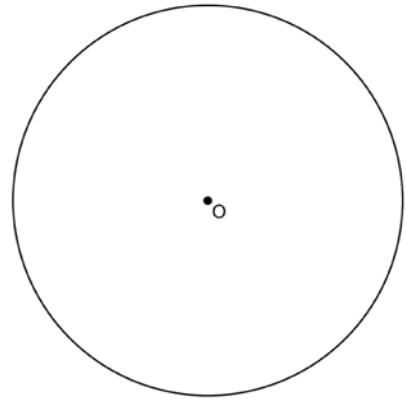


350 The diagram below shows circle $O$ with diameter $\overline{AB}$. Using a compass and straightedge, construct a square that is inscribed in circle $O$. [Leave all construction marks.]
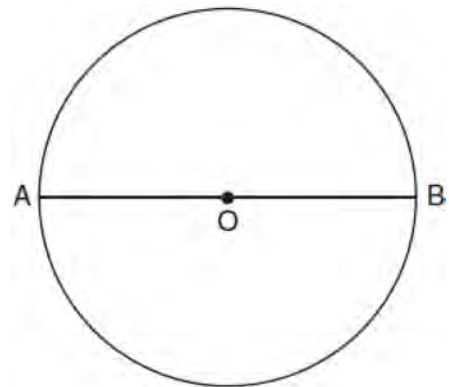
351 The diagram below shows two figures. Figure *A* is a right triangular prism and figure *B* is an oblique triangular prism. The base of figure *A* has a height of 5 and a length of 8 and the height of prism *A* is 14. The base of figure *B* has a height of 8 and a length of 5 and the height of prism *B* is 14.

**Figure A**       **Figure B**



14

5

8

14

8

5
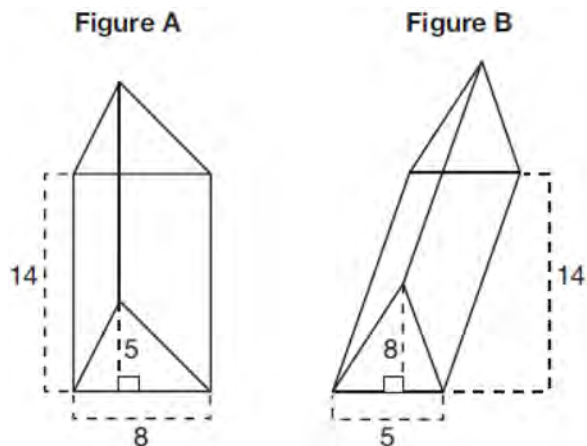
Use Cavalieri's Principle to explain why the volumes of these two triangular prisms are equal.

352 In right triangle *ABC* shown below, altitude $\overline{CD}$ is drawn to hypotenuse $\overline{AB}$. Explain why $\triangle ABC \sim \triangle ACD$.
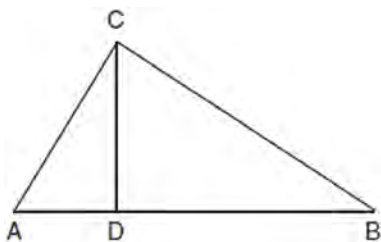


353 Ian needs to replace two concrete sections in his sidewalk, as modeled below. Each section is 36 inches by 36 inches and 4 inches deep. He can mix his own concrete for $3.25 per cubic foot.
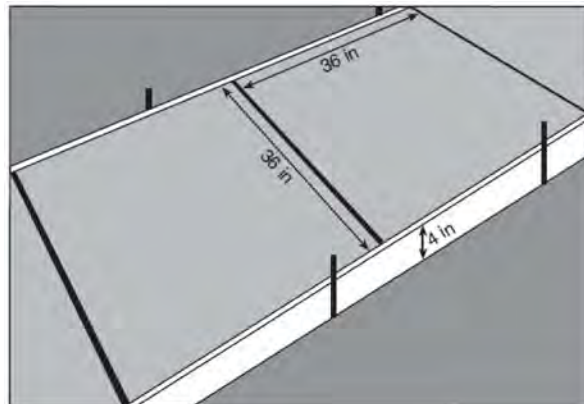


How much money will it cost Ian to replace the two concrete sections?

354 Describe a sequence of transformations that will map $\triangle ABC$ onto $\triangle DEF$ as shown below.
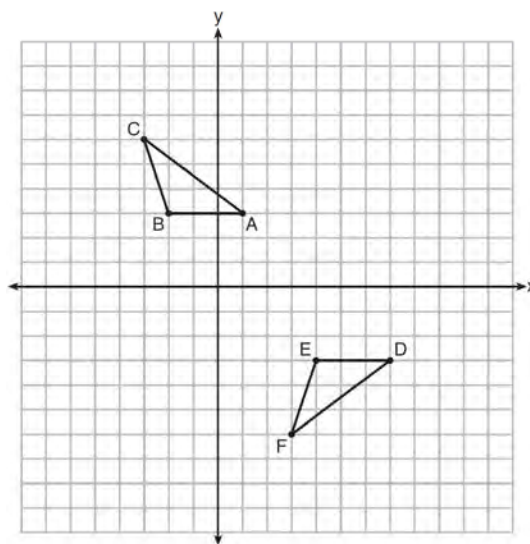
355 Directed line segment *PT* has endpoints whose coordinates are $P(-2,1)$ and $T(4,7)$. Determine the coordinates of point *J* that divides the segment in the ratio 2 to 1. [The use of the set of axes below is optional.]
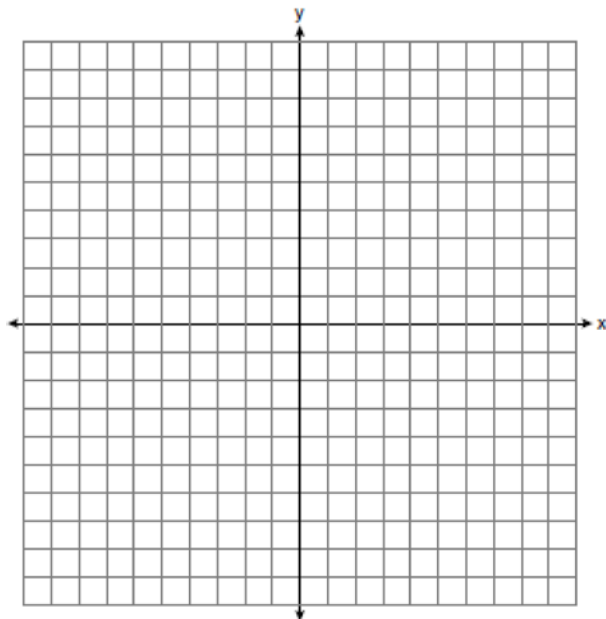
356 Triangle *ABC* and point $D(1,2)$ are graphed on the set of axes below.
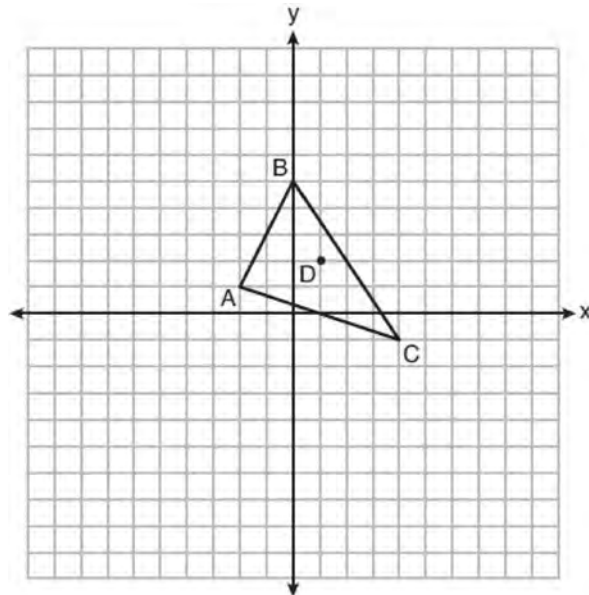
Graph and label $\triangle A'B'C'$, the image of $\triangle ABC$, after a dilation of scale factor 2 centered at point *D*.

357   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.]
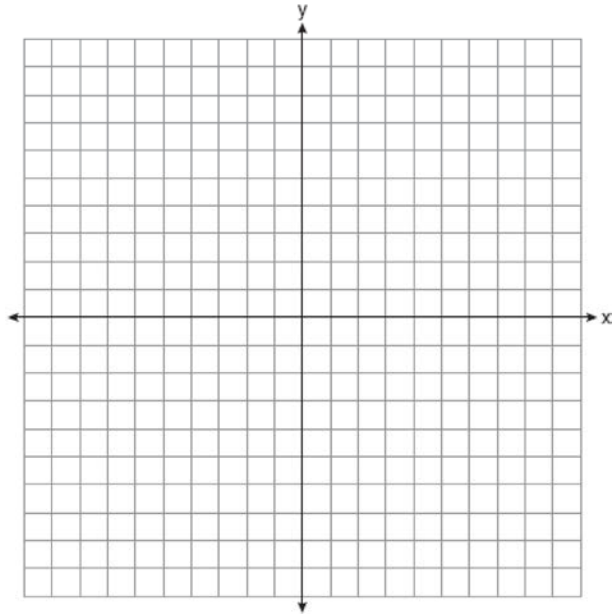
## Geometry 4 Point Regents Exam Questions

358 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.
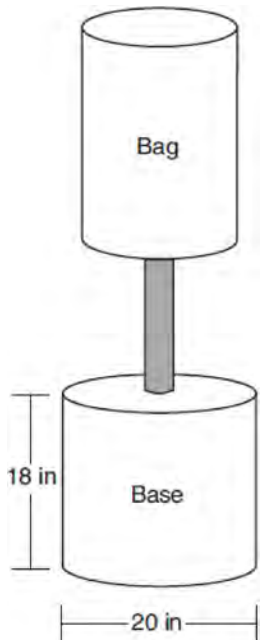


To the *nearest pound*, determine and state the total weight of the training equipment if the base is filled to 85% of its capacity.

359 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.

360 Using a compass and straightedge, construct a regular hexagon inscribed in circle $O$ below. Label it *ABCDEF*. [Leave all construction marks.]
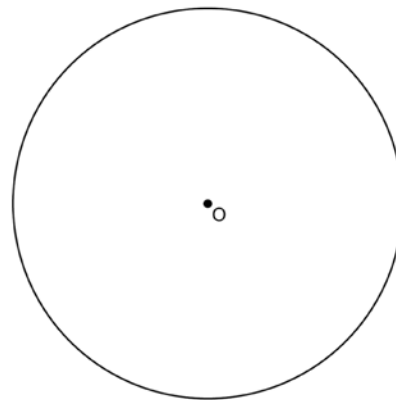


If chords $\overline{FB}$ and $\overline{FC}$ are drawn, which type of triangle, according to its angles, would $\triangle FBC$ be? Explain your answer.

361 In the diagram below, $\overline{AC} \cong \overline{DF}$ and points $A$, $C$, $D$, and $F$ are collinear on line $\ell$.
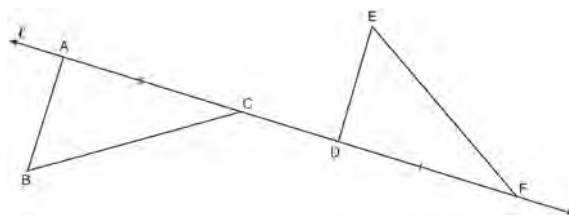


Let $\triangle D'E'F'$ be the image of $\triangle DEF$ after a translation along $\ell$, such that point $D$ is mapped onto point $A$. Determine and state the location of $F'$. Explain your answer. Let $\triangle D''E''F''$ be the image of $\triangle D'E'F'$ after a reflection across line $\ell$. Suppose that $E''$ is located at $B$. Is $\triangle DEF$ congruent to $\triangle ABC$? Explain your answer.

362 Triangle *QRS* is graphed on the set of axes below.
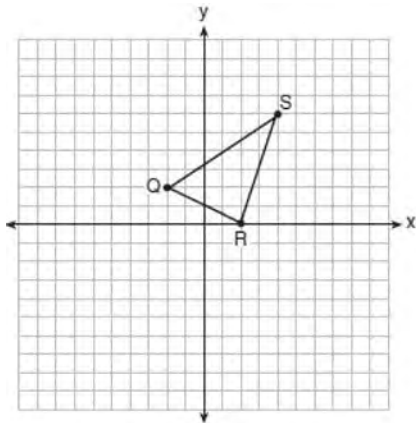


On the same set of axes, graph and label $\triangle Q'R'S'$, the image of $\triangle QRS$ after a dilation with a scale factor of $\dfrac{3}{2}$ centered at the origin. Use slopes to explain why $Q'R' \parallel QR$.

363 In the diagram below, $\overline{EF}$ intersects $\overline{AB}$ and $\overline{CD}$ at *G* and *H*, respectively, and $\overline{GI}$ is drawn such that $\overline{GH} \cong \overline{IH}$.
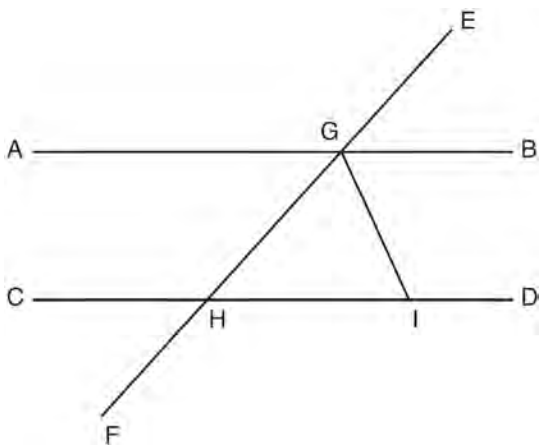


If m$\angle EGB = 50°$ and m$\angle DIG = 115°$, explain why $\overline{AB} \parallel \overline{CD}$.

364 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.]
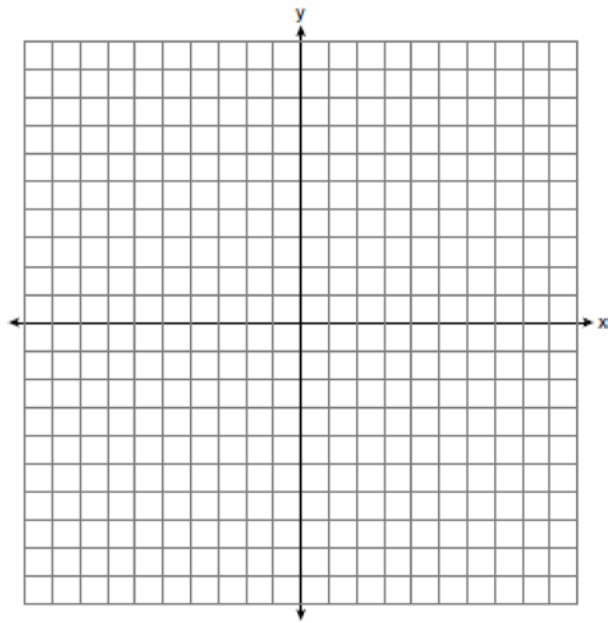


365 Given: $\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$
Prove that $\angle YWZ$ is a right angle.
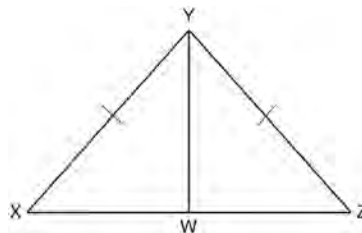
366 A barrel of fuel oil is a right circular cylinder where the inside measurements of the barrel are a diameter of 22.5 inches and a height of 33.5 inches. There are 231 cubic inches in a liquid gallon. Determine and state, to the *nearest tenth*, the gallons of fuel that are in a barrel of fuel oil.

367 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.

368 In the diagram of $\triangle LAC$ and $\triangle DNC$ below, $\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$.
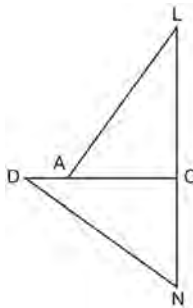


a) Prove that $\triangle LAC \cong \triangle DNC$.
b) Describe a sequence of rigid motions that will map $\triangle LAC$ onto $\triangle DNC$.

369 Given: Quadrilateral *ABCD* is a parallelogram with diagonals $\overline{AC}$ and $\overline{BD}$ intersecting at *E*
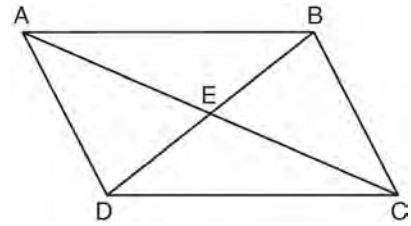


Prove: $\triangle AED \cong \triangle CEB$
Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

370 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.
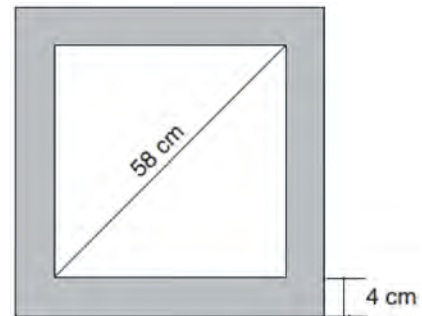


Determine and state the total area of the poster and frame to the *nearest tenth of a square centimeter*.

