

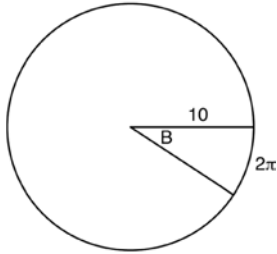
JMAP REGENTS AT RANDOM

NY Geometry CCSS Regents Exam Questions
from Spring 2014 to August 2017

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Geometry Common Core State Standards Regents at Random

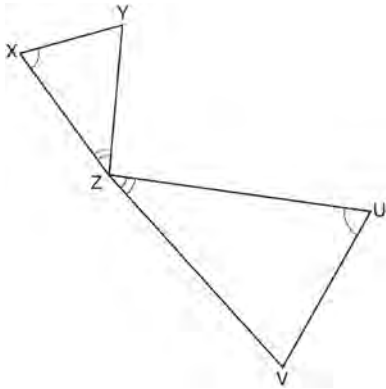
- 1 In the diagram below, the circle shown has radius 10. Angle B intercepts an arc with a length of 2π .



What is the measure of angle B , in radians?

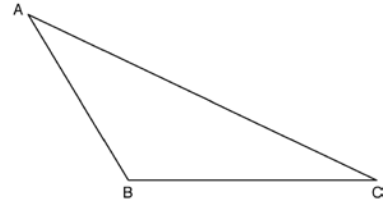
- 1) $10 + 2\pi$
- 2) 20π
- 3) $\frac{\pi}{5}$
- 4) $\frac{5}{\pi}$

- 2 In the diagram below, triangles XYZ and UVZ are drawn such that $\angle X \cong \angle U$ and $\angle XZY \cong \angle UZV$.

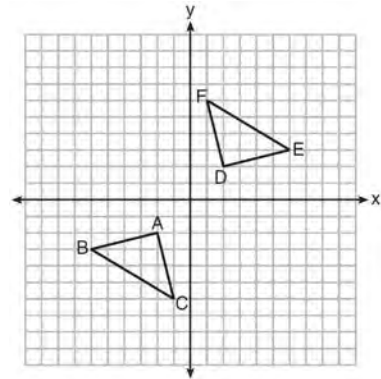


Describe a sequence of similarity transformations that shows $\triangle XYZ$ is similar to $\triangle UVZ$.

- 3 Using a compass and straightedge, construct an altitude of triangle ABC below. [Leave all construction marks.]



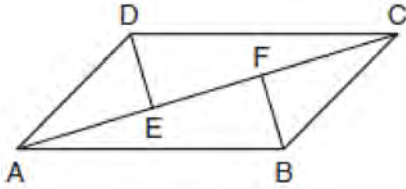
- 4 Triangle ABC and triangle DEF are graphed on the set of axes below.



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

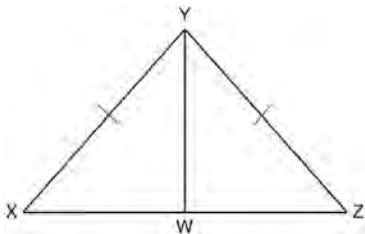
- 5 In quadrilateral $ABCD$, $\overline{AB} \cong \overline{CD}$, $\overline{AB} \parallel \overline{CD}$, and \overline{BF} and \overline{DE} are perpendicular to diagonal \overline{AC} at points F and E .



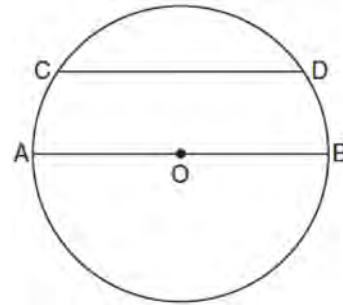
Prove: $\overline{AE} \cong \overline{CF}$

- 6 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

- 7 Given: $\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and \overline{YW} bisects $\angle XYZ$
 Prove that $\angle YWZ$ is a right angle.



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



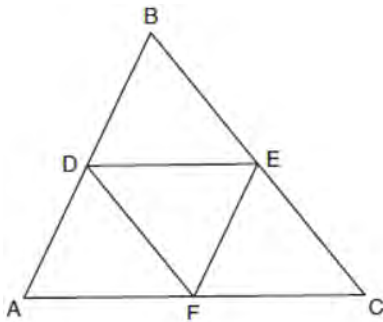
What is $m\widehat{AC}$?

- 1) 25
 - 2) 50
 - 3) 65
 - 4) 115
- 9 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

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

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



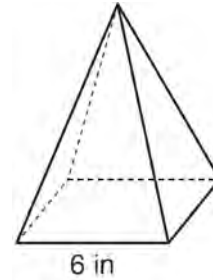
The perimeter of quadrilateral $ADEF$ is equivalent to

- 1) $AB + BC + AC$
- 2) $\frac{1}{2}AB + \frac{1}{2}AC$
- 3) $2AB + 2AC$
- 4) $AB + AC$

12 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}

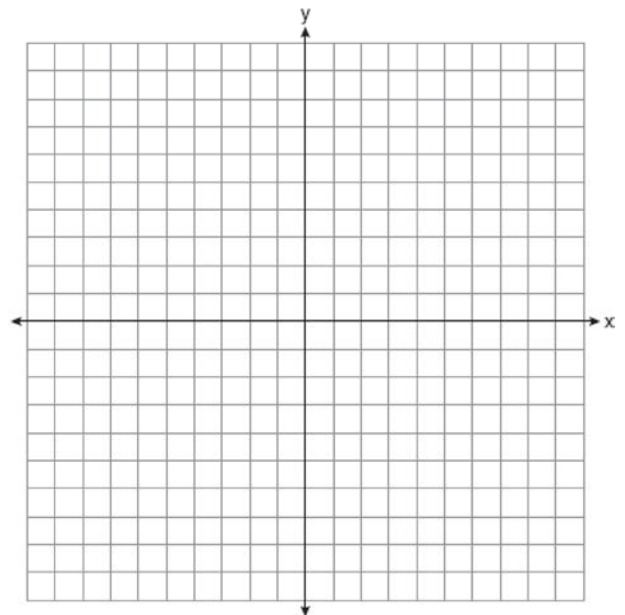
13 As shown in the diagram below, a regular pyramid has a square base whose side measures 6 inches.



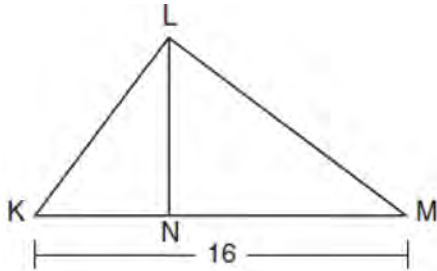
If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is

- 1) 72
- 2) 144
- 3) 288
- 4) 432

14 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.]

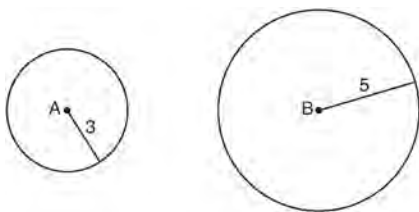


- 15 Kirstie is testing values that would make triangle KLM a right triangle when \overline{LN} is an altitude, and $KM = 16$, as shown below.



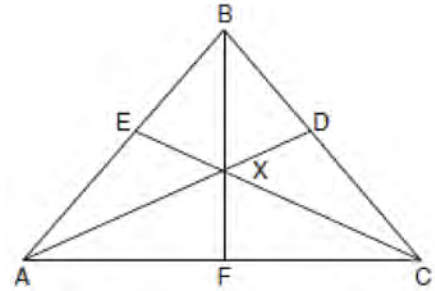
Which lengths would make triangle KLM a right triangle?

- 1) $LM = 13$ and $KN = 6$
 - 2) $LM = 12$ and $NM = 9$
 - 3) $KL = 11$ and $KN = 7$
 - 4) $LN = 8$ and $NM = 10$
- 16 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
- 17 As shown in the diagram below, circle A has a radius of 3 and circle B has a radius of 5.



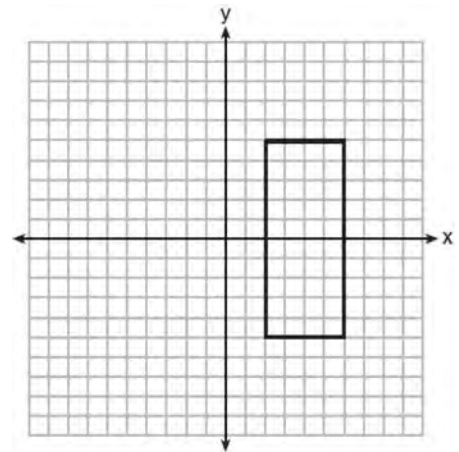
Use transformations to explain why circles A and B are similar.

- 18 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 $m\angle BAC = 50^\circ$, find $m\angle AXC$.

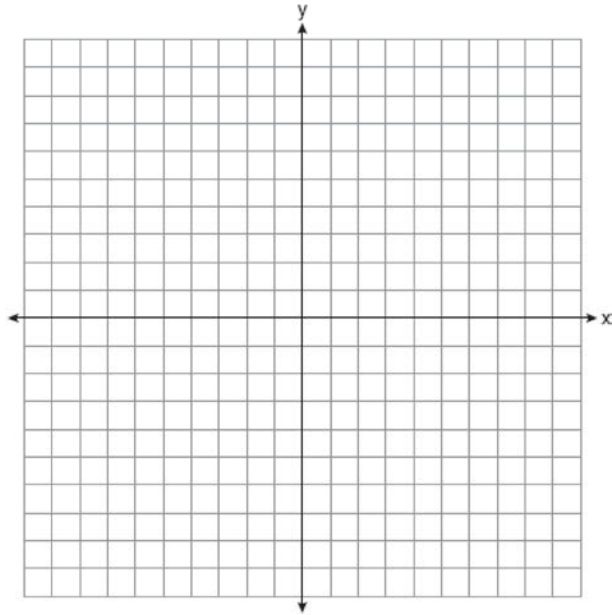
- 19 As shown in the graph below, the quadrilateral is a rectangle.



Which transformation would *not* map the rectangle onto itself?

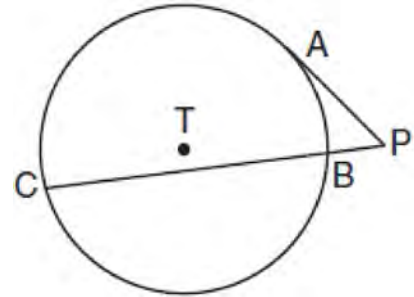
- 1) a reflection over the x -axis
- 2) a reflection over the line $x = 4$
- 3) a rotation of 180° about the origin
- 4) a rotation of 180° about the point $(4, 0)$

- 20 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.]



- 21 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/cm^3 , 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?

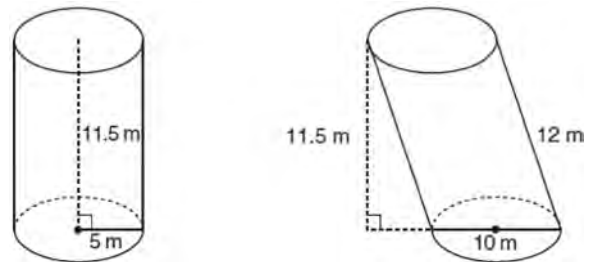
- 22 In the diagram shown below, \overline{PA} is tangent to circle T at A , and secant \overline{PBC} is drawn where point B is on circle T .



If $PB = 3$ and $BC = 15$, what is the length of \overline{PA} ?

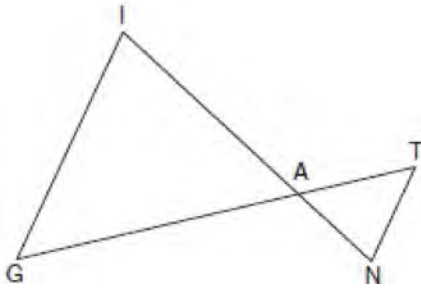
- 1) $3\sqrt{5}$
- 2) $3\sqrt{6}$
- 3) 3
- 4) 9

- 23 Sue believes that the two cylinders shown in the diagram below have equal volumes.



Is Sue correct? Explain why.

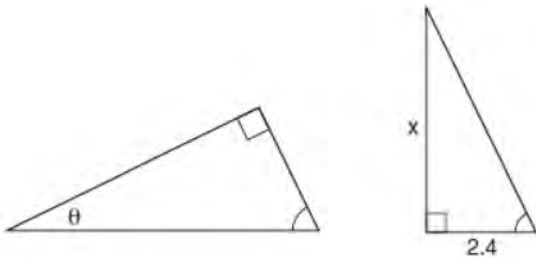
- 24 In the diagram below, \overline{GI} is parallel to \overline{NT} , and \overline{IN} intersects \overline{GT} at A .



Prove: $\triangle GIA \sim \triangle TNA$

- 25 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

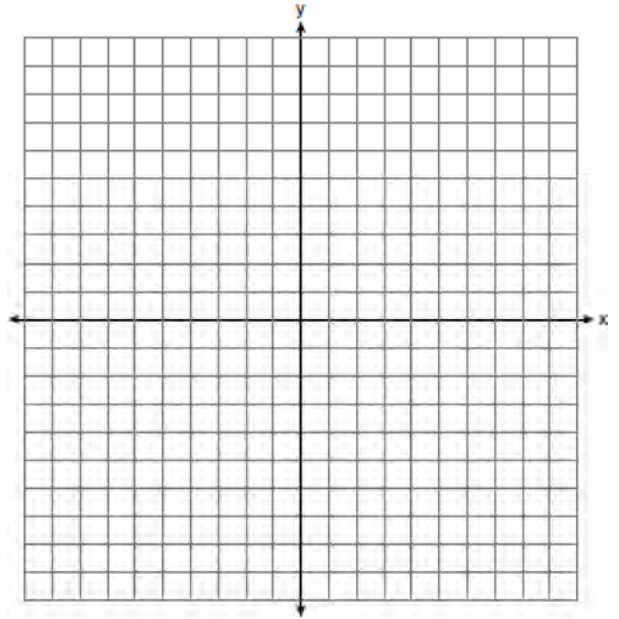
- 26 The diagram below shows two similar triangles.



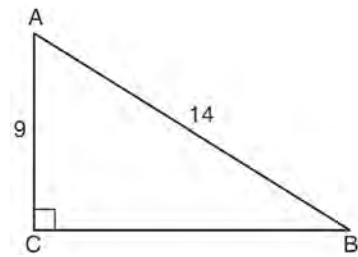
If $\tan \theta = \frac{3}{7}$, what is the value of x , to the nearest

- tenth?
- 1) 1.2
 - 2) 5.6
 - 3) 7.6
 - 4) 8.8

- 27 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.]



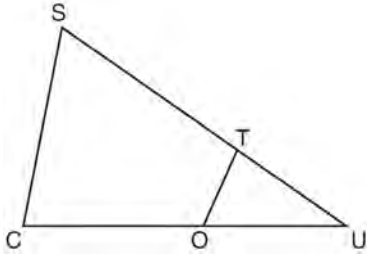
- 28 In the diagram of right triangle ABC shown below, $AB = 14$ and $AC = 9$.



What is the measure of $\angle A$, to the nearest degree?

- 1) 33
- 2) 40
- 3) 50
- 4) 57

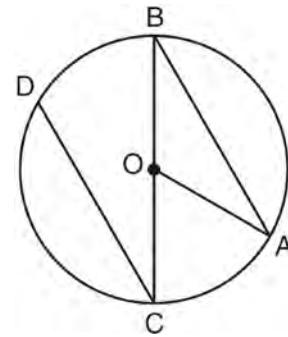
- 29 In $\triangle SCU$ shown below, points T and O are on \overline{SU} and \overline{CU} , respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.



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

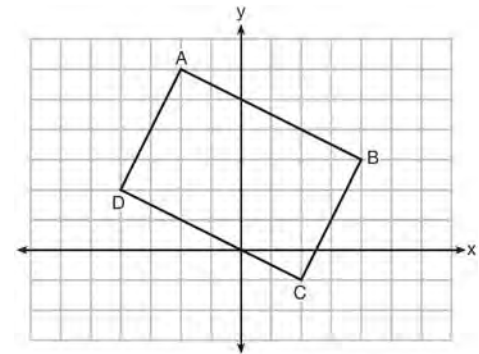
- 1) 5.6
 - 2) 8.75
 - 3) 11
 - 4) 15
- 30 The vertices of square $RSTV$ have coordinates $R(-1,5)$, $S(-3,1)$, $T(-7,3)$, and $V(-5,7)$. What is the perimeter of $RSTV$?
- 1) $\sqrt{20}$
 - 2) $\sqrt{40}$
 - 3) $4\sqrt{20}$
 - 4) $4\sqrt{40}$
- 31 A line that passes through the points whose coordinates 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

- 32 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 $m\angle BCD = 30^\circ$, determine and state $m\angle AOB$.

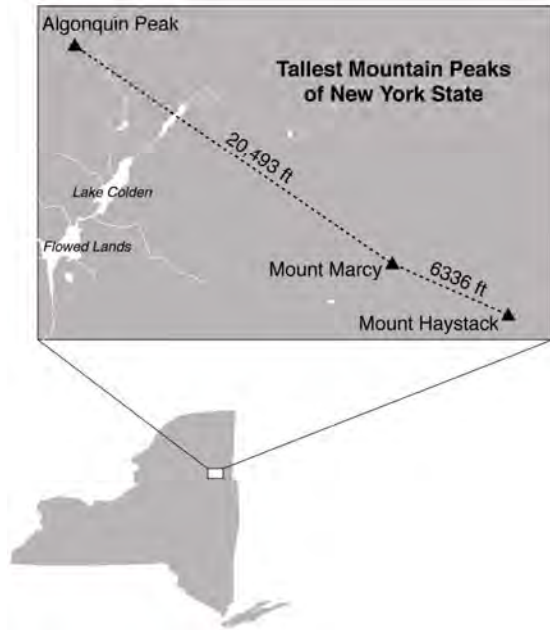
- 33 Quadrilateral $ABCD$ is graphed on the set of axes below.



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 $B'(-3,4)$

- 34 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.

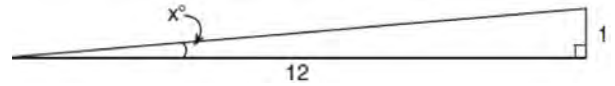


The angle of depression from the peak of Mount Marcy to the peak of Mount Haystack is 3.47 degrees. The angle of elevation from the peak of Algonquin Peak to the peak of Mount Marcy is 0.64 degrees. What are the heights, to the *nearest foot*, of Mount Marcy and Algonquin Peak? Justify your answer.

- 35 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 $\triangle DEF$

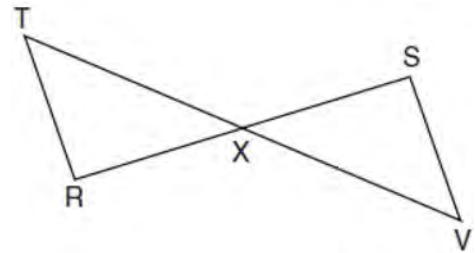
- 36 What are the coordinates of the point on the directed line segment from $K(-5, -4)$ to $L(5, 1)$ that partitions the segment into a ratio of 3 to 2?
- 1) $(-3, -3)$
 - 2) $(-1, -2)$
 - 3) $\left(0, -\frac{3}{2}\right)$
 - 4) $(1, -1)$

- 37 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.



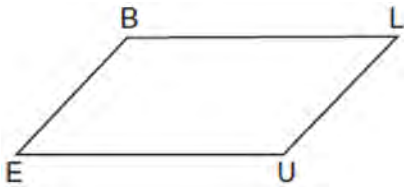
What is the angle of inclination, x , of this ramp, to the *nearest hundredth of a degree*?

- 1) 4.76
 - 2) 4.78
 - 3) 85.22
 - 4) 85.24
- 38 Given: \overline{RS} and \overline{TV} bisect each other at point X
 \overline{TR} and \overline{SV} are drawn



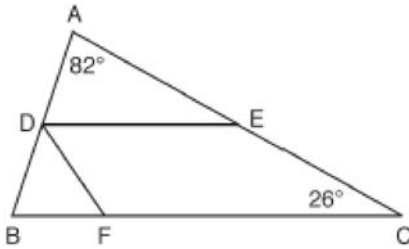
Prove: $\overline{TR} \parallel \overline{SV}$

- 39 In quadrilateral $BLUE$ shown below, $\overline{BE} \cong \overline{UL}$.



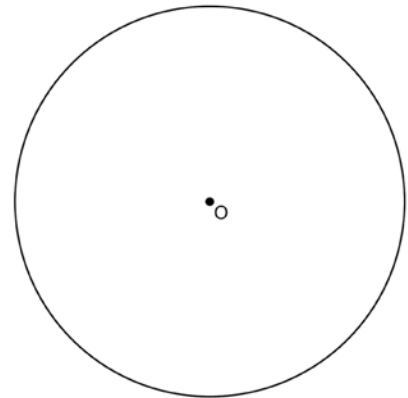
Which information would be sufficient to prove quadrilateral $BLUE$ is a parallelogram?

- 1) $\overline{BL} \parallel \overline{EU}$
 - 2) $\overline{LU} \parallel \overline{BE}$
 - 3) $\overline{BE} \cong \overline{BL}$
 - 4) $\overline{LU} \cong \overline{EU}$
- 40 In the diagram below, \overline{DE} divides \overline{AB} and \overline{AC} proportionally, $m\angle C = 26^\circ$, $m\angle A = 82^\circ$, and \overline{DF} bisects $\angle BDE$.

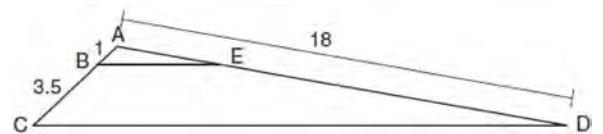


The measure of angle DFB is

- 1) 36°
 - 2) 54°
 - 3) 72°
 - 4) 82°
- 41 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
- 42 Using a compass and straightedge, construct a regular hexagon inscribed in circle O . [Leave all construction marks.]



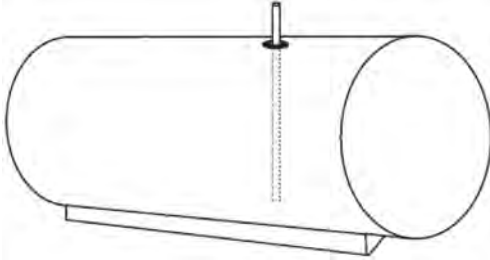
- 43 In the diagram below, triangle ACD has points B and E on sides \overline{AC} and \overline{AD} , respectively, such that $\overline{BE} \parallel \overline{CD}$, $AB = 1$, $BC = 3.5$, and $AD = 18$.



What is the length of \overline{AE} , to the nearest tenth?

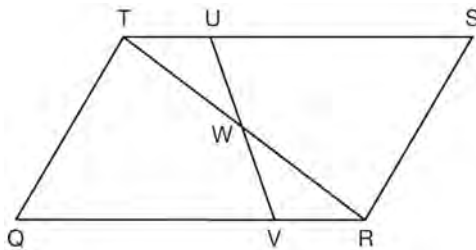
- 1) 14.0
- 2) 5.1
- 3) 3.3
- 4) 4.0

- 44 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. [$1 \text{ ft}^3 = 7.48 \text{ gallons}$]

- 45 In parallelogram $QRST$ shown below, diagonal \overline{TR} is drawn, U and V are points on \overline{TS} and \overline{QR} , respectively, and \overline{UV} intersects \overline{TR} at W .

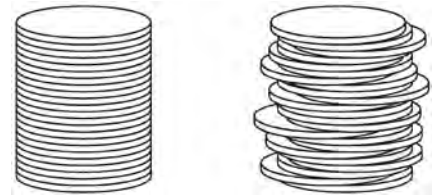


If $m\angle S = 60^\circ$, $m\angle SRT = 83^\circ$, and $m\angle TWU = 35^\circ$, what is $m\angle WVQ$?

- 1) 37°
- 2) 60°
- 3) 72°
- 4) 83°

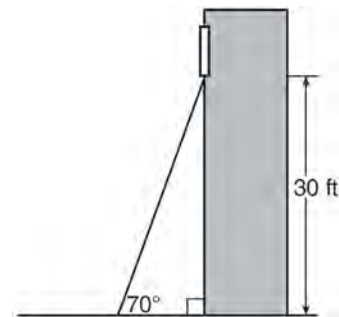
- 46 A man who is 5 feet 9 inches tall casts a shadow of 8 feet 6 inches. Assuming that the man is standing perpendicular to the ground, what is the angle of elevation from the end of the shadow to the top of the man's head, to the *nearest tenth of a degree*?
- 1) 34.1
 - 2) 34.5
 - 3) 42.6
 - 4) 55.9

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



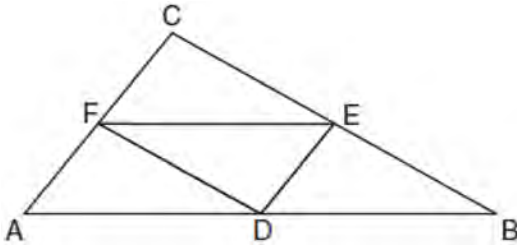
Use Cavalieri's principle to explain why the volumes of these two stacks of quarters are equal.

- 48 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.



- 49 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 $= \sqrt{35}$

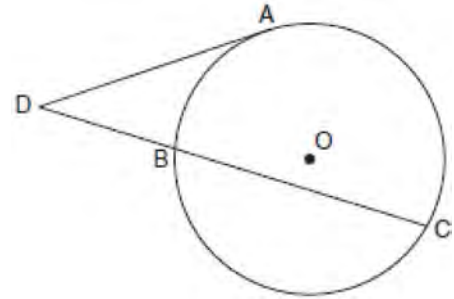
- 50 In the diagram below of $\triangle ABC$, D , E , and F are the midpoints of \overline{AB} , \overline{BC} , and \overline{CA} , respectively.



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
- 51 Under which transformation would $\triangle A'B'C'$, the image of $\triangle ABC$, *not* be congruent to $\triangle ABC$?
- 1) reflection over the y -axis
 - 2) rotation of 90° clockwise about the origin
 - 3) translation of 3 units right and 2 units down
 - 4) dilation with a scale factor of 2 centered at the origin

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

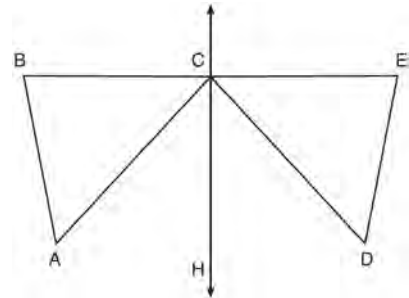


If $m\widehat{BC} = 152^\circ$, determine and state $m\angle D$.

- 53 Given: D is the image of A after a reflection over \overleftrightarrow{CH} .