371 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**
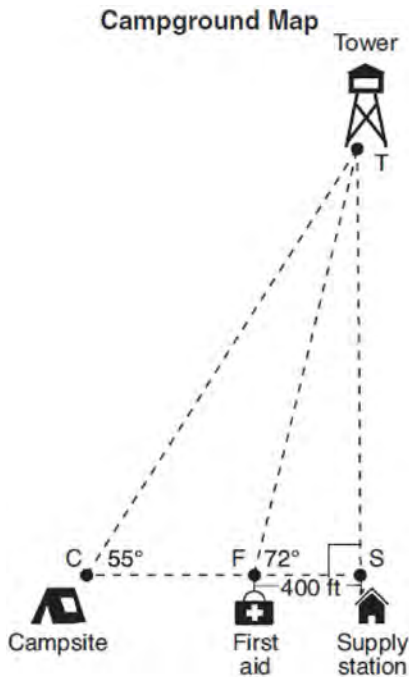


Determine and state, to the *nearest foot*, the distance from the campsite to the tower.

372 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.

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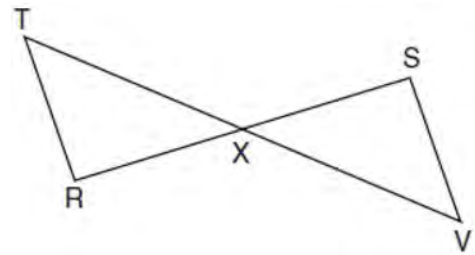


Prove: $\overline{TR} \parallel \overline{SV}$

374 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.
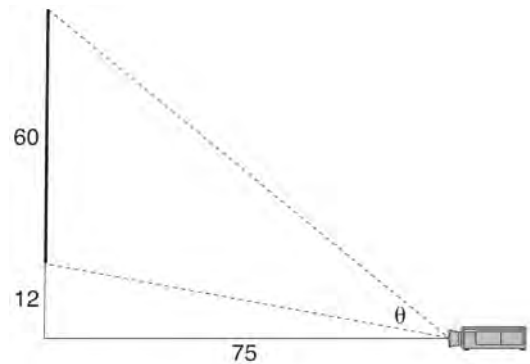


Determine and state, to the *nearest tenth of a degree*, the measure of $\theta$, the projection angle.

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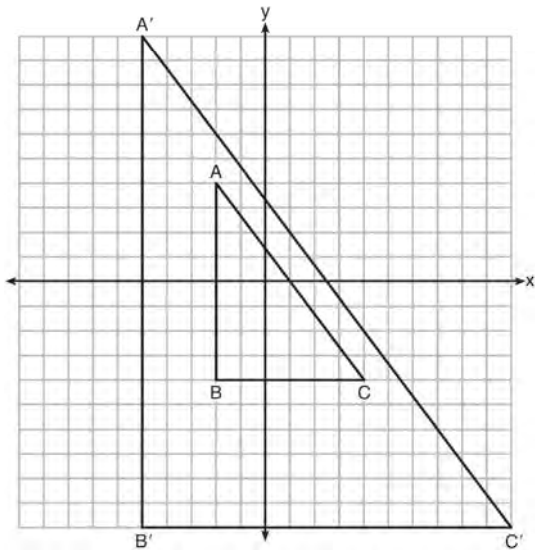
Describe the transformation that was performed. Explain why $\triangle A'B'C' \sim \triangle ABC$.

376 Prove the sum of the exterior angles of a triangle is 360°.
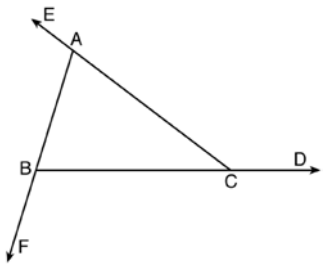
377 Given: $\triangle ABC$, $\overline{AEC}$, $\overline{BDE}$ with $\angle ABE \cong \angle CBE$, and $\angle ADE \cong \angle CDE$
Prove: $\overline{BDE}$ is the perpendicular bisector of $\overline{AC}$
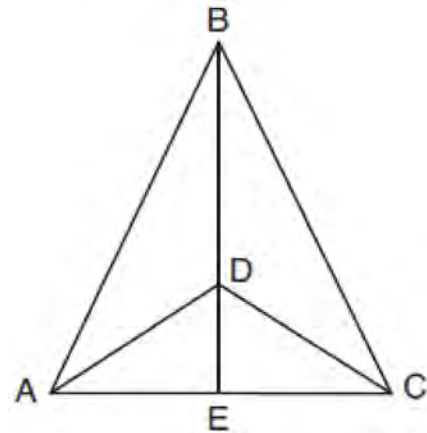
Fill in the missing statement and reasons below.

| Statements | Reasons |
|---|---|
| 1 $\triangle ABC$, $\overline{AEC}$, $\overline{BDE}$ with $\angle ABE \cong \angle CBE$, and $\angle ADE \cong \angle CDE$ | 1 Given |
| 2 $\overline{BD} \cong \overline{BD}$ | 2 |
| 3 $\angle BDA$ and $\angle ADE$ are supplementary. $\angle BDC$ and $\angle CDE$ are supplementary. | 3 Linear pairs of angles are supplementary. |
| 4 | 4 Supplements of congruent angles are congruent. |
| 5 $\triangle ABD \cong \triangle CBD$ | 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 |

378 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 $\triangle XYZ$.

380 Given: Parallelogram *ABCD*, $\overline{EFG}$, and diagonal $\overline{DFB}$

Prove: $\triangle DEF \sim \triangle BGF$

381 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.
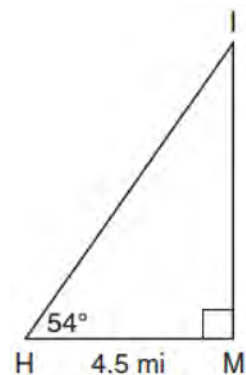
Determine and state, to the *nearest tenth of a mile*, the distance from the boat house (*H*) to the island (*I*). Determine and state, to the *nearest tenth of a mile*, the distance from the island (*I*) to the marina (*M*).

379 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 $\overparen{AC} \cong \overparen{BD}$, find the area of sector *BOD* in terms of $\pi$.

382 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
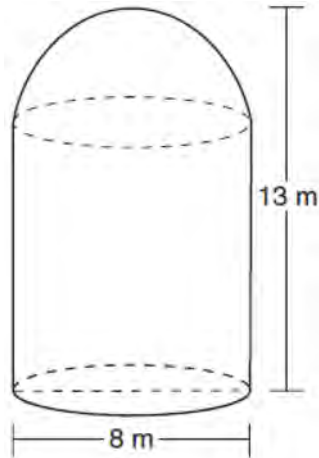
383 A gas station has a cylindrical fueling tank that holds the gasoline for its pumps, as modeled below. The tank holds a maximum of 20,000 gallons of gasoline and has a length of 34.5 feet.
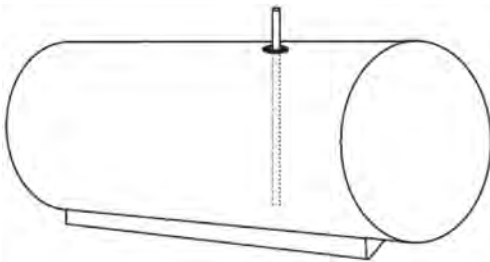
A metal pole is used to measure how much gas is in the tank. To the *nearest tenth of a foot*, how long does the pole need to be in order to reach the bottom of the tank and still extend one foot outside the tank? Justify your answer. [1 ft³=7.48 gallons]

384 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 $\triangle ABC \cong \triangle DEF$.
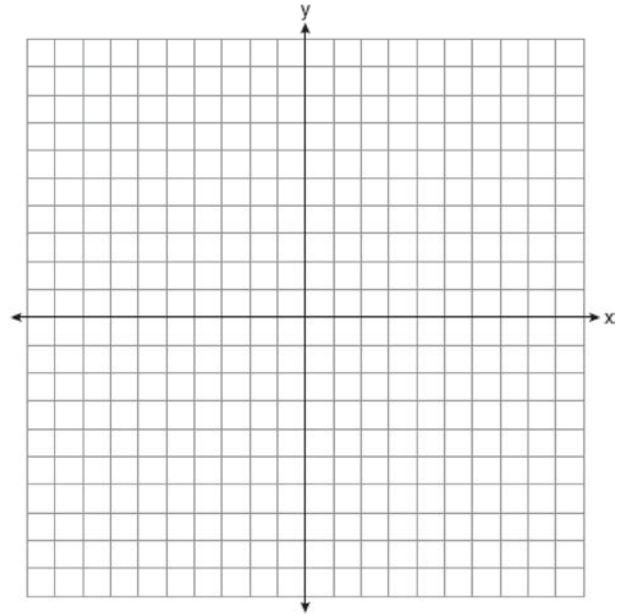
385 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point *A*, the angle of elevation from the ship to the light was 7°. A short time later, at point *D*, the angle of elevation was 16°.

B
7°          16°
125 ft
A          D          C
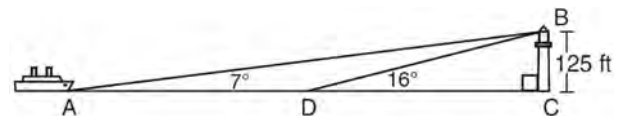
To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

81

386 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 )
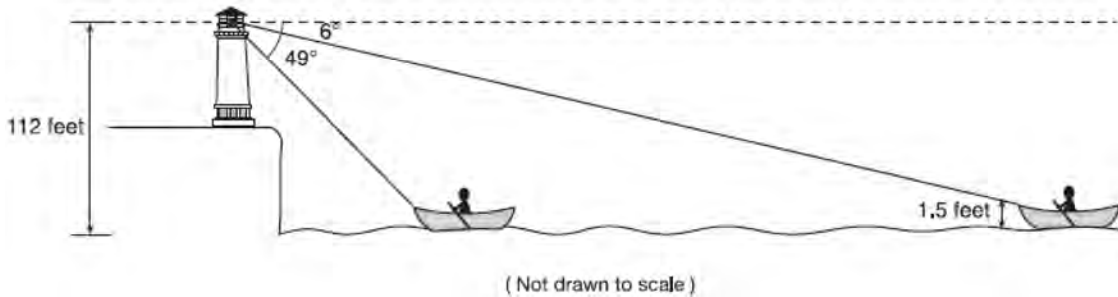
At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed at which the canoe traveled toward the lighthouse.

387 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.
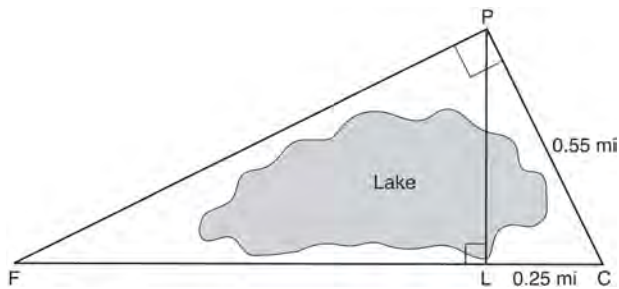


If the path from the park ranger station to the campground is 0.55 mile, determine and state, to the *nearest hundredth of a mile*, the distance between the park ranger station and the lifeguard chair. Gerald believes the distance from the first aid station to the campground is at least 1.5 miles. Is Gerald correct? Justify your answer.

388 Triangle *ABC* and triangle *ADE* are graphed on the set of axes below.
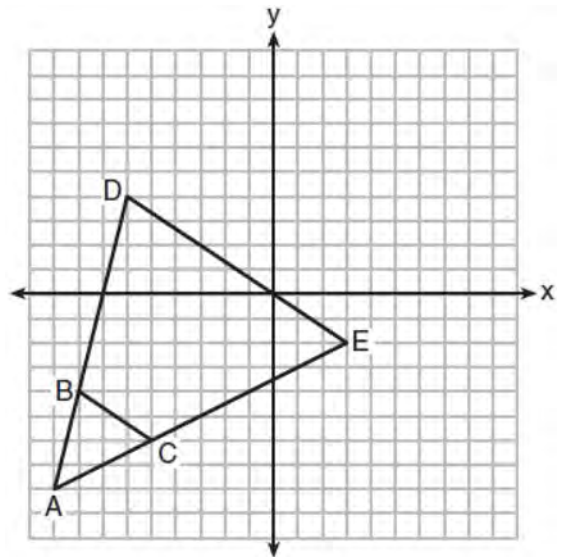


Describe a transformation that maps triangle *ABC* onto triangle *ADE*. Explain why this transformation makes triangle *ADE* similar to triangle *ABC*.

389 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.]
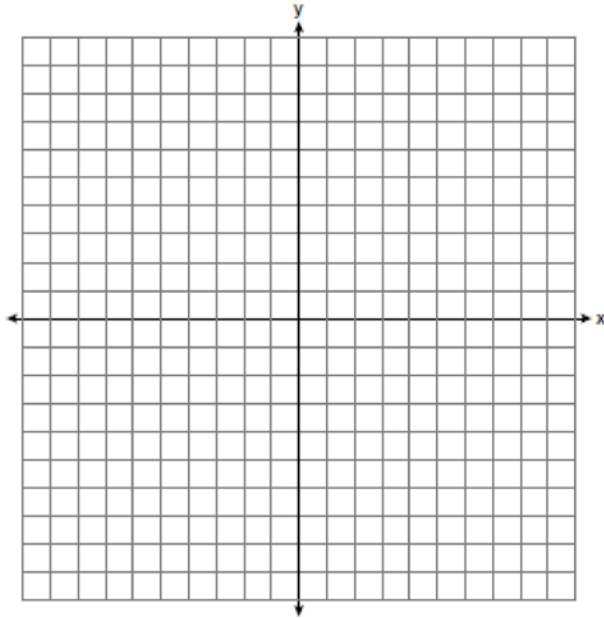


391 In rhombus *MATH*, the coordinates of the endpoints of the diagonal $\overline{MT}$ are $M(0,-1)$ and $T(4,6)$. Write an equation of the line that contains diagonal $\overline{AH}$. [Use of the set of axes below is optional.] Using the given information, explain how you know that your line contains diagonal $\overline{AH}$.
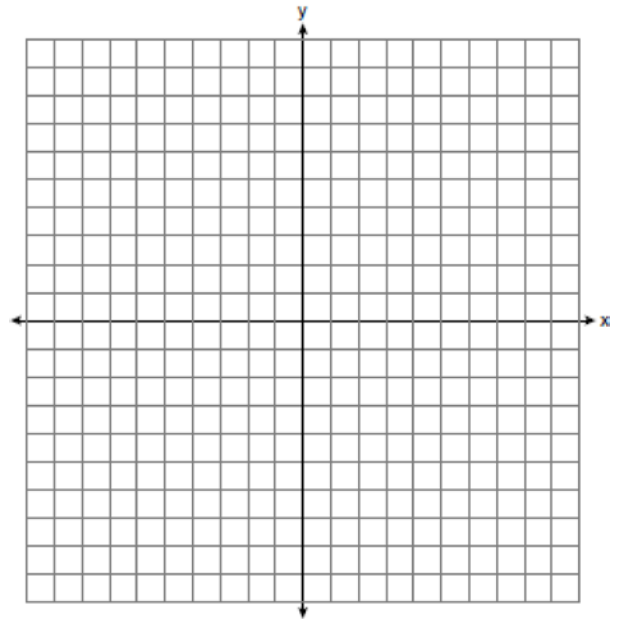


390 In the diagram below of circle *O*, tangent $\overleftrightarrow{EC}$ is drawn to diameter $\overline{AC}$. Chord $\overline{BC}$ is parallel to secant $\overline{ADE}$, and chord $\overline{AB}$ is drawn.
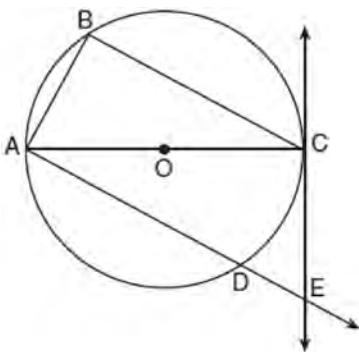


Prove: $\dfrac{BC}{CA} = \dfrac{AB}{EC}$

392 Given the theorem, "The sum of the measures of the interior angles of a triangle is 180°," complete the proof for this theorem.
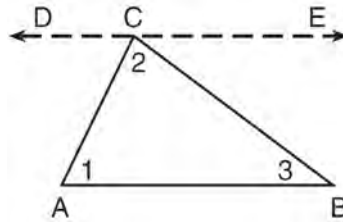


Given: $\triangle ABC$
Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180°$
Fill in the missing reasons below.

| 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) _____ |

393 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 $\angle CBA = 90°$.
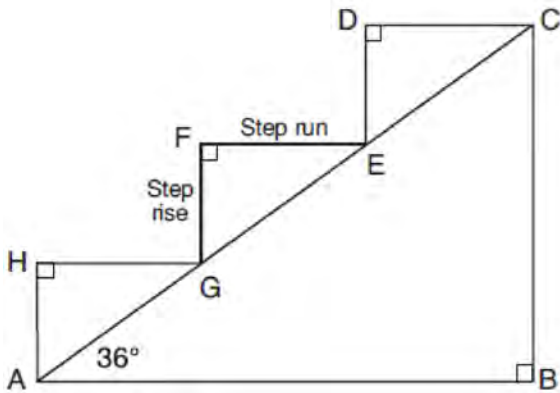


If each step run is parallel to $\overline{AB}$ and has a length of 10 inches, determine and state the length of each step rise, to the *nearest tenth of an inch*. Determine and state the length of $\overline{AC}$, to the *nearest inch*.