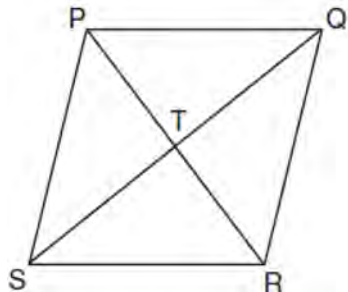
\overleftrightarrow{CH} is the perpendicular bisector of \overline{BE}
 $\triangle ABC$ and $\triangle DEC$ are drawn

Prove: $\triangle ABC \cong \triangle DEC$



- 54 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) $(6, 0)$

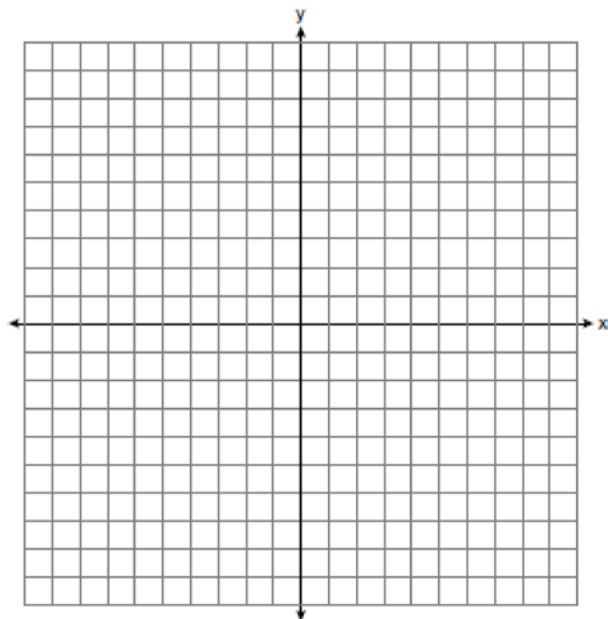
- 55 In the diagram of rhombus $PQRS$ below, the diagonals \overline{PR} and \overline{QS} intersect at point T , $PR = 16$, and $QS = 30$. Determine and state the perimeter of $PQRS$.



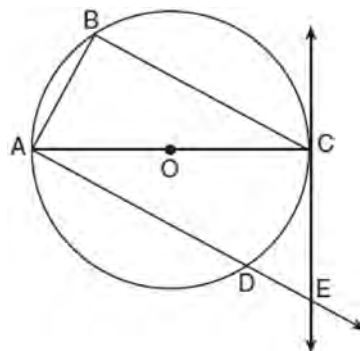
- 56 A line segment is dilated by a scale factor of 2 centered at a point not on the line segment. Which statement regarding the relationship between the given line segment and its image is true?
- 1) The line segments are perpendicular, and the image is one-half of the length of the given line segment.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

- 57 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

- 58 Directed line segment \overrightarrow{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.]

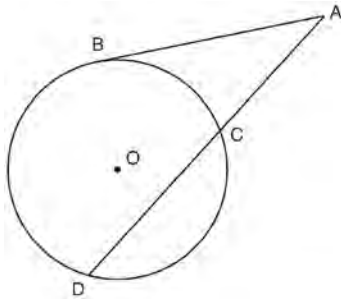


- 59 In the diagram below of circle O , tangent \overleftrightarrow{EC} is drawn to diameter \overline{AC} . Chord \overline{BC} is parallel to secant \overline{ADE} , and chord \overline{AB} is drawn.



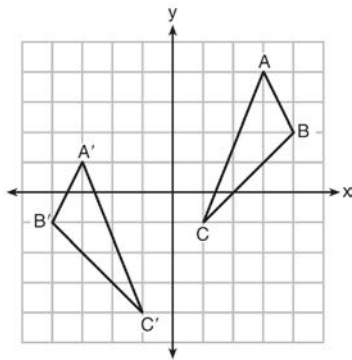
Prove: $\frac{BC}{CA} = \frac{AB}{EC}$

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



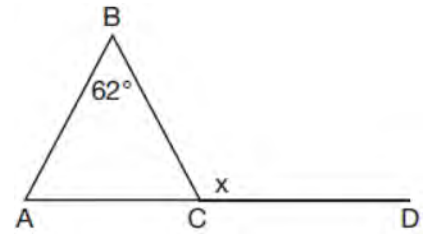
Prove the theorem: If a secant and a tangent are drawn to a circle from an external point, the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. ($AC \cdot AD = AB^2$)

- 61 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.

- 62 Given $\triangle ABC$ with $m\angle B = 62^\circ$ 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°

- 63 In right triangle ABC , $m\angle C = 90^\circ$. If $\cos B = \frac{5}{13}$,

which function also equals $\frac{5}{13}$?

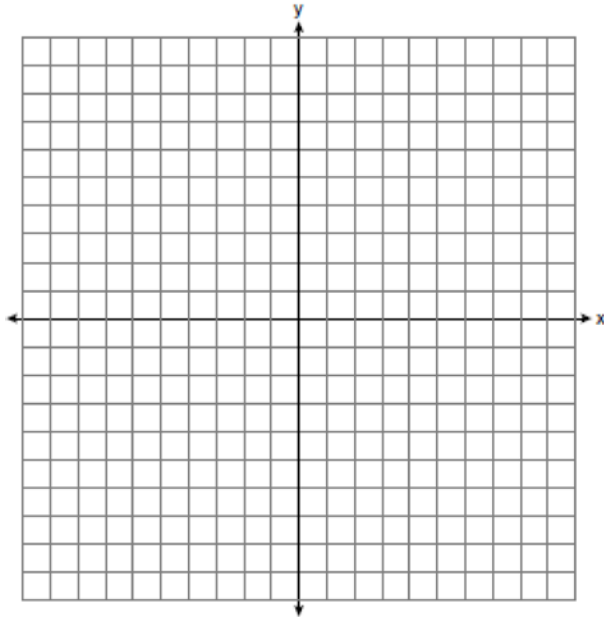
- 1) $\tan A$
- 2) $\tan B$
- 3) $\sin A$
- 4) $\sin B$

- 64 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.

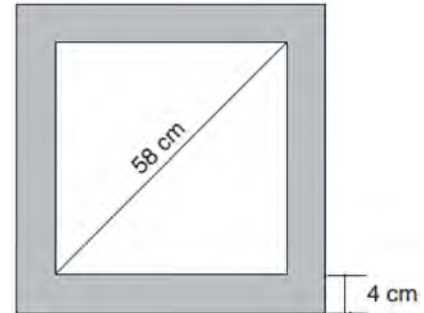


- 65 In $\triangle ABC$, the complement of $\angle B$ is $\angle A$. Which statement is always true?
- 1) $\tan \angle A = \tan \angle B$
 - 2) $\sin \angle A = \sin \angle B$
 - 3) $\cos \angle A = \tan \angle B$
 - 4) $\sin \angle A = \cos \angle B$

- 66 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} .

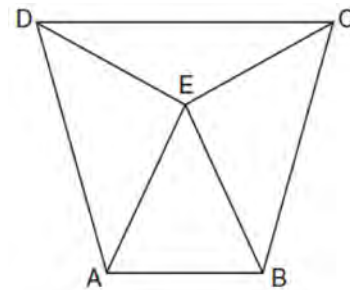


- 67 Keira has a square poster that she is framing and placing on her wall. The poster has a diagonal 58 cm long and fits exactly inside the frame. The width of the frame around the picture is 4 cm.



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

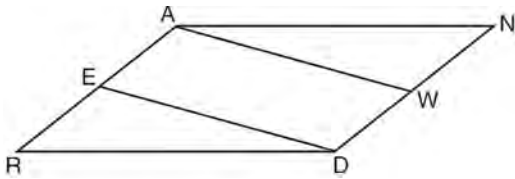
- 68 Isosceles trapezoid $ABCD$ has bases \overline{DC} and \overline{AB} with nonparallel legs \overline{AD} and \overline{BC} . Segments \overline{AE} , \overline{BE} , \overline{CE} , and \overline{DE} are drawn in trapezoid $ABCD$ such that $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$.



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

- 69 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) $(10,2)$

- 70 Given: Parallelogram $ANDR$ with \overline{AW} and \overline{DE} bisecting \overline{ND} and \overline{RA} at points W and E , respectively



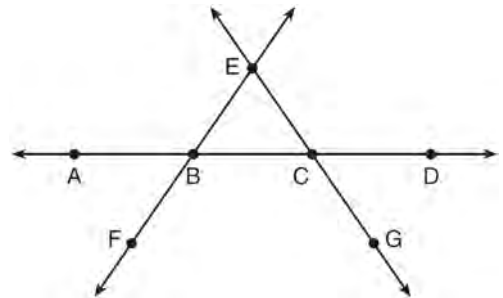
Prove that $\triangle ANW \cong \triangle DRE$. Prove that quadrilateral $AWDE$ is a parallelogram.

- 71 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

- 72 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) $y = 2x + 1$

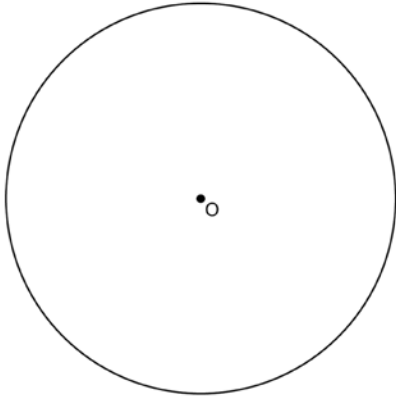
- 73 The line represented by the equation $4y = 3x + 7$ is transformed by a dilation centered at the origin. Which linear equation could represent its image?
- 1) $3x - 4y = 9$
 - 2) $3x + 4y = 9$
 - 3) $4x - 3y = 9$
 - 4) $4x + 3y = 9$

- 74 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 .

- 75 Using a straightedge and compass, construct a square inscribed in circle O below. [Leave all construction marks.]



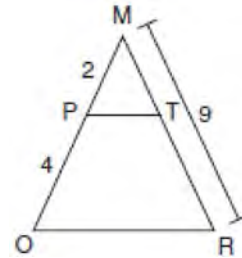
Determine the measure of the arc intercepted by two adjacent sides of the constructed square. Explain your reasoning.

- 76 Which rotation about its center will carry a regular decagon onto itself?
- 1) 54°
 - 2) 162°
 - 3) 198°
 - 4) 252°
- 77 In right triangle ABC , $m\angle A = 32^\circ$, $m\angle B = 90^\circ$, 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

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

- 79 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

- 80 Given $\triangle MRO$ shown below, with trapezoid $PTRO$, $MR = 9$, $MP = 2$, and $PO = 4$.



What is the length of \overline{TR} ?

- 1) 4.5
 - 2) 5
 - 3) 3
 - 4) 6
- 81 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

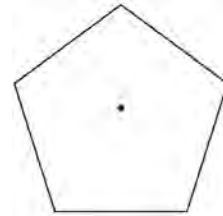
- 82 A fish tank in the shape of a rectangular prism has dimensions of 14 inches, 16 inches, and 10 inches. The tank contains 1680 cubic inches of water. What percent of the fish tank is empty?
- 1) 10
 - 2) 25
 - 3) 50
 - 4) 75

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

- 84 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.

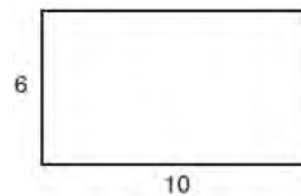
- 85 Freda, who is training to use a radar system, detects an airplane flying at a constant speed and heading in a straight line to pass directly over her location. She sees the airplane at an angle of elevation of 15° and notes that it is maintaining a constant altitude of 6250 feet. One minute later, 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*.

- 86 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°
- 87 A rectangle whose length and width are 10 and 6, respectively, is shown below. The rectangle is continuously rotated around a straight line to form an object whose volume is 150π .

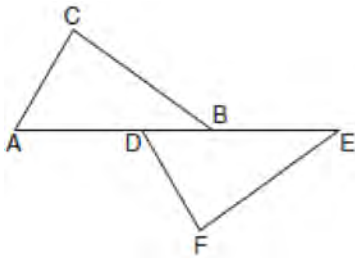


Which line could the rectangle be rotated around?

- 1) a long side
- 2) a short side
- 3) the vertical line of symmetry
- 4) the horizontal line of symmetry

- 88 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) $y = 3x - 6$

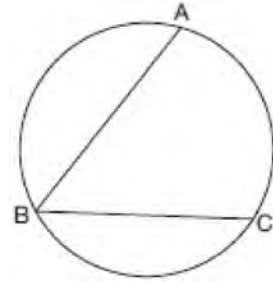
- 89 Kelly is completing a proof based on the figure below.



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 $\triangle ABC \cong \triangle DEF$?

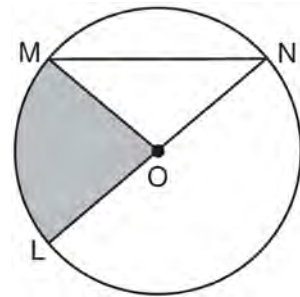
- 1) $\overline{AC} \cong \overline{DF}$ and SAS
 - 2) $\overline{BC} \cong \overline{EF}$ and SAS
 - 3) $\angle C \cong \angle F$ and AAS
 - 4) $\angle CBA \cong \angle FED$ and ASA
- 90 The coordinates of the endpoints of \overline{AB} are $A(-8, -2)$ and $B(16, 6)$. Point P is on \overline{AB} . What 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) $(6.4, 2.8)$

- 91 In the diagram below, $m\widehat{ABC} = 268^\circ$.



What is the number of degrees in the measure of $\angle ABC$?

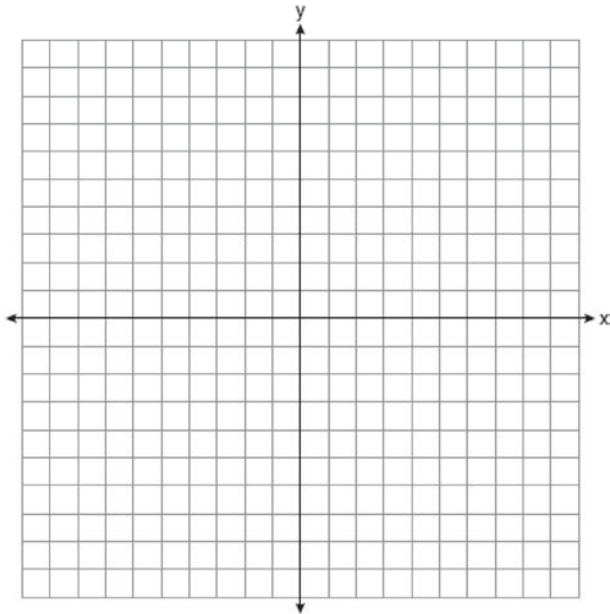
- 1) 134°
 - 2) 92°
 - 3) 68°
 - 4) 46°
- 92 In the diagram below of circle O , the area of the shaded sector LOM is $2\pi \text{ cm}^2$.



If the length of \overline{NL} is 6 cm, what is $m\angle N$?

- 1) 10°
- 2) 20°
- 3) 40°
- 4) 80°

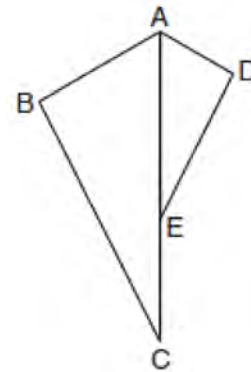
- 93 The coordinates of the endpoints of \overline{AB} are $A(2,3)$ and $B(5,-1)$. Determine the length of $\overline{A'B'}$, the image of \overline{AB} , after a dilation of $\frac{1}{2}$ centered at the origin. [The use of the set of axes below is optional.]



- 94 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

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

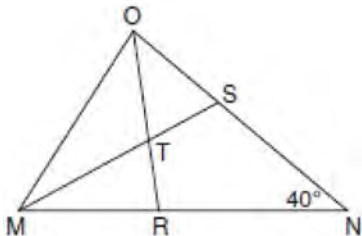
- 96 In the diagram below, $\triangle ADE$ is the image of $\triangle ABC$ after a reflection over the line AC followed by a dilation of scale factor $\frac{AE}{AC}$ centered at point A .



Which statement must be true?

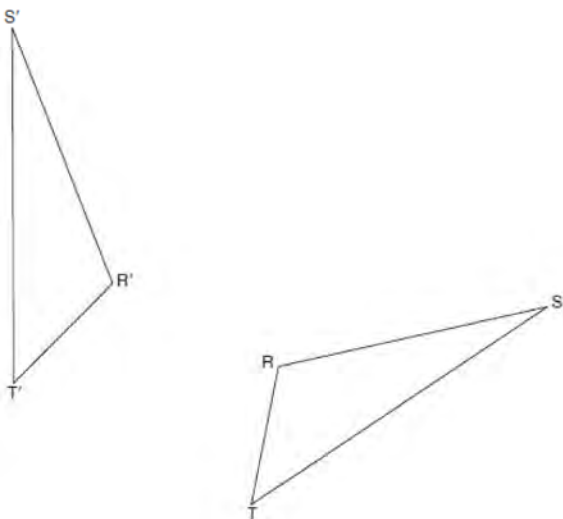
- 1) $m\angle BAC \cong m\angle AED$
- 2) $m\angle ABC \cong m\angle ADE$
- 3) $m\angle DAE \cong \frac{1}{2} m\angle BAC$
- 4) $m\angle ACB \cong \frac{1}{2} m\angle DAB$

- 97 In the diagram below of triangle MNO , $\angle M$ and $\angle O$ are bisected by MS and OR , respectively. Segments MS and OR intersect at T , and $m\angle N = 40^\circ$.



If $m\angle TMR = 28^\circ$, the measure of angle OTS is

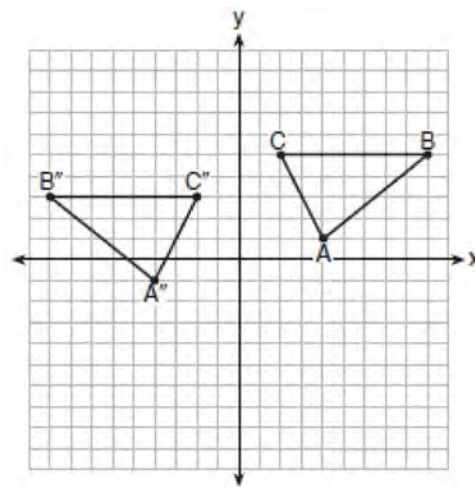
- 1) 40°
 - 2) 50°
 - 3) 60°
 - 4) 70°
- 98 Using a compass and straightedge, construct the line of reflection over which triangle RST reflects onto triangle $R'S'T'$. [Leave all construction marks.]



- 99 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.

- 100 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

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

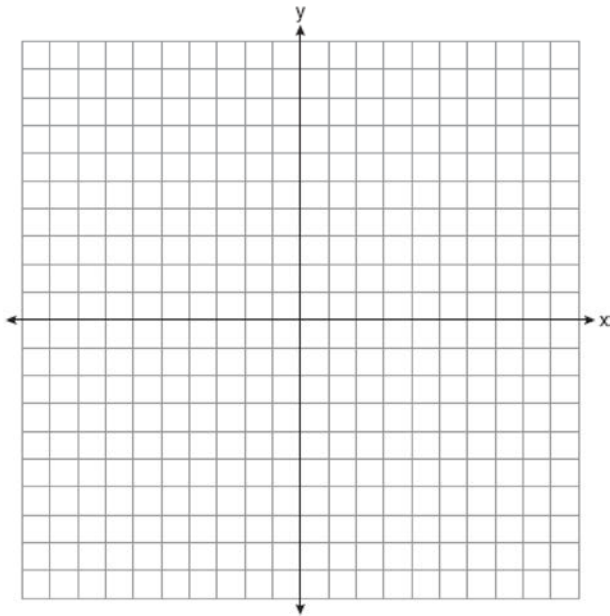


Describe a sequence of rigid motions which would map $\triangle ABC$ onto $\triangle A''B''C''$.

102 What is an equation of a line that is perpendicular to the line whose equation is $2y = 3x - 10$ and passes through $(-6, 1)$?

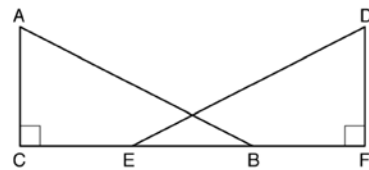
- 1) $y = -\frac{2}{3}x - 5$
- 2) $y = -\frac{2}{3}x - 3$
- 3) $y = \frac{2}{3}x + 1$
- 4) $y = \frac{2}{3}x + 10$

103 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 $\triangle ABC \cong \triangle DEF$.

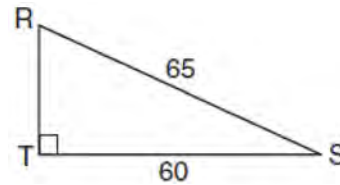


104 When volleyballs are purchased, they are not fully inflated. A partially inflated volleyball can be modeled by a sphere whose volume is approximately 180 in^3 . After being fully inflated, its volume is approximately 294 in^3 . To the *nearest tenth of an inch*, how much does the radius increase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

105 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 $\triangle ABC \cong \triangle DEF$.



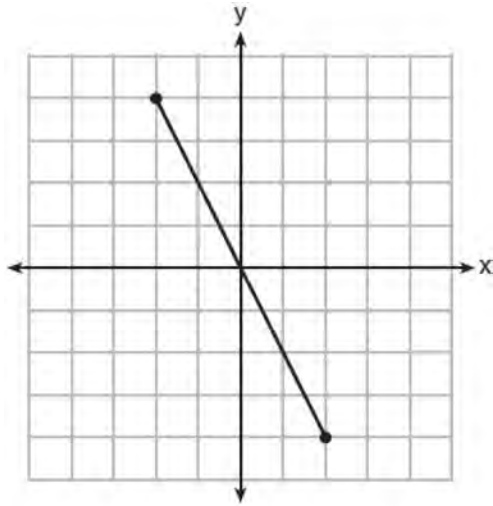
106 In the diagram of $\triangle RST$ below, $m\angle T = 90^\circ$, $RS = 65$, and $ST = 60$.



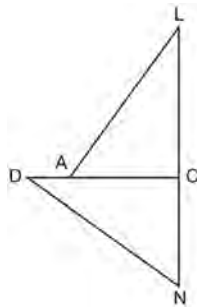
What is the measure of $\angle S$, to the *nearest degree*?

- 1) 23°
- 2) 43°
- 3) 47°
- 4) 67°

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



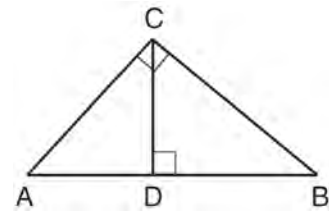
- 1) $y + 2x = 0$
 2) $y - 2x = 0$
 3) $2y + x = 0$
 4) $2y - x = 0$
- 108 In the diagram of $\triangle LAC$ and $\triangle DNC$ below, $\overline{LA} \cong \overline{DN}$, $\overline{CA} \cong \overline{CN}$, and $\overline{DAC} \perp \overline{LCN}$.



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

- 109 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

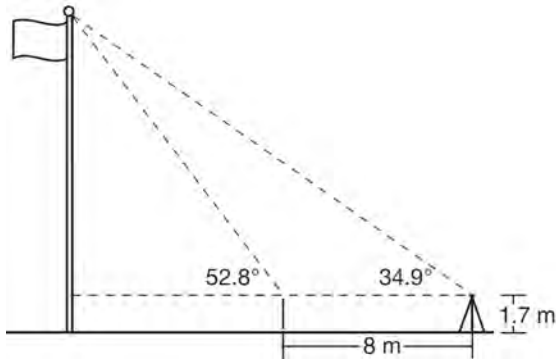
- 110 In the diagram below, \overline{CD} is the altitude drawn to the hypotenuse \overline{AB} of right triangle ABC .



Which lengths would *not* produce an altitude that measures $6\sqrt{2}$?

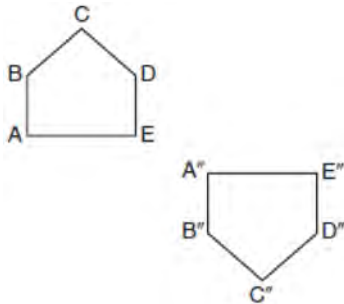
- 1) $AD = 2$ and $DB = 36$
 - 2) $AD = 3$ and $AB = 24$
 - 3) $AD = 6$ and $DB = 12$
 - 4) $AD = 8$ and $AB = 17$
- 111 Molly wishes to make a lawn ornament in the form of a solid sphere. The clay being used to make the sphere weighs .075 pound per cubic inch. If the sphere's radius is 4 inches, what is the weight of the sphere, to the *nearest pound*?
- 1) 34
 - 2) 20
 - 3) 15
 - 4) 4

- 112 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.



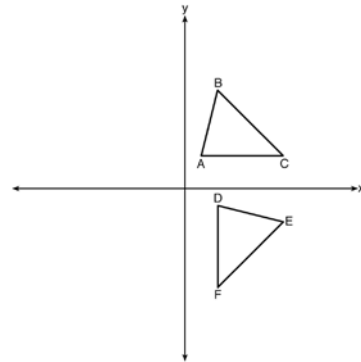
Determine and state, to the nearest tenth of a meter, the height of the flagpole.

- 113 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

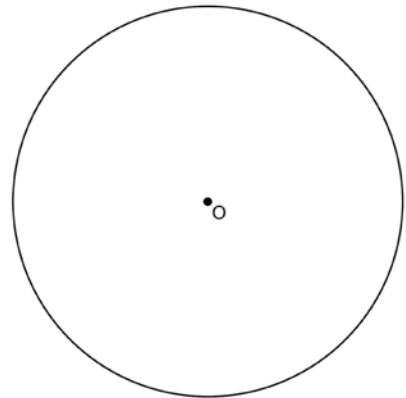
- 114 The image of $\triangle ABC$ after a rotation of 90° clockwise about the origin is $\triangle DEF$, as shown below.



Which statement is true?

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

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

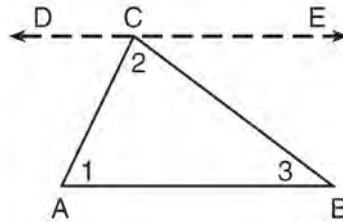


If chords \overline{FB} and \overline{FC} are drawn, which type of triangle, according to its angles, would $\triangle FBC$ be? Explain your answer.

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- 116 Given the theorem, “The sum of the measures of the interior angles of a triangle is 180° ,” complete the proof for this theorem.



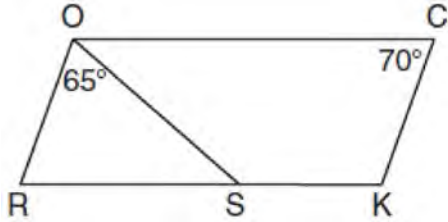
Given: $\triangle ABC$

Prove: $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$

Fill in the missing reasons below.

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

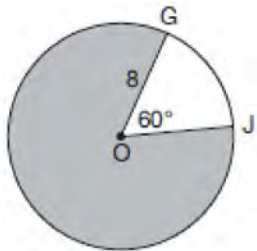
- 117 In the diagram below of parallelogram $ROCK$, $m\angle C$ is 70° and $m\angle ROS$ is 65° .



What is $m\angle KSO$?

- 1) 45°
- 2) 110°
- 3) 115°
- 4) 135°

- 118 In the diagram below of circle O , $GO = 8$ and $m\angle GOJ = 60^\circ$.

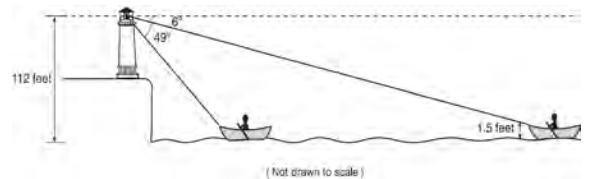


What is the area, in terms of π , of the shaded region?

- 1) $\frac{4\pi}{3}$
- 2) $\frac{20\pi}{3}$
- 3) $\frac{32\pi}{3}$
- 4) $\frac{160\pi}{3}$

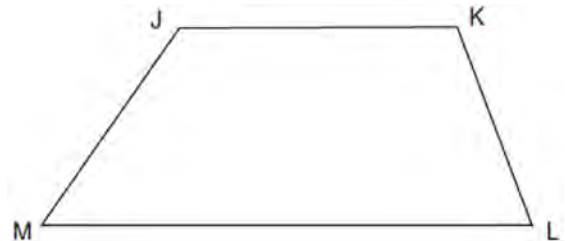
- 119 Line l is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line l is $3x - y = 4$. Determine and state an equation for line m .

- 120 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.

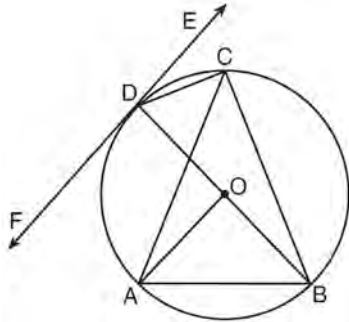


At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6° . Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49° . Determine and state, to the *nearest foot per minute*, the average speed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

- 121 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.]



- 122 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."

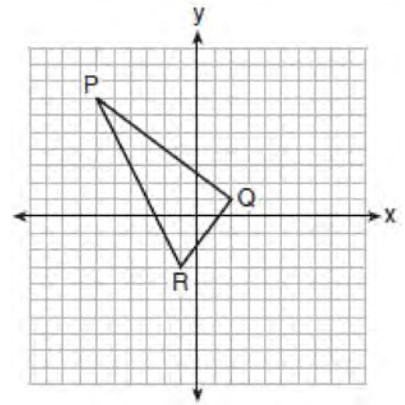


Which angle is Sam referring to?

- 1) $\angle AOB$
 - 2) $\angle BAC$
 - 3) $\angle DCB$
 - 4) $\angle FDB$
- 123 In a circle with a diameter of 32, the area of a sector is $\frac{512\pi}{3}$. The measure of the angle of the sector, in radians, is
- 1) $\frac{\pi}{3}$
 - 2) $\frac{4\pi}{3}$
 - 3) $\frac{16\pi}{3}$
 - 4) $\frac{64\pi}{3}$

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

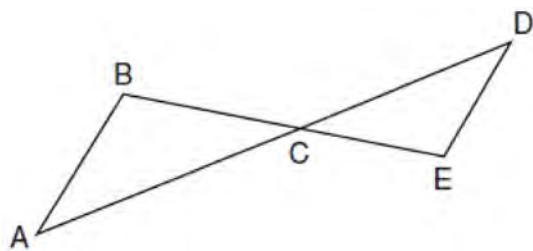
- 125 On the set of axes below, the vertices of $\triangle PQR$ have coordinates $P(-6,7)$, $Q(2,1)$, and $R(-1,-3)$.



What is the area of $\triangle PQR$?

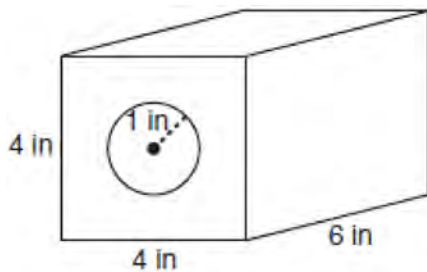
- 1) 10
 - 2) 20
 - 3) 25
 - 4) 50
- 126 If $ABCD$ is a parallelogram, which statement would prove that $ABCD$ is a rhombus?
- 1) $\angle ABC \cong \angle CDA$
 - 2) $\overline{AC} \cong \overline{BD}$
 - 3) $\overline{AC} \perp \overline{BD}$
 - 4) $\overline{AB} \perp \overline{CD}$

- 127 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?

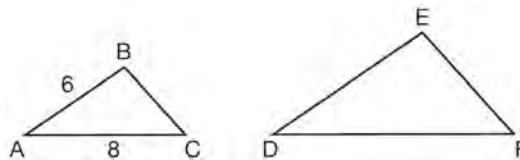
- 1) 2.70
 - 2) 3.34
 - 3) 5.28
 - 4) 8.25
- 128 A solid metal prism has a rectangular base with sides of 4 inches and 6 inches, and a height of 4 inches. A hole in the shape of a cylinder, with a radius of 1 inch, is drilled through the entire length of the rectangular prism.



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

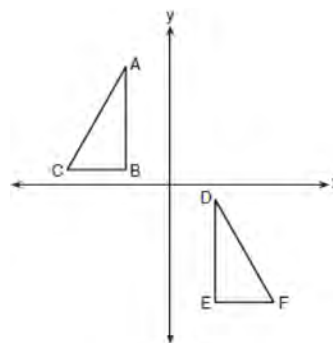
- 1) 19
- 2) 77
- 3) 93
- 4) 96

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



If $AB = 6$ and $AC = 8$, which statement will justify similarity by SAS?

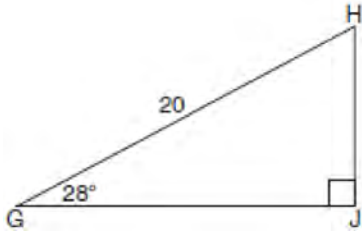
- 1) $DE = 9$, $DF = 12$, and $\angle A \cong \angle D$
 - 2) $DE = 8$, $DF = 10$, and $\angle A \cong \angle D$
 - 3) $DE = 36$, $DF = 64$, and $\angle C \cong \angle F$
 - 4) $DE = 15$, $DF = 20$, and $\angle C \cong \angle F$
- 130 In the diagram below, $\triangle ABC \cong \triangle DEF$.



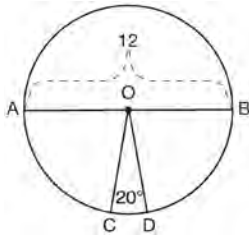
Which sequence of transformations maps $\triangle ABC$ onto $\triangle DEF$?

- 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

- 131 When instructed to find the length of \overline{HJ} in right triangle HJG , Alex wrote the equation $\sin 28^\circ = \frac{HJ}{20}$ while Marlene wrote $\cos 62^\circ = \frac{HJ}{20}$. Are both students' equations correct? Explain why.



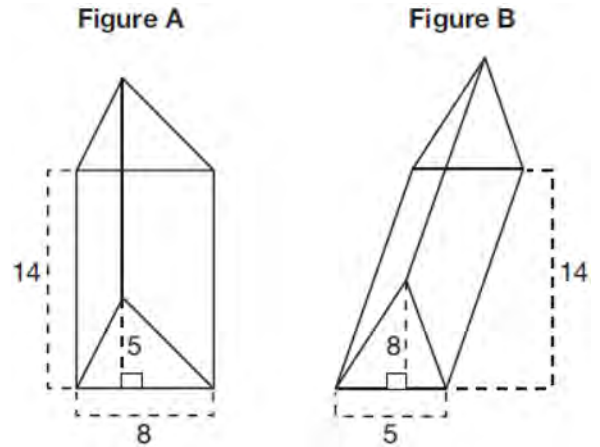
- 132 In the diagram below of circle O , diameter \overline{AB} and radii \overline{OC} and \overline{OD} are drawn. The length of \overline{AB} is 12 and the measure of $\angle COD$ is 20 degrees.



If $\widehat{AC} \cong \widehat{BD}$, find the area of sector BOD in terms of π .

- 133 The image of $\triangle DEF$ is $\triangle D'E'F'$. Under which transformation will the 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

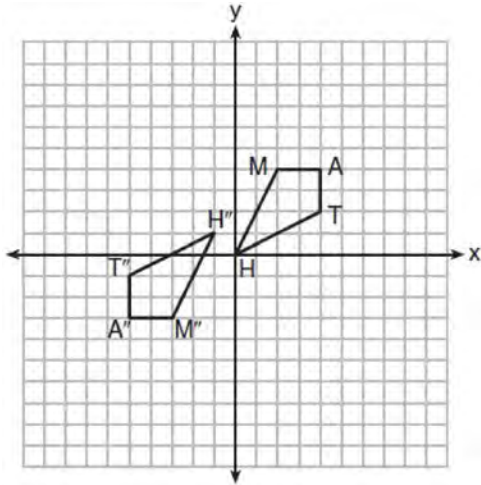
- 134 The diagram below shows two figures. Figure A is a right triangular prism and figure B is an oblique triangular prism. The base of figure A has a height of 5 and a length of 8 and the height of prism A is 14. The base of figure B has a height of 8 and a length of 5 and the height of prism B is 14.



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

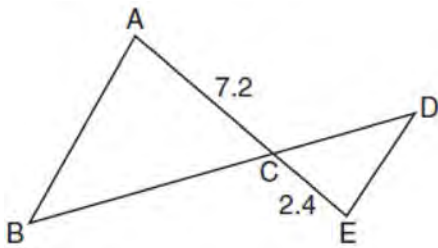
- 135 A plane intersects a hexagonal prism. The plane is perpendicular to the base of the prism. Which two-dimensional figure is the cross section of the plane intersecting the prism?
- 1) triangle
 - 2) trapezoid
 - 3) hexagon
 - 4) rectangle

- 136 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 $M''A''T''H''$.

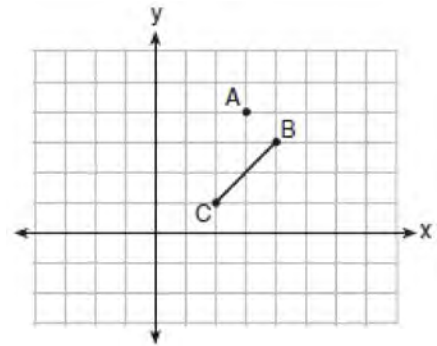
- 137 In the diagram below, $AC = 7.2$ and $CE = 2.4$.



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 $BC = 8.7$

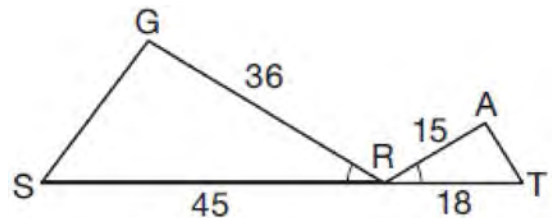
- 138 On the graph below, point $A(3,4)$ and \overline{BC} with coordinates $B(4,3)$ and $C(2,1)$ are graphed.



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 $C'(3,0)$

- 139 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 $\triangle ART$.

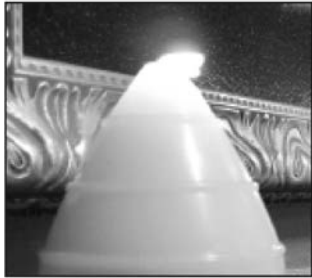
140 Explain why $\cos(x) = \sin(90 - x)$ for x such that $0 < x < 90$.

141 Which equation represents the line that passes through the point $(-2, 2)$ and is parallel to

$$y = \frac{1}{2}x + 8?$$

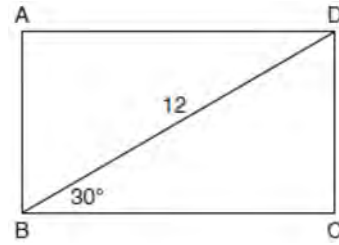
- 1) $y = \frac{1}{2}x$
- 2) $y = -2x - 3$
- 3) $y = \frac{1}{2}x + 3$
- 4) $y = -2x + 3$

142 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.

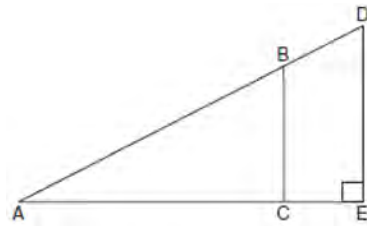
143 The diagram shows rectangle $ABCD$, with diagonal \overline{BD} .



What is the perimeter of rectangle $ABCD$, to the nearest tenth?

- 1) 28.4
- 2) 32.8
- 3) 48.0
- 4) 62.4

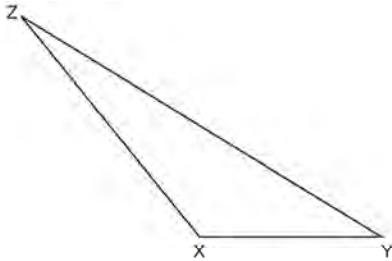
144 In the diagram of right triangle ADE below, $\overline{BC} \parallel \overline{DE}$.



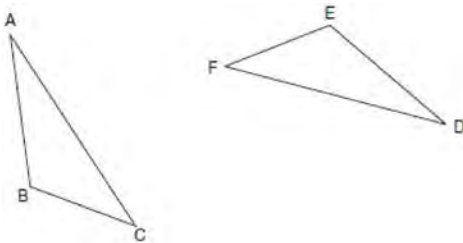
Which ratio is always equivalent to the sine of $\angle A$?

- 1) $\frac{AD}{DE}$
- 2) $\frac{AE}{AD}$
- 3) $\frac{BC}{AB}$
- 4) $\frac{AB}{AC}$

- 148 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 $\triangle XYZ$.



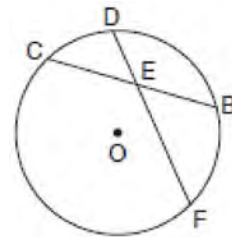
- 149 Triangle ABC and triangle DEF are drawn below.



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 .

- 150 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) $(-8, 5\sqrt{21})$

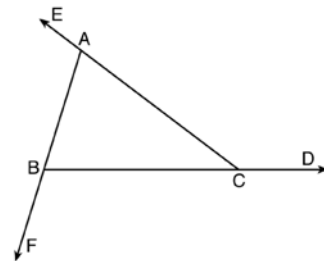
- 151 In the diagram below of circle O , chord \overline{DF} bisects chord \overline{BC} at E .



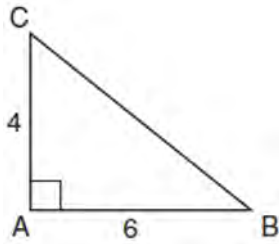
If $BC = 12$ and FE is 5 more than DE , then FE is

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

- 152 Prove the sum of the exterior angles of a triangle is 360° .

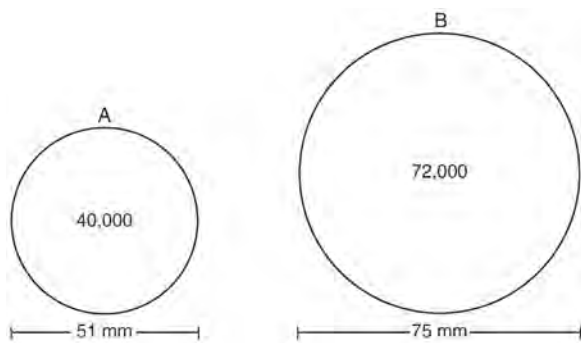


- 153 In the diagram below, right triangle ABC has legs whose lengths are 4 and 6.



What is the volume of the three-dimensional object formed by continuously rotating the right triangle around \overline{AB} ?

- 1) 32π
 - 2) 48π
 - 3) 96π
 - 4) 144π
- 154 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.

- 155 In a right triangle, $\sin(40 - x)^\circ = \cos(3x)^\circ$. What is the value of x ?

- 1) 10
 - 2) 15
 - 3) 20
 - 4) 25
- 156 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

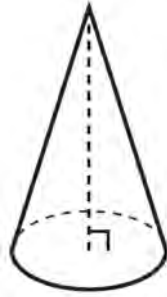
- 157 A water cup in the shape of a cone has a height of 4 inches and a maximum diameter of 3 inches. What is the volume of the water in the cup, to the *nearest tenth of a cubic inch*, when the cup is filled to half its height?

- 1) 1.2
- 2) 3.5
- 3) 4.7
- 4) 14.1





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

- 1) $y = -\frac{1}{2}x + 4$
- 2) $y = -\frac{1}{2}x - 1$
- 3) $y = 2x + 14$
- 4) $y = 2x - 16$

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

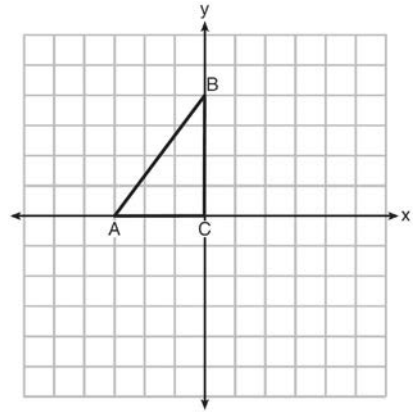


Which drawing can *not* be a cross section of a cone?

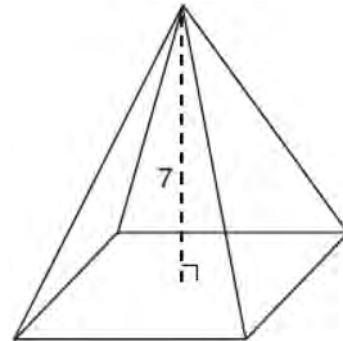
- 1) 
- 2) 
- 3) 
- 4) 

- 160 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°

- 161 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 $x = 1$.



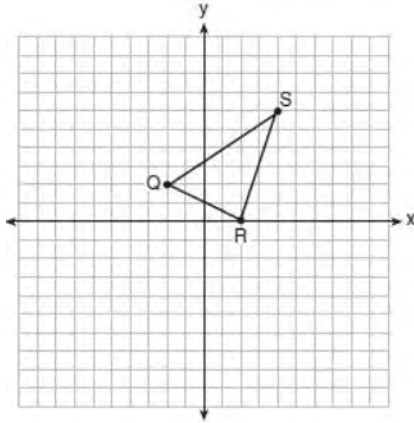
- 162 The pyramid shown below has a square base, a height of 7, and a volume of 84.



What is the length of the side of the base?

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

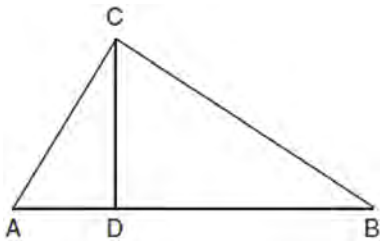
163 Triangle QRS is graphed on the set of axes below.



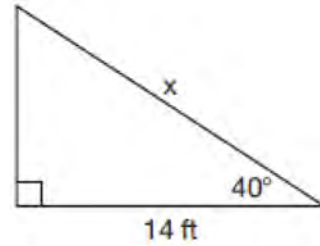
On the same set of axes, graph and label $\triangle Q'R'S'$, the image of $\triangle QRS$ after a dilation with a scale factor of $\frac{3}{2}$ centered at the origin. Use slopes to explain why $Q'R' \parallel QR$.

164 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.

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



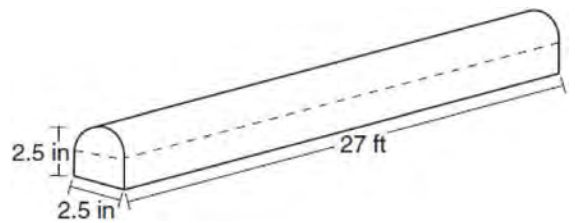
166 Given the right triangle in the diagram below, what is the value of x , to the nearest foot?



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

167 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.

168 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

Geometry Common Core State Standards Regents at Random Answer Section

1 ANS: 3

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

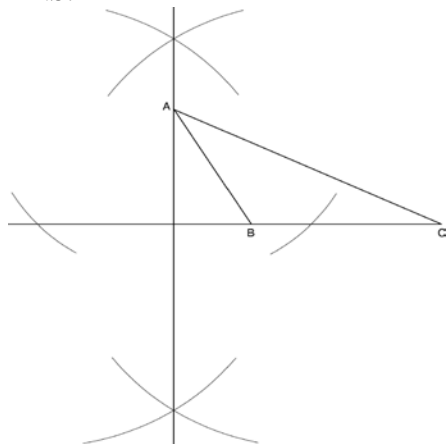
PTS: 2 REF: fall1404geo NAT: G.C.B.5 TOP: Arc Length
KEY: angle

2 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 NAT: G.SRT.A.2 TOP: Compositions of Transformations
KEY: grids

3 ANS:



PTS: 2 REF: fall1409geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

4 ANS: 1 PTS: 2 REF: 011608geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

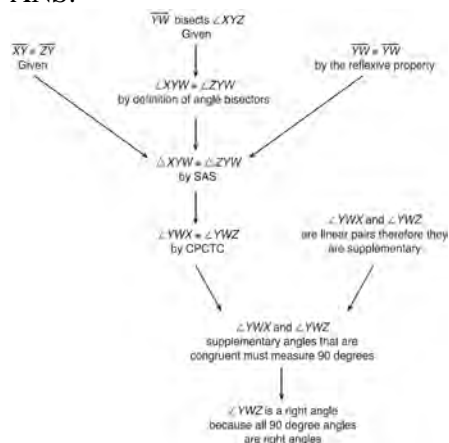
5 ANS:

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 NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

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

7 ANS:



$\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and \overline{YW} bisects $\angle XYZ$ (Given). $\triangle XYZ$ is isosceles (Definition of isosceles triangle). \overline{YW} is an altitude of $\triangle XYZ$ (The angle bisector of the vertex of an isosceles triangle is also the altitude of that triangle). $\overline{YW} \perp \overline{XZ}$ (Definition of altitude). $\angle YWZ$ is a right angle (Definition of perpendicular lines).

PTS: 4 REF: spr1411geo NAT: G.CO.C.10 TOP: Triangle Proofs

8 ANS: 1

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

PTS: 2 REF: 081704geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: parallel lines

9 ANS: 1

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

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

10 ANS: 3

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

PTS: 2 REF: 011719geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
11 ANS: 4 PTS: 2 REF: 011704geo NAT: G.CO.C.10
TOP: Midsegments

12 ANS: 3

NYSED has stated that all students should be awarded credit regardless of their answer to this question.

PTS: 2 REF: 061722geo NAT: G.CO.B.7 TOP: Triangle Congruency

13 ANS: 2

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

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

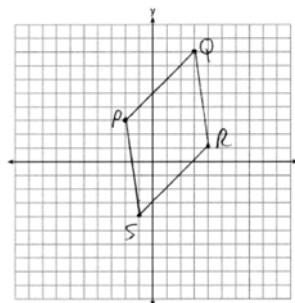
KEY: pyramids

14 ANS:

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

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

$$m_{\overline{QR}} = \frac{1-8}{4-3} = -7 \quad \text{Because the slopes of adjacent sides are not opposite reciprocals, they are not perpendicular}$$

and do not form a right angle. Therefore $PQRS$ is not a square.

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

KEY: grids

15 ANS: 2

$$12^2 = 9 \cdot 16$$

$$144 = 144$$

PTS: 2 REF: 081718geo NAT: G.SRT.B.5 TOP: Similarity

KEY: leg

16 ANS: 1 PTS: 2 REF: 011716geo NAT: G.CO.C.11

TOP: Special Quadrilaterals

17 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 NAT: G.C.A.1 TOP: Similarity Proofs

18 ANS:

$$180 - 2(25) = 130$$

PTS: 2 REF: 011730geo NAT: G.SRT.B.5 TOP: Isosceles Triangle Theorem

19 ANS: 3

The x -axis and line $x = 4$ are lines of symmetry and $(4,0)$ is a point of symmetry.

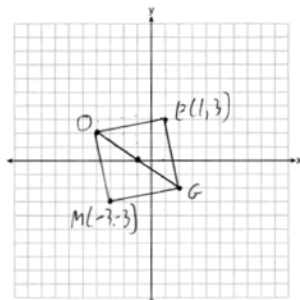
PTS: 2

REF: 081706geo

NAT: G.CO.A.3

TOP: Mapping a Polygon onto Itself

20 ANS:



PTS: 2

REF: 011731geo

NAT: G.GPE.B.4

TOP: Quadrilaterals in the Coordinate Plane

KEY: grids

21 ANS:

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

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

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

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

PTS: 6

REF: 011736geo

NAT: G.MG.A.2

TOP: Density

22 ANS: 2

$$x^2 = 3 \cdot 18$$

$$x = \sqrt{3 \cdot 3 \cdot 6}$$

$$x = 3\sqrt{6}$$

PTS: 2

REF: 081712geo

NAT: G.C.A.2

TOP: Chords, Secants and Tangents

KEY: secant and tangent drawn from common point, length

23 ANS:

Yes. The bases of the cylinders have the same area and the cylinders have the same height.

PTS: 2

REF: 081725geo

NAT: G.GMD.A.1

TOP: Volume

24 ANS:

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

PTS: 2

REF: 011729geo

NAT: G.SRT.A.3

TOP: Similarity Proofs

25 ANS: 1

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

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

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

KEY: completing the square

26 ANS: 2

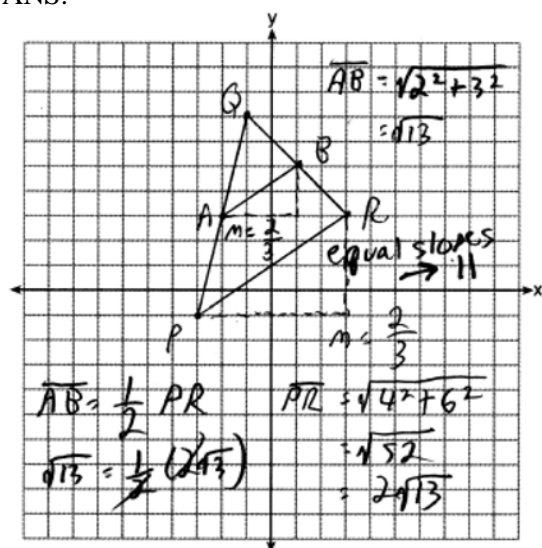
$$\tan \theta = \frac{2.4}{x}$$

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

$$x = 5.6$$

PTS: 2 REF: 011707geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

27 ANS:



PTS: 4 REF: 081732geo NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

28 ANS: 3

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

$$A \approx 50^\circ$$

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

29 ANS: 3

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

$$x = 15$$

PTS: 2 REF: 011624geo NAT: G.SRT.B.5 TOP: Similarity

KEY: basic

30 ANS: 3

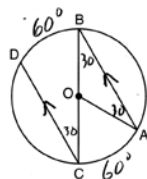
$$4\sqrt{(-1 - -3)^2 + (5 - 1)^2} = 4\sqrt{20}$$

PTS: 2 REF: 081703geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

31 ANS: 2 PTS: 2 REF: 011610geo NAT: G.SRT.A.1

TOP: Line Dilations

32 ANS:



$$180 - 2(30) = 120$$

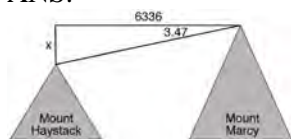
PTS: 2 REF: 011626geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents

KEY: parallel lines

33 ANS: 4 PTS: 2 REF: 011611geo NAT: G.CO.B.6

TOP: Properties of Transformations KEY: graphics

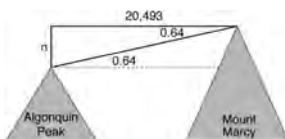
34 ANS:



$$\tan 3.47 = \frac{M}{6336}$$

$$M \approx 384$$

$$4960 + 384 = 5344$$



$$\tan 0.64 = \frac{A}{20,493}$$

$$A \approx 229$$

$$5344 - 229 = 5115$$

PTS: 6 REF: fall1413geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

KEY: advanced

35 ANS: 1 PTS: 2 REF: 011703geo NAT: G.SRT.B.5

TOP: Triangle Congruency

36 ANS: 4

$$-5 + \frac{3}{5}(5 - -5) \quad -4 + \frac{3}{5}(1 - -4)$$

$$-5 + \frac{3}{5}(10) \quad -4 + \frac{3}{5}(5)$$

$$-5 + 6 \quad -4 + 3$$

$$1 \quad -1$$

PTS: 2 REF: spr1401geo NAT: G.GPE.B.6 TOP: Directed Line Segments

37 ANS: 1

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

$$x \approx 4.76$$

PTS: 2 REF: 081715geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

38 ANS:

\overline{RS} and \overline{TV} bisect each other at point X ; \overline{TR} and \overline{SV} are drawn (given); $\overline{TX} \cong \overline{XV}$ and $\overline{RX} \cong \overline{XS}$ (segment bisectors create two congruent segments); $\angle TXR \cong \angle VXS$ (vertical angles are congruent); $\triangle TXR \cong \triangle VXS$ (SAS); $\angle T \cong \angle V$ (CPCTC); $\overline{TR} \parallel \overline{SV}$ (a transversal that creates congruent alternate interior angles cuts parallel lines).