394 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.]
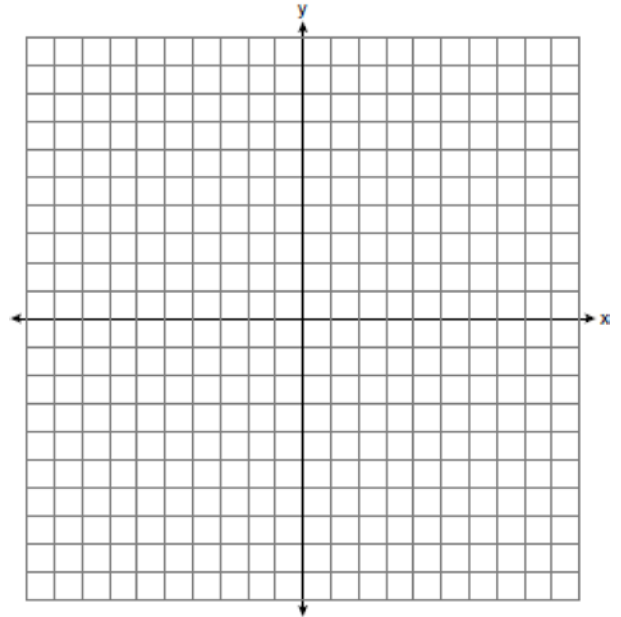


395 A candle maker uses a mold to make candles like the one shown below.
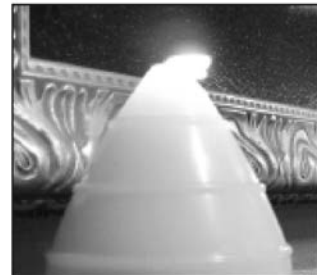


The height of the candle is 13 cm and the circumference of the candle at its widest measure is 31.416 cm. Use modeling to approximate how much wax, to the *nearest cubic centimeter*, is needed to make this candle. Justify your answer.

85

396 Using a compass and straightedge, construct and label △A'B'C', the image of △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 $\overline{A'C'}$.
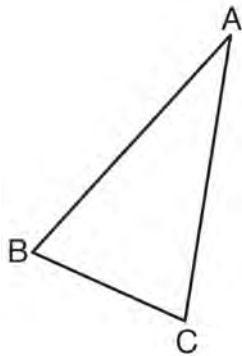
397 The grid below shows △ABC and △DEF.
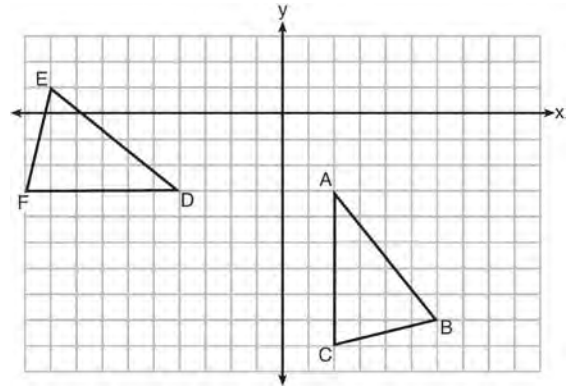
Let △A'B'C' be the image of △ABC after a rotation about point A. Determine and state the location of B' if the location of point C' is (8,−3). Explain your answer. Is △DEF congruent to △A'B'C'? Explain your answer.

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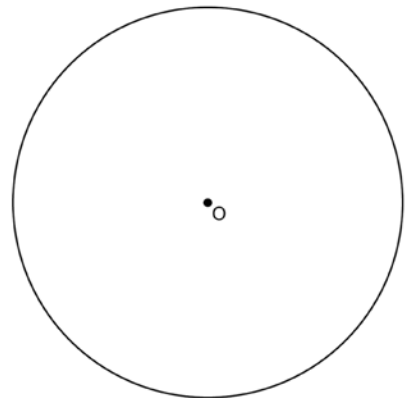
Determine the measure of the arc intercepted by two adjacent sides of the constructed square. Explain your reasoning.

## Geometry 6 Point Regents Exam Questions

399 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.
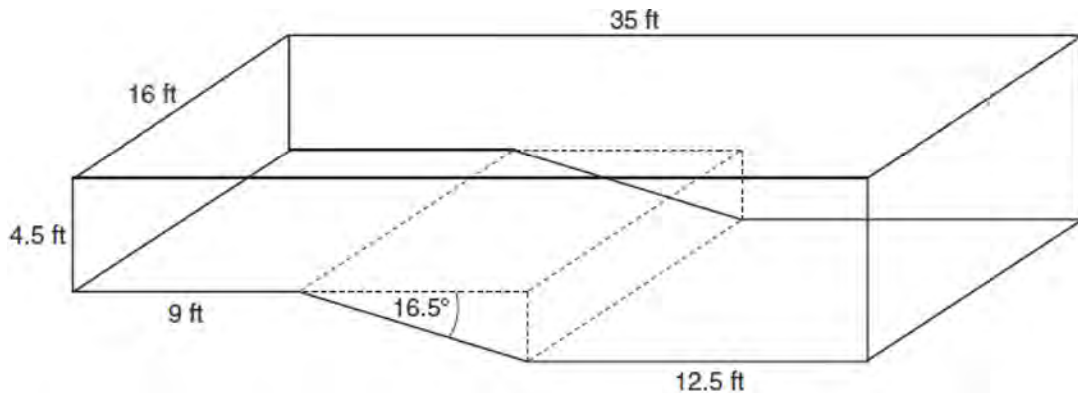


If the sloped floor has an angle of depression of 16.5 degrees, what is the depth of the pool at the deep end, to the *nearest tenth of a foot*?  Find the volume of the inside of the pool to the *nearest cubic foot*.  A garden hose is used to fill the pool.  Water comes out of the hose at a rate of 10 .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]

400 Given: Circle $O$, chords $\overline{AB}$ and $\overline{CD}$ intersect at $E$
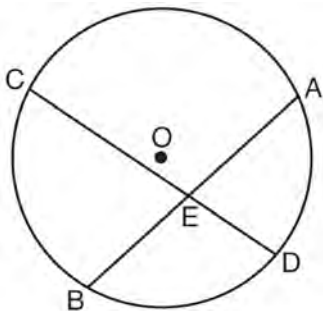


Theorem: If two chords intersect in a circle, the product of the lengths of the segments of one chord is equal to the product of the lengths of the segments of the other chord.  Prove this theorem by proving $AE \cdot EB = CE \cdot ED$.

401 Given: Parallelogram $ABCD$, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$
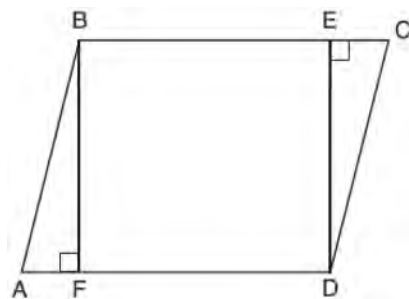


Prove:  $BEDF$ is a rectangle

87

402 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
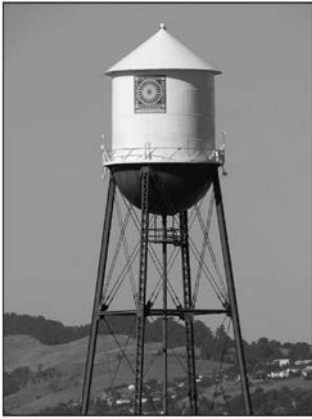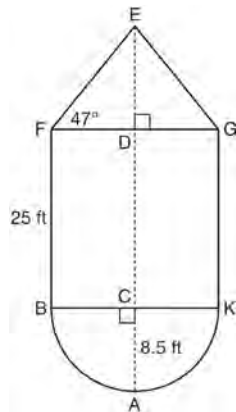
If *AC* = 8.5 feet, *BF* = 25 feet, and m∠*EFD* = 47°, determine and state, to the *nearest cubic foot*, the volume of the water tower. The water tower was constructed to hold a maximum of 400,000 pounds of water. If water weighs 62.4 pounds per cubic foot, can the water tower be filled to 85% of its volume and *not* exceed the weight limit? Justify your answer.

403 Given: Quadrilateral *ABCD* with diagonals $\overline{AC}$ and $\overline{BD}$ that bisect each other, and ∠1 ≅ ∠2
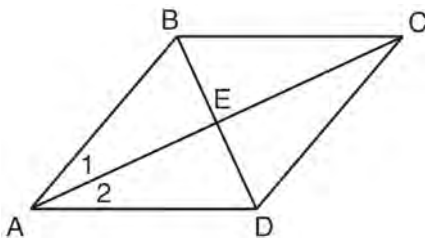


Prove: △*ACD* is an isosceles triangle and △*AEB* is a right triangle

404 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?
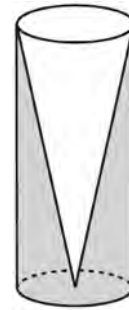


Walter goes to a hobby store to buy the wax for his candles. The wax costs $0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of $37.83 for the molds and charges $1.95 for each candle, what is Walter's profit after selling 100 candles?

405 In 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*.



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

88
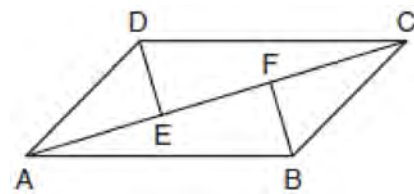
406 The map below shows the three tallest mountain peaks in New York State: Mount Marcy, Algonquin Peak, and Mount Haystack. Mount Haystack, the shortest peak, is 4960 feet tall. Surveyors have determined the horizontal distance between Mount Haystack and Mount Marcy is 6336 feet and the horizontal distance between Mount Marcy and Algonquin Peak is 20,493 feet.
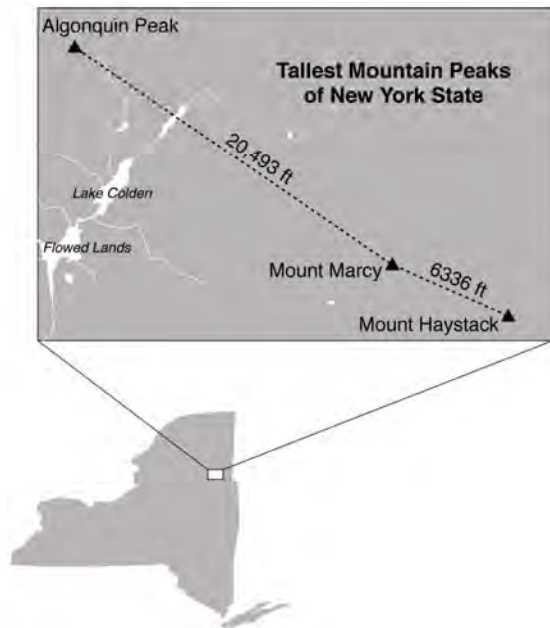


The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer.

407 In the diagram below, secant $\overline{ACD}$ and tangent $\overline{AB}$ are drawn from external point $A$ to circle $O$.
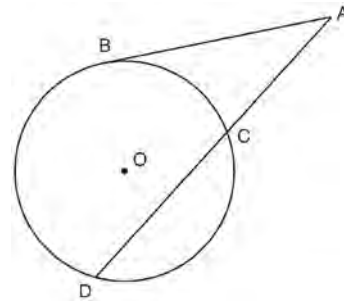


Prove the theorem: If a secant and a tangent are drawn to a circle from an external point, the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. $(AC \cdot AD = AB^2)$

408 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.]
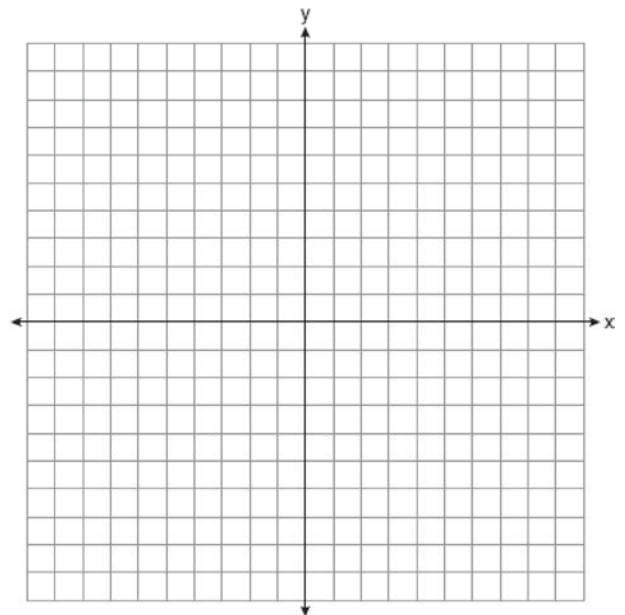
409 A snow cone consists of a paper cone completely filled with shaved ice and topped with a hemisphere of shaved ice, as shown in the diagram below. The inside diameter of both the cone and the hemisphere is 8.3 centimeters. The height of the cone is 10.2 centimeters.



8.3 cm

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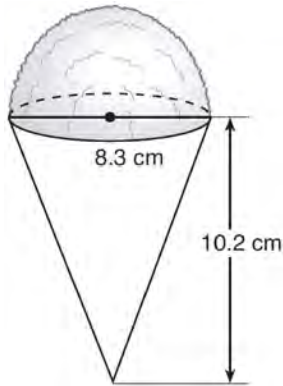
The desired density of the shaved ice is 0.697 g/cm$^3$, and the cost, per kilogram, of ice is $3.83. Determine and state the cost of the ice needed to make 50 snow cones.

410 In the diagram of parallelogram *ABCD* below, $BE \perp CED$, $DF \perp BFC$, $CE \cong CF$.
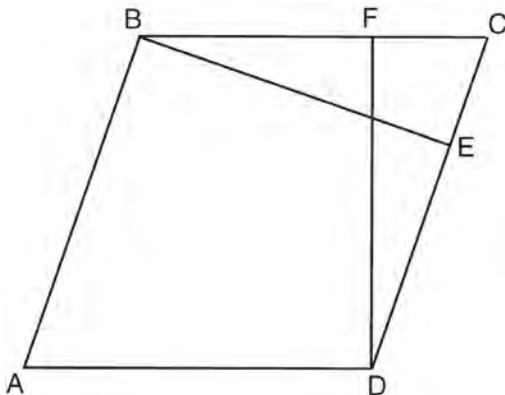


Prove *ABCD* is a rhombus.

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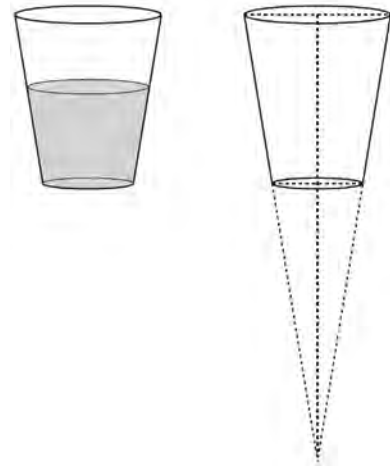


The diameter of the top of the glass is 3 inches, the diameter at the bottom of the glass is 2 inches, and the height of the glass is 5 inches. The base with a diameter of 2 inches must be parallel to the base with a diameter of 3 inches in order to find the height of the cone. Explain why. Determine 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.

412 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*.

413 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.
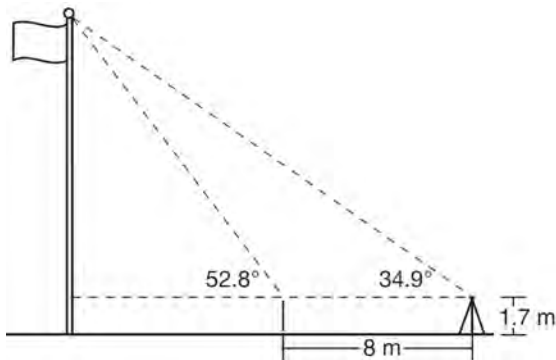


Determine and state, to the *nearest tenth of a meter*, the height of the flagpole.

414 Given: Parallelogram $ANDR$ with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points $W$ and $E$, respectively
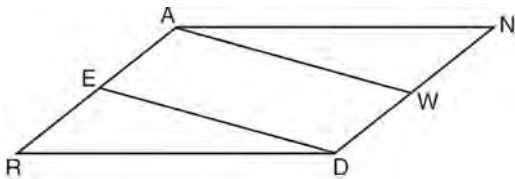


Prove that $\triangle ANW \cong \triangle DRE$. Prove that quadrilateral $AWDE$ is a parallelogram.

415 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.]
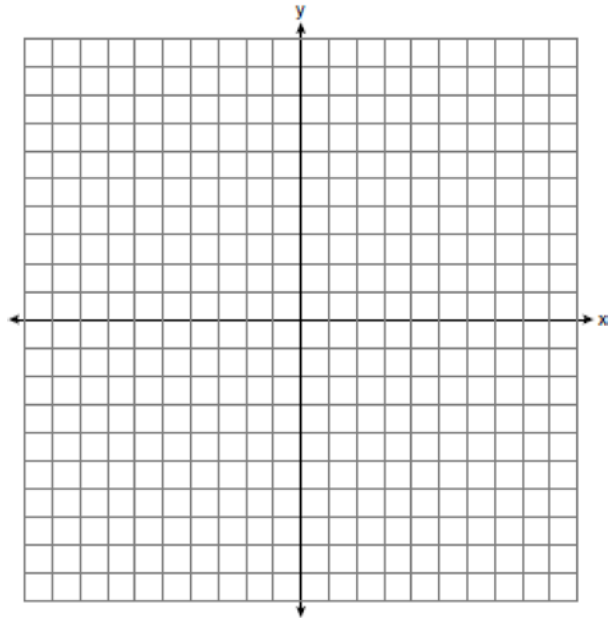


416 Given: $D$ is the image of $A$ after a reflection over $\overleftrightarrow{CH}$.
$\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$
$\triangle ABC$ and $\triangle DEC$ are drawn
Prove: $\triangle ABC \cong \triangle DEC$
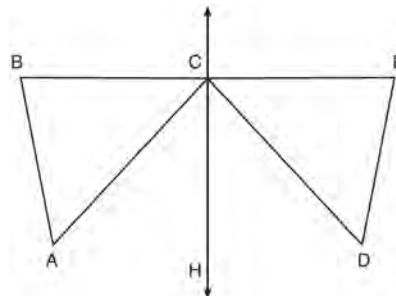
417 The vertices of quadrilateral *MATH* have coordinates $M(-4,2)$, $A(-1,-3)$, $T(9,3)$, and $H(6,8)$. Prove that quadrilateral *MATH* is a parallelogram. Prove that quadrilateral *MATH* is a rectangle. [The use of the set of axes below is optional.]
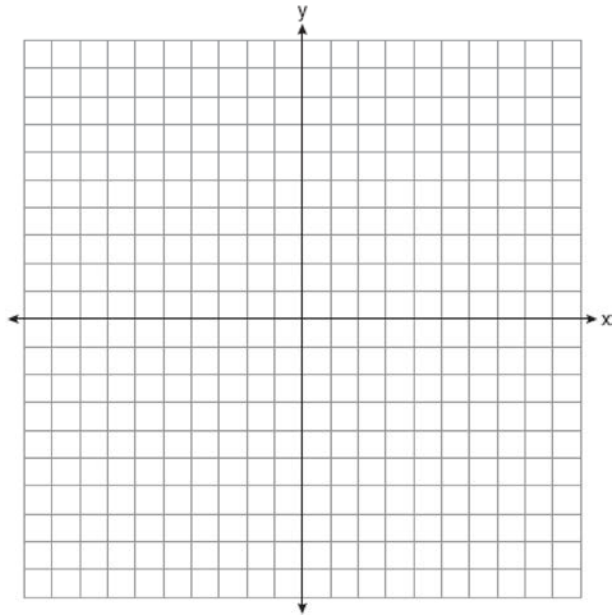


418 New streetlights will be installed along a section of the highway. The posts for the streetlights will be 7.5 m tall and made of aluminum. The city can choose to buy the posts shaped like cylinders or the posts shaped like rectangular prisms. The cylindrical posts have a hollow core, with aluminum 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?

419 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 $\overline{BE} \perp \overline{CE}$.
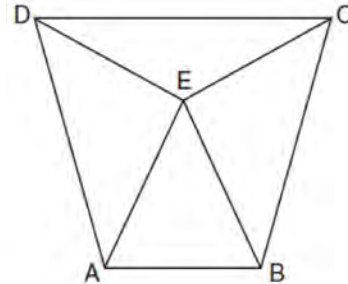


Prove $\triangle ADE \cong \triangle BCE$ and prove $\triangle AEB$ is an isosceles triangle.

420 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.
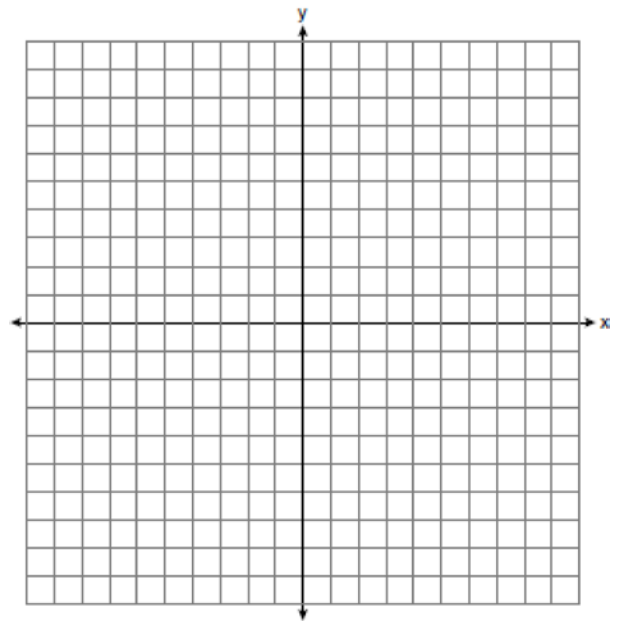
# Geometry Multiple Choice Regents Exam Questions
# Answer Section

1 ANS: 1
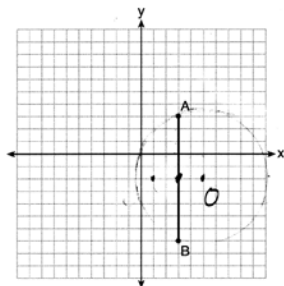


Since the midpoint of $\overline{AB}$ is $(3,-2)$, the center must be either $(5,-2)$ or $(1,-2)$.

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

   PTS: 2          REF: 061623geo     TOP: Equations of Circles
   KEY: other
2 ANS: 4          PTS: 2          REF: 061501geo     TOP: Rotations of Two-Dimensional Objects
3 ANS: 1

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

   PTS: 2          REF: 011720geo     TOP: Directed Line Segments
4 ANS: 1
   1) opposite sides;  2) adjacent sides;  3) perpendicular diagonals; 4) diagonal bisects angle

   PTS: 2          REF: 061609geo     TOP: Special Quadrilaterals
5 ANS: 4          PTS: 2          REF: 061512geo     TOP: Cofunctions
6 ANS: 2          PTS: 2          REF: 061720geo     TOP: Parallelograms
7 ANS: 3

$\dfrac{24}{40} = \dfrac{15}{x}$

$24x = 600$

$x = 25$

   PTS: 2          REF: 011813geo     TOP: Side Splitter Theorem
8 ANS: 4          PTS: 2          REF: 011819geo     TOP: Special Quadrilaterals
9 ANS: 2

$-4 + \dfrac{2}{5}(1--4) = -4 + \dfrac{2}{5}(5) = -4+2 = -2$   $-2 + \dfrac{2}{5}(8--2) = -2 + \dfrac{2}{5}(10) = -2+4 = 2$

   PTS: 2          REF: 061814geo     TOP: Directed Line Segments

1

10  ANS:  3

$$\tan 34 = \frac{T}{20}$$

$$T \approx 13.5$$

PTS:  2          REF:  061505geo     TOP:  Using Trigonometry to Find a Side
KEY:  graphics

11  ANS:  2
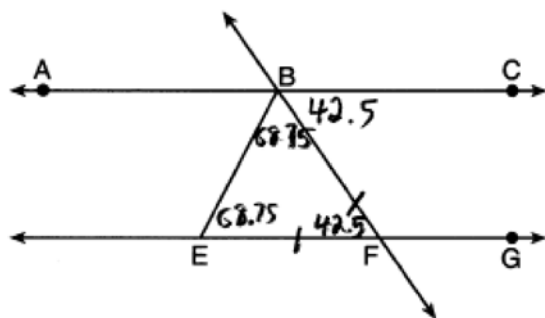


PTS:  2          REF:  011818geo     TOP:  Lines and Angles

12  ANS:  2          PTS:  2          REF:  011805geo
TOP:  Cross-Sections of Three-Dimensional Objects

13  ANS:  4          PTS:  2          REF:  011706geo     TOP:  Identifying Transformations
KEY:  basic

14  ANS:  3

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

PTS:  2          REF:  061605geo     TOP:  Similarity     KEY:  basic

15  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     TOP:  Equations of Circles
KEY:  write equation, given graph

16  ANS:  2          PTS:  2          REF:  061516geo     TOP:  Dilations

17  ANS:  4

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

$$3x - 1 = 2x + 6$$

$$x = 7$$

PTS:  2          REF:  011620geo     TOP:  Similarity     KEY:  basic

18  ANS:  1          PTS:  2          REF:  011601geo
TOP:  Cross-Sections of Three-Dimensional Objects

19 ANS: 4 PTS: 2 REF: 061513geo TOP: Parallelograms
20 ANS: 3 PTS: 2 REF: 011621geo TOP: Chords, Secants and Tangents
   KEY: inscribed
21 ANS: 3

$$r = \sqrt{(7-3)^2 + (1--2)^2} = \sqrt{16+9} = 5$$

   PTS: 2 REF: 061503geo TOP: Circles in the Coordinate Plane
22 ANS: 1

$$\frac{360°}{45°} = 8$$

   PTS: 2 REF: 061510geo TOP: Mapping a Polygon onto Itself
23 ANS: 1 PTS: 2 REF: 011606geo TOP: Lines and Angles
24 ANS: 2
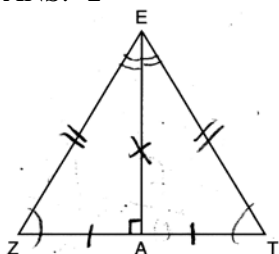


   PTS: 2 REF: 061619geo TOP: Triangle Proofs
25 ANS: 2

$$\frac{12}{4} = \frac{36}{x}$$

$$12x = 144$$

$$x = 12$$

   PTS: 2 REF: 061621geo TOP: Side Splitter Theorem
26 ANS: 1
   $360 - (82 + 104 + 121) = 53$

   PTS: 2 REF: 011801geo TOP: Properties of Transformations
   KEY: graph
27 ANS: 1

$m_{\overline{RT}} = \frac{5--3}{4--2} = \frac{8}{6} = \frac{4}{3}$ $m_{\overline{ST}} = \frac{5-2}{4-8} = \frac{3}{-4} = -\frac{3}{4}$ Slopes are opposite reciprocals, so lines form a right angle.

   PTS: 2 REF: 011618geo TOP: Triangles in the Coordinate Plane

28  ANS:  1

$24x = 10^2$

$24x = 100$

$x \approx 4.2$

PTS:  2          REF:  061823geo     TOP:  Similarity      KEY:  leg

29  ANS:  2

$\triangle ACB \sim \triangle AED$

PTS:  2          REF:  061811geo     TOP:  Similarity      KEY:  basic

30  ANS:  1          PTS:  2          REF:  011608geo     TOP:  Compositions of Transformations
    KEY:  identify

31  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 $-\dfrac{2}{3}$.

PTS:  2          REF:  061522geo     TOP:  Line Dilations

32  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     TOP:  Triangle Proofs
KEY:  statements

33  ANS:  4          PTS:  2          REF:  011609geo     TOP:  Cofunctions

34  ANS:  3

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

$A \approx 50°$

PTS:  2          REF:  011616geo     TOP:  Using Trigonometry to Find an Angle

35  ANS:  4

$\sin 70 = \dfrac{x}{20}$

$x \approx 18.8$

PTS:  2          REF:  061611geo     TOP:  Using Trigonometry to Find a Side
KEY:  without graphics

36  ANS:  1          PTS:  2          REF:  011716geo     TOP:  Special Quadrilaterals

37  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     TOP:  Area of Polygons

38  ANS:  1          PTS:  2          REF:  011703geo     TOP:  Triangle Congruency

39  ANS:  4

Opposite angles of an inscribed quadrilateral are supplementary.

PTS:  2          REF:  011821geo     TOP:  Inscribed Quadrilaterals

40  ANS:  1          PTS:  2          REF:  061520geo     TOP:  Chords, Secants and Tangents

KEY:  mixed

41  ANS:  3          PTS:  2          REF:  011605geo

TOP:  Analytical Representations of Transformations          KEY:  basic

42  ANS:  2

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

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

PTS:  2          REF:  061812geo     TOP:  Parallel and Perpendicular Lines

KEY:  write equation of perpendicular line

43  ANS:  2          PTS:  2          REF:  011702geo     TOP:  Compositions of Transformations

KEY:  grids

44  ANS:  2

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

PTS:  2          REF:  011709geo     TOP:  30-60-90 Triangles

45  ANS:  4          PTS:  2          REF:  011817geo     TOP:  Similarity

KEY:  basic

46  ANS:  2          PTS:  2          REF:  061701geo     TOP:  Compositions of Transformations

KEY:  identify

47  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     TOP:  Sectors

48  ANS:  1
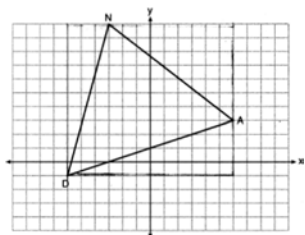


$$(12 \cdot 11) - \left[ \frac{1}{2}(12 \cdot 4) + \frac{1}{2}(7 \cdot 9) + \frac{1}{2}(11 \cdot 3) \right] = 60$$

PTS:  2          REF:  061815geo     TOP:  Polygons in the Coordinate Plane

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

PTS:  2          REF:  061602geo      TOP:  Line Dilations
50  ANS:  4
AA

PTS:  2          REF:  061809geo      TOP:  Similarity Proofs
51  ANS:  2
$$\cos B = \frac{17.6}{26}$$

$$B \approx 47$$

PTS:  2          REF:  061806geo      TOP:  Using Trigonometry to Find an Angle
52  ANS:  3          PTS:  2          REF:  061702geo      TOP:  Polygons in the Coordinate Plane
53  ANS:  3          PTS:  2          REF:  061703geo      TOP:  Cofunctions
54  ANS:  1
$x^2 + y^2 - 12y + 36 = -20 + 36$

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

PTS:  2          REF:  061712geo      TOP:  Equations of Circles
KEY:  completing the square
55  ANS:  4          PTS:  2          REF:  061606geo      TOP:  Volume
KEY:  compositions
56  ANS:  4          PTS:  2          REF:  011723geo
TOP:  Cross-Sections of Three-Dimensional Objects
57  ANS:  1
$$V = \frac{1}{3} \pi(4)^2(6) = 32\pi$$

PTS:  2          REF:  061718geo      TOP:  Rotations of Two-Dimensional Objects
58  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      TOP:  Compositions of Transformations
KEY:  basic
59  ANS:  4          PTS:  2          REF:  011803geo      TOP:  Identifying Transformations
KEY:  graphics
60  ANS:  3
$6x - 40 + x + 20 = 180 - 3x$  $m\angle BAC = 180 - (80 + 40) = 60$

$$10x = 200$$

$$x = 20$$

PTS:  2          REF:  011809geo      TOP:  Exterior Angle Theorem

61  ANS:  3

$$\frac{12}{4} = \frac{x}{5} \quad 15 - 4 = 11$$

$$x = 15$$

    PTS:  2                REF:  011624geo     TOP:  Similarity     KEY:  basic

62  ANS:  3             PTS:  2           REF:  061601geo     TOP:  Rotations of Two-Dimensional Objects

63  ANS:  2             PTS:  2           REF:  011802geo     TOP:  Parallelograms

64  ANS:  4             PTS:  2           REF:  061615geo     TOP:  Trigonometric Ratios

65  ANS:  4             PTS:  2           REF:  061504geo     TOP:  Compositions of Transformations

    KEY:  identify

66  ANS:  3             PTS:  2           REF:  061706geo     TOP:  Line Dilations

67  ANS:  4

$$9 \cdot 3 = 27, \, 27 \cdot 4 = 108$$

    PTS:  2                REF:  061805geo     TOP:  Dilations

68  ANS:  1

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

$$6 = s$$

    PTS:  2                REF:  061716geo     TOP:  Volume     KEY:  pyramids

69  ANS:  1

$$\frac{1000}{20\pi} \approx 15.9$$

    PTS:  2                REF:  011623geo     TOP:  Circumference

70  ANS:  1             PTS:  2           REF:  061518geo     TOP:  Line Dilations

71  ANS:  2

$x$ is $\frac{1}{2}$ the circumference. $\frac{C}{2} = \frac{10\pi}{2} \approx 16$

    PTS:  2                REF:  061523geo     TOP:  Circumference

72  ANS:  3             PTS:  2           REF:  061524geo     TOP:  Triangle Congruency

73  ANS:  1             PTS:  2           REF:  061508geo     TOP:  Chords, Secants and Tangents

    KEY:  inscribed

74  ANS:  4             PTS:  2           REF:  061813geo     TOP:  Special Quadrilaterals

75  ANS:  3

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

$$x \approx 18$$

    PTS:  2                REF:  011712geo     TOP:  Using Trigonometry to Find a Side

76 ANS: 1

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

$$f = 10$$

PTS: 2 REF: 061617geo TOP: Lines and Angles

77 ANS: 4 PTS: 2 REF: 011705geo TOP: Special Quadrilaterals

78 ANS: 4 PTS: 2 REF: 011704geo TOP: Midsegments

79 ANS: 1

Alternate interior angles

PTS: 2 REF: 061517geo TOP: Lines and Angles

80 ANS: 1

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

$$h = 6$$

PTS: 2 REF: 061810geo TOP: Volume KEY: pyramids

81 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 TOP: Parallel and Perpendicular Lines

KEY: find slope of perpendicular line

82 ANS: 2

$$\frac{11}{1.2\,\text{oz}}\left(\frac{16\,\text{oz}}{1\,\text{lb}}\right) = \frac{13.\overline{3}1}{\text{lb}} \quad \frac{13.\overline{3}1}{\text{lb}}\left(\frac{1\,\text{g}}{3.785\,\text{l}}\right) \approx \frac{3.5\,\text{g}}{1\,\text{lb}}$$