PTS: 4 REF: 061733geo NAT: G.SRT.B.5 TOP: Triangle Proofs

KEY: proof

39 ANS: 2 PTS: 2 REF: 061720geo NAT: G.CO.C.11

TOP: Parallelograms

40 ANS: 2

$$\angle B = 180 - (82 + 26) = 72; \angle DEC = 180 - 26 = 154; \angle EDB = 360 - (154 + 26 + 72) = 108; \angle BDF = \frac{108}{2} = 54;$$

$$\angle DFB = 180 - (54 + 72) = 54$$

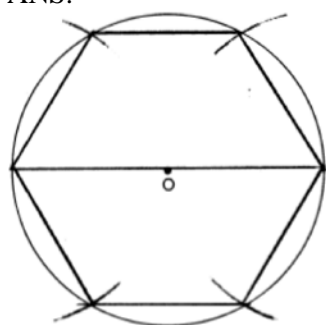
PTS: 2 REF: 061710geo NAT: G.CO.C.10 TOP: Interior and Exterior Angles of Triangles

41 ANS: 1

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

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

42 ANS:



PTS: 2 REF: 081728geo NAT: G.CO.D.13 TOP: Constructions

43 ANS: 4

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

$$3.5x = 18 - x$$

$$4.5x = 18$$

$$x = 4$$

PTS: 2 REF: 081707geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

44 ANS:

$$20000 \text{ g} \left(\frac{1 \text{ ft}^3}{7.48 \text{ g}} \right) = 2673.8 \text{ ft}^3 \quad 2673.8 = \pi r^2 (34.5) \quad 9.9 + 1 = 10.9$$

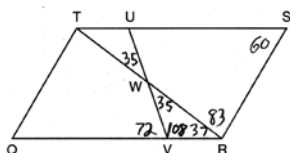
$$r \approx 4.967$$

$$d \approx 9.9$$

PTS: 4 REF: 061734geo NAT: G.GMD.A.3 TOP: Volume

KEY: cylinders

45 ANS: 3



PTS: 2 REF: 011603geo NAT: G.CO.C.11 TOP: Parallelograms

46 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 NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

47 ANS:

Each quarter in both stacks has the same base area. Therefore, each corresponding cross-section of the stacks will have the same area. Since the two stacks of quarters have the same height of 23 quarters, the two volumes must be the same.

PTS: 2 REF: spr1405geo NAT: G.GMD.A.1 TOP: Volume

48 ANS:

$$\sin 70 = \frac{30}{L}$$

$$L \approx 32$$

PTS: 2 REF: 011629geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

KEY: graphics

49 ANS: 1

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

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

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

KEY: completing the square

50 ANS: 4 PTS: 2 REF: 081716geo NAT: G.CO.C.10

TOP: Midsegments

51 ANS: 4 PTS: 2 REF: 011706geo NAT: G.CO.A.2

TOP: Identifying Transformations KEY: basic

52 ANS:

$$\frac{152 - 56}{2} = 48$$

PTS: 2 REF: 011728geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents

KEY: secant and tangent drawn from common point, angle

53 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 BCE at point C . Since a bisector divides a segment into two congruent segments at its midpoint, $\overline{BC} \cong \overline{EC}$. Point E is the image of point B after a reflection over the line CH , since points B and E are equidistant from point C and it is given that \overleftrightarrow{CH} is perpendicular to \overline{BE} . Point C is on \overleftrightarrow{CH} , and therefore, point C maps to itself after the reflection over \overleftrightarrow{CH} . Since all three vertices of triangle ABC map to all three vertices of triangle DEC under the same line reflection, then $\triangle ABC \cong \triangle DEC$ because a line reflection is a rigid motion and triangles are congruent when one can be mapped onto the other using a sequence of rigid motions.

PTS: 6 REF: spr1414geo NAT: G.CO.B.7 TOP: Triangle Congruency

54 ANS: 1

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

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

55 ANS:

The four small triangles are 8-15-17 triangles. $4 \times 17 = 68$

PTS: 2 REF: 081726geo NAT: G.CO.C.11 TOP: Special Quadrilaterals

56 ANS: 3 PTS: 2 REF: 061706geo NAT: G.SRT.A.1

TOP: Line Dilations

57 ANS: 1

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

$$w = 15$$

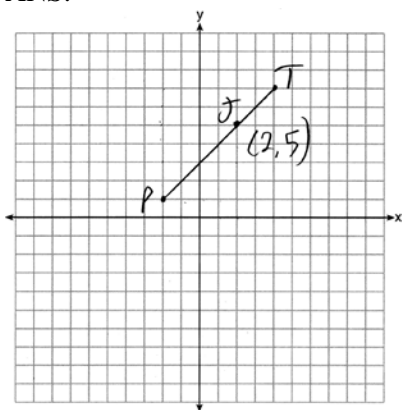
$$w = 14$$

$$w = 13$$

$$13 \times 19 = 247$$

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

58 ANS:



$$x = \frac{2}{3}(4 - -2) = 4 \quad -2 + 4 = 2 \quad J(2, 5)$$

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

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

59 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); $\overline{EC} \perp \overline{OC}$ (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); $\frac{BC}{CA} = \frac{AB}{EC}$ (Corresponding sides of similar triangles are in proportion).

PTS: 4 REF: 081733geo NAT: G.SRT.B.5 TOP: Circle Proofs

60 ANS:

Circle O , secant \overline{ACD} , tangent \overline{AB} (Given). Chords \overline{BC} and \overline{BD} are drawn (Auxiliary lines). $\angle A \cong \angle A$, $\widehat{BC} \cong \widehat{BC}$ (Reflexive property). $m\angle BDC = \frac{1}{2}m\widehat{BC}$ (The measure of an inscribed angle is half the measure of the intercepted arc). $m\angle CBA = \frac{1}{2}m\widehat{BC}$ (The measure of an angle formed by a tangent and a chord is half the measure of the intercepted arc). $\angle BDC \cong \angle CBA$ (Angles equal to half of the same arc are congruent). $\triangle ABC \sim \triangle ADB$ (AA). $\frac{AB}{AC} = \frac{AD}{AB}$ (Corresponding sides of similar triangles are proportional). $AC \cdot AD = AB^2$ (In a proportion, the product of the means equals the product of the extremes).

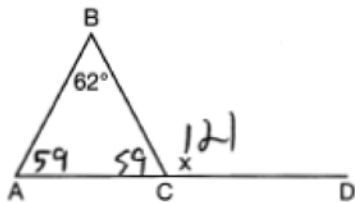
PTS: 6 REF: spr1413geo NAT: G.SRT.B.5 TOP: Circle Proofs

61 ANS:

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

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

62 ANS: 4



PTS: 2 REF: 081711geo NAT: G.CO.C.10 TOP: Exterior Angle Theorem

63 ANS: 3 PTS: 2 REF: 061703geo NAT: G.SRT.C.7

TOP: Cofunctions

64 ANS:

$\triangle MNO$ is congruent to $\triangle PNO$ by SAS. Since $\triangle MNO \cong \triangle PNO$, then $\overline{MO} \cong \overline{PO}$ by CPCTC. So \overline{NO} must divide \overline{MP} in half, and $MO = 8$.

PTS: 2 REF: fall1405geo NAT: G.SRT.B.5 TOP: Isosceles Triangle Theorem

65 ANS: 4 PTS: 2 REF: 011609geo NAT: G.SRT.C.7

TOP: Cofunctions

66 ANS:

$M\left(\frac{4+0}{2}, \frac{6-1}{2}\right) = M\left(2, \frac{5}{2}\right)$ $m = \frac{6-1}{4-0} = \frac{7}{4}$ $m_{\perp} = -\frac{4}{7}$ $y - 2.5 = -\frac{4}{7}(x - 2)$ The diagonals, \overline{MT} and \overline{AH} , of

rhombus $MATH$ are perpendicular bisectors of each other.

PTS: 4 REF: fall1411geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane

KEY: grids

67 ANS:

$$x^2 + x^2 = 58^2 \quad A = (\sqrt{1682} + 8)^2 \approx 2402.2$$

$$2x^2 = 3364$$

$$x = \sqrt{1682}$$

PTS: 4 REF: 081734geo NAT: G.MG.A.3 TOP: Area of Polygons

68 ANS:

Isosceles trapezoid $ABCD$, $\angle CDE \cong \angle DCE$, $\overline{AE} \perp \overline{DE}$, and $\overline{BE} \perp \overline{CE}$ (given); $\overline{AD} \cong \overline{BC}$ (congruent legs of isosceles trapezoid); $\angle DEA$ and $\angle CEB$ are right angles (perpendicular lines form right angles); $\angle DEA \cong \angle CEB$ (all right angles are congruent); $\angle CDA \cong \angle DCB$ (base angles of an isosceles trapezoid are congruent); $\angle CDA - \angle CDE \cong \angle DCB - \angle DCE$ (subtraction postulate); $\triangle ADE \cong \triangle BCE$ (AAS); $\overline{EA} \cong \overline{EB}$ (CPCTC);

$$\angle EDA \cong \angle ECB$$

$\triangle AEB$ is an isosceles triangle (an isosceles triangle has two congruent sides).

PTS: 6 REF: 081735geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

69 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 NAT: G.GPE.B.6 TOP: Directed Line Segments

70 ANS:

Parallelogram $ANDR$ with \overline{AW} and \overline{DE} bisecting \overline{NWD} and \overline{REA} at points W and E (Given). $\overline{AN} \cong \overline{RD}$, $\overline{AR} \cong \overline{DN}$ (Opposite sides of a parallelogram are congruent). $AE = \frac{1}{2}AR$, $WD = \frac{1}{2}DN$, so $\overline{AE} \cong \overline{WD}$ (Definition of bisect and division property of equality). $\overline{AR} \parallel \overline{DN}$ (Opposite sides of a parallelogram are parallel). $AWDE$ is a parallelogram (Definition of parallelogram). $RE = \frac{1}{2}AR$, $NW = \frac{1}{2}DN$, so $\overline{RE} \cong \overline{NW}$ (Definition of bisect and division property of equality). $\overline{ED} \cong \overline{AW}$ (Opposite sides of a parallelogram are congruent). $\triangle ANW \cong \triangle DRE$ (SSS).

PTS: 6 REF: 011635geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

71 ANS: 4 PTS: 2 REF: 061711geo NAT: G.CO.C.11

TOP: Special Quadrilaterals

72 ANS: 2

The given line h , $2x + y = 1$, does not pass through the center of dilation, the origin, because the y -intercept is at $(0, 1)$. The slope of the dilated line, m , will remain the same as the slope of line h , -2 . All points on line h , such as $(0, 1)$, the y -intercept, are dilated by a scale factor of 4; therefore, the y -intercept of the dilated line is $(0, 4)$ because the center of dilation is the origin, resulting in the dilated line represented by the equation $y = -2x + 4$.

PTS: 2 REF: spr1403geo NAT: G.SRT.A.1 TOP: Line Dilations

73 ANS: 1

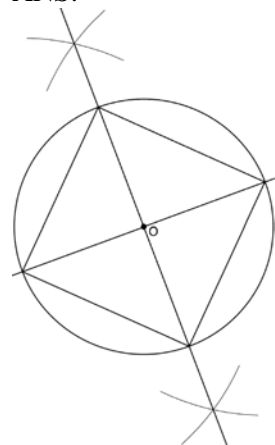
Since a dilation preserves parallelism, the line $4y = 3x + 7$ and its image $3x - 4y = 9$ are parallel, with slopes of $\frac{3}{4}$.

PTS: 2 REF: 081710geo NAT: G.SRT.A.1 TOP: Line Dilations

74 ANS: 1 PTS: 2 REF: 011606geo NAT: G.CO.C.9

TOP: Lines and Angles

75 ANS:



Since the square is inscribed, each vertex of the square is on the circle and the diagonals of the square are diameters of the circle. Therefore, each angle of the square is an inscribed angle in the circle that intercepts the circle at the endpoints of the diameters. Each angle of the square, which is an inscribed angle, measures 90 degrees. Therefore, the measure of the arc intercepted by two adjacent sides of the square is 180 degrees because it is twice the measure of its inscribed angle.

PTS: 4 REF: fall1412geo NAT: G.CO.D.13 TOP: Constructions

76 ANS: 4

$$\frac{360^\circ}{10} = 36^\circ \quad 252^\circ \text{ is a multiple of } 36^\circ$$

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

77 ANS: 1

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

$$x \approx 3.3$$

PTS: 2 REF: 081719geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

78 ANS:

$$x^2 - 6x + 9 + y^2 + 8y + 16 = 56 + 9 + 16 \quad (3, -4); r = 9$$

$$(x - 3)^2 + (y + 4)^2 = 81$$

PTS: 2 REF: 081731geo NAT: G.GPE.A.1 TOP: Equations of Circles

KEY: completing the square

79 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 NAT: G.SRT.B.5 TOP: Similarity

KEY: basic

80 ANS: 4

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

$$36 - 4x = 2x$$

$$x = 6$$

PTS: 2 REF: 061705geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

81 ANS: 2 PTS: 2 REF: 081701geo NAT: G.GMD.B.4

TOP: Cross-Sections of Three-Dimensional Objects

82 ANS: 2

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

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

KEY: prisms

83 ANS:

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

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

84 ANS:

$$r = 25 \text{ cm} \left(\frac{1 \text{ m}}{100 \text{ cm}} \right) = 0.25 \text{ m} \quad V = \pi(0.25 \text{ m})^2(10 \text{ m}) = 0.625\pi \text{ m}^3 \quad W = 0.625\pi \text{ m}^3 \left(\frac{380 \text{ K}}{1 \text{ m}^3} \right) \approx 746.1 \text{ K}$$

$$n = \frac{\$50,000}{\left(\frac{\$4.75}{\text{K}} \right) (746.1 \text{ K})} = 14.1 \quad 15 \text{ trees}$$

PTS: 4 REF: spr1412geo NAT: G.MG.A.2 TOP: Density

85 ANS:

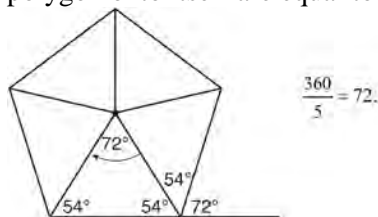
$$\tan 15 = \frac{6250}{x} \quad \tan 52 = \frac{6250}{y} \quad 23325.3 - 4883 = 18442 \quad \frac{18442 \text{ ft}}{1 \text{ min}} \left(\frac{1 \text{ mi}}{5280 \text{ ft}} \right) \left(\frac{60 \text{ min}}{1 \text{ h}} \right) \approx 210$$

$$x \approx 23325.3 \quad y \approx 4883$$

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

86 ANS: 2

Segments drawn from the center of the regular pentagon bisect each angle of the pentagon, and create five isosceles triangles as shown in the diagram below. Since each exterior angle equals the angles formed by the segments drawn from the center of the regular pentagon, the minimum degrees necessary to carry a regular polygon onto itself are equal to the measure of an exterior angle of the regular polygon.



PTS: 2 REF: spr1402geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

87 ANS: 3

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

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

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

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

PTS: 2 REF: 081713geo NAT: G.GMD.B.4 TOP: Rotations of Two-Dimensional Objects

88 ANS: 2

The line $y = 2x - 4$ does not pass through the center of dilation, so the dilated line will be distinct from $y = 2x - 4$. Since a dilation preserves parallelism, the line $y = 2x - 4$ and its image will be parallel, with slopes of 2. To obtain the y-intercept of the dilated line, the scale factor of the dilation, $\frac{3}{2}$, can be applied to the y-intercept,

$(0, -4)$. Therefore, $\left(0 \cdot \frac{3}{2}, -4 \cdot \frac{3}{2}\right) \rightarrow (0, -6)$. So the equation of the dilated line is $y = 2x - 6$.

PTS: 2 REF: fall1403geo NAT: G.SRT.A.1 TOP: Line Dilations

89 ANS: 2 PTS: 2 REF: 061709geo NAT: G.SRT.B.5

TOP: Triangle Proofs KEY: statements

90 ANS: 1

$$-8 + \frac{3}{8}(16 - -8) = -8 + \frac{3}{8}(24) = -8 + 9 = 1 \quad -2 + \frac{3}{8}(6 - -2) = -2 + \frac{3}{8}(8) = -2 + 3 = 1$$

PTS: 2 REF: 081717geo NAT: G.GPE.B.6 TOP: Directed Line Segments

91 ANS: 4

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

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

KEY: inscribed

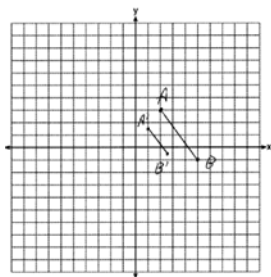
92 ANS: 3

$$\frac{x}{360} \cdot 3^2 \pi = 2\pi \quad 180 - 80 = 100$$

$$x = 80 \quad \frac{180 - 100}{2} = 40$$

PTS: 2 REF: 011612geo NAT: G.C.B.5 TOP: Sectors

93 ANS:



$$\sqrt{(2.5 - 1)^2 + (-.5 - 1.5)^2} = \sqrt{2.25 + 4} = 2.5$$

PTS: 2 REF: 081729geo NAT: G.SRT.A.2 TOP: Dilations

100 ANS: 4

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

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

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

KEY: completing the square

101 ANS:

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

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

KEY: identify

102 ANS: 2

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

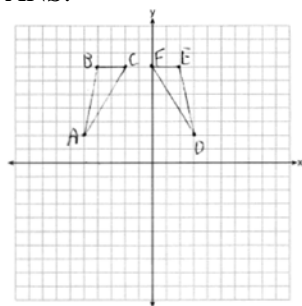
$$m_{\perp} = -\frac{2}{3} \quad 1 = 4 + b$$

$$-3 = b$$

PTS: 2 REF: 061719geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines

KEY: write equation of perpendicular line

103 ANS:


 $r_{x=-1}$ Reflections are rigid motions that preserve distance, so $\triangle ABC \cong \triangle DEF$.

PTS: 4 REF: 061732geo NAT: G.CO.A.2 TOP: Identifying Transformations

KEY: graphics

104 ANS:

$$\sqrt[3]{\frac{3V_f}{4\pi}} - \sqrt[3]{\frac{3V_p}{4\pi}} = \sqrt[3]{\frac{3(294)}{4\pi}} - \sqrt[3]{\frac{3(180)}{4\pi}} \approx 0.6$$

PTS: 2 REF: 061728geo NAT: G.GMD.A.3 TOP: Volume

KEY: spheres

105 ANS:

Translate $\triangle ABC$ along \overline{CF} such that point C maps onto point F , resulting in image $\triangle A'B'C'$. Then reflect $\triangle A'B'C'$ over \overline{DF} such that $\triangle A'B'C'$ maps onto $\triangle DEF$.

or

Reflect $\triangle ABC$ over the perpendicular bisector of \overline{EB} such that $\triangle ABC$ maps onto $\triangle DEF$.

PTS: 2 REF: fall1408geo NAT: G.CO.B.7 TOP: Triangle Congruency

106 ANS: 1

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

$$S \approx 23$$

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

107 ANS: 4

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

$$2y = x$$

$$2y - x = 0$$

PTS: 2 REF: 081724geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines

KEY: perpendicular bisector

108 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 90° about point C such that point L maps onto point D .

PTS: 4 REF: spr1408geo NAT: G.CO.B.8 TOP: Triangle Congruency

109 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 NAT: G.GPE.B.4 TOP: Triangles in the Coordinate Plane

110 ANS: 2

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

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

KEY: altitude

111 ANS: 2

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

PTS: 2 REF: 011619geo NAT: G.MG.A.2 TOP: Density

112 ANS:

$$\begin{aligned} \tan 52.8 &= \frac{h}{x} & x \tan 52.8 &= x \tan 34.9 + 8 \tan 34.9 & \tan 52.8 &\approx \frac{h}{9} & 11.86 + 1.7 &\approx 13.6 \\ h &= x \tan 52.8 & x \tan 52.8 - x \tan 34.9 &= 8 \tan 34.9 & & & x &\approx 11.86 \\ \tan 34.9 &= \frac{h}{x+8} & x(\tan 52.8 - \tan 34.9) &= 8 \tan 34.9 & & & & \\ h &= (x+8) \tan 34.9 & x &= \frac{8 \tan 34.9}{\tan 52.8 - \tan 34.9} & & & & \\ & & & x &\approx 9 & & & \end{aligned}$$

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

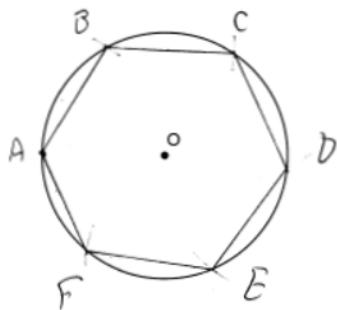
113 ANS: 3 PTS: 2 REF: 011710geo NAT: G.CO.A.5
TOP: Compositions of Transformations KEY: identify

114 ANS: 4

The measures of the angles of a triangle remain the same after all rotations because rotations are rigid motions which preserve angle measure.

PTS: 2 REF: fall1402geo NAT: G.CO.B.6 TOP: Properties of Transformations
KEY: graphics

115 ANS:



Right triangle because $\angle CBF$ is inscribed in a semi-circle.

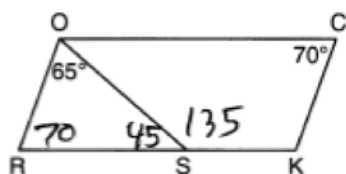
PTS: 4 REF: 011733geo NAT: G.CO.D.13 TOP: Constructions

116 ANS:

(2) Euclid's Parallel Postulate; (3) Alternate interior angles formed by parallel lines and a transversal are congruent; (4) Angles forming a line are supplementary; (5) Substitution

PTS: 4 REF: 011633geo NAT: G.CO.C.10 TOP: Triangle Proofs

117 ANS: 4



PTS: 2 REF: 081708geo NAT: G.CO.C.11 TOP: Parallelograms

118 ANS: 4

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

PTS: 2

REF: 011721geo

NAT: G.C.B.5

TOP: Sectors

119 ANS:

$$\ell: y = 3x - 4$$

$$m: y = 3x - 8$$

PTS: 2

REF: 011631geo

NAT: G.SRT.A.1

TOP: Line Dilations

120 ANS:

x represents the distance between the lighthouse and the canoe at 5:00; y represents the distance between the

lighthouse and the canoe at 5:05. $\tan 6 = \frac{112 - 1.5}{x}$ $\tan(49 + 6) = \frac{112 - 1.5}{y}$ $\frac{1051.3 - 77.4}{5} \approx 195$

$$x \approx 1051.3$$

$$y \approx 77.4$$

PTS: 4

REF: spr1409geo

NAT: G.SRT.C.8

TOP: Using Trigonometry to Find a Side

KEY: advanced

121 ANS:



PTS: 2

REF: 061725geo

NAT: G.CO.D.12

TOP: Constructions

KEY: parallel and perpendicular lines

122 ANS: 3

PTS: 2

REF: 011621geo

NAT: G.C.A.2

TOP: Chords, Secants and Tangents

KEY: inscribed

123 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

NAT: G.C.B.5

TOP: Sectors

- 124 ANS: 2
 $8(x + 8) = 6(x + 18)$
 $8x + 64 = 6x + 108$
 $2x = 44$
 $x = 22$
- PTS: 2 REF: 011715geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
 KEY: secants drawn from common point, length
- 125 ANS: 3 PTS: 2 REF: 061702geo NAT: G.GPE.B.7
 TOP: Polygons in the Coordinate Plane
- 126 ANS: 3
 In (1) and (2), $ABCD$ could be a rectangle with non-congruent sides. (4) is not possible
- PTS: 2 REF: 081714geo NAT: G.CO.C.11 TOP: Special Quadrilaterals
- 127 ANS: 4
 $\frac{6.6}{x} = \frac{4.2}{5.25}$
 $4.2x = 34.65$
 $x = 8.25$
- PTS: 2 REF: 081705geo NAT: G.SRT.B.5 TOP: Similarity
 KEY: basic
- 128 ANS: 2
 $4 \times 4 \times 6 - \pi(1)^2(6) \approx 77$
- PTS: 2 REF: 011711geo NAT: G.GMD.A.3 TOP: Volume
 KEY: compositions
- 129 ANS: 1
 $\frac{6}{8} = \frac{9}{12}$
- PTS: 2 REF: 011613geo NAT: G.SRT.B.5 TOP: Similarity
 KEY: basic
- 130 ANS: 2 PTS: 2 REF: 061701geo NAT: G.CO.A.5
 TOP: Compositions of Transformations KEY: identify
- 131 ANS:
 Yes, because 28° and 62° angles are complementary. The sine of an angle equals the cosine of its complement.
- PTS: 2 REF: 011727geo NAT: G.SRT.C.7 TOP: Cofunctions
- 132 ANS:
 $\frac{\left(\frac{180-20}{2}\right)}{360} \times \pi(6)^2 = \frac{80}{360} \times 36\pi = 8\pi$
- PTS: 4 REF: spr1410geo NAT: G.C.B.5 TOP: Sectors

133 ANS: 4 PTS: 2 REF: 081702geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic

134 ANS:

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

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

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

136 ANS:

$$R_{180^\circ} \text{ about } \left(-\frac{1}{2}, \frac{1}{2} \right)$$

PTS: 2 REF: 081727geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

137 ANS: 2

(1) AA; (3) SAS; (4) SSS. NYSED has stated that all students should be awarded credit regardless of their answer to this question.

PTS: 2 REF: 061724geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

138 ANS: 1

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

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

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

139 ANS: 4

$$\frac{36}{45} \neq \frac{15}{18}$$

$$\frac{4}{5} \neq \frac{5}{6}$$

PTS: 2 REF: 081709geo NAT: G.SRT.A.3 TOP: Similarity Proofs

140 ANS:

The acute angles in a right triangle are always complementary. The sine of any acute angle is equal to the cosine of its complement.

PTS: 2 REF: spr1407geo NAT: G.SRT.C.7 TOP: Cofunctions

141 ANS: 3

$$y = mx + b$$

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

$$3 = b$$

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

142 ANS:

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

$$31.416 = 2\pi r$$

$$5 \approx r$$

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

KEY: cones

143 ANS: 2

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

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

144 ANS: 3 PTS: 2 REF: 011714geo NAT: G.SRT.C.6

TOP: Trigonometric Ratios

145 ANS:

$$\tan 16.5 = \frac{x}{13.5} \quad 9 \times 16 \times 4.5 = 648 \quad 3752 - (35 \times 16 \times 5) = 3472$$

$$x \approx 4 \quad 13.5 \times 16 \times 4.5 = 972 \quad 3472 \times 7.48 \approx 25971$$

$$4 + 4.5 = 8.5 \quad \frac{1}{2} \times 13.5 \times 16 \times 4 = 432 \quad \frac{25971}{10.5} \approx 2473.4$$

$$12.5 \times 16 \times 8.5 = \frac{1700}{3752} \quad \frac{2473.4}{60} \approx 41$$

PTS: 6 REF: 081736geo NAT: G.GMD.A.3 TOP: Volume

KEY: compositions

146 ANS: 2

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

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

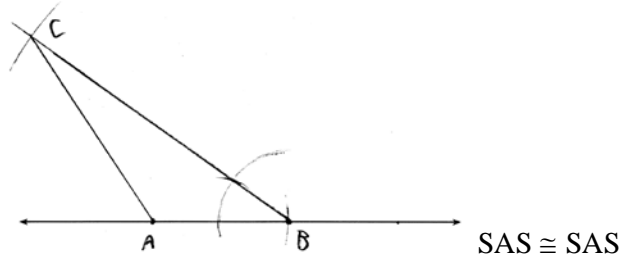
147 ANS: 1

$$\text{Illinois: } \frac{12830632}{231.1} \approx 55520 \quad \text{Florida: } \frac{18801310}{350.6} \approx 53626 \quad \text{New York: } \frac{19378102}{411.2} \approx 47126 \quad \text{Pennsylvania:}$$

$$\frac{12702379}{283.9} \approx 44742$$

PTS: 2 REF: 081720geo NAT: G.MG.A.2 TOP: Density

148 ANS:



PTS: 4 REF: 011634geo NAT: G.CO.D.12 TOP: Constructions
KEY: congruent and similar figures

149 ANS:

Rotate $\triangle ABC$ clockwise about point C until $\overline{DF} \parallel \overline{AC}$. Translate $\triangle ABC$ along \overline{CF} so that C maps onto F .

PTS: 2 REF: 061730geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

150 ANS: 3

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

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

151 ANS: 2

$$6 \cdot 6 = x(x - 5)$$

$$36 = x^2 - 5x$$

$$0 = x^2 - 5x - 36$$

$$0 = (x - 9)(x + 4)$$

$$x = 9$$

PTS: 2 REF: 061708geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: intersecting chords, length

152 ANS:

As the sum of the measures of the angles of a triangle is 180° , $m\angle ABC + m\angle BCA + m\angle CAB = 180^\circ$. Each interior angle of the triangle and its exterior angle form a linear pair. Linear pairs are supplementary, so $m\angle ABC + m\angle FBC = 180^\circ$, $m\angle BCA + m\angle DCA = 180^\circ$, and $m\angle CAB + m\angle EAB = 180^\circ$. By addition, the sum of these linear pairs is 540° . When the angle measures of the triangle are subtracted from this sum, the result is 360° , the sum of the exterior angles of the triangle.

PTS: 4 REF: fall1410geo NAT: G.CO.C.10 TOP: Triangle Proofs

153 ANS: 1

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

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

154 ANS:

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

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

155 ANS: 4

$$40 - x + 3x = 90$$

$$2x = 50$$

$$x = 25$$

PTS: 2 REF: 081721geo NAT: G.SRT.C.7 TOP: Cofunctions

156 ANS: 4

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

$$x = 20 \sin 71 \approx 19$$

PTS: 2 REF: 061721geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: without graphics

157 ANS: 1

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

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

KEY: cones

158 ANS: 4

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

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

$$-16 = b$$

PTS: 2 REF: 011602geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines

KEY: write equation of perpendicular line

159 ANS: 1

PTS: 2

REF: 011601geo

NAT: G.GMD.B.4

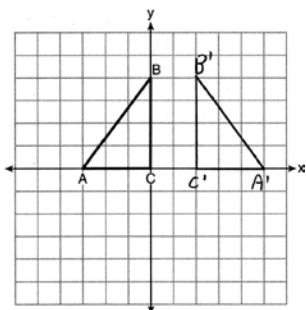
TOP: Cross-Sections of Three-Dimensional Objects

160 ANS: 4

$$\frac{360^\circ}{10} = 36^\circ \quad 252^\circ \text{ is a multiple of } 36^\circ$$

PTS: 2 REF: 081722geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

161 ANS:



PTS: 2 REF: 011625geo NAT: G.CO.A.5 TOP: Reflections

KEY: grids

162 ANS: 1

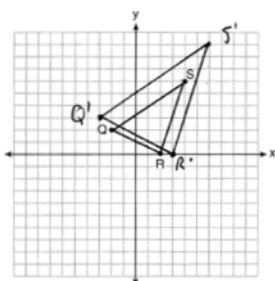
$$84 = \frac{1}{3} \cdot s^2 \cdot 7$$

$$6 = s$$

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

KEY: pyramids

163 ANS:



A dilation preserves slope, so the slopes of \overline{QR} and $\overline{Q'R'}$ are equal. Because the slopes are equal, $Q'R' \parallel QR$.

PTS: 4 REF: 011732geo NAT: G.SRT.A.2 TOP: Dilations

KEY: grids

164 ANS:

No, the weight of the bricks is greater than 900 kg. $500 \times (5.1 \text{ cm} \times 10.2 \text{ cm} \times 20.3 \text{ cm}) = 528,003 \text{ cm}^3$.

$$528,003 \text{ cm}^3 \times \frac{1 \text{ m}^3}{100 \text{ cm}^3} = 0.528003 \text{ m}^3. \quad \frac{1920 \text{ kg}}{\text{m}^3} \times 0.528003 \text{ m}^3 \approx 1013 \text{ kg}.$$

PTS: 2 REF: fall1406geo NAT: G.MG.A.2 TOP: Density

165 ANS:

If an altitude is drawn to the hypotenuse of a triangle, it divides the triangle into two right triangles similar to each other and the original triangle.

PTS: 2 REF: 061729geo NAT: G.SRT.B.5 TOP: Similarity

KEY: altitude

166 ANS: 3

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

$$x \approx 18$$

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

167 ANS:

$4x - .07 = 2x + .01$ $\sin A$ is the ratio of the opposite side and the hypotenuse while $\cos B$ is the ratio of the adjacent

$$2x = 0.8$$

$$x = 0.4$$

side and the hypotenuse. The side opposite angle A is the same side as the side adjacent to angle B . Therefore, $\sin A = \cos B$.

PTS: 2 REF: fall1407geo NAT: G.SRT.C.7 TOP: Cofunctions

168 ANS: 3

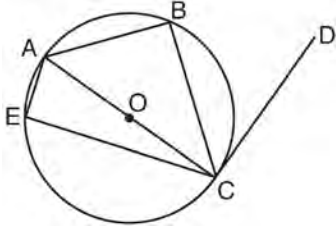
$$2.5 \times 1.25 \times (27 \times 12) + \frac{1}{2} \pi (1.25)^2 (27 \times 12) \approx 1808$$

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

KEY: compositions

Geometry Common Core State Standards Regents at Random

- 169 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) $\angle CBA \cong \angle AEC$
- 170 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) $y = 2x + 6$

- 171 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.

- 172 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) $\frac{64\pi}{3}$

- 173 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

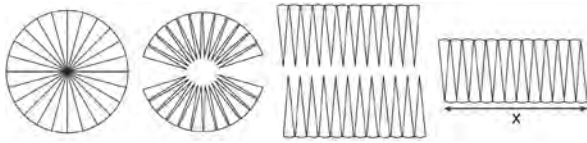
- 174 If $\triangle ABC$ is dilated by a scale factor of 3, which statement is true of the image $\triangle A'B'C'$?

- 1) $3A'B' = AB$
- 2) $B'C' = 3BC$
- 3) $m\angle A' = 3(m\angle A)$
- 4) $3(m\angle C') = m\angle C$

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

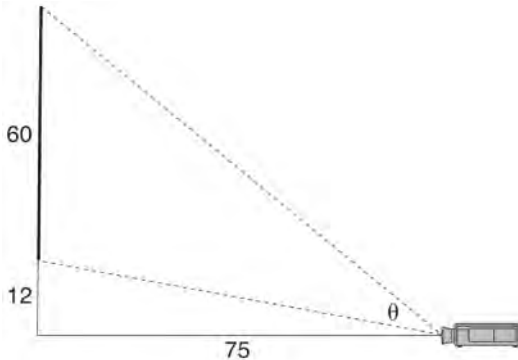
- 1) octagon
- 2) decagon
- 3) hexagon
- 4) pentagon

- 176 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
- 177 As modeled below, a movie is projected onto a large outdoor screen. The bottom of the 60-foot-tall screen is 12 feet off the ground. The projector sits on the ground at a horizontal distance of 75 feet from the screen.



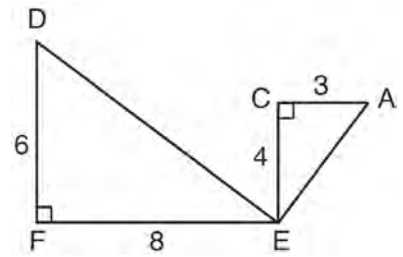
Determine and state, to the *nearest tenth of a degree*, the measure of θ , the projection angle.

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

- 179 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

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



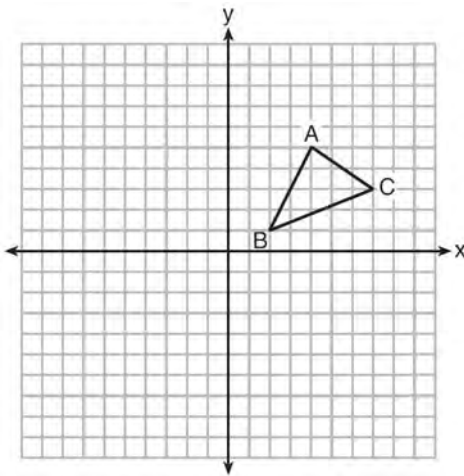
What is a correct sequence of similarity transformations that shows $\triangle AEC \sim \triangle DEF$?

- 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
- 181 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) $3x - 2y = 5$

- 182 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

- 183 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) $\frac{2}{5}$
- 2) $\frac{3}{2}$
- 3) $-\frac{1}{2}$
- 4) $-\frac{5}{2}$

- 184 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 .

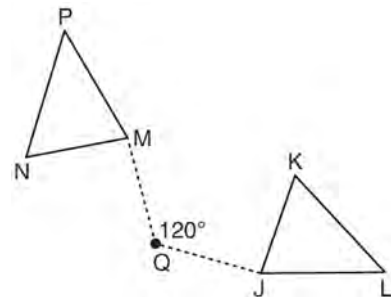
- 185 A hemispherical water tank has an inside diameter of 10 feet. If water has a density of 62.4 pounds per cubic foot, what is the weight of the water in a full tank, to the *nearest pound*?

- 1) 16,336
- 2) 32,673
- 3) 130,690
- 4) 261,381

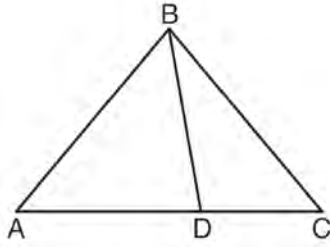
- 186 An equilateral triangle has sides of length 20. To the *nearest tenth*, what is the height of the equilateral triangle?

- 1) 10.0
- 2) 11.5
- 3) 17.3
- 4) 23.1

- 187 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.

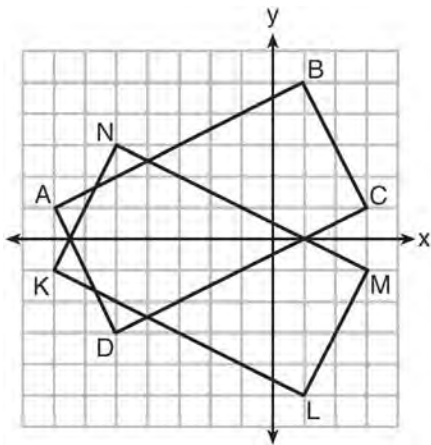


- 188 In the diagram below, $m\angle BDC = 100^\circ$, $m\angle A = 50^\circ$, and $m\angle DBC = 30^\circ$.



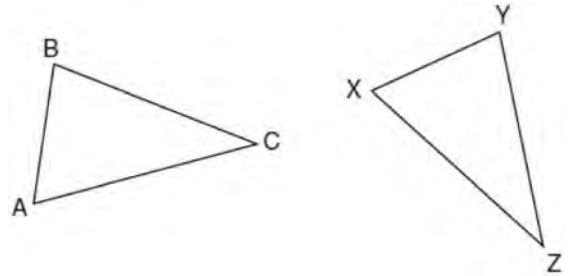
Which statement is true?

- 1) $\triangle ABD$ is obtuse.
 - 2) $\triangle ABC$ is isosceles.
 - 3) $m\angle ABD = 80^\circ$
 - 4) $\triangle ABD$ is scalene.
- 189 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

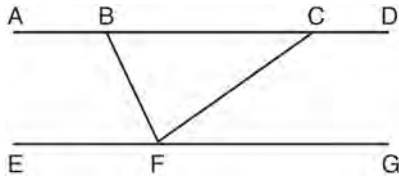
- 190 In the diagram below of $\triangle ABC$ and $\triangle XYZ$, a sequence of rigid motions maps $\angle A$ onto $\angle X$, $\angle C$ onto $\angle Z$, and \overline{AC} onto \overline{XZ} .



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

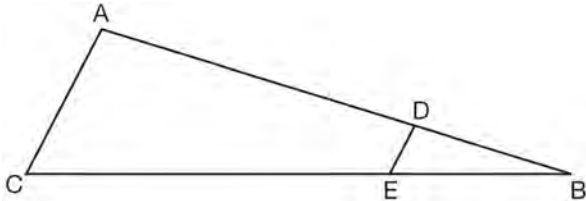
- 191 A gallon of paint will cover approximately 450 square feet. An artist wants to paint all the outside surfaces of a cube measuring 12 feet on each edge. What is the *least* number of gallons of paint he must buy to paint the cube?
- 1) 1
 - 2) 2
 - 3) 3
 - 4) 4
- 192 A flagpole casts a shadow 16.60 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*.

- 193 Steve drew line segments \overline{ABCD} , \overline{EFG} , \overline{BF} , and \overline{CF} as shown in the diagram below. Scalene $\triangle BFC$ is formed.



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

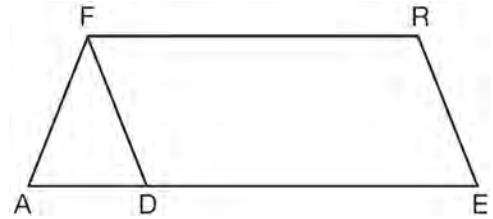
- 1) $\angle CFG \cong \angle FCB$
 - 2) $\angle ABF \cong \angle BFC$
 - 3) $\angle EFB \cong \angle CFB$
 - 4) $\angle CBF \cong \angle GFC$
- 194 In the diagram of $\triangle ABC$, points D and E are on \overline{AB} and \overline{CB} , respectively, such that $\overline{AC} \parallel \overline{DE}$.



If $AD = 24$, $DB = 12$, and $DE = 4$, what is the length of \overline{AC} ?

- 1) 8
 - 2) 12
 - 3) 16
 - 4) 72
- 195 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

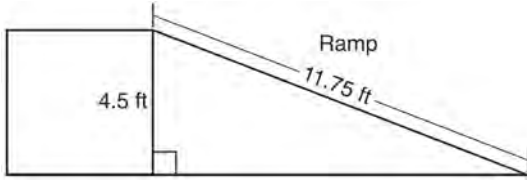
- 196 In the diagram of parallelogram $FRED$ shown below, \overline{ED} is extended to A , and \overline{AF} is drawn such that $\overline{AF} \cong \overline{DF}$.



If $m\angle R = 124^\circ$, what is $m\angle AFD$?

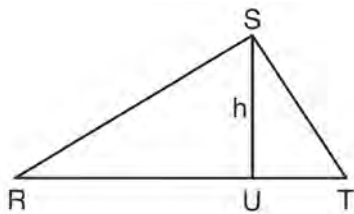
- 1) 124°
 - 2) 112°
 - 3) 68°
 - 4) 56°
- 197 A triangle is dilated by a scale factor of 3 with the center of dilation at the origin. Which statement is true?
- 1) The area of the image is nine times the area of the original triangle.
 - 2) The perimeter of the image is nine times the perimeter of the 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.
- 198 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) $(6,3)$

- 199 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.

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

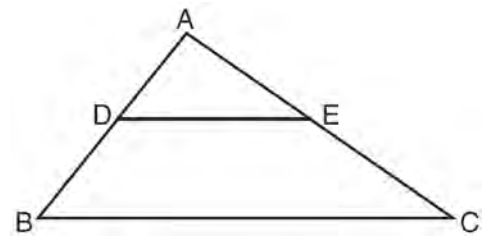


If $SU = h$, $UT = 12$, and $RT = 42$, which value of h will make $\triangle RST$ a right triangle with $\angle RST$ as a right angle?

- 1) $6\sqrt{3}$
 - 2) $6\sqrt{10}$
 - 3) $6\sqrt{14}$
 - 4) $6\sqrt{35}$
- 201 After a reflection over a line, $\triangle A'B'C'$ is the image of $\triangle ABC$. Explain why triangle ABC is congruent to triangle $\triangle A'B'C'$.

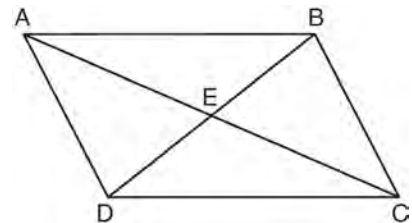
- 202 A hemispherical tank is filled with water and has a diameter of 10 feet. If water weighs 62.4 pounds per cubic foot, what is the total weight of the water in a full tank, to the *nearest pound*?
- 1) 16,336
 - 2) 32,673
 - 3) 130,690
 - 4) 261,381

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



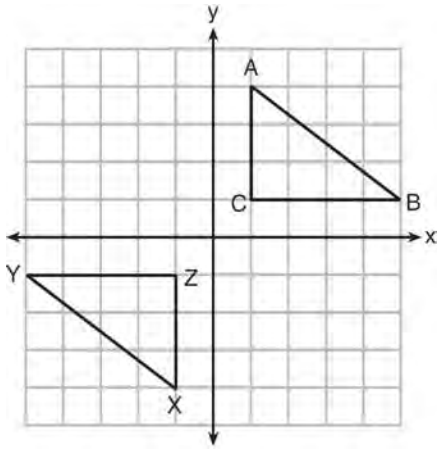
Which measurements are justified by this similarity?

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



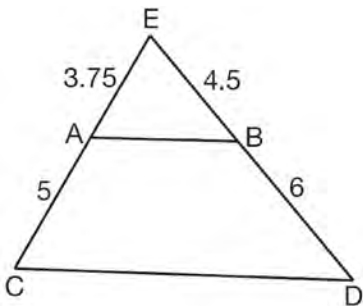
Prove: $\triangle AED \cong \triangle CEB$
 Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

- 205 In the diagram below, $\triangle ABC$ and $\triangle XYZ$ are graphed.



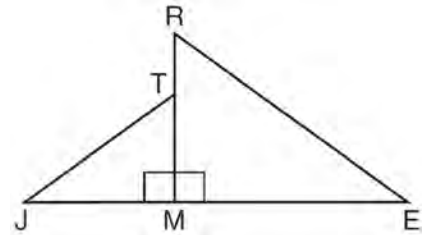
Use the properties of rigid motions to explain why $\triangle ABC \cong \triangle XYZ$.

- 206 In $\triangle CED$ as shown below, points A and B are located on sides \overline{CE} and \overline{ED} , respectively. Line segment \overline{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} .

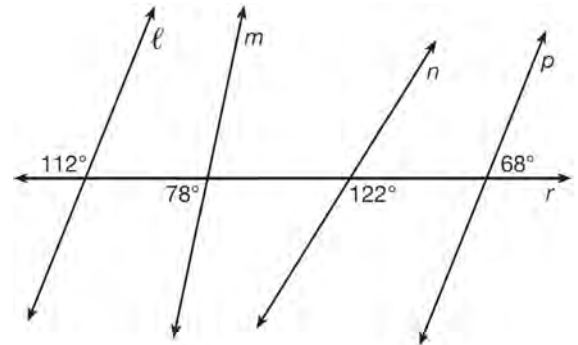
- 207 In the diagram below, $\triangle ERM \sim \triangle JTM$.



Which statement is always true?

- 1) $\cos J = \frac{RM}{RE}$
- 2) $\cos R = \frac{JM}{JT}$
- 3) $\tan T = \frac{RM}{EM}$
- 4) $\tan E = \frac{TM}{JM}$

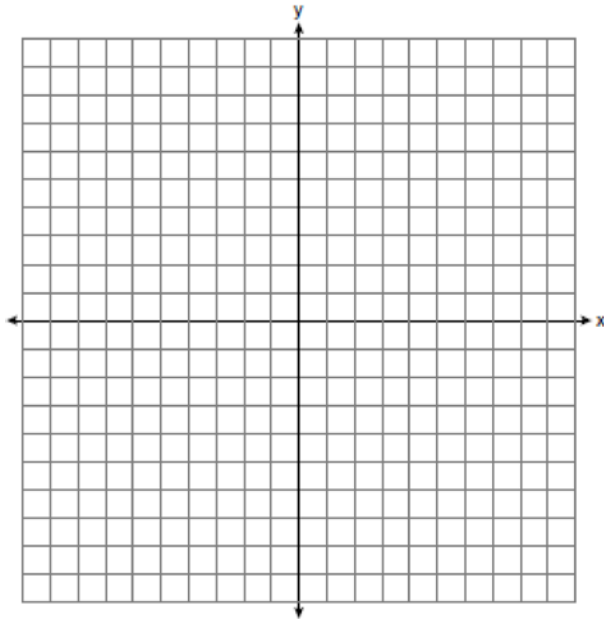
- 208 In the diagram below, lines ℓ , m , n , and p intersect line r .



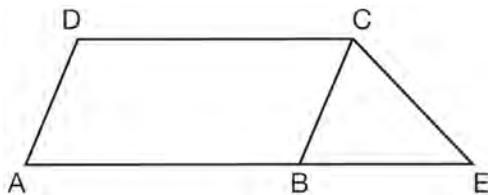
Which statement is true?

- 1) $\ell \parallel n$
- 2) $\ell \parallel p$
- 3) $m \parallel p$
- 4) $m \parallel n$

- 209 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.]



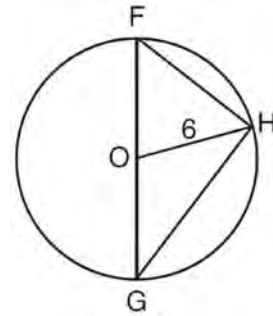
- 210 In the diagram below, $ABCD$ is a parallelogram, \overline{AB} is extended through B to E , and \overline{CE} is drawn.



If $\overline{CE} \cong \overline{BE}$ and $m\angle D = 112^\circ$, what is $m\angle E$?

- 1) 44°
- 2) 56°
- 3) 68°
- 4) 112°

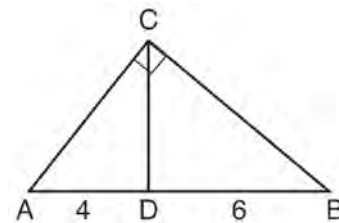
- 211 Triangle FGH is inscribed in circle O , the length of radius \overline{OH} is 6, and $\overline{FH} \cong \overline{OG}$.



What is the area of the sector formed by angle FOH ?

- 1) 2π
- 2) $\frac{3}{2}\pi$
- 3) 6π
- 4) 24π

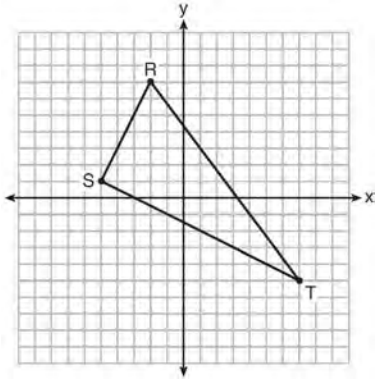
- 212 In the diagram of right triangle ABC , \overline{CD} intersects hypotenuse \overline{AB} at D .



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) $4\sqrt{2}$

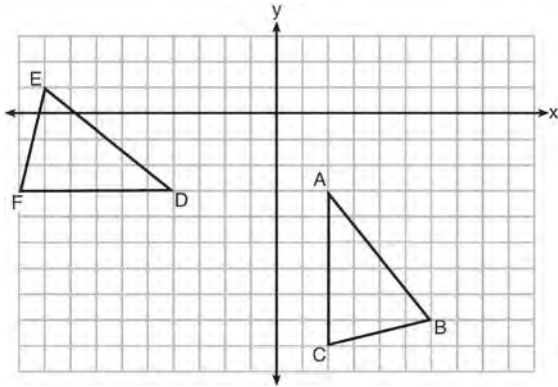
213 Triangle RST is graphed on the set of axes below.



How many square units are in the area of $\triangle RST$?