PTS: 2 REF: 061618geo TOP: Density

83 ANS: 3

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

PTS: 2 REF: 011719geo TOP: Quadrilaterals in the Coordinate Plane

84 ANS: 4 PTS: 2 REF: 061608geo TOP: Compositions of Transformations

KEY: grids

85 ANS: 3

$$\frac{60}{360}\cdot 8^2\pi = \frac{1}{6}\cdot 64\pi = \frac{32\pi}{3}$$

PTS: 2 REF: 061624geo TOP: Sectors

86  ANS:  4
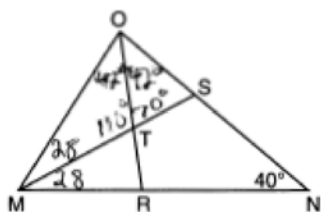


PTS:  2          REF:  061717geo     TOP:  Interior and Exterior Angles of Triangles
87  ANS:  4          PTS:  2          REF:  011808geo
    TOP:  Analytical Representations of Transformations          KEY:  basic
88  ANS:  3          PTS:  2          REF:  061616geo     TOP:  Identifying Transformations
    KEY:  graphics
89  ANS:  2          PTS:  2          REF:  061709geo     TOP:  Triangle Proofs
    KEY:  statements
90  ANS:  2
    $4 \times 4 \times 6 - \pi(1)^2(6) \approx 77$

PTS:  2          REF:  011711geo     TOP:  Volume          KEY:  compositions
91  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     TOP:  Chords, Secants and Tangents
    KEY:  intersecting chords, length
92  ANS:  2
    $x^2 = 12(12 - 8)$

    $x^2 = 48$

    $x = 4\sqrt{3}$

PTS:  2          REF:  011823geo     TOP:  Similarity     KEY:  leg
93  ANS:  2
    $-4 + \frac{2}{5}(6 - -4) = -4 + \frac{2}{5}(10) = -4 + 4 = 0 \quad 5 + \frac{2}{5}(20 - 5) = 5 + \frac{2}{5}(15) = 5 + 6 = 11$

PTS:  2          REF:  061715geo     TOP:  Directed Line Segments

9

94 ANS: 3

$V = 12 \cdot 8.5 \cdot 4 = 408$

$W = 408 \cdot 0.25 = 102$

PTS: 2  REF: 061507geo  TOP: Density

95 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  TOP: Similarity  KEY: basic

96 ANS: 2

$\tan \theta = \dfrac{2.4}{x}$

$\dfrac{3}{7} = \dfrac{2.4}{x}$

$x = 5.6$

PTS: 2  REF: 011707geo  TOP: Using Trigonometry to Find a Side

97 ANS: 1  PTS: 2  REF: 011811geo  TOP: Dilations

98 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  TOP: Interior and Exterior Angles of Triangles

99 ANS: 1

$m = \dfrac{-4}{-6} = \dfrac{2}{3}$

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

PTS: 2  REF: 011820geo  TOP: Parallel and Perpendicular Lines

KEY: write equation of perpendicular line

100 ANS: 1

$x = -5 + \dfrac{1}{3}(4 - -5) = -5 + 3 = -2 \quad y = 2 + \dfrac{1}{3}(-10 - 2) = 2 - 4 = -2$

PTS: 2  REF: 011806geo  TOP: Directed Line Segments

101 ANS: 2

$h^2 = 30 \cdot 12$

$h^2 = 360$

$h = 6\sqrt{10}$

PTS: 2  REF: 061613geo  TOP: Similarity  KEY: altitude

102 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　　TOP: Parallel and Perpendicular Lines
KEY: perpendicular bisector

103 ANS: 3　　　　PTS: 2　　　　REF: 011815geo　　TOP: Mapping a Polygon onto Itself

104 ANS: 3　　　　PTS: 2　　　　REF: 061802geo　　TOP: Lines and Angles

105 ANS: 4　　　　PTS: 2　　　　REF: 011810geo　　TOP: Rotations of Two-Dimensional Objects

106 ANS: 1

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

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

PTS: 2　　　　REF: 011718geo　　TOP: Equations of Circles
KEY: completing the square

107 ANS: 3

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

$9x = 46$

$x \approx 5.1$

PTS: 2　　　　REF: 061511geo　　TOP: Side Splitter Theorem

108 ANS: 4

$\sin 71 = \dfrac{x}{20}$

$x = 20 \sin 71 \approx 19$

PTS: 2　　　　REF: 061721geo　　TOP: Using Trigonometry to Find a Side
KEY: without graphics

109 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　　TOP: Line Dilations

110 ANS: 2

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

PTS: 2　　　　REF: 011607geo　　TOP: Volume　　　KEY: pyramids

111  ANS:  4

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

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

PTS:  2            REF:  011617geo    TOP:  Equations of Circles
KEY:  completing the square

112  ANS:  2
The line $y = -3x + 6$ passes through the center of dilation, so the dilated line is not distinct.

PTS:  2            REF:  061824geo    TOP:  Line Dilations

113  ANS:  4

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

PTS:  2            REF:  061704geo    TOP:  Chords, Secants and Tangents
KEY:  inscribed

114  ANS:  3        PTS:  2            REF:  011714geo    TOP:  Trigonometric Ratios

115  ANS:  1

$\cos S = \frac{60}{65}$

$S \approx 23$

PTS:  2            REF:  061713geo    TOP:  Using Trigonometry to Find an Angle

116  ANS:  3

$\frac{s_L}{s_S} = \frac{6\theta}{4\theta} = 1.5$

PTS:  2            REF:  011824geo    TOP:  Arc Length    KEY:  arc length

117  ANS:  2

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

PTS:  2            REF:  011604geo    TOP:  Volume        KEY:  prisms

118  ANS:  1

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

PTS:  2            REF:  061620geo    TOP:  Density

119  ANS:  4        PTS:  2            REF:  061803geo    TOP:  Identifying Transformations
KEY:  graphics

120  ANS:  1

$20 \cdot 12 \cdot 45 + \frac{1}{2}\pi(10)^2(45) \approx 17869$

PTS:  2            REF:  061807geo    TOP:  Volume        KEY:  compositions

121 ANS: 1

$$\frac{6}{8} = \frac{9}{12}$$

PTS: 2 REF: 011613geo TOP: Similarity KEY: basic

122 ANS: 2 PTS: 2 REF: 061506geo

TOP: Cross-Sections of Three-Dimensional Objects

123 ANS: 2

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

PTS: 2 REF: 011622geo TOP: Similarity KEY: altitude

124 ANS: 2

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

PTS: 2 REF: 011615geo TOP: Polygons in the Coordinate Plane

125 ANS: 3 PTS: 2 REF: 011710geo TOP: Compositions of Transformations

KEY: identify

126 ANS: 2

$$V = \frac{1}{3}\left(\frac{36}{4}\right)^2 \cdot 15 = 405$$

PTS: 2 REF: 011822geo TOP: Volume KEY: pyramids

127 ANS: 2

$$m = \frac{3}{2} \qquad 1 = -\frac{2}{3}(-6) + b$$

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

$$-3 = b$$

PTS: 2 REF: 061719geo TOP: Parallel and Perpendicular Lines

KEY: write equation of perpendicular line

128 ANS: 4

$$C = 12\pi \quad \frac{120}{360}(12\pi) = \frac{1}{3}(12\pi)$$

PTS: 2 REF: 061822geo TOP: Arc Length KEY: arc length

129 ANS: 3

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

PTS: 2 REF: 061819geo TOP: Mapping a Polygon onto Itself

130 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 TOP: Volume KEY: cones

131 ANS: 1 PTS: 2 REF: 061707geo TOP: Mapping a Polygon onto Itself

132 ANS: 4

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

PTS: 2 REF: 061521geo TOP: Similarity KEY: perimeter and area

133 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 TOP: Circles in the Coordinate Plane

134 ANS: 4 PTS: 2 REF: 061502geo TOP: Identifying Transformations
KEY: basic

135 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 TOP: Volume KEY: compositions

136 ANS: 2

$$8(x + 8) = 6(x + 18)$$

$$8x + 64 = 6x + 108$$

$$2x = 44$$

$$x = 22$$

PTS: 2 REF: 011715geo TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

137 ANS: 2 PTS: 2 REF: 011610geo TOP: Line Dilations

138 ANS: 2 PTS: 2 REF: 061610geo TOP: Chords, Secants and Tangents
KEY: inscribed

139 ANS: 1

$$\sin 32 = \frac{O}{129.5}$$

$$O \approx 68.6$$

PTS: 2 REF: 011804geo TOP: Using Trigonometry to Find a Side

140 ANS: 4

$$\frac{300}{360} \cdot 8^2 \pi = \frac{160\pi}{3}$$

PTS: 2 REF: 011721geo TOP: Sectors
141 ANS: 1 PTS: 2 REF: 061801geo TOP: Properties of Transformations
KEY: graphics
142 ANS: 3
NYSED has stated that all students should be awarded credit regardless of their answer to this question.

PTS: 2 REF: 061722geo TOP: Triangle Congruency
143 ANS: 3
$y = mx + b$

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

$3 = b$

PTS: 2 REF: 011701geo TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line
144 ANS: 2 PTS: 2 REF: 061603geo TOP: Equations of Circles
KEY: find center and radius | completing the square
145 ANS: 2
$x^2 + y^2 + 6y + 9 = 7 + 9$

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

PTS: 2 REF: 061514geo TOP: Equations of Circles
KEY: completing the square
146 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 TOP: Side Splitter Theorem
147 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 TOP: Volume KEY: cones
148 ANS: 4 PTS: 2 REF: 011611geo TOP: Properties of Transformations
KEY: graphics

149  ANS:  4

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

PTS:  2          REF:  011717geo     TOP:  Mapping a Polygon onto Itself

150  ANS:  1

$2x + 4 + 46 = 90$

$\qquad 2x = 40$

$\qquad\ x = 20$

PTS:  2          REF:  061808geo     TOP:  Cofunctions

151  ANS:  3

$\triangle CFB \sim \triangle CAD \quad \dfrac{CB}{CF} = \dfrac{CD}{CA}$

$\qquad\qquad\qquad \dfrac{x}{21.6} = \dfrac{7.2}{9.6}$

$\qquad\qquad\qquad\quad x = 16.2$

PTS:  2          REF:  061804geo     TOP:  Similarity     KEY:  basic

152  ANS:  4

$m = -\dfrac{1}{2} \quad -4 = 2(6) + b$

$m_\perp = 2 \quad\ \ -4 = 12 + b$

$\qquad\qquad\quad -16 = b$

PTS:  2          REF:  011602geo     TOP:  Parallel and Perpendicular Lines
KEY:  write equation of perpendicular line

153  ANS:  3

$\dfrac{\dfrac{4}{3}\pi\left(\dfrac{9.5}{2}\right)^3}{\dfrac{4}{3}\pi\left(\dfrac{2.5}{2}\right)^3} \approx 55$

PTS:  2          REF:  011614geo     TOP:  Volume       KEY:  spheres

154  ANS: 3
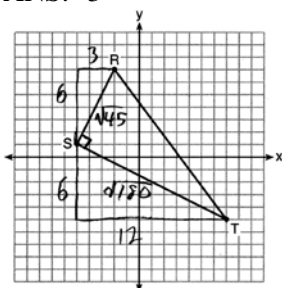


$\sqrt{45} = 3\sqrt{5}$    $a = \dfrac{1}{2}\left(3\sqrt{5}\right)\left(6\sqrt{5}\right) = \dfrac{1}{2}(18)(5) = 45$

$\sqrt{180} = 6\sqrt{5}$

PTS:  2            REF:  061622geo    TOP:  Polygons in the Coordinate Plane

155  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    TOP:  Equations of Circles
KEY:  completing the square

156  ANS: 1        PTS:  2        REF:  061604geo    TOP:  Identifying Transformations
KEY:  graphics

157  ANS: 3
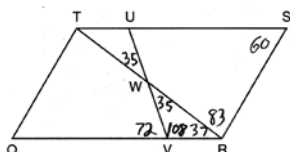


PTS:  2            REF:  011603geo    TOP:  Interior and Exterior Angles of Polygons

158  ANS: 4

$\dfrac{2}{4} = \dfrac{9 - x}{x}$

$36 - 4x = 2x$

$x = 6$

PTS:  2            REF:  061705geo    TOP:  Side Splitter Theorem

159  ANS: 4        PTS:  2        REF:  011816geo    TOP:  Chords, Secants and Tangents
KEY:  inscribed

160  ANS: 1        PTS:  2        REF:  011814geo    TOP:  Line Dilations

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

PTS:  2            REF:  061818geo    TOP:  Centroid, Orthocenter, Incenter and Circumcenter

162 ANS: 1

$$m = \frac{-A}{B} = \frac{-2}{-1} = 2$$

$$m_\perp = -\frac{1}{2}$$

PTS: 2　　　REF: 061509geo　　TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines

163 ANS: 3

$$\frac{AB}{BC} = \frac{DE}{EF}$$

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

$$90 = 90$$

PTS: 2　　　REF: 061515geo　　TOP: Similarity　　KEY: basic

164 ANS: 2

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

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

PTS: 2　　　REF: 061519geo　　TOP: Surface Area

165 ANS: 4　　　PTS: 2　　　REF: 061711geo　　TOP: Special Quadrilaterals

166 ANS: 2

$$\frac{4}{3}\pi \cdot 4^3 + 0.075 \approx 20$$

PTS: 2　　　REF: 011619geo　　TOP: Density

167 ANS: 3　　　PTS: 2　　　REF: 061816geo　　TOP: Rotations of Two-Dimensional Objects

168 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　　TOP: Line Dilations

# Geometry Multiple Choice Regents Exam Questions
## Answer Section

169 ANS: 4      PTS: 2      REF: 081822geo      TOP: Medians, Altitudes and Bisectors

170 ANS: 4      PTS: 2      REF: 081514geo      TOP: Compositions of Transformations
KEY: grids

171 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      TOP: Properties of Transformations
KEY: graphics

172 ANS: 2

$$C = \pi d \quad V = \pi \left( \frac{2.25}{\pi} \right)^2 \cdot 8 \approx 12.8916 \quad W = 12.8916 \cdot 752 \approx 9694$$

$$4.5 = \pi d$$

$$\frac{4.5}{\pi} = d$$

$$\frac{2.25}{\pi} = r$$

PTS: 2      REF: 081617geo      TOP: Density

173 ANS: 2      PTS: 2      REF: 081501geo      TOP: Special Quadrilaterals

174 ANS: 3      PTS: 2      REF: 081817geo      TOP: Mapping a Polygon onto Itself

175 ANS: 1

Distance and angle measure are preserved after a reflection and translation.

PTS: 2      REF: 081802geo      TOP: Properties of Transformations
KEY: basic

176 ANS: 2

$\overline{AB} = 10$ since $\triangle ABC$ is a 6-8-10 triangle.    $6^2 = 10x$

$$3.6 = x$$

PTS: 2      REF: 081820geo      TOP: Similarity      KEY: leg

177 ANS: 2      PTS: 2      REF: 081602geo      TOP: Identifying Transformations
KEY: basic

178 ANS: 1

$$\sin 32 = \frac{x}{6.2}$$

$$x \approx 3.3$$

PTS: 2      REF: 081719geo      TOP: Using Trigonometry to Find a Side

179 ANS: 1

The other statements are true only if $\overline{AD}\perp\overline{BC}$.