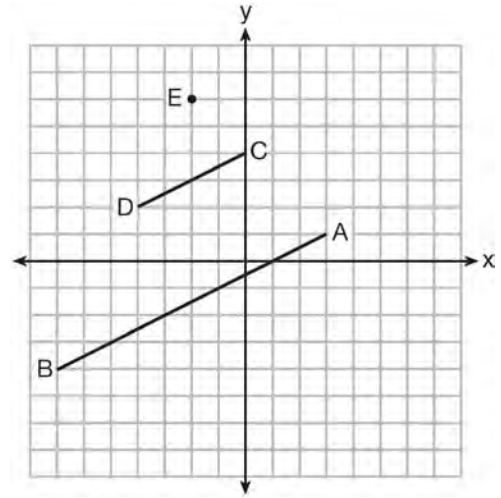
- 1) $9\sqrt{3} + 15$
- 2) $9\sqrt{5} + 15$
- 3) 45
- 4) 90

214 The grid below shows $\triangle ABC$ and $\triangle DEF$.



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

215 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) $\frac{EC}{EA}$
- 2) $\frac{BA}{EA}$
- 3) $\frac{EA}{BA}$
- 4) $\frac{EA}{EC}$

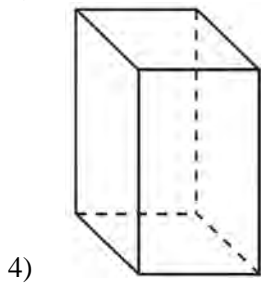
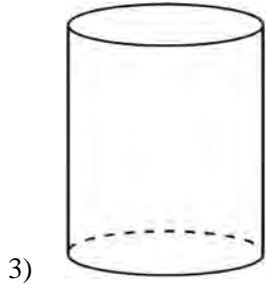
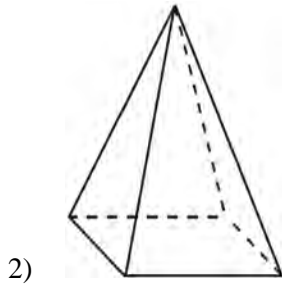
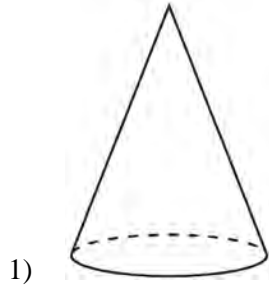
216 If the rectangle below is continuously rotated about side w , which solid figure is formed?



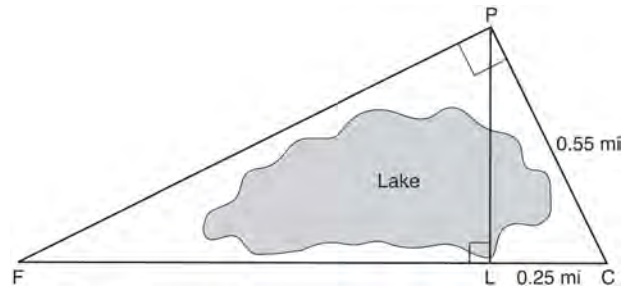
- 1) pyramid
- 2) rectangular prism
- 3) cone
- 4) cylinder

217 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.

218 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?



219 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.

220 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.

221 Which transformation would *not* always produce an image that would be congruent to the original figure?

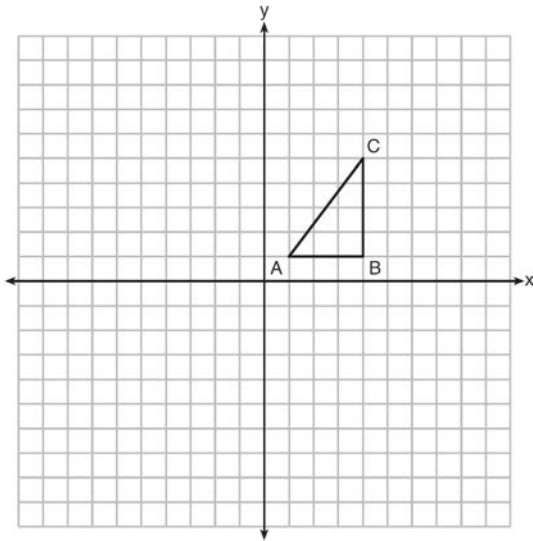
- 1) translation
- 2) dilation
- 3) rotation
- 4) reflection

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

223 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 $y = 0$.

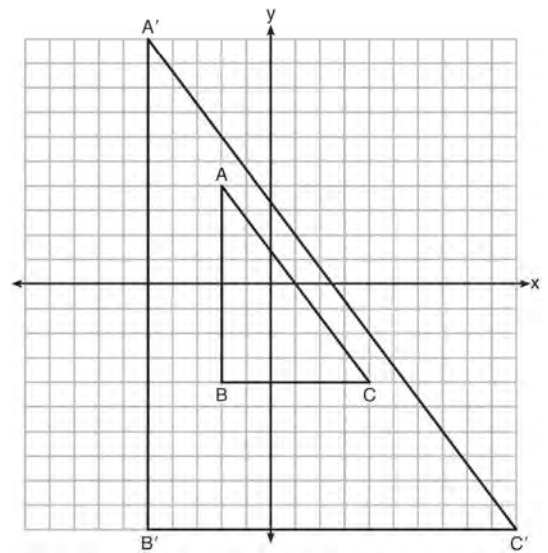


224 The endpoints of \overline{DEF} are $D(1, 4)$ and $F(16, 14)$. Determine and state the coordinates of point E , if $DE:EF = 2:3$.

225 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) AC bisects $\angle DCB$

226 In the diagram below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a transformation.

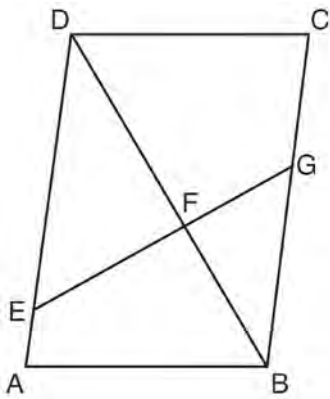


Describe the transformation that was performed. Explain why $\triangle A'B'C' \sim \triangle ABC$.

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

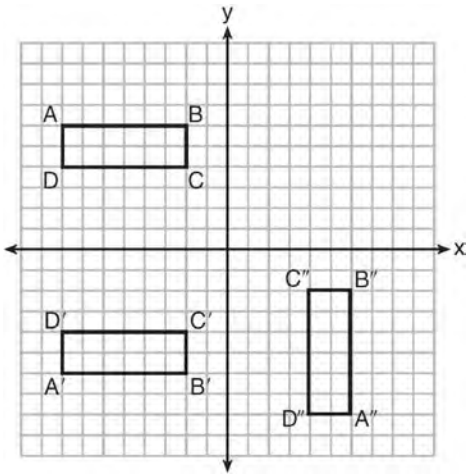
- 1) 50
- 2) 25
- 3) 10
- 4) 5

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



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

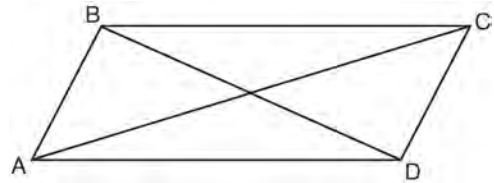
229 A sequence of transformations maps rectangle $ABCD$ onto rectangle $A''B''C''D''$, as shown in the diagram below.



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

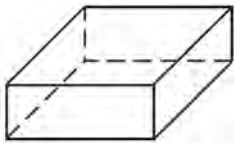

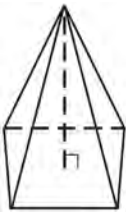
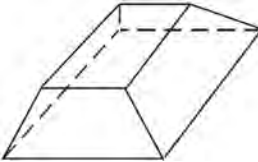
230 Quadrilateral $ABCD$ with diagonals \overline{AC} and \overline{BD} is shown in the diagram below.



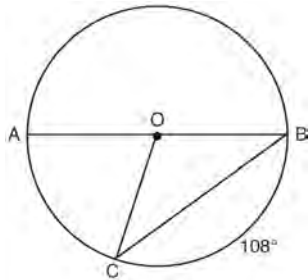
Which information is *not* enough to prove $ABCD$ is a parallelogram?

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

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

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

- 232 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 $\frac{3}{10} \cdot \pi \cdot (BC)^2$

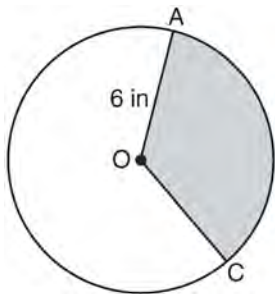
Beth $\frac{108}{360} \cdot \pi \cdot (OC)^2$

Carl $\frac{3}{10} \cdot \pi \cdot \left(\frac{1}{2}AB\right)^2$

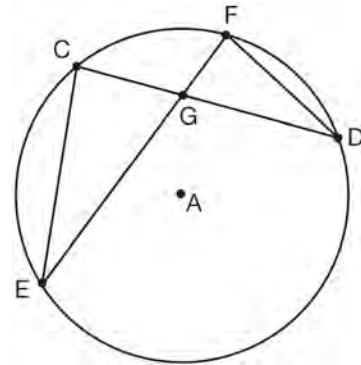
Dex $\frac{108}{360} \cdot \pi \cdot \frac{1}{2}(AB)^2$

Which students wrote correct formulas?

- 1) Amy and Dex
 - 2) Beth and Carl
 - 3) Carl and Amy
 - 4) Dex and Beth
- 233 In the diagram below of circle O , the area of the shaded sector AOC is $12\pi \text{ in}^2$ and the length of \overline{OA} is 6 inches. Determine and state $m\angle AOC$.

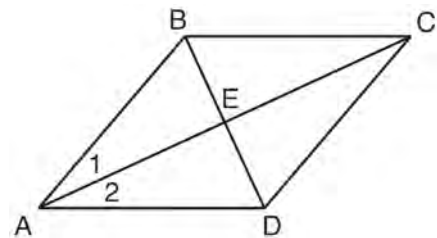


- 234 In the diagram of circle A shown below, chords \overline{CD} and \overline{EF} intersect at G , and chords \overline{CE} and \overline{FD} are drawn.



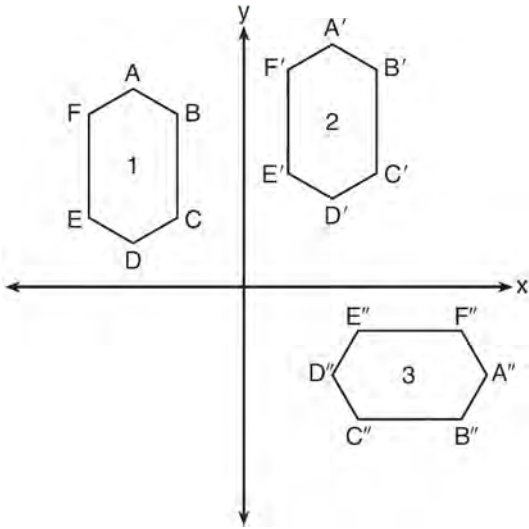
Which statement is *not* always true?

- 1) $\overline{CG} \cong \overline{FG}$
 - 2) $\angle CEG \cong \angle FDG$
 - 3) $\frac{CE}{EG} = \frac{FD}{DG}$
 - 4) $\triangle CEG \sim \triangle FDG$
- 235 Given: Quadrilateral $ABCD$ with diagonals \overline{AC} and \overline{BD} that bisect each other, and $\angle 1 \cong \angle 2$



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

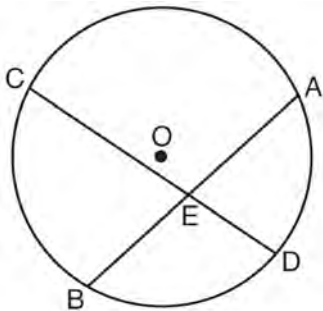
- 236 In the diagram below, congruent figures 1, 2, and 3 are drawn.



Which sequence of transformations maps figure 1 onto figure 2 and then figure 2 onto figure 3?

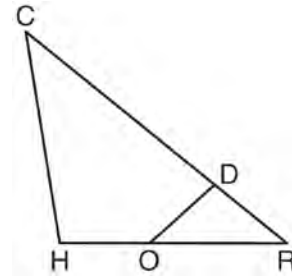
- 1) a reflection followed by a translation
- 2) a rotation followed by a translation
- 3) a translation followed by a reflection
- 4) a translation followed by a rotation

- 237 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 $AE \cdot EB = CE \cdot ED$.

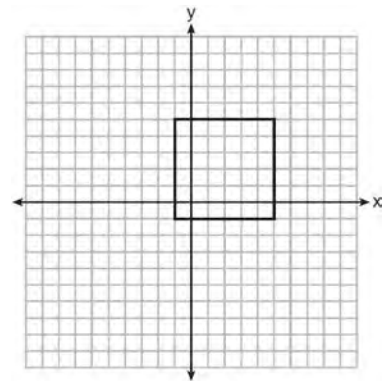
- 238 In triangle CHR , O is on \overline{HR} , and D is on \overline{CR} so that $\angle H \cong \angle RDO$.



If $RD = 4$, $RO = 6$, and $OH = 4$, what is the length of \overline{CD} ?

- 1) $2\frac{2}{3}$
- 2) $6\frac{2}{3}$
- 3) 11
- 4) 15

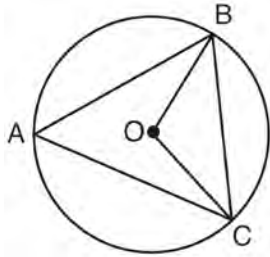
- 239 In the diagram below, a square is graphed in the coordinate plane.



A reflection over which line does *not* carry the square onto itself?

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

- 240 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.

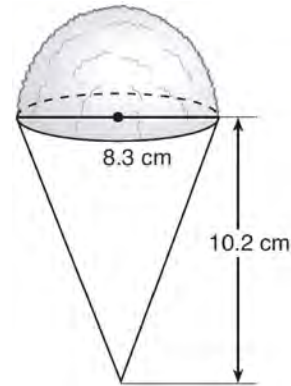


Which statement must always be true?

- 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 $\triangle BOC$.
- 241 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

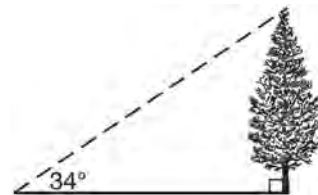
- 242 The density of the American white oak tree is 752 kilograms per cubic meter. If the trunk of an American white oak tree has a circumference of 4.5 meters and the height of the trunk is 8 meters, what is the approximate number of kilograms of the trunk?
- 1) 13
 - 2) 9694
 - 3) 13,536
 - 4) 30,456

- 243 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.



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.

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



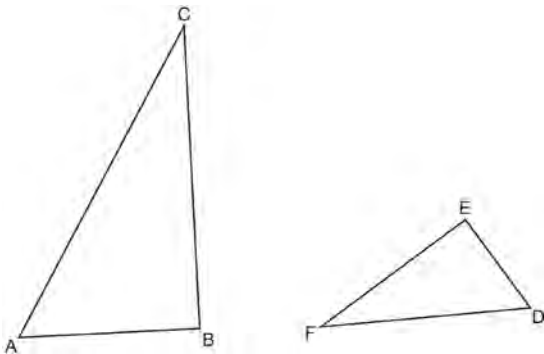
If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?

- 1) 29.7
- 2) 16.6
- 3) 13.5
- 4) 11.2

245 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/cm ³)
Pine	0.373
Hemlock	0.431
Elm	0.554
Birch	0.601
Ash	0.638
Maple	0.676
Oak	0.711

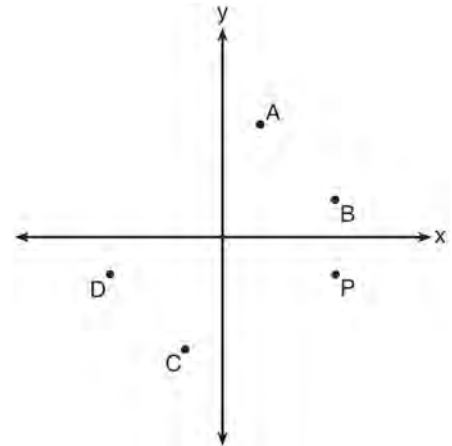
246 Triangles ABC and DEF are drawn below.



If $AB = 9$, $BC = 15$, $DE = 6$, $EF = 10$, and $\angle B \cong \angle E$, which statement is true?

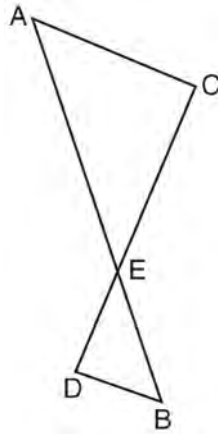
- 1) $\angle CAB \cong \angle DEF$
- 2) $\frac{AB}{CB} = \frac{FE}{DE}$
- 3) $\triangle ABC \sim \triangle DEF$
- 4) $\frac{AB}{DE} = \frac{FE}{CB}$

247 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

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

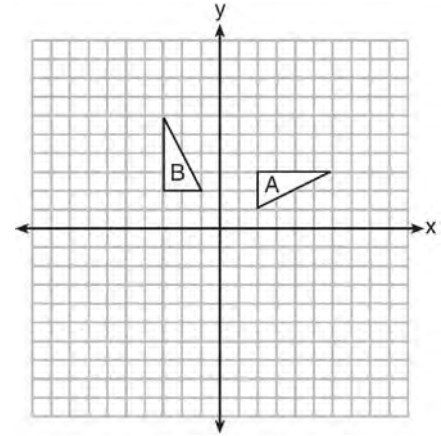


Given $\triangle AEC \sim \triangle BED$, which equation is true?

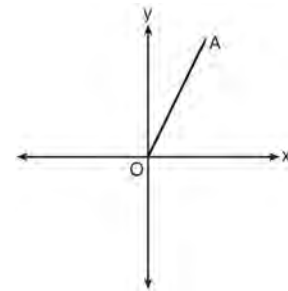
- 1) $\frac{CE}{DE} = \frac{EB}{EA}$
 - 2) $\frac{AE}{BE} = \frac{AC}{BD}$
 - 3) $\frac{EC}{AE} = \frac{BE}{ED}$
 - 4) $\frac{ED}{EC} = \frac{AC}{BD}$
- 249 Point P is on the directed line segment from point $X(-6, -2)$ to point $Y(6, 7)$ and divides the segment in the ratio 1:5. What are the coordinates 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) $\left(-4, -\frac{1}{2}\right)$

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

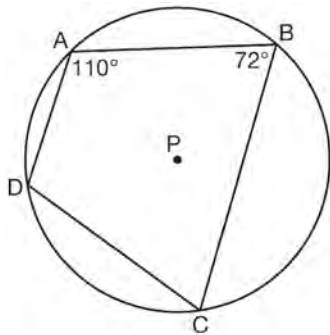


- 1) line reflection
 - 2) rotation
 - 3) dilation
 - 4) translation
- 251 Which transformation of \overline{OA} would result in an image parallel to \overline{OA} ?



- 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

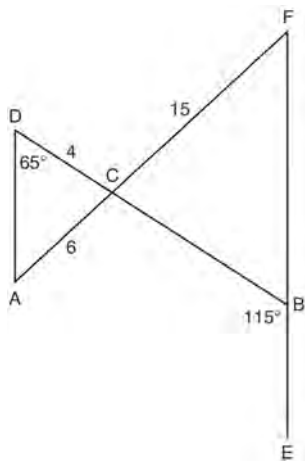
- 252 In the diagram below, quadrilateral $ABCD$ is inscribed in circle P .



What is $m\angle ADC$?

- 1) 70°
- 2) 72°
- 3) 108°
- 4) 110°

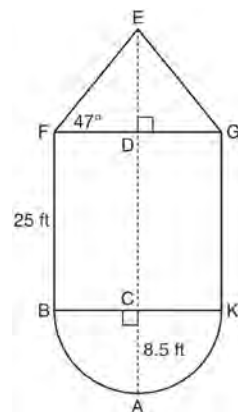
- 253 In the diagram below, \overline{DB} and \overline{AF} intersect at point C , and \overline{AD} and \overline{FBE} are drawn.



If $AC = 6$, $DC = 4$, $FC = 15$, $m\angle D = 65^\circ$, and $m\angle CBE = 115^\circ$, what is the length of \overline{CB} ?

- 1) 10
- 2) 12
- 3) 17
- 4) 22.5

- 254 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.

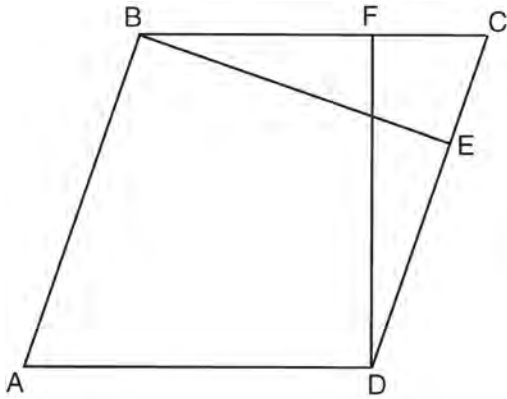


If $AC = 8.5$ feet, $BF = 25$ feet, and $m\angle EFD = 47^\circ$, determine and state, to the *nearest cubic foot*, the volume of the water tower. The water tower was constructed to hold a maximum of 400,000 pounds of water. If water weighs 62.4 pounds per cubic foot, can the water tower be filled to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

- 255 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

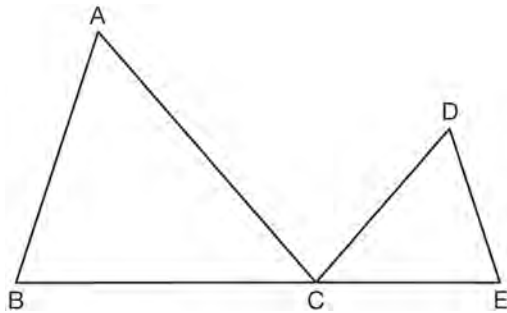
- 1) 3.5
- 2) 4.9
- 3) 5.0
- 4) 6.9

- 256 In the diagram of parallelogram $ABCD$ below,
 $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$.



Prove $ABCD$ is a rhombus.

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

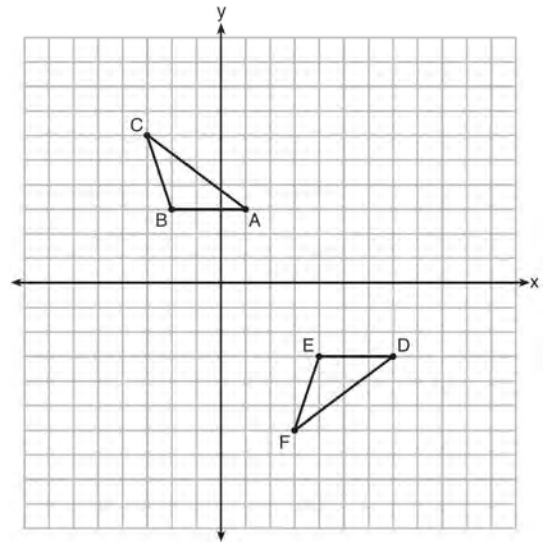


If $AC = 12$, $DC = 7$, $DE = 5$, and the perimeter of $\triangle ABC$ is 30, what is the perimeter of $\triangle DEC$?

- 1) 12.5
- 2) 14.0
- 3) 14.8
- 4) 17.5

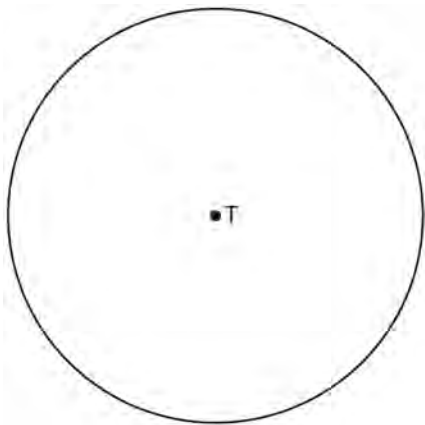
- 258 A parallelogram must be a rectangle when its
- 1) diagonals are perpendicular
 - 2) diagonals are congruent
 - 3) opposite sides are parallel
 - 4) opposite sides are congruent

- 259 Describe a sequence of transformations that will map $\triangle ABC$ onto $\triangle DEF$ as shown below.

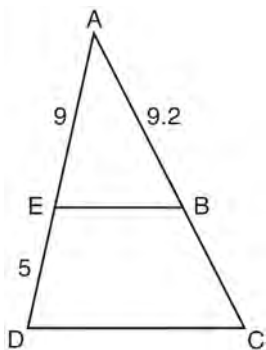


- 260 The Great Pyramid of Giza was constructed as a regular pyramid with a square base. It was built with an approximate volume of 2,592,276 cubic meters and a height of 146.5 meters. What was the length of one side of its base, to the nearest meter?
- 1) 73
 - 2) 77
 - 3) 133
 - 4) 230

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



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

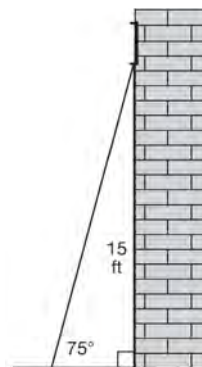


What is the length of \overline{AC} , to the *nearest tenth*?

- 1) 5.1
- 2) 5.2
- 3) 14.3
- 4) 14.4

- 263 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

- 264 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*.

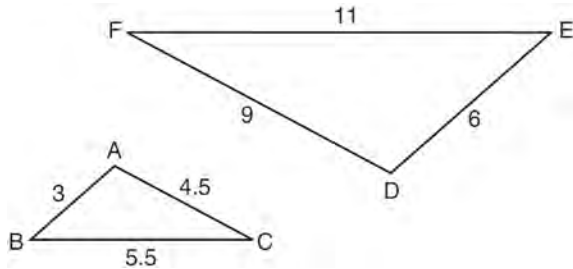


- 265 Two right triangles must be congruent if
- 1) an acute angle in each triangle is congruent
 - 2) the lengths of the hypotenuses are equal
 - 3) the corresponding legs are congruent
 - 4) the areas are equal

- 266 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.

- 267 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) $y = 3x - 1$

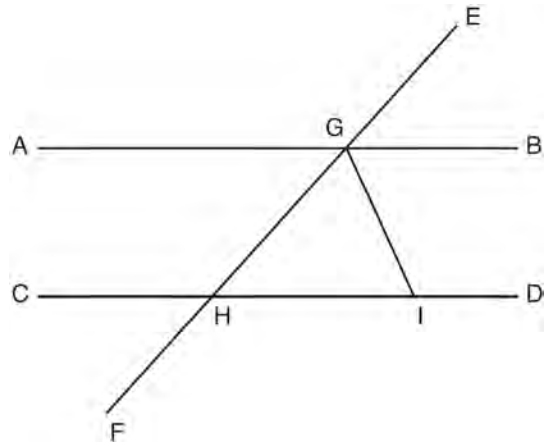
- 268 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.



Which relationship must always be true?

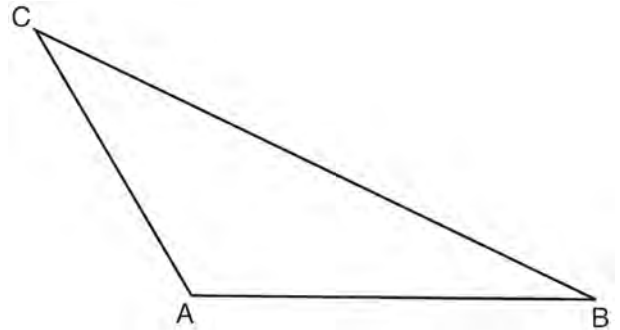
- 1) $\frac{m\angle A}{m\angle D} = \frac{1}{2}$
- 2) $\frac{m\angle C}{m\angle F} = \frac{2}{1}$
- 3) $\frac{m\angle A}{m\angle C} = \frac{m\angle F}{m\angle D}$
- 4) $\frac{m\angle B}{m\angle E} = \frac{m\angle C}{m\angle F}$

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

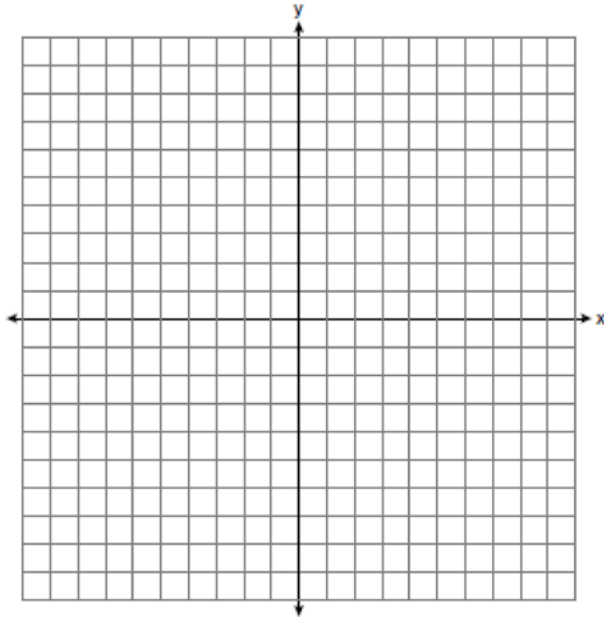


If $m\angle EGB = 50^\circ$ and $m\angle DIG = 115^\circ$, explain why $\overline{AB} \parallel \overline{CD}$.

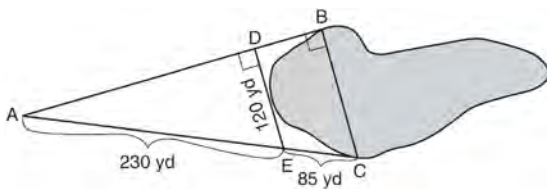
- 270 In the diagram of $\triangle ABC$ shown below, use a compass and straightedge to construct the median to \overline{AB} . [Leave all construction marks.]



- 271 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.]

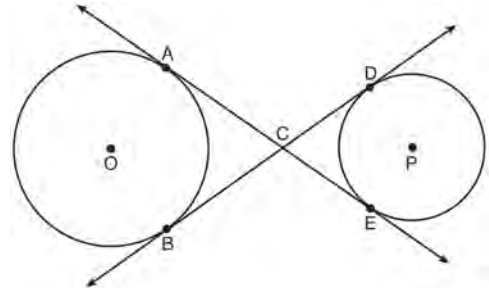


- 272 To find the distance across a pond from point B to point C , a surveyor drew the diagram below. The measurements he made are indicated on his diagram.

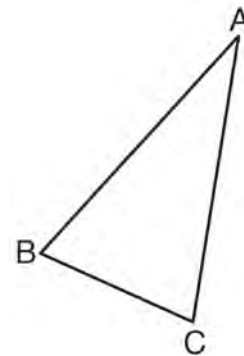


Use the surveyor's information to determine and state the distance from point B to point C , to the nearest yard.

- 273 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} .



- 274 Using a compass and straightedge, construct and label $\triangle A'B'C'$, the image of $\triangle ABC$ after a dilation with a scale factor of 2 and centered at B . [Leave all construction marks.] Describe the relationship between the lengths of \overline{AC} and $\overline{A'C'}$.



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

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

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

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

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

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

In which step did he make an error in his work?

- 1) Step 1
- 2) Step 2
- 3) Step 3
- 4) Step 4

- 276 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) $\overline{DE}, \overline{CE}$

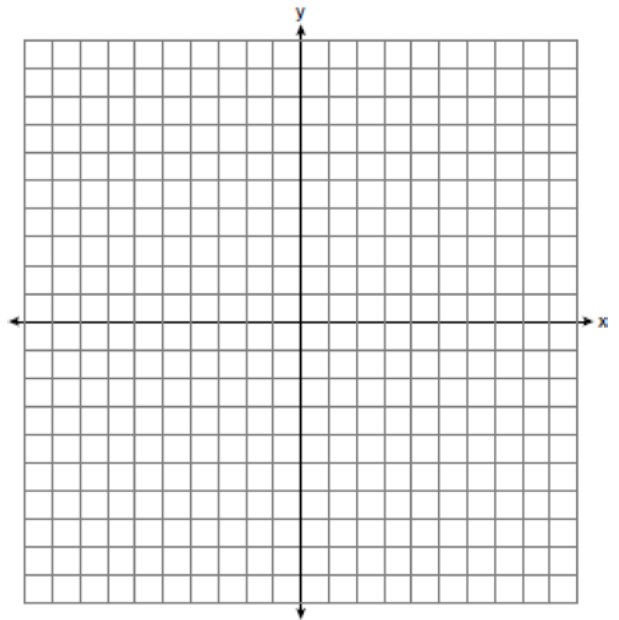
- 277 A company is creating an object from a wooden cube with an edge length of 8.5 cm. A right circular cone with a diameter of 8 cm and an altitude of 8 cm will be cut out of the cube. Which expression represents the volume of the remaining wood?

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

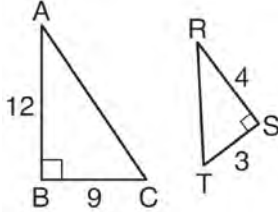
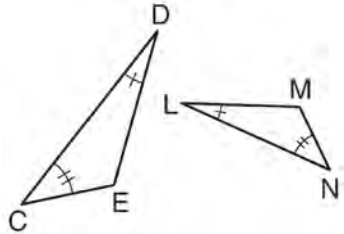
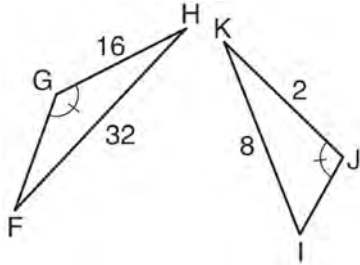
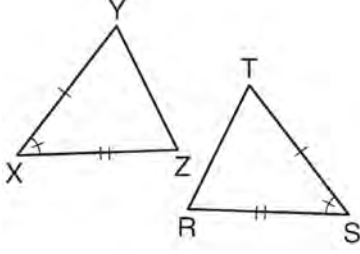
- 278 Tennis balls are sold in cylindrical cans with the balls stacked one on top of the other. A tennis ball has a diameter of 6.7 cm. To the *nearest cubic centimeter*, what is the minimum volume of the can that holds a stack of 4 tennis balls?

- 1) 236
- 2) 282
- 3) 564
- 4) 945

- 279 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.]



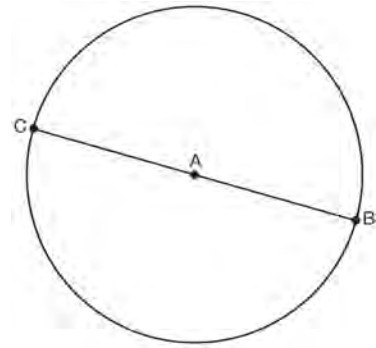
280 Using the information given below, which set of triangles can *not* be proven similar?

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

281 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

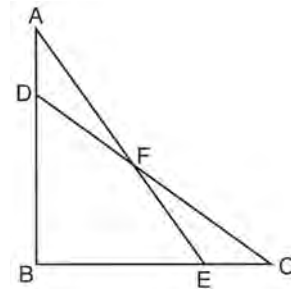
282 In the diagram below, \overline{BC} is the diameter of circle A.



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.

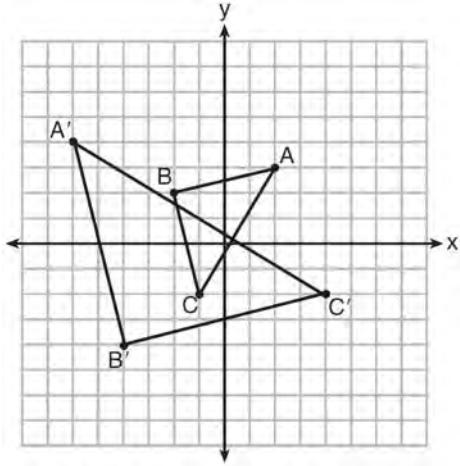
283 Given: $\triangle ABE$ and $\triangle CBD$ shown in the diagram below with $\overline{DB} \cong \overline{BE}$



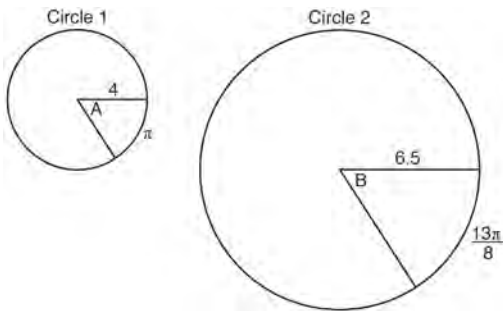
Which statement is needed to prove $\triangle ABE \cong \triangle CBD$ using only SAS \cong SAS?

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

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



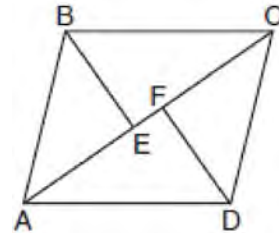
- 1) reflection and translation
 - 2) rotation and reflection
 - 3) translation and dilation
 - 4) dilation and rotation
- 285 In the diagram below, Circle 1 has radius 4, while Circle 2 has radius 6.5. Angle A intercepts an arc of length π , and angle B intercepts an arc of length $\frac{13\pi}{8}$.



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

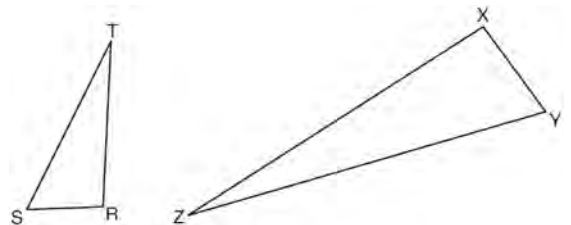
- 286 A shipping container is in the shape of a right rectangular prism with a length of 12 feet, a width of 8.5 feet, and a height of 4 feet. The container is completely filled with contents that weigh, on average, 0.25 pound per cubic foot. What is the weight, in pounds, of the contents in the container?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

- 287 In the diagram below, if $\triangle ABE \cong \triangle CDF$ and $AEFC$ is drawn, then it could be proven that quadrilateral ABCD is a



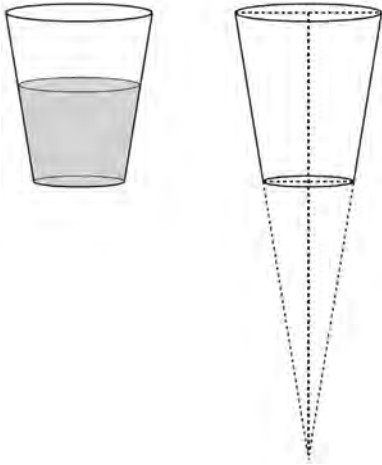
- 1) square
- 2) rhombus
- 3) rectangle
- 4) parallelogram

- 288 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.



- 289 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

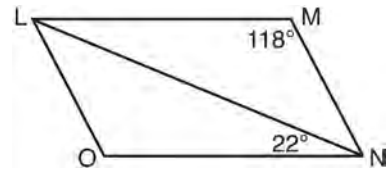
- 290 A water glass can be modeled by a truncated right cone (a cone which is cut parallel to its base) as shown below.



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.

- 291 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

- 292 The diagram below shows parallelogram $LMNO$ with diagonal \overline{LN} , $m\angle M = 118^\circ$, and $m\angle LNO = 22^\circ$.

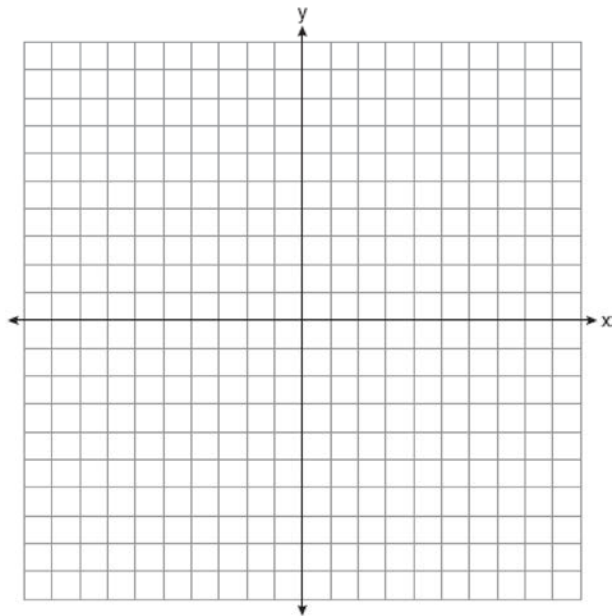


Explain why $m\angle NLO$ is 40 degrees.

- 293 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 \overline{EM} ?
- 1) $y = x - 1$
 - 2) $y = x - 3$
 - 3) $y = -x - 1$
 - 4) $y = -x - 3$

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

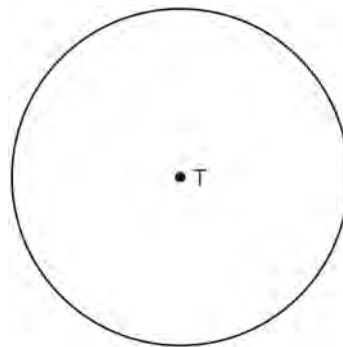
- 295 Line n is represented by the equation $3x + 4y = 20$. Determine and state the equation of line p , the image of line n , after a dilation of scale factor $\frac{1}{3}$ centered at the point $(4,2)$. [The use of the set of axes below is optional.] Explain your answer.



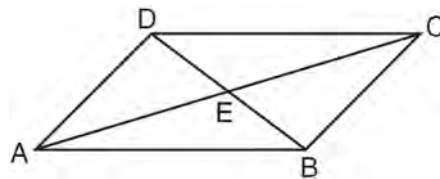
- 296 Line segment NY has endpoints $N(-11,5)$ and $Y(5,-7)$. What is the equation of the perpendicular bisector of NY ?
- 1) $y + 1 = \frac{4}{3}(x + 3)$
 - 2) $y + 1 = -\frac{3}{4}(x + 3)$
 - 3) $y - 6 = \frac{4}{3}(x - 8)$
 - 4) $y - 6 = -\frac{3}{4}(x - 8)$

- 297 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

- 298 Construct an equilateral triangle inscribed in circle T shown below. [Leave all construction marks.]

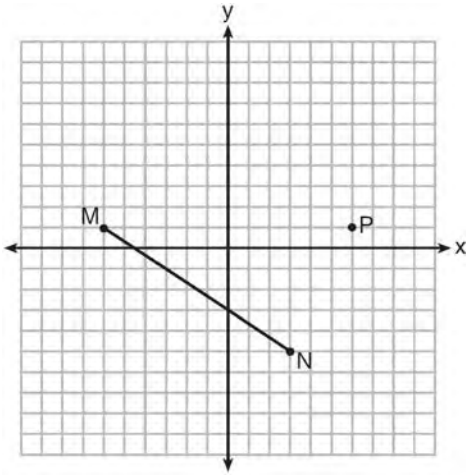


- 299 In parallelogram $ABCD$ shown below, diagonals AC and BD intersect at E .



Prove: $\angle ACD \cong \angle CAB$

- 300 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} ?



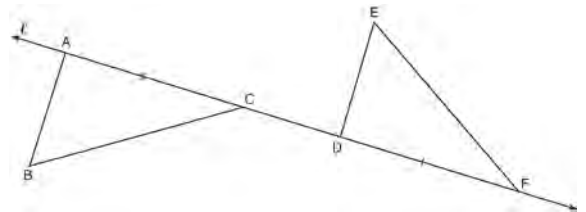
- 1) $y = -\frac{2}{3}x + 5$
 - 2) $y = -\frac{2}{3}x - 3$
 - 3) $y = \frac{3}{2}x + 7$
 - 4) $y = \frac{3}{2}x - 8$
- 301 Line segment $A'B'$, whose endpoints are $(4, -2)$ and $(16, 14)$, is the image of \overline{AB} after a dilation of $\frac{1}{2}$ centered at the origin. What is the length of \overline{AB} ?

- 1) 5
- 2) 10
- 3) 20
- 4) 40

- 302 Which expression is always equivalent to $\sin x$ when $0^\circ < x < 90^\circ$?

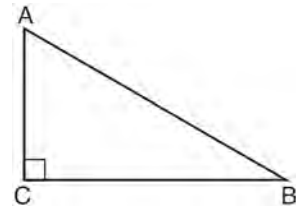
- 1) $\cos(90^\circ - x)$
- 2) $\cos(45^\circ - x)$
- 3) $\cos(2x)$
- 4) $\cos x$

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



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

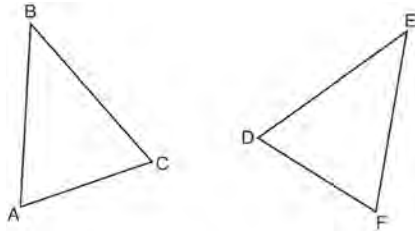
- 304 In scalene triangle ABC shown in the diagram below, $m\angle C = 90^\circ$.



Which equation is always true?

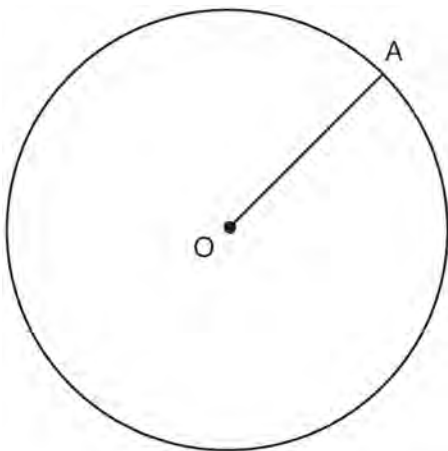
- 1) $\sin A = \sin B$
- 2) $\cos A = \cos B$
- 3) $\cos A = \sin C$
- 4) $\sin A = \cos B$

305 Which statement is sufficient evidence that $\triangle DEF$ is congruent to $\triangle ABC$?

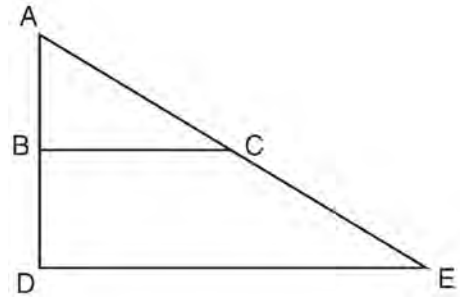


- 1) $AB = DE$ and $BC = EF$
- 2) $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
- 3) There is a sequence of rigid motions that maps \overline{AB} onto \overline{DE} , \overline{BC} onto \overline{EF} , and \overline{AC} onto \overline{DF} .
- 4) There is a sequence of rigid motions that maps point A onto point D , \overline{AB} onto \overline{DE} , and $\angle B$ onto $\angle E$.

306 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.]



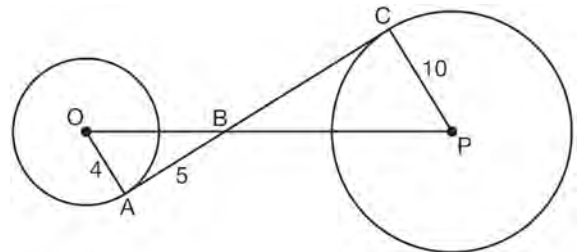
307 The image of $\triangle ABC$ after a dilation of scale factor k centered at point A is $\triangle ADE$, as shown in the diagram below.



Which statement is always true?

- 1) $2AB = AD$
- 2) $AD \perp DE$
- 3) $AC = CE$
- 4) $BC \parallel DE$

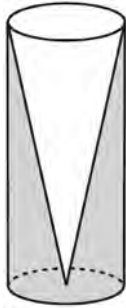
308 In the diagram shown below, \overline{AC} is tangent to circle O at A and to circle P at C , \overline{OP} intersects \overline{AC} at B , $OA = 4$, $AB = 5$, and $PC = 10$.



What is the length of \overline{BC} ?

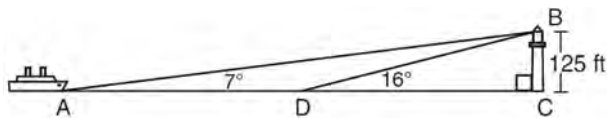
- 1) 6.4
- 2) 8
- 3) 12.5
- 4) 16

- 309 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?



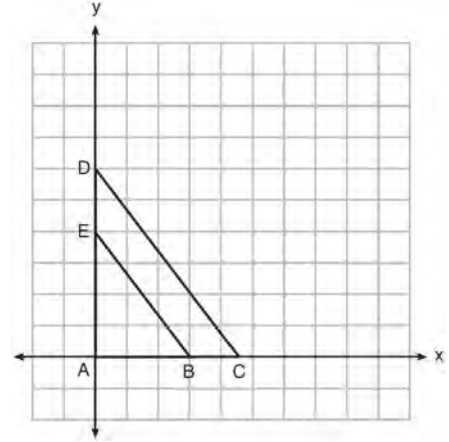
Walter goes to a hobby store to buy the wax for his candles. The wax costs \$0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of \$37.83 for the molds and charges \$1.95 for each candle, what is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

- 310 As shown in the diagram below, a ship is heading directly toward a lighthouse whose beacon is 125 feet above sea level. At the first sighting, point A, the angle of elevation from the ship to the light was 7° . A short time later, at point D, the angle of elevation was 16° .



To the *nearest foot*, determine and state how far the ship traveled from point A to point D.

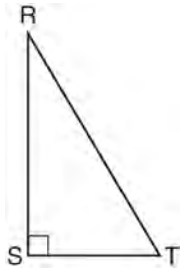
- 311 In the diagram below, $\triangle ABE$ is the image of $\triangle ACD$ after a dilation centered at the origin. The coordinates of the vertices are $A(0,0)$, $B(3,0)$, $C(4.5,0)$, $D(0,6)$, and $E(0,4)$.



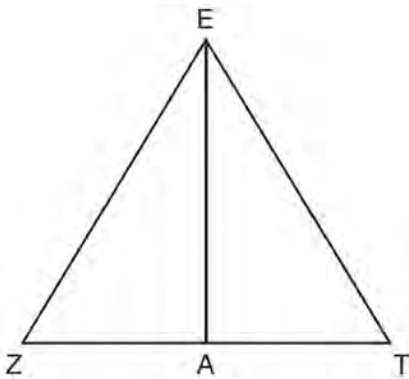
The ratio of the lengths of \overline{BE} to \overline{CD} is

- 1) $\frac{2}{3}$
 - 2) $\frac{3}{2}$
 - 3) $\frac{3}{4}$
 - 4) $\frac{4}{3}$
- 312 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

- 313 Which object is formed when right triangle RST shown below is rotated around leg RS ?



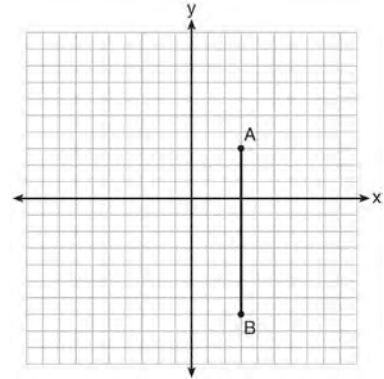
- 1) a pyramid with a square base
 - 2) an isosceles triangle
 - 3) a right triangle
 - 4) a cone
- 314 Line segment EA is the perpendicular bisector of ZT , and ZE and TE are drawn.



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 .

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

Geometry Common Core State Standards Regents at Random Answer Section

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

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

$$m_{\perp} = -\frac{1}{2}$$
- PTS: 2 REF: 061509geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines
KEY: identify perpendicular lines
- 171 ANS:

$$\frac{\pi \cdot 11.25^2 \cdot 33.5}{231} \approx 57.7$$
- PTS: 4 REF: 061632geo NAT: G.GMD.A.3 TOP: Volume
KEY: cylinders
- 172 ANS: 3

$$\frac{60}{360} \cdot 8^2 \pi = \frac{1}{6} \cdot 64\pi = \frac{32\pi}{3}$$
- PTS: 2 REF: 061624geo NAT: G.C.B.5 TOP: Sectors
- 173 ANS: 4

$$\frac{-2-1}{-1--3} = \frac{-3}{2} \quad \frac{3-2}{0-5} = \frac{1}{-5} \quad \frac{3-1}{0--3} = \frac{2}{3} \quad \frac{2--2}{5--1} = \frac{4}{6} = \frac{2}{3}$$
- PTS: 2 REF: 081522geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: general
- 174 ANS: 2 PTS: 2 REF: 061516geo NAT: G.SRT.A.2
TOP: Dilations
- 175 ANS: 1

$$\frac{360^{\circ}}{45^{\circ}} = 8$$
- PTS: 2 REF: 061510geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself
- 176 ANS: 2

$$x \text{ is } \frac{1}{2} \text{ the circumference. } \frac{C}{2} = \frac{10\pi}{2} \approx 16$$
- PTS: 2 REF: 061523geo NAT: G.GMD.A.1 TOP: Circumference

177 ANS:

$$\tan x = \frac{12}{75} \quad \tan y = \frac{72}{75} \quad 43.83 - 9.09 \approx 34.7$$

$$x \approx 9.09 \quad y \approx 43.83$$

PTS: 4 REF: 081634geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

178 ANS:

$73 + R = 90$ Equal cofunctions are complementary.

$$R = 17$$

PTS: 2 REF: 061628geo NAT: G.SRT.C.7 TOP: Cofunctions

179 ANS: 2

$$\frac{11}{1.2 \text{ oz}} \left(\frac{16 \text{ oz}}{1 \text{ lb}} \right) = \frac{13.\bar{3}1}{\text{lb}} \quad \frac{13.\bar{3}1}{\text{lb}} \left(\frac{1 \text{ g}}{3.7851} \right) \approx \frac{3.5 \text{ g}}{1 \text{ lb}}$$

PTS: 2 REF: 061618geo NAT: G.MG.A.2 TOP: Density

180 ANS: 4 PTS: 2 REF: 081609geo NAT: G.SRT.A.2

TOP: Compositions of Transformations KEY: grids

181 ANS: 1

The line $3y = -2x + 8$ does not pass through the center of dilation, so the dilated line will be distinct from $3y = -2x + 8$. Since a dilation preserves parallelism, the line $3y = -2x + 8$ and its image $2x + 3y = 5$ are parallel, with slopes of $-\frac{2}{3}$.