PTS: 2 REF: 081623geo TOP: Chords, Secants and Tangents
KEY: inscribed

180 ANS: 4 PTS: 2 REF: 081716geo TOP: Midsegments

181 ANS: 4 PTS: 2 REF: 081702geo TOP: Identifying Transformations
KEY: basic

182 ANS: 1

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

$1 = -4 + b$

$5 = b$

PTS: 2 REF: 081510geo TOP: Parallel and Perpendicular Lines
KEY: write equation of parallel line

183 ANS: 2
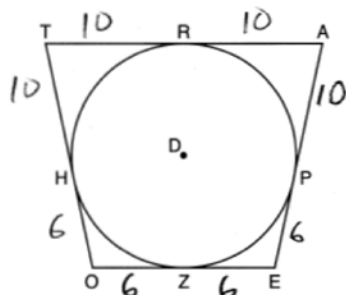


PTS: 2 REF: 081814geo TOP: Chords, Secants and Tangents
KEY: tangents drawn from common point, length

184 ANS: 4

$\sqrt{(32-8)^2 + (28--4)^2} = \sqrt{576 + 1024} = \sqrt{1600} = 40$

PTS: 2 REF: 081621geo TOP: Line Dilations

185 ANS: 4

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

PTS: 2 REF: 081722geo TOP: Mapping a Polygon onto Itself

186 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 TOP: Line Dilations

2

187 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      TOP: Side Splitter Theorem
188 ANS: 3      PTS: 2      REF: 081515geo      TOP: Inscribed Quadrilaterals
189 ANS: 4      PTS: 2      REF: 081801geo      TOP: Lines and Angles
190 ANS: 3      PTS: 2      REF: 081613geo
     TOP: Cross-Sections of Three-Dimensional Objects
191 ANS: 1      PTS: 2      REF: 081603geo      TOP: Rotations of Two-Dimensional Objects
192 ANS: 2

$$\frac{x}{x+3} = \frac{14}{21} \qquad 14 - 6 = 8$$

$$21x = 14x + 42$$

$$7x = 42$$

$$x = 6$$

PTS: 2      REF: 081812geo      TOP: Side Splitter Theorem
193 ANS: 1

Parallel chords intercept congruent arcs. $\frac{180 - 130}{2} = 25$

PTS: 2      REF: 081704geo      TOP: Chords, Secants and Tangents
KEY: parallel lines
194 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.
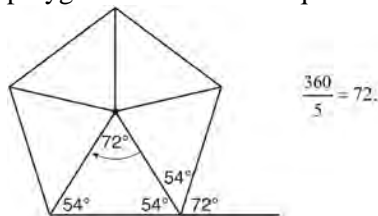


PTS: 2      REF: spr1402geo      TOP: Mapping a Polygon onto Itself
195 ANS: 1      PTS: 2      REF: 081507geo      TOP: Compositions of Transformations
KEY: identify

196  ANS: 2

$$\frac{\frac{512\pi}{3}}{\left(\frac{32}{2}\right)^2 \pi} \cdot 2\pi = \frac{4\pi}{3}$$

PTS: 2          REF: 081723geo     TOP: Sectors
197  ANS: 2          PTS: 2          REF: 081519geo     TOP: Similarity
KEY: basic
198  ANS: 2

$$V = \frac{1}{3}\left(\frac{60}{12}\right)^2\left(\frac{84}{12}\right) \approx 58$$

PTS: 2          REF: 081819geo     TOP: Volume        KEY: pyramids
199  ANS: 4          PTS: 2          REF: 081813geo     TOP: Parallelograms
200  ANS: 3          PTS: 2          REF: 081622geo     TOP: Triangle Proofs
KEY: statements
201  ANS: 2

$$s^2 + s^2 = 7^2$$
$$2s^2 = 49$$
$$s^2 = 24.5$$
$$s \approx 4.9$$

PTS: 2          REF: 081511geo     TOP: Pythagorean Theorem
202  ANS: 1

$$-8 + \frac{3}{5}(7 - -8) = -8 + 9 = 1 \quad 7 + \frac{3}{5}(-13 - 7) = 7 - 12 = -5$$

PTS: 2          REF: 081815geo     TOP: Directed Line Segments
203  ANS: 4

$$\frac{2}{6} = \frac{5}{15}$$

PTS: 2          REF: 081517geo     TOP: Side Splitter Theorem
204  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. $\tan x = \frac{69}{102}$

$$x \approx 34.1$$

PTS: 2          REF: fall1401geo     TOP: Using Trigonometry to Find an Angle
205  ANS: 2          PTS: 2          REF: 081513geo     TOP: Identifying Transformations
KEY: graphics

206  ANS:  4

$$2592276 = \frac{1}{3} \cdot s^2 \cdot 146.5$$

$$230 \approx s$$

PTS:  2          REF:  081521geo     TOP:  Volume        KEY:  pyramids

207  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     TOP:  Line Dilations

208  ANS:  1

$$\tan x = \frac{1}{12}$$

$$x \approx 4.76$$

PTS:  2          REF:  081715geo     TOP:  Using Trigonometry to Find an Angle

209  ANS:  3

$$\frac{60}{360} \cdot 6^2 \pi = 6\pi$$

PTS:  2          REF:  081518geo     TOP:  Sectors

210  ANS:  3

$$\frac{x + 72}{2} = 58$$

$$x + 72 = 116$$

$$x = 44$$

PTS:  2          REF:  061817geo     TOP:  Chords, Secants and Tangents
KEY:  intersecting chords, angle

211  ANS:  4
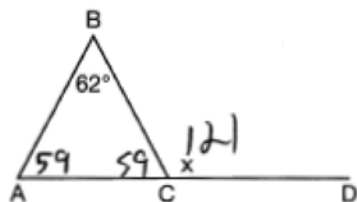


PTS:  2          REF:  081711geo     TOP:  Exterior Angle Theorem

212  ANS:  1

$$\cos x = \frac{12}{13}$$

$$x \approx 23$$

PTS:  2          REF:  081809ai     TOP:  Using Trigonometry to Find an Angle

213  ANS:  1          PTS:  2          REF:  081504geo     TOP:  Cofunctions

214 ANS: 3
$6 \cdot 3^2 = 54 \quad 12 \cdot 3 = 36$

   PTS: 2          REF: 081823geo    TOP: Dilations
215 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    TOP: Density
216 ANS: 3
$\frac{x}{10} = \frac{6}{4} \quad \overline{CD} = 15 - 4 = 11$

$x = 15$

   PTS: 2          REF: 081612geo    TOP: Similarity       KEY: basic
217 ANS: 4
$$V = \pi \left( \frac{6.7}{2} \right)^2 (4 \cdot 6.7) \approx 945$$

   PTS: 2          REF: 081620geo    TOP: Volume       KEY: cylinders
218 ANS: 3
$$x(x - 6) = 4^2$$
$$x^2 - 6x - 16 = 0$$
$$(x - 8)(x + 2) = 0$$
$$x = 8$$

   PTS: 2          REF: 081807geo    TOP: Similarity       KEY: altitude
219 ANS: 4
$x^2 + 4x + 4 + y^2 - 8y + 16 = -16 + 4 + 16$

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

   PTS: 2          REF: 081821geo    TOP: Equations of Circles
   KEY: completing the square
220 ANS: 3
$4\sqrt{(-1 - -3)^2 + (5 - 1)^2} = 4\sqrt{20}$

   PTS: 2          REF: 081703geo    TOP: Polygons in the Coordinate Plane

6

221  ANS:  4

$$\frac{6.6}{x} = \frac{4.2}{5.25}$$

$4.2x = 34.65$

$x = 8.25$

PTS:  2          REF:  081705geo     TOP:  Similarity       KEY:  basic

222  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     TOP:  Quadrilaterals in the Coordinate Plane
KEY:  general

223  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     TOP:  Polygons in the Coordinate Plane

224  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     TOP:  Parallel and Perpendicular Lines
KEY:  identify perpendicular lines

225  ANS:  1

$3^2 = 9$

PTS:  2          REF:  081520geo     TOP:  Dilations

226  ANS:  1          PTS:  2          REF:  081606geo     TOP:  Cofunctions

227  ANS:  2
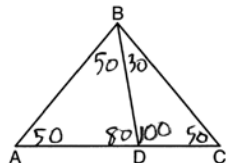


PTS:  2          REF:  081604geo     TOP:  Interior and Exterior Angles of Triangles

228  ANS:  2

$12^2 = 9 \cdot 16$

$144 = 144$

PTS:  2          REF:  081718geo     TOP:  Similarity       KEY:  leg

229 ANS: 4

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

PTS: 2　　　　REF: 081808geo　　TOP: Polygons in the Coordinate Plane

230 ANS: 2　　　　PTS: 2　　　　REF: 081701geo
TOP: Cross-Sections of Three-Dimensional Objects

231 ANS: 4

$\dfrac{1}{3.5} = \dfrac{x}{18-x}$

$3.5x = 18-x$

$4.5x = 18$

$x = 4$

PTS: 2　　　　REF: 081707geo　　TOP: Side Splitter Theorem

232 ANS: 4

The segment's midpoint is the origin and slope is $-2$. The slope of a perpendicular line is $\dfrac{1}{2}$.　　$y = \dfrac{1}{2}x + 0$

$2y = x$

$2y - x = 0$

PTS: 2　　　　REF: 081724geo　　TOP: Parallel and Perpendicular Lines
KEY: perpendicular bisector

233 ANS: 4　　　　PTS: 2　　　　REF: 081503geo　　TOP: Rotations of Two-Dimensional Objects

234 ANS: 2　　　　PTS: 2　　　　REF: 081601geo　　TOP: Lines and Angles

235 ANS: 2

$x^2 = 4 \cdot 10$

$x = \sqrt{40}$

$x = 2\sqrt{10}$

PTS: 2　　　　REF: 081610geo　　TOP: Similarity　　KEY: leg

236 ANS: 1

$\dfrac{4}{6} = \dfrac{3}{4.5} = \dfrac{2}{3}$

PTS: 2　　　　REF: 081523geo　　TOP: Dilations

237 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　　TOP: Directed Line Segments

238 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　　TOP: Mapping a Polygon onto Itself

239 ANS: 3
$$x^2 + 4x + 4 + y^2 - 6y + 9 = 12 + 4 + 9$$
$$(x + 2)^2 + (y - 3)^2 = 25$$

PTS: 2　　　　　REF: 081509geo　　TOP: Equations of Circles
KEY: completing the square

240 ANS: 3　　　　　PTS: 2　　　　　REF: 081502geo　　TOP: Identifying Transformations
KEY: basic

241 ANS: 2
$$2x + 7 + 4x - 7 = 90$$
$$6x = 90$$
$$x = 15$$

PTS: 2　　　　　REF: 081824geo　　TOP: Cofunctions

242 ANS: 4
$$40 - x + 3x = 90$$
$$2x = 50$$
$$x = 25$$

PTS: 2　　　　　REF: 081721geo　　TOP: Cofunctions

243 ANS: 1
$$x^2 - 4x + 4 + y^2 + 8y + 16 = -11 + 4 + 16$$
$$(x - 2)^2 + (y + 4)^2 = 9$$

PTS: 2　　　　　REF: 081616geo　　TOP: Equations of Circles
KEY: completing the square

244 ANS: 3
In (1) and (2), *ABCD* could be a rectangle with non-congruent sides. (4) is not possible

PTS: 2　　　　　REF: 081714geo　　TOP: Special Quadrilaterals

245 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　　TOP: Density

246 ANS: 3

$v = \pi r^2 h$  (1) $6^2 \cdot 10 = 360$

$150\pi = \pi r^2 h$  (2) $10^2 \cdot 6 = 600$

$150 = r^2 h$  (3) $5^2 \cdot 6 = 150$

(4) $3^2 \cdot 10 = 900$

PTS: 2        REF: 081713geo    TOP: Rotations of Two-Dimensional Objects

247 ANS: 3

$\sqrt{20^2 - 10^2} \approx 17.3$

PTS: 2        REF: 081608geo    TOP: Pythagorean Theorem
KEY: without graphics

248 ANS: 4
The line $y = 3x - 1$ passes through the center of dilation, so the dilated line is not distinct.

PTS: 2        REF: 081524geo    TOP: Line Dilations

249 ANS: 4
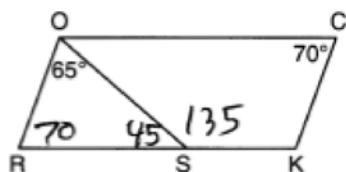


PTS: 2        REF: 081708geo    TOP: Interior and Exterior Angles of Polygons

250 ANS: 1        PTS: 2        REF: 081605geo    TOP: Rotations
KEY: grids

251 ANS: 3
(3) Could be a trapezoid.

PTS: 2        REF: 081607geo    TOP: Parallelograms

252 ANS: 1

$m_{\overline{TA}} = -1$   $y = mx + b$

$m_{\overline{EM}} = 1$   $1 = 1(2) + b$

$-1 = b$

PTS: 2        REF: 081614geo    TOP: Quadrilaterals in the Coordinate Plane
KEY: general

253 ANS: 4

$\sin 16.5 = \dfrac{8}{x}$

$x \approx 28.2$

PTS: 2        REF: 081806ai    TOP: Using Trigonometry to Find a Side

254 ANS: 4        PTS: 2        REF: 081803geo    TOP: Rotations of Two-Dimensional Objects

10

255 ANS: 1 PTS: 2 REF: 081804geo TOP: Compositions of Transformations
KEY: grids

256 ANS: 3

$$\theta = \frac{s}{r} = \frac{2\pi}{10} = \frac{\pi}{5}$$

PTS: 2 REF: fall1404geo TOP: Arc Length KEY: angle

257 ANS: 4 PTS: 2 REF: 081810geo TOP: Triangle Proofs
KEY: statements

258 ANS: 4

$$-5 + \frac{3}{5}(5 - -5) \quad -4 + \frac{3}{5}(1 - -4)$$

$$-5 + \frac{3}{5}(10) \qquad -4 + \frac{3}{5}(5)$$

$$-5 + 6 \qquad\qquad -4 + 3$$

$$1 \qquad\qquad\qquad -1$$

PTS: 2 REF: spr1401geo TOP: Directed Line Segments

259 ANS: 2 PTS: 2 REF: 081619geo TOP: Sectors

260 ANS: 1
$$180 - (68 \cdot 2)$$

PTS: 2 REF: 081624geo TOP: Interior and Exterior Angles of Polygons

261 ANS: 3
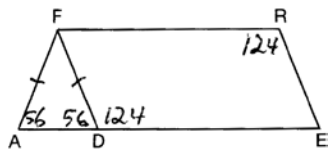


PTS: 2 REF: 081508geo TOP: Interior and Exterior Angles of Polygons

262 ANS: 2
$$x^2 = 3 \cdot 18$$

$$x = \sqrt{3 \cdot 3 \cdot 6}$$

$$x = 3\sqrt{6}$$

PTS: 2 REF: 081712geo TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, length

263 ANS: 4 PTS: 2 REF: 081609geo TOP: Compositions of Transformations
KEY: grids

264 ANS: 4
$$x = -6 + \frac{1}{6}(6 - -6) = -6 + 2 = -4 \quad y = -2 + \frac{1}{6}(7 - -2) = -2 + \frac{9}{6} = -\frac{1}{2}$$

PTS: 2 REF: 081618geo TOP: Directed Line Segments

265  ANS:  4          PTS:  2          REF:  081506geo    TOP:  Dilations

266  ANS:  2

$$\frac{30}{360}(5)^2(\pi) \approx 6.5$$

PTS:  2          REF:  081818geo    TOP:  Sectors

267  ANS:  3          PTS:  2          REF:  081805geo

TOP:  Cross-Sections of Three-Dimensional Objects

268  ANS:  1          PTS:  2          REF:  081505geo    TOP:  Mapping a Polygon onto Itself

269  ANS:  4          PTS:  2          REF:  081611geo    TOP:  Lines and Angles

270  ANS:  4

$$\frac{36}{45} \neq \frac{15}{18}$$

$$\frac{4}{5} \neq \frac{5}{6}$$

PTS:  2          REF:  081709geo    STA:  G.G.44          TOP:  Similarity Proofs

271  ANS:  3

$$5 \cdot \frac{10}{4} = \frac{50}{4} = 12.5$$

PTS:  2          REF:  081512geo    TOP:  Chords, Secants and Tangents
KEY:  common tangents

# Geometry 2 Point Regents Exam Questions
## Answer Section

272 ANS:

$M = 180 - (47 + 57) = 76$  Rotations do not change angle measurements.

PTS: 2        REF: 081629geo     TOP: Properties of Transformations

273 ANS:

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

PTS: 2        REF: 061827geo     TOP: Compositions of Transformations
KEY: identify

274 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     TOP: Density

275 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     TOP: Triangle Congruency

276 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     TOP: Quadrilateral Proofs

277 ANS:

$\dfrac{152 - 56}{2} = 48$

PTS: 2        REF: 011728geo     TOP: Chords, Secants and Tangents
KEY: secant and tangent drawn from common point, angle

278 ANS:

$73 + R = 90$  Equal cofunctions are complementary.

$\quad R = 17$

PTS: 2        REF: 061628geo     TOP: Cofunctions

279 ANS:

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

$\quad W \approx 71$

PTS: 2        REF: 011831geo     TOP: Using Trigonometry to Find an Angle

280 ANS:
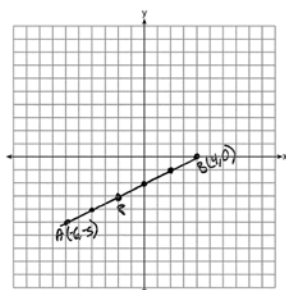


$-6 + \dfrac{2}{5}(4 - -6)$   $-5 + \dfrac{2}{5}(0 - -5)$   $(-2, -3)$

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

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

$\qquad\quad -2$   $\qquad\qquad -3$

PTS: 2          REF: 061527geo     TOP: Directed Line Segments

281 ANS:
$180 - 2(25) = 130$

PTS: 2          REF: 011730geo     TOP: Isosceles Triangle Theorem

282 ANS:
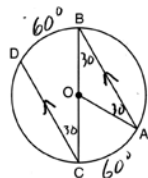


$180 - 2(30) = 120$

PTS: 2          REF: 011626geo     TOP: Chords, Secants and Tangents
KEY: parallel lines

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

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

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

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

PTS: 2          REF: 061629geo     TOP: Arc Length     KEY: arc length

284 ANS:
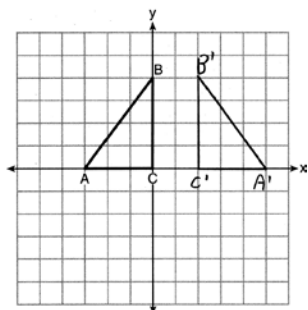


PTS: 2        REF: 011625geo    TOP: Reflections    KEY: grids

285 ANS:
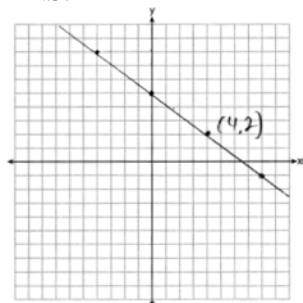


The line is on the center of dilation, so the line does not change.  $p: 3x + 4y = 20$

PTS: 2        REF: 061731geo    TOP: Line Dilations

286 ANS:
The transformation is a rotation, which is a rigid motion.

PTS: 2        REF: 081530geo    TOP: Triangle Congruency

287 ANS:
$R_{180°}$ about $\left(-\dfrac{1}{2}, \dfrac{1}{2}\right)$

PTS: 2        REF: 081727geo    TOP: Compositions of Transformations
KEY: identify

288 ANS:
The four small triangles are 8-15-17 triangles.  $4 \times 17 = 68$

PTS: 2        REF: 081726geo    TOP: Special Quadrilaterals

289 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   TOP: Isosceles Triangle Theorem