PTS: 2 REF: 061522geo NAT: G.SRT.A.1 TOP: Line Dilations

182 ANS: 3 PTS: 2 REF: 081502geo NAT: G.CO.A.2

TOP: Identifying Transformations KEY: basic

183 ANS: 4

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

PTS: 2 REF: 061614geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines

KEY: find slope of perpendicular line

184 ANS:

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

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

$$4 + 8 \quad 2 + 0$$

$$12 \quad 2$$

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

185 ANS: 1

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

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

186 ANS: 3

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

PTS: 2 REF: 081608geo NAT: G.SRT.C.8 TOP: Pythagorean Theorem

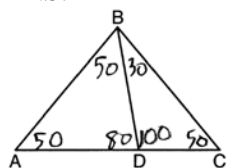
KEY: without graphics

187 ANS:

 $M = 180 - (47 + 57) = 76$ Rotations do not change angle measurements.

PTS: 2 REF: 081629geo NAT: G.CO.B.6 TOP: Properties of Transformations

188 ANS: 2



PTS: 2 REF: 081604geo NAT: G.CO.C.10 TOP: Interior and Exterior Angles of Triangles

189 ANS: 3 PTS: 2 REF: 061616geo NAT: G.CO.A.2

TOP: Identifying Transformations KEY: graphics

190 ANS:

Yes. $\angle A \cong \angle X$, $\angle C \cong \angle Z$, $\overline{AC} \cong \overline{XZ}$ after a sequence of rigid motions which preserve distance and angle measure, so $\triangle ABC \cong \triangle XYZ$ by ASA. $\overline{BC} \cong \overline{YZ}$ by CPCTC.

PTS: 2 REF: 081730geo NAT: G.CO.B.7 TOP: Triangle Congruency

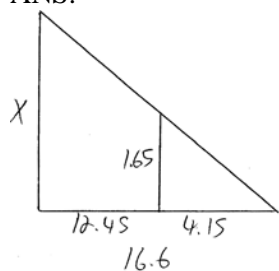
191 ANS: 2

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

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

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

192 ANS:



$$\frac{1.65}{4.15} = \frac{x}{16.6}$$

$$4.15x = 27.39$$

$$x = 6.6$$

PTS: 2

REF: 061531geo

NAT: G.SRT.B.5

TOP: Similarity

KEY: basic

193 ANS: 1

Alternate interior angles

PTS: 2

REF: 061517geo

NAT: G.CO.C.9

TOP: Lines and Angles

194 ANS: 2

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

$$12x = 144$$

$$x = 12$$

PTS: 2

REF: 061621geo

NAT: G.SRT.B.5

TOP: Side Splitter Theorem

195 ANS: 3

$$x^2 + 4x + 4 + y^2 - 6y + 9 = 12 + 4 + 9$$

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

PTS: 2

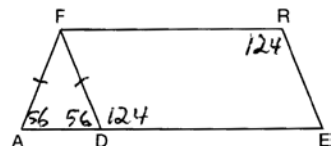
REF: 081509geo

NAT: G.GPE.A.1

TOP: Equations of Circles

KEY: completing the square

196 ANS: 3



PTS: 2

REF: 081508geo

NAT: G.CO.C.11

TOP: Parallelograms

197 ANS: 1

$$3^2 = 9$$

PTS: 2

REF: 081520geo

NAT: G.SRT.A.2

TOP: Dilations

198 ANS: 3

$$A = \frac{1}{2}ab \quad 3 - 6 = -3 = x$$

$$24 = \frac{1}{2}a(8) \quad \frac{4+12}{2} = 8 = y$$

$$a = 6$$

PTS: 2 REF: 081615geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

199 ANS:

$$\sin x = \frac{4.5}{11.75}$$

$$x \approx 23$$

PTS: 2 REF: 061528geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find an Angle

200 ANS: 2

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

$$h^2 = 360$$

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

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

KEY: altitude

201 ANS:

Reflections are rigid motions that preserve distance.

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

202 ANS: 1

$$V = \frac{\frac{4}{3}\pi\left(\frac{10}{2}\right)^3}{2} \approx 261.8 \cdot 62.4 = 16,336$$

PTS: 2 REF: 081516geo NAT: G.MG.A.2 TOP: Density

203 ANS: 4

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

PTS: 2 REF: 081517geo NAT: G.SRT.B.5 TOP: Side Splitter Theorem

204 ANS:

Quadrilateral $ABCD$ is a parallelogram with diagonals \overline{AC} and \overline{BD} intersecting at E (Given). $\overline{AD} \cong \overline{BC}$ (Opposite sides of a parallelogram are congruent). $\angle AED \cong \angle CEB$ (Vertical angles are congruent). $\overline{BC} \parallel \overline{DA}$ (Definition of parallelogram). $\angle DBC \cong \angle BDA$ (Alternate interior angles are congruent). $\triangle AED \cong \triangle CEB$ (AAS). 180° rotation of $\triangle AED$ around point E .

PTS: 4 REF: 061533geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

205 ANS:
The transformation is a rotation, which is a rigid motion.

PTS: 2 REF: 081530geo NAT: G.CO.B.7 TOP: Triangle Congruency

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

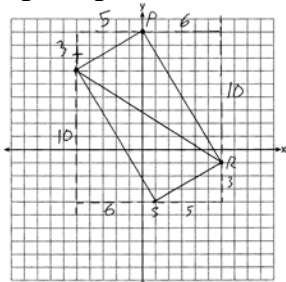
$$39.375 = 39.375$$

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

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

208 ANS: 2 PTS: 2 REF: 081601geo NAT: G.CO.C.9
TOP: Lines and Angles

209 ANS:
 $m_{\overline{TS}} = \frac{-10}{6} = -\frac{5}{3}$ $m_{\overline{SR}} = \frac{3}{5}$ 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. $P(0,9)$ $m_{\overline{RP}} = \frac{-10}{6} = -\frac{5}{3}$ $m_{\overline{PT}} = \frac{3}{5}$
Since the slopes of all four adjacent sides (\overline{TS} and \overline{SR} , \overline{SR} and \overline{RP} , \overline{PT} and \overline{TS} , \overline{RP} and \overline{PT}) are opposite reciprocals, they are perpendicular and form right angles. Quadrilateral $RSTP$ is a rectangle because it has four right angles.



PTS: 6 REF: 061536geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane
KEY: grids

210 ANS: 1
 $180 - (68 \cdot 2)$

PTS: 2 REF: 081624geo NAT: G.CO.C.11 TOP: Parallelograms

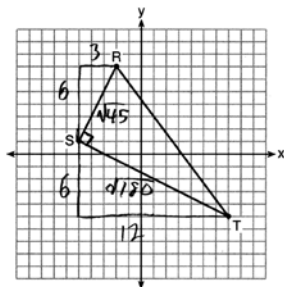
211 ANS: 3
 $\frac{60}{360} \cdot 6^2 \pi = 6\pi$

PTS: 2 REF: 081518geo NAT: G.C.B.5 TOP: Sectors

212 ANS: 2
 $x^2 = 4 \cdot 10$
 $x = \sqrt{40}$
 $x = 2\sqrt{10}$

PTS: 2 REF: 081610geo NAT: G.SRT.B.5 TOP: Similarity
 KEY: leg

213 ANS: 3



$$\sqrt{45} = 3\sqrt{5} \quad a = \frac{1}{2} (3\sqrt{5})(6\sqrt{5}) = \frac{1}{2} (18)(5) = 45$$

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

PTS: 2 REF: 061622geo NAT: G.GPE.B.7 TOP: Polygons in the Coordinate Plane

214 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 NAT: G.CO.A.5 TOP: Rotations
 KEY: grids

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

216 ANS: 4 PTS: 2 REF: 081503geo NAT: G.GMD.B.4
 TOP: Rotations of Two-Dimensional Objects

217 ANS:

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

$$x \approx 68$$

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

218 ANS: 3 PTS: 2 REF: 061601geo NAT: G.GMD.B.4
 TOP: Rotations of Two-Dimensional Objects

219 ANS:

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

$$.9604 = y$$

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

220 ANS:

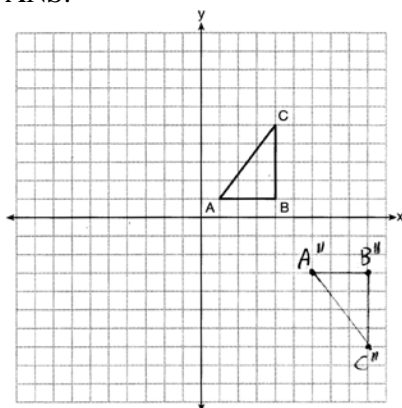
$$\frac{360}{6} = 60$$

PTS: 2 REF: 081627geo NAT: G.CO.A.3 TOP: Mapping a Polygon onto Itself

221 ANS: 2 PTS: 2 REF: 081602geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: basic

222 ANS: 1 PTS: 2 REF: 081606geo NAT: G.SRT.C.7
TOP: Cofunctions

223 ANS:



PTS: 2 REF: 081626geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: grids

224 ANS:

$$\frac{2}{5} \cdot (16 - 1) = 6 \quad \frac{2}{5} \cdot (14 - 4) = 4 \quad (1 + 6, 4 + 4) = (7, 8)$$

PTS: 2 REF: 081531geo NAT: G.GPE.B.6 TOP: Directed Line Segments

225 ANS: 1

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

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

226 ANS:

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

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

227 ANS: 3

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

PTS: 2 REF: 061503geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

228 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 NAT: G.SRT.A.3 TOP: Similarity Proofs

229 ANS: 1

PTS: 2

REF: 081507geo

NAT: G.CO.A.5

TOP: Compositions of Transformations KEY: identify

230 ANS: 3

(3) Could be a trapezoid.

PTS: 2 REF: 081607geo NAT: G.CO.C.11 TOP: Parallelograms

231 ANS: 2

PTS: 2

REF: 061506geo

NAT: G.GMD.B.4

TOP: Cross-Sections of Three-Dimensional Objects

232 ANS: 2

PTS: 2

REF: 081619geo

NAT: G.C.B.5

TOP: Sectors

233 ANS:

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

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

$$x = 120$$

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

234 ANS: 1

PTS: 2

REF: 061508geo

NAT: G.C.A.2

TOP: Chords, Secants and Tangents KEY: inscribed

235 ANS:

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

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

236 ANS: 4

PTS: 2

REF: 061504geo

NAT: G.CO.A.5

TOP: Compositions of Transformations KEY: identify

237 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); $\frac{AE}{CE} = \frac{ED}{EB}$ (Corresponding sides of similar triangles are proportional); $AE \cdot EB = CE \cdot ED$ (The product of the means equals the product of the extremes).

PTS: 6 REF: 081635geo NAT: G.SRT.B.5 TOP: Circle Proofs

238 ANS: 3

$$\frac{x}{10} = \frac{6}{4} \quad \overline{CD} = 15 - 4 = 11$$

$$x = 15$$

PTS: 2 REF: 081612geo NAT: G.SRT.B.5 TOP: Similarity

KEY: basic

239 ANS: 1

PTS: 2

REF: 081505geo

NAT: G.CO.A.3

TOP: Mapping a Polygon onto Itself

240 ANS: 2

PTS: 2

REF: 061610geo

NAT: G.C.A.2

TOP: Chords, Secants and Tangents

KEY: inscribed

241 ANS: 4

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

$$x \approx 18.8$$

PTS: 2 REF: 061611geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

KEY: without graphics

242 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 NAT: G.MG.A.2 TOP: Density

243 ANS:

$$V = \frac{1}{3} \pi \left(\frac{8.3}{2} \right)^2 (10.2) + \frac{1}{2} \cdot \frac{4}{3} \pi \left(\frac{8.3}{2} \right)^3 \approx 183.961 + 149.693 \approx 333.65 \text{ cm}^3 \quad 333.65 \times 50 = 16682.7 \text{ cm}^3$$

$$16682.7 \times 0.697 = 11627.8 \text{ g} \quad 11.6278 \times 3.83 = \$44.53$$

PTS: 6 REF: 081636geo NAT: G.MG.A.2 TOP: Density

244 ANS: 3

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

$$T \approx 13.5$$

PTS: 2 REF: 061505geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: graphics

245 ANS:

$$\frac{137.8}{6^3} \approx 0.638 \text{ Ash}$$

PTS: 2 REF: 081525geo NAT: G.MG.A.2 TOP: Density

246 ANS: 3

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

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

$$90 = 90$$

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

247 ANS: 1 PTS: 2 REF: 081605geo NAT: G.CO.A.5
TOP: Rotations KEY: grids

248 ANS: 2 PTS: 2 REF: 081519geo NAT: G.SRT.B.5
TOP: Similarity KEY: basic

249 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 NAT: G.GPE.B.6 TOP: Directed Line Segments

250 ANS: 2 PTS: 2 REF: 081513geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics

251 ANS: 1 PTS: 2 REF: 061604geo NAT: G.CO.A.2
TOP: Identifying Transformations KEY: graphics

252 ANS: 3 PTS: 2 REF: 081515geo NAT: G.C.A.3
TOP: Inscribed Quadrilaterals

253 ANS: 1

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

$$f = 10$$

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

254 ANS:

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

$$x \approx 9.115$$

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

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

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

255 ANS: 2

$$s^2 + s^2 = 7^2$$

$$2s^2 = 49$$

$$s^2 = 24.5$$

$$s \approx 4.9$$

PTS: 2 REF: 081511geo NAT: G.SRT.C.8 TOP: Pythagorean Theorem

256 ANS:

Parallelogram $ABCD$, $\overline{BE} \perp \overline{CED}$, $\overline{DF} \perp \overline{BFC}$, $\overline{CE} \cong \overline{CF}$ (given). $\angle BEC \cong \angle DFC$ (perpendicular lines form right angles, which are congruent). $\angle FCD \cong \angle BCE$ (reflexive property). $\triangle BEC \cong \triangle DFC$ (ASA). $\overline{BC} \cong \overline{CD}$ (CPCTC). $ABCD$ is a rhombus (a parallelogram with consecutive congruent sides is a rhombus).

PTS: 6 REF: 081535geo NAT: G.SRT.B.5 TOP: Quadrilateral Proofs

257 ANS: 4

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

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

258 ANS: 2 PTS: 2 REF: 081501geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

259 ANS:

$$T_{6,0} \circ r_{x\text{-axis}}$$

PTS: 2 REF: 061625geo NAT: G.CO.A.5 TOP: Compositions of Transformations
KEY: identify

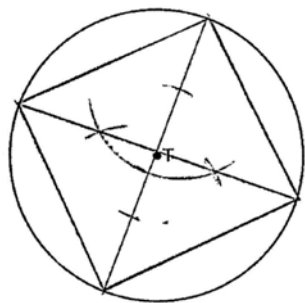
260 ANS: 4

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

$$230 \approx s$$

PTS: 2 REF: 081521geo NAT: G.GMD.A.3 TOP: Volume
KEY: pyramids

261 ANS:



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

262 ANS: 3

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

$$9x = 46$$

$$x \approx 5.1$$

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

263 ANS: 4

$$3 \times 6 = 18$$

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

264 ANS:

$$\sin 75 = \frac{15}{x}$$

$$x = \frac{15}{\sin 75}$$

$$x \approx 15.5$$

PTS: 2 REF: 081631geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side

KEY: graphics

265 ANS: 3

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

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

KEY: statements

266 ANS:

$$\text{Yes.} \quad (x-1)^2 + (y+2)^2 = 4^2$$

$$(3.4-1)^2 + (1.2+2)^2 = 16$$

$$5.76 + 10.24 = 16$$

$$16 = 16$$

PTS: 2 REF: 081630geo NAT: G.GPE.B.4 TOP: Circles in the Coordinate Plane

267 ANS: 4

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

PTS: 2 REF: 081524geo NAT: G.SRT.A.1 TOP: Line Dilations

268 ANS: 4 PTS: 2 REF: 081514geo NAT: G.SRT.A.2

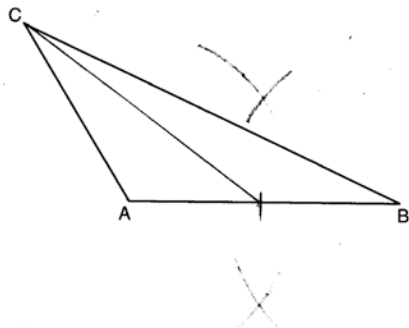
TOP: Compositions of Transformations KEY: grids

269 ANS:

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

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

270 ANS:

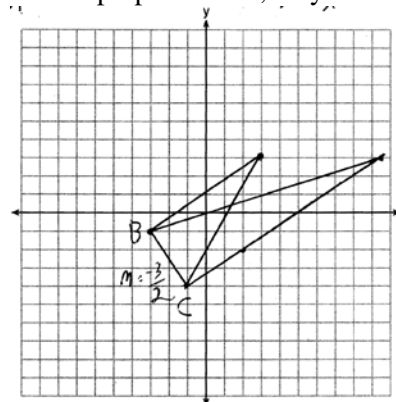


PTS: 2 REF: 081628geo NAT: G.CO.D.12 TOP: Constructions

KEY: line bisector

271 ANS:

The slopes of perpendicular lines are opposite reciprocals. Since the lines are perpendicular, they form right angles



and a right triangle. $m_{BC} = -\frac{3}{2}$ $-1 = \frac{2}{3}(-3) + b$ or $-4 = \frac{2}{3}(-1) + b$

$$m_{\perp} = \frac{2}{3} \quad -1 = -2 + b \quad \frac{-12}{3} = \frac{-2}{3} + b$$

$$1 = b$$

$$3 = \frac{2}{3}x + 1 \quad -\frac{10}{3} = b$$

$$2 = \frac{2}{3}x \quad 3 = \frac{2}{3}x - \frac{10}{3}$$

$$3 = x \quad 9 = 2x - 10$$

$$19 = 2x$$

$$9.5 = x$$

PTS: 4

REF: 081533geo

NAT: G.GPE.B.4

TOP: Triangles in the Coordinate Plane

272 ANS:

$$\frac{120}{230} = \frac{x}{315}$$

$$x = 164$$

PTS: 2

REF: 081527geo

NAT: G.SRT.B.5

TOP: Similarity

KEY: basic

273 ANS:

$$\frac{3}{8} \cdot 56 = 21$$

PTS: 2

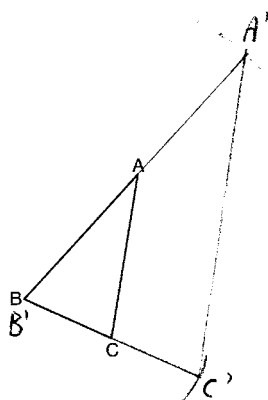
REF: 081625geo

NAT: G.C.A.2

TOP: Chords, Secants and Tangents

KEY: common tangents

274 ANS:



The length of $\overline{A'C'}$ is twice \overline{AC} .

PTS: 4 REF: 081632geo NAT: G.CO.D.12 TOP: Constructions
 KEY: congruent and similar figures

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

276 ANS: 4 PTS: 2 REF: 081611geo NAT: G.CO.C.9
 TOP: Lines and Angles

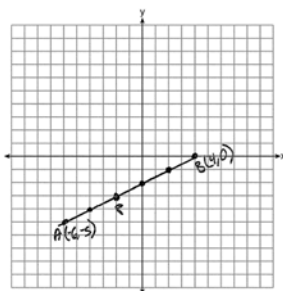
277 ANS: 4 PTS: 2 REF: 061606geo NAT: G.GMD.A.3
 TOP: Volume KEY: compositions

278 ANS: 4

$$V = \pi \left(\frac{6.7}{2} \right)^2 (4 \cdot 6.7) \approx 945$$

PTS: 2 REF: 081620geo NAT: G.GMD.A.3 TOP: Volume
 KEY: cylinders

279 ANS:



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

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

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

$$-2 \quad -3$$

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

280 ANS: 3

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

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

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

282 ANS: 1

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

PTS: 2 REF: 081623geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: inscribed

283 ANS: 3 PTS: 2 REF: 081622geo NAT: G.SRT.B.5
TOP: Triangle Proofs KEY: statements

284 ANS: 4 PTS: 2 REF: 061608geo NAT: G.SRT.A.2
TOP: Compositions of Transformations KEY: grids

285 ANS:

$$s = \theta \cdot r \quad s = \theta \cdot r \quad \text{Yes, both angles are equal.}$$

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

$$\frac{\pi}{4} = A \quad \frac{\pi}{4} = B$$

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

286 ANS: 3

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

$$W = 408 \cdot 0.25 = 102$$

PTS: 2 REF: 061507geo NAT: G.MG.A.2 TOP: Density

287 ANS: 4 PTS: 2 REF: 011705geo NAT: G.CO.C.11
TOP: Special Quadrilaterals

288 ANS:

$$\frac{6}{14} = \frac{9}{21} \quad \text{SAS}$$

$$126 = 126$$

PTS: 2 REF: 081529geo NAT: G.SRT.B.5 TOP: Similarity
KEY: basic

289 ANS: 2

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

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

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

KEY: completing the square

290 ANS:

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

$$x + 5 = 1.5x$$

$$5 = .5x$$

$$10 = x$$

$$10 + 5 = 15$$

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

KEY: cones

291 ANS: 3 PTS: 2 REF: 081613geo NAT: G.GMD.B.4

TOP: Cross-Sections of Three-Dimensional Objects

292 ANS:

Opposite angles in a parallelogram are congruent, so $m\angle O = 118^\circ$. The interior angles of a triangle equal 180° . $180 - (118 + 22) = 40$.

PTS: 2 REF: 061526geo NAT: G.CO.C.11 TOP: Parallelograms

293 ANS: 1

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

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

$$-1 = b$$

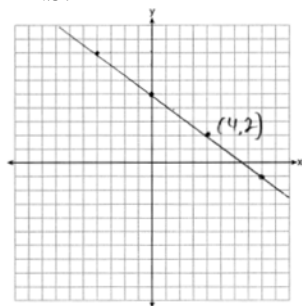
PTS: 2 REF: 081614geo NAT: G.GPE.B.4 TOP: Quadrilaterals in the Coordinate Plane

KEY: general

294 ANS: 4 PTS: 2 REF: 061513geo NAT: G.CO.C.11

TOP: Parallelograms

295 ANS:



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

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

296 ANS: 1

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

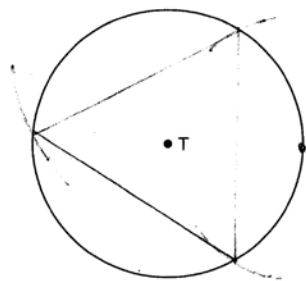
PTS: 2 REF: 061612geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines

KEY: perpendicular bisector

297 ANS: 1 PTS: 2 REF: 081603geo NAT: G.GMD.B.4

TOP: Rotations of Two-Dimensional Objects

298 ANS:



PTS: 2 REF: 081526geo NAT: G.CO.D.13 TOP: Constructions

299 ANS:

Parallelogram $ABCD$, diagonals \overline{AC} and \overline{BD} intersect at E (given). $\overline{DC} \parallel \overline{AB}$; $\overline{DA} \parallel \overline{CB}$ (opposite sides of a parallelogram are parallel). $\angle ACD \cong \angle CAB$ (alternate interior angles formed by parallel lines and a transversal are congruent).

PTS: 2 REF: 081528geo NAT: G.CO.C.11 TOP: Quadrilateral Proofs

300 ANS: 1

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

$$1 = -4 + b$$

$$5 = b$$

PTS: 2 REF: 081510geo NAT: G.GPE.B.5 TOP: Parallel and Perpendicular Lines

KEY: write equation of parallel line

301 ANS: 4

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

PTS: 2 REF: 081621geo NAT: G.SRT.A.1 TOP: Line Dilations

302 ANS: 1 PTS: 2 REF: 081504geo NAT: G.SRT.C.7

TOP: Cofunctions

303 ANS:

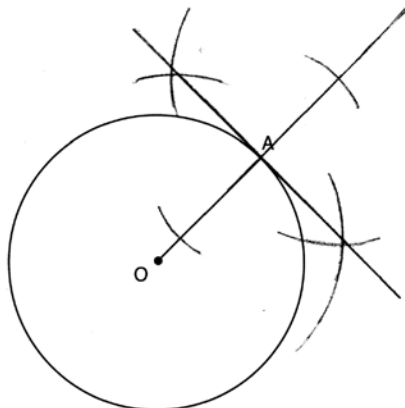
Translations preserve distance. If point D is mapped onto point A , point F would map onto point C . $\triangle DEF \cong \triangle ABC$ as $\overline{AC} \cong \overline{DF}$ and points are collinear on line ℓ and a reflection preserves distance.

PTS: 4 REF: 081534geo NAT: G.CO.B.7 TOP: Triangle Congruency

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

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

306 ANS:



PTS: 2 REF: 061631geo NAT: G.CO.D.12 TOP: Constructions
KEY: parallel and perpendicular lines

307 ANS: 4 PTS: 2 REF: 081506geo NAT: G.SRT.A.2
TOP: Dilations

308 ANS: 3

$$5 \cdot \frac{10}{4} = \frac{50}{4} = 12.5$$

PTS: 2 REF: 081512geo NAT: G.C.A.2 TOP: Chords, Secants and Tangents
KEY: common tangents

309 ANS:

$$V = \frac{1}{3} \pi \left(\frac{3}{2} \right)^2 \cdot 8 \approx 18.85 \cdot 100 = 1885 \quad 1885 \cdot 0.52 \cdot 0.10 = 98.02 \quad 1.95(100) - (37.83 + 98.02) = 59.15$$

PTS: 6 REF: 081536geo NAT: G.MG.A.2 TOP: Density

310 ANS:

$$\tan 7 = \frac{125}{x} \quad \tan 16 = \frac{125}{y} \quad 1018 - 436 \approx 582$$

$$x \approx 1018 \quad y \approx 436$$

PTS: 4 REF: 081532geo NAT: G.SRT.C.8 TOP: Using Trigonometry to Find a Side
KEY: advanced

311 ANS: 1

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

PTS: 2 REF: 081523geo NAT: G.SRT.A.2 TOP: Dilations

312 ANS: 1

$$x^2 - 4x + 4 + y^2 + 8y + 16 = -11 + 4 + 16$$

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

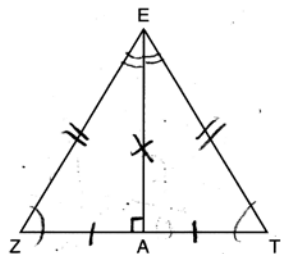
PTS: 2 REF: 081616geo NAT: G.GPE.A.1 TOP: Equations of Circles

KEY: completing the square

313 ANS: 4 PTS: 2 REF: 061501geo NAT: G.GMD.B.4

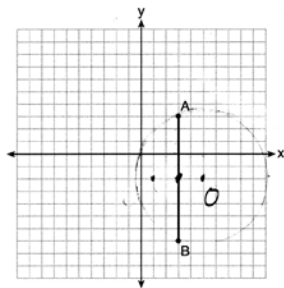
TOP: Rotations of Two-Dimensional Objects

314 ANS: 2



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

315 ANS: 1



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

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

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

KEY: other