290 ANS:
Yes.  The bases of the cylinders have the same area and the cylinders have the same height.

PTS: 2        REF: 081725geo    TOP: Volume

3

291 ANS:

$$\sin x = \frac{4.5}{11.75}$$

$$x \approx 23$$

PTS: 2 REF: 061528geo TOP: Using Trigonometry to Find an Angle

292 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 TOP: Volume KEY: spheres

293 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 $\frac{ZU}{ZX}$ 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 TOP: Compositions of Transformations
KEY: grids

294 ANS:
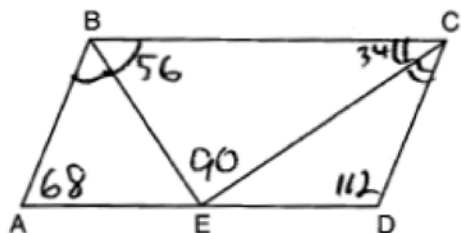


PTS: 2 REF: 081826geo TOP: Parallelograms

295 ANS:
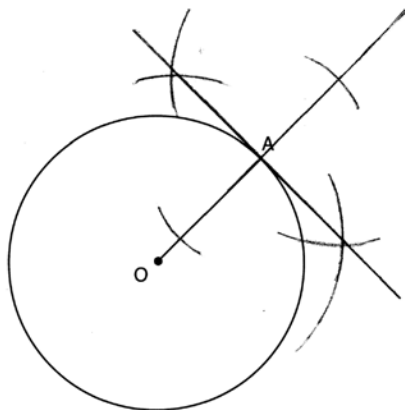


PTS: 2 REF: 061631geo TOP: Constructions
KEY: parallel and perpendicular lines

296 ANS:
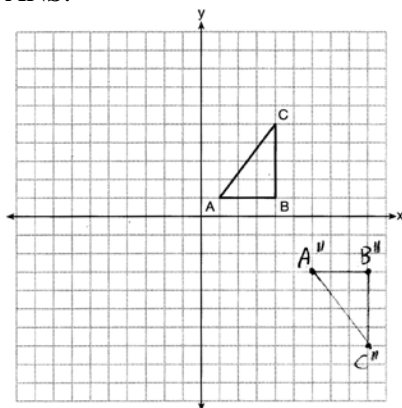


PTS: 2     REF: 081626geo     TOP: Compositions of Transformations
KEY: grids

297 ANS:

$$\frac{3}{8} \cdot 56 = 21$$

PTS: 2     REF: 081625geo     TOP: Chords, Secants and Tangents
KEY: common tangents

298 ANS:

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

$$x \approx 68$$

PTS: 2     REF: 061630geo     TOP: Using Trigonometry to Find an Angle

299 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     TOP: Triangle Congruency

300 ANS:

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

PTS: 2     REF: 061726geo     TOP: Sectors

301 ANS:



$$\frac{134 + 102}{2} = 118$$
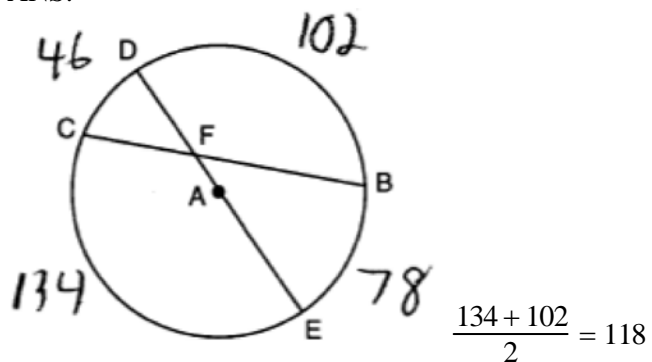
PTS: 2 REF: 081827geo TOP: Chords, Secants and Tangents
KEY: intersecting chords, angle

302 ANS:
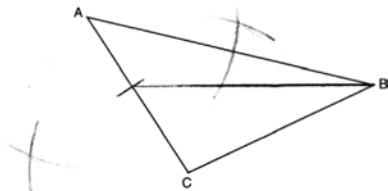


PTS: 2 REF: 061829geo TOP: Constructions
KEY: line bisector

303 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 TOP: Cofunctions

304 ANS:
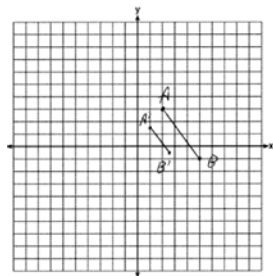


$$\sqrt{(2.5 - 1)^2 + (-.5 - 1.5)^2} = \sqrt{2.25 + 4} = 2.5$$

PTS: 2 REF: 081729geo TOP: Line Dilations

305  ANS:

$$\frac{120}{230} = \frac{x}{315}$$

$$x = 164$$

PTS: 2    REF: 081527geo    TOP: Similarity    KEY: basic

306  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    TOP: Similarity Proofs

307  ANS:
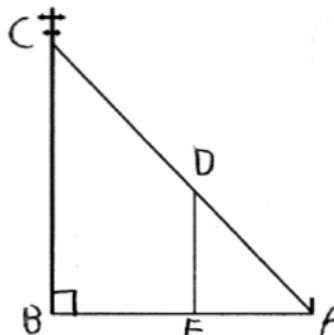


$\triangle ABC \sim \triangle AED$ by AA. $\angle DAE \cong \angle CAB$ because they are the same $\angle$. $\angle DEA \cong \angle CBA$ because they are both right $\angle$s.

PTS: 2    REF: 081829geo    TOP: Similarity    KEY: basic

308  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    TOP: Interior and Exterior Angles of Polygons

309  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    TOP: Sectors

310  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    TOP: Volume    KEY: spheres

311 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  TOP: Volume

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

PTS: 2  REF: 011726geo  TOP: Compositions of Transformations
KEY: identify

313 ANS:
$\dfrac{360}{6} = 60$

PTS: 2  REF: 081627geo  TOP: Mapping a Polygon onto Itself

314 ANS:
$\sin 70 = \dfrac{30}{L}$

   $L \approx 32$

PTS: 2  REF: 011629geo  TOP: Using Trigonometry to Find a Side
KEY: graphics

315 ANS:
rotation 180º about the origin, translation 2 units down;  rotation 180º 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  TOP: Compositions of Transformations
KEY: identify

316 ANS:



PTS: 2  REF: 061725geo  TOP: Constructions
KEY: parallel and perpendicular lines

317 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  TOP: Compositions of Transformations
KEY: identify

318 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 $\frac{5}{3}$. 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    TOP: Similarity Proofs

319 ANS:
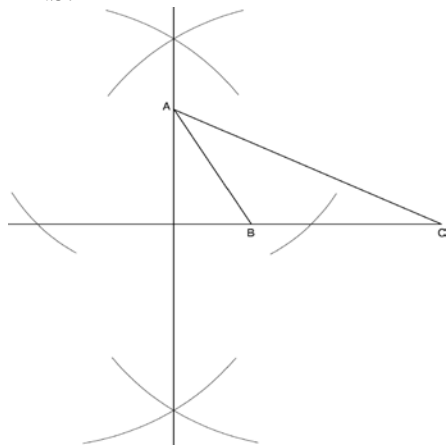


PTS: 2      REF: fall1409geo    TOP: Constructions
KEY: parallel and perpendicular lines

320 ANS:

Yes, because 28° and 62° angles are complementary. The sine of an angle equals the cosine of its complement.

PTS: 2      REF: 011727geo    TOP: Cofunctions

321 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    TOP: Triangle Congruency

322 ANS:

$\frac{137.8}{6^3} \approx 0.638$ Ash

PTS: 2      REF: 081525geo    TOP: Density

323 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    TOP: Triangle Congruency

324 ANS:
Reflections are rigid motions that preserve distance.

PTS: 2          REF: 061530geo          TOP: Triangle Congruency

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

PTS: 2          REF: 011827geo          TOP: Cofunctions

326 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          TOP: Sectors

327 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          TOP: Circles in the Coordinate Plane

328 ANS:
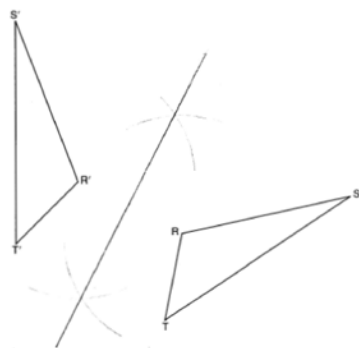


PTS: 2          REF: 011725geo          TOP: Constructions
KEY: line bisector

329  ANS:
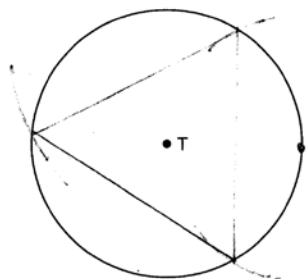


PTS:  2          REF:  081526geo     TOP:  Constructions

330  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     TOP:  Cofunctions

331  ANS:

$\dfrac{6}{14} = \dfrac{9}{21}$  SAS

$126 = 126$

PTS:  2          REF:  081529geo     TOP:  Similarity      KEY:  basic

332  ANS:

No,  The line $4x + 3y = 24$ passes through the center of dilation, so the dilated line is not distinct.

$4x + 3y = 24$

$3y = -4x + 24$

$y = -\dfrac{4}{3}x + 8$

PTS:  2          REF:  081830geo     TOP:  Line Dilations

333  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     TOP:  Triangle Congruency

334  ANS:

Yes, as translations do not change angle measurements.

PTS:  2          REF:  061825geo     TOP:  Properties of Transformations

KEY:  basic

335 ANS:

$$\sin 75 = \frac{15}{x}$$

$$x = \frac{15}{\sin 75}$$

$$x \approx 15.5$$

PTS: 2      REF: 081631geo      TOP: Using Trigonometry to Find a Side
KEY: graphics

336 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      TOP: Quadrilateral Proofs

337 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      TOP: Directed Line Segments

338 ANS:
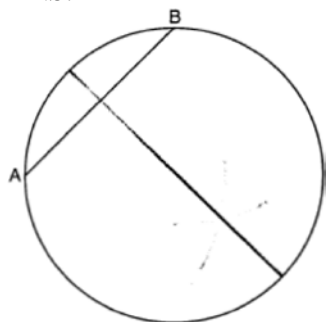


PTS: 2      REF: 081825geo      TOP: Constructions
KEY: parallel and perpendicular lines

339 ANS:

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

$$39.375 = 39.375$$

PTS: 2      REF: 061627geo      TOP: Side Splitter Theorem

340  ANS:
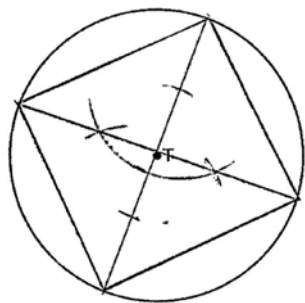


PTS: 2          REF: 061525geo    TOP: Constructions

341  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    TOP: Density

342  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   TOP: Density

343  ANS:

$10 \cdot 6 = 15x$

$\quad x = 4$

PTS: 2          REF: 061828geo    TOP: Chords, Secants and Tangents
KEY: secants drawn from common point, length

344  ANS:

$\ell: y = 3x - 4$

$m: y = 3x - 8$

PTS: 2          REF: 011631geo    TOP: Line Dilations

345  ANS:

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

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

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

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

PTS: 2          REF: 061626geo    TOP: Directed Line Segments

13

346 ANS:

$x^2 - 6x + 9 + y^2 + 8y + 16 = 56 + 9 + 16$   (3, −4); $r = 9$

$(x - 3)^2 + (y + 4)^2 = 81$

PTS: 2          REF: 081731geo     TOP: Equations of Circles
KEY: completing the square

347 ANS:
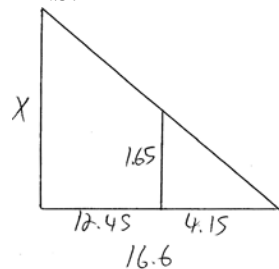


$\dfrac{1.65}{4.15} = \dfrac{x}{16.6}$

$4.15x = 27.39$

$x = 6.6$

PTS: 2          REF: 061531geo     TOP: Similarity      KEY: basic

348 ANS:
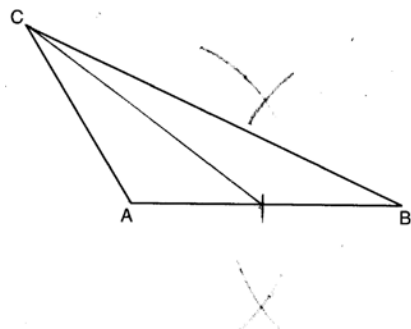


PTS: 2          REF: 081628geo     TOP: Constructions
KEY: line bisector

349 ANS:
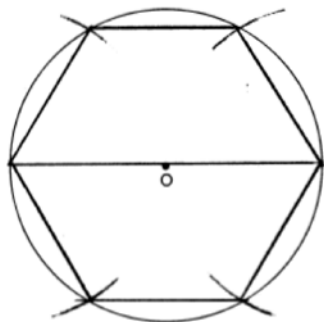


PTS: 2          REF: 081728geo     TOP: Constructions

14

350 ANS:
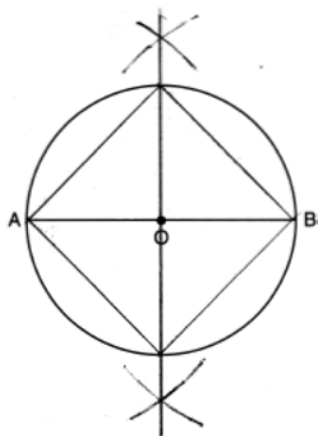


PTS: 2 REF: 011826geo TOP: Constructions

351 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 TOP: Volume

352 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 TOP: Similarity KEY: altitude

353 ANS:

$$2\left(\frac{36}{12} \times \frac{36}{12} \times \frac{4}{12}\right) \times 3.25 = 19.50$$

PTS: 2 REF: 081831geo TOP: Volume KEY: prisms

354 ANS:

$T_{6,0} \circ r_{x\text{-axis}}$

PTS: 2 REF: 061625geo TOP: Compositions of Transformations
KEY: identify

355 ANS:
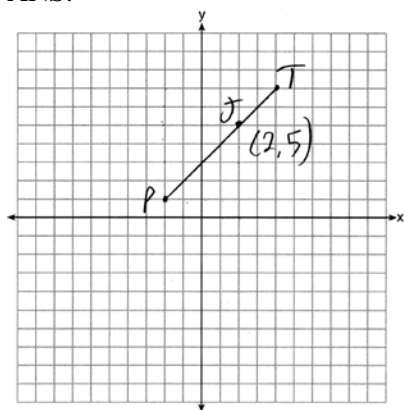


$x = \dfrac{2}{3}(4 - -2) = 4$  $-2 + 4 = 2$  $J(2,5)$

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

PTS: 2  REF: 011627geo  TOP: Directed Line Segments

356 ANS:
$A(-2,1) \to (-3,-1) \to (-6,-2) \to (-5,0)$, $B(0,5) \to (-1,3) \to (-2,6) \to (-1,8)$,
$C(4,-1) \to (3,-3) \to (6,-6) \to (7,-4)$

PTS: 2  REF: 061826geo  TOP: Dilations

357 ANS:
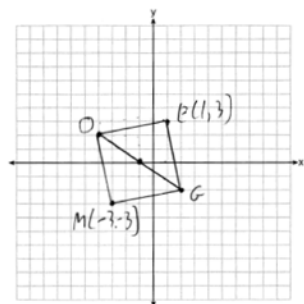


PTS: 2  REF: 011731geo  TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

# Geometry 4 Point Regents Exam Questions
## Answer Section

358 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        TOP: Density

359 ANS:

$$\frac{4\pi}{3}(2^3 - 1.5^3) \approx 19.4 \quad 19.4 \cdot 1.308 \cdot 8 \approx 203$$

PTS: 4        REF: 081834geo        TOP: Density

360 ANS:
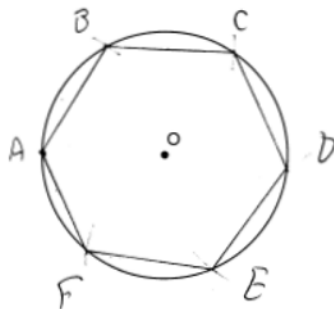


Right triangle because $\angle CBF$ is inscribed in a semi-circle.

PTS: 4        REF: 011733geo        TOP: Constructions

361 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 $\ell$ and a reflection preserves distance.

PTS: 4        REF: 081534geo        TOP: Triangle Congruency

362 ANS:
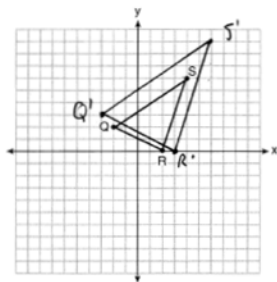


A dilation preserves slope, so the slopes of $\overline{QR}$ and $\overline{Q'R'}$ are equal. Because the slopes are equal, $Q'R' \parallel QR$.

PTS: 4        REF: 011732geo        TOP: Dilations        KEY: grids

363 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    TOP: Lines and Angles

364 ANS:
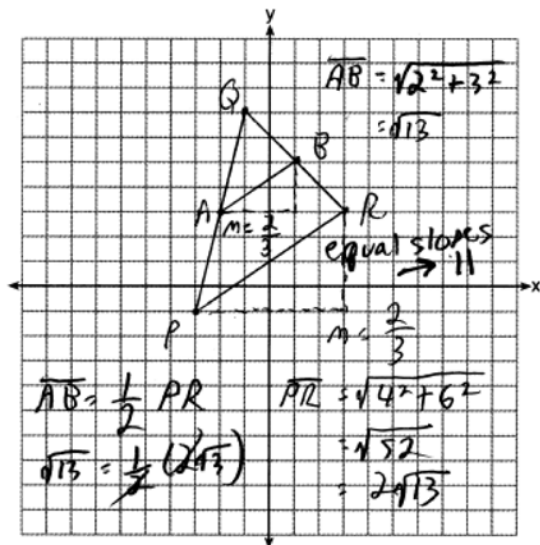


PTS: 4    REF: 081732geo    TOP: Triangles in the Coordinate Plane

365 ANS:
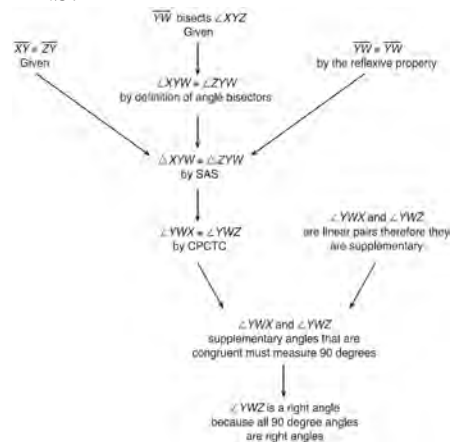


$\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$ (Given). $\triangle XYZ$ is isosceles (Definition of isosceles triangle). $\overline{YW}$ is an altitude of $\triangle XYZ$ (The angle bisector of the vertex of an isosceles triangle is also the altitude of that triangle). $\overline{YW} \perp \overline{XZ}$ (Definition of altitude). $\angle YWZ$ is a right angle (Definition of perpendicular lines).

PTS: 4    REF: spr1411geo    TOP: Triangle Proofs

366 ANS:

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

PTS: 4    REF: 061632geo    TOP: Volume    KEY: cylinders

367  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     TOP: Density

368  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     TOP: Triangle Congruency

369  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     TOP: Quadrilateral Proofs

370  ANS:

$$x^2 + x^2 = 58^2 \qquad A = (\sqrt{1682} + 8)^2 \approx 2402.2$$
$$2x^2 = 3364$$
$$x = \sqrt{1682}$$

PTS: 4          REF: 081734geo     TOP: Area of Polygons

371  ANS:

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

PTS: 4          REF: 061833geo     TOP: Using Trigonometry to Find a Side
KEY: advanced

372  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     TOP: Pythagorean Theorem
KEY: without graphics

3

373  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    TOP: Triangle Proofs
KEY: proof

374  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    TOP: Using Trigonometry to Find an Angle

375  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    TOP: Similarity Proofs

376  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    TOP: Triangle Proofs

377  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    TOP: Triangle Proofs
KEY: proof

378  ANS:



$SAS \cong SAS$
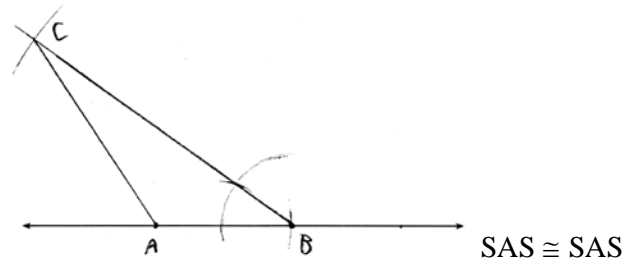
PTS: 4          REF: 011634geo    TOP: Constructions
KEY: congruent and similar figures

379 ANS:

$$\frac{\left(\dfrac{180-20}{2}\right)}{360} \times \pi(6)^2 = \frac{80}{360} \times 36\pi = 8\pi$$

PTS: 4 REF: spr1410geo TOP: Sectors

380 ANS:

Parallelogram *ABCD*, $\overline{EFG}$, and diagonal $\overline{DFB}$ (given); $\angle DFE \cong \angle BFG$ (vertical angles); $\overline{AD} \parallel \overline{CB}$ (opposite sides of a parallelogram are parallel); $\angle EDF \cong \angle GBF$ (alternate interior angles are congruent); $\triangle DEF \sim \triangle BGF$ (AA).

PTS: 4 REF: 061633geo TOP: Similarity Proofs

381 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 TOP: Using Trigonometry to Find a Side

382 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 TOP: Volume KEY: compositions

383 ANS:

$$20000 \, g\left(\frac{1 \, \text{ft}^3}{7.48 \, g}\right) = 2673.8 \, \text{ft}^3 \quad 2673.8 = \pi r^2(34.5) \quad 9.9 + 1 = 10.9$$
$$r \approx 4.967$$
$$d \approx 9.9$$

PTS: 4 REF: 061734geo TOP: Volume KEY: cylinders

384 ANS:
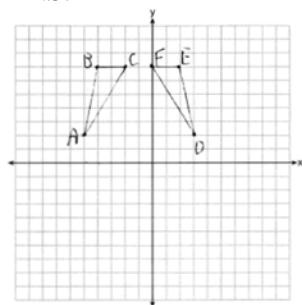


$r_{x=-1}$ Reflections are rigid motions that preserve distance, so $\triangle ABC \cong \triangle DEF$.

PTS: 4 REF: 061732geo TOP: Identifying Transformations
KEY: graphics

385  ANS:

$$\tan 7 = \frac{125}{x} \quad \tan 16 = \frac{125}{y} \quad 1018 - 436 \approx 582$$

$$x \approx 1018 \qquad y \approx 436$$

PTS: 4        REF: 081532geo    TOP: Using Trigonometry to Find a Side
KEY: advanced

386  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.  $\tan 6 = \frac{112 - 1.5}{x} \quad \tan(49 + 6) = \frac{112 - 1.5}{y} \quad \frac{1051.3 - 77.4}{5} \approx 195$

$$x \approx 1051.3 \qquad\qquad y \approx 77.4$$

PTS: 4        REF: spr1409geo    TOP: Using Trigonometry to Find a Side
KEY: advanced

387  ANS:

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

$$.9604 = y$$

PTS: 4        REF: 061534geo    TOP: Similarity    KEY: leg

388  ANS:

A dilation of 3 centered at *A*.  A dilation preserves angle measure, so the triangles are similar.

PTS: 4        REF: 011832geo    TOP: Dilations

389  ANS:
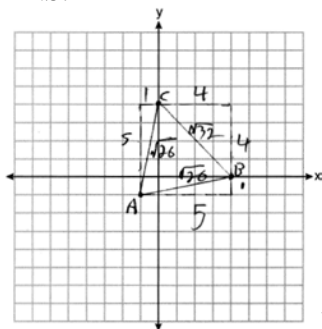


Because $\overline{AB} \cong \overline{AC}$, $\triangle ABC$ has two congruent sides and is isosceles.  Because $\overline{AB} \cong \overline{BC}$ is not true, $\triangle ABC$ has sides that are not congruent and $\triangle ABC$ is not equilateral.

PTS: 4        REF: 061832geo    TOP: Triangles in the Coordinate Plane

390 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    TOP: Circle Proofs

391 ANS:

$M\left(\dfrac{4+0}{2}, \dfrac{6-1}{2}\right) = M\left(2, \dfrac{5}{2}\right)$  $m = \dfrac{6--1}{4-0} = \dfrac{7}{4}$  $m_\perp = -\dfrac{4}{7}$  $y - 2.5 = -\dfrac{4}{7}(x-2)$  The diagonals, $\overline{MT}$ and $\overline{AH}$, of rhombus $MATH$ are perpendicular bisectors of each other.

PTS: 4        REF: fall1411geo    TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

392 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    TOP: Triangle Proofs

393 ANS:

$\tan 36 = \dfrac{x}{10}$   $\cos 36 = \dfrac{10}{y}$   $12.3607 \times 3 \approx 37$

$x \approx 7.3$   $y \approx 12.3607$

PTS: 4        REF: 081833geo    TOP: Using Trigonometry to Find a Side

394 ANS:

The slopes of perpendicular line are opposite reciprocals.  Since the lines are perpendicular, they form right angles
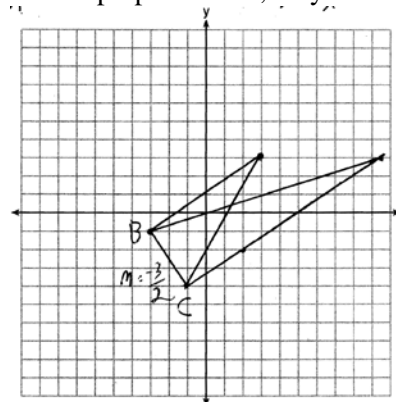


and a right triangle. $m_{\overline{BC}} = -\dfrac{3}{2}$   $-1 = \dfrac{2}{3}(-3)+b$   or   $-4 = \dfrac{2}{3}(-1)+b$

$$m_{\perp} = \dfrac{2}{3}$$

$-1 = -2+b$

$1 = b$

$3 = \dfrac{2}{3}x+1$

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

$3 = x$

$\dfrac{-12}{3} = \dfrac{-2}{3}+b$

$-\dfrac{10}{3} = b$

$3 = \dfrac{2}{3}x - \dfrac{10}{3}$

$9 = 2x - 10$

$19 = 2x$

$9.5 = x$

PTS:  4          REF:  081533geo     TOP:  Triangles in the Coordinate Plane

395 ANS:

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

$31.416 = 2\pi r$

$5 \approx r$

PTS:  4          REF:  011734geo     TOP:  Volume          KEY:  cones

396 ANS:
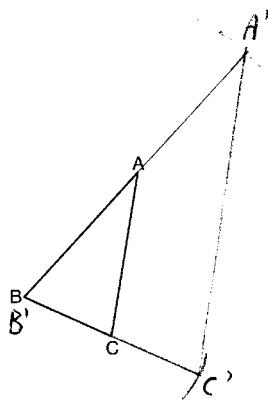


The length of $\overline{A'C'}$ is twice $\overline{AC}$.

PTS: 4    REF: 081632geo    TOP: Constructions
KEY: congruent and similar figures

397 ANS:

$ABC$ – point of reflection $\rightarrow (-y,x)$ + point of reflection    $\triangle DEF \cong \triangle A'B'C'$ because $\triangle DEF$ is a reflection of

$A(2,-3) - (2,-3) = (0,0) \rightarrow (0,0) + (2,-3) = A'(2,-3)$

$B(6,-8) - (2,-3) = (4,-5) \rightarrow (5,4) + (2,-3) = B'(7,1)$

$C(2,-9) - (2,-3) = (0,-6) \rightarrow (6,0) + (2,-3) = C'(8,-3)$

$\triangle A'B'C'$ and reflections preserve distance.

PTS: 4    REF: 081633geo    TOP: Rotations    KEY: grids

398 ANS:
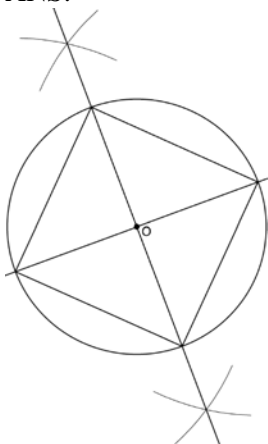


Since the square is inscribed, each vertex of the square is on the circle and the diagonals of the square are diameters of the circle. Therefore, each angle of the square is an inscribed angle in the circle that intercepts the circle at the endpoints of the diameters. Each angle of the square, which 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    TOP: Constructions

# Geometry 6 Point Regents Exam Questions
## Answer Section

399  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      TOP:  Volume      KEY:  compositions

400  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      TOP:  Circle Proofs

401  ANS:

Parallelogram $ABCD$, $\overline{BF} \perp \overline{AFD}$, and $\overline{DE} \perp \overline{BEC}$ (given);  $\overline{BC} \parallel \overline{AD}$ (opposite sides of a $\square$ are $\parallel$);  $\overline{BE} \parallel \overline{FD}$ (parts of $\parallel$ lines are $\parallel$);  $\overline{BF} \parallel \overline{DE}$ (two lines $\perp$ to the same line are $\parallel$);  $BEDF$ is $\square$ (a quadrilateral with both pairs of opposite sides $\parallel$ is a $\square$);  $\angle DEB$ is a right $\angle$ ($\perp$ lines form right $\angle$s);  $BEDF$ is a rectangle (a $\square$ with one right $\angle$ is a rectangle).

PTS:  6       REF:  061835geo      TOP:  Quadrilateral Proofs

402  ANS:

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

    $x \approx 9.115$

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

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

PTS:  6       REF:  061535geo      TOP:  Density

403 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        TOP: Quadrilateral Proofs

404 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        TOP: Density

405 ANS:

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* (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). $\overline{AD} \parallel \overline{BC}$ (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        TOP: Quadrilateral Proofs

406 ANS:
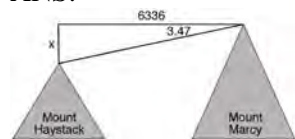


$$\tan 3.47 = \frac{M}{6336}$$

$$M \approx 384$$

$$4960 + 384 = 5344$$
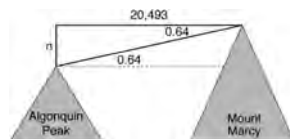
$$\tan 0.64 = \frac{A}{20,493}$$

$$A \approx 229$$

$$5344 - 229 = 5115$$

PTS: 6        REF: fall1413geo        TOP: Using Trigonometry to Find a Side
KEY: advanced

2

407 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     TOP: Circle Proofs

408 ANS:

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

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

$m_{\overline{QR}} = \frac{1-8}{4-3} = -7$  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      TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

409 ANS:

$V = \frac{1}{3}\,\pi\left(\frac{8.3}{2}\right)^2 (10.2) + \frac{1}{2} \cdot \frac{4}{3}\,\pi\left(\frac{8.3}{2}\right)^3 \approx 183.961 + 149.693 \approx 333.65\ \text{cm}^3$  $333.65 \times 50 = 16682.7\ \text{cm}^3$

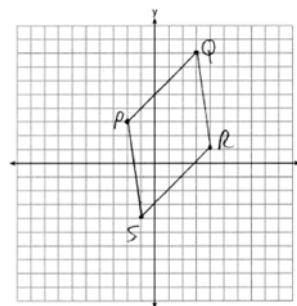$16682.7 \times 0.697 = 11627.8\ \text{g}$  $11.6278 \times 3.83 = \$44.53$

PTS: 6        REF: 081636geo     TOP: Density

410 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     TOP: Quadrilateral Proofs

411 ANS:

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

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

PTS: 6 REF: 061636geo TOP: Volume KEY: cones

412 ANS:

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

$x \approx 23325.3$ $\quad y \approx 4883$

PTS: 6 REF: 061736geo TOP: Using Trigonometry to Find a Side
KEY: advanced

413 ANS:

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

$\quad h = x\tan 52.8$ $\qquad x\tan 52.8 - x\tan 34.9 = 8\tan 34.9$

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

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

$\quad h = (x+8)\tan 34.9$ $\qquad\qquad x = \dfrac{8\tan 34.9}{\tan 52.8 - \tan 34.9}$

$\qquad\qquad\qquad\qquad x \approx 9$

PTS: 6 REF: 011636geo TOP: Using Trigonometry to Find a Side
KEY: advanced

414 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). $AE = \dfrac{1}{2}AR$, $WD = \dfrac{1}{2}DN$, 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). $RE = \dfrac{1}{2}AR$, $NW = \dfrac{1}{2}DN$, 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 TOP: Quadrilateral Proofs

4

415 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.
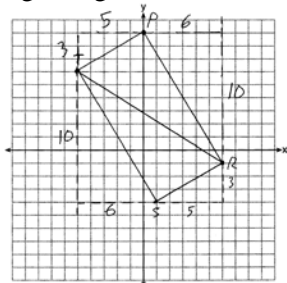


PTS: 6          REF: 061536geo     TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

416 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     TOP: Triangle Congruency

417  ANS:
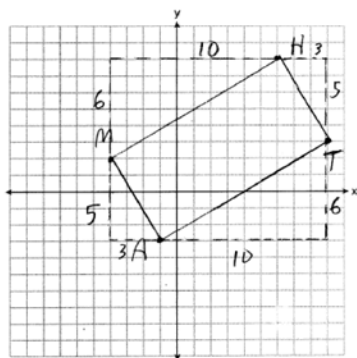


$$m\overline{MH} = \frac{6}{10} = \frac{3}{5}, m\overline{AT} = \frac{6}{10} = \frac{3}{5}, m\overline{MA} = -\frac{5}{3}, m\overline{HT} = -\frac{5}{3}; \ \overline{MH} \parallel \overline{AT} \text{ and } \overline{MA} \parallel \overline{HT}.$$

*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     TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

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

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

PTS: 6          REF: 011736geo     TOP: Density

419  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);

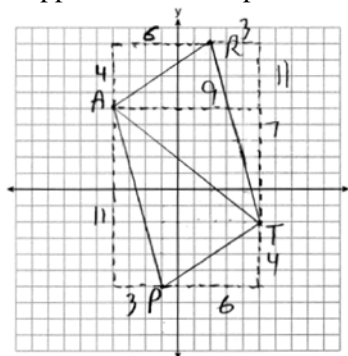$\qquad\qquad \angle EDA \cong \angle ECB$

$\triangle AEB$ is an isosceles triangle (an isosceles triangle has two congruent sides).

PTS: 6          REF: 081735geo     TOP: Quadrilateral Proofs

420 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     TOP: Quadrilaterals in the Coordinate Plane
KEY: grids