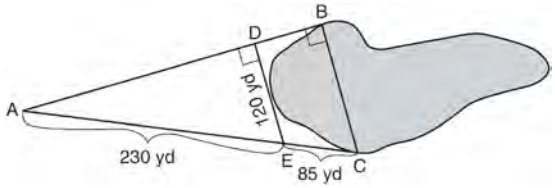
# JMAP
# REGENTS AT RANDOM

NY Geometry CCSS Regents Exam Questions
from Fall 2014-January 2016

www.jmap.org

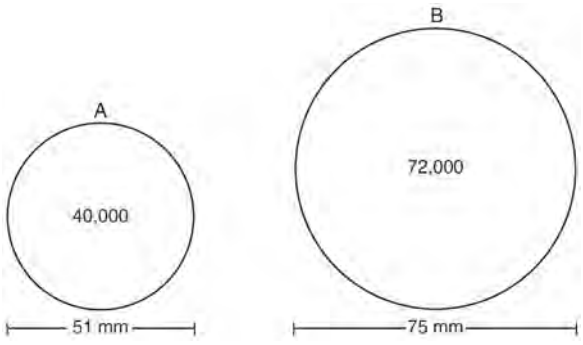
# Geometry Common Core State Standards Regents at Random

1 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.



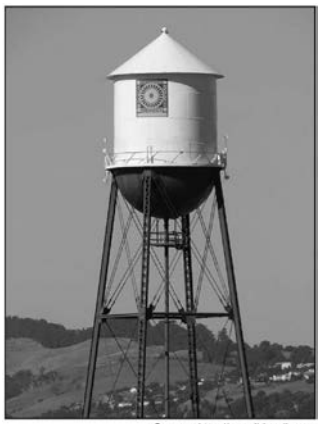

Use the surveyor's information to determine and state the distance from point *B* to point *C*, to the *nearest yard*.

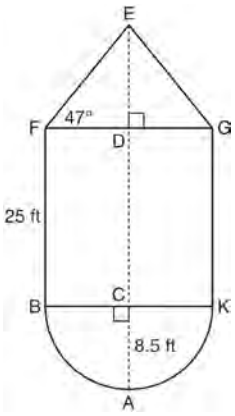
2 During an experiment, the same type of bacteria is grown in two petri dishes. Petri dish *A* has a diameter of 51 mm and has approximately 40,000 bacteria after 1 hour. Petri dish *B* has a diameter of 75 mm and has approximately 72,000 bacteria after 1 hour.




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

3 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.



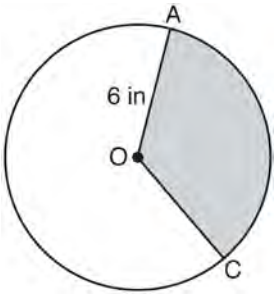




If $AC = 8.5$ feet, $BF = 25$ feet, and $m\angle EFD = 47°$, determine and state, to the *nearest cubic foot*, the volume of the water tower. The water tower was constructed to hold a maximum of 400,000 pounds of water. If water weighs 62.4 pounds per cubic foot, can the water tower be filled to 85%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

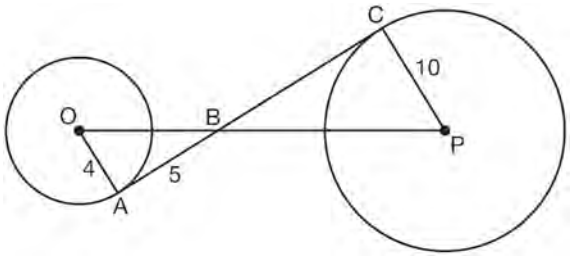
4 Which equation represents a line that is perpendicular to the line represented by $2x - y = 7$?

1) $y = -\frac{1}{2}x + 6$
2) $y = \frac{1}{2}x + 6$
3) $y = -2x + 6$
4) $y = 2x + 6$

5 In the diagram below of circle $O$, the area of the shaded sector $AOC$ is $12\pi$ in$^2$ and the length of $\overline{OA}$ is 6 inches. Determine and state m$\angle AOC$.



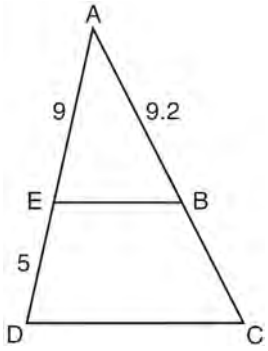

6 In the diagram shown below, $\overline{AC}$ is tangent to circle $O$ at $A$ and to circle $P$ at $C$, $\overline{OP}$ intersects $\overline{AC}$ at $B$, $OA = 4$, $AB = 5$, and $PC = 10$.




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

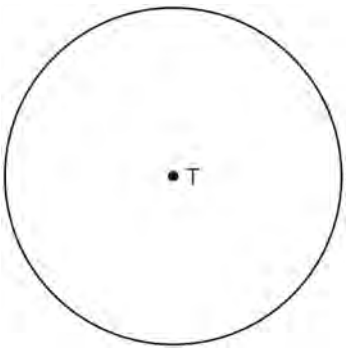
7 If $\triangle A'B'C'$ is the image of $\triangle ABC$, under which transformation will the triangles *not* be congruent?
1) reflection over the $x$-axis
2) translation to the left 5 and down 4
3) dilation centered at the origin with scale factor 2
4) rotation of 270° counterclockwise about the origin

8 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

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




10 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

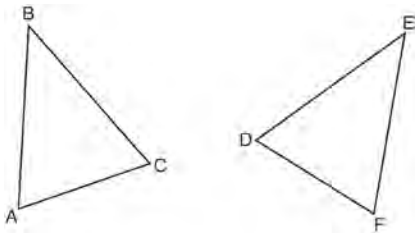
11 Which transformation would result in the perimeter of a triangle being different from the perimeter of its image?

1) $(x,y) \rightarrow (y,x)$
2) $(x,y) \rightarrow (x,-y)$
3) $(x,y) \rightarrow (4x,4y)$
4) $(x,y) \rightarrow (x+2,y-5)$

12 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*?

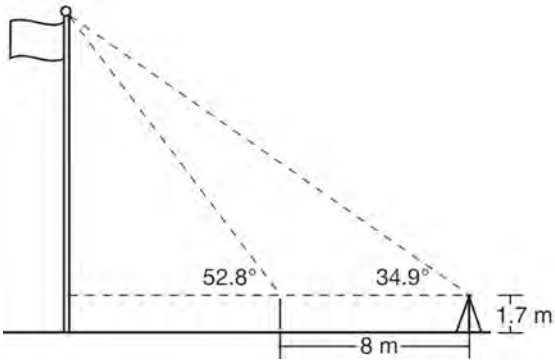
1) 73
2) 77
3) 133
4) 230

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



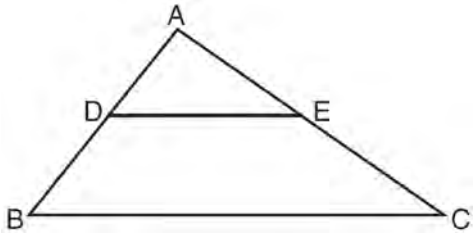

1) $AB = DE$ and $BC = EF$
2) $\angle D \cong \angle A$, $\angle B \cong \angle E$, $\angle C \cong \angle F$
3) There is a sequence of rigid motions that maps $\overline{AB}$ onto $\overline{DE}$, $\overline{BC}$ onto $\overline{EF}$, and $\overline{AC}$ onto $\overline{DF}$.
4) There is a sequence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

14 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.

15 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 $AC = 15$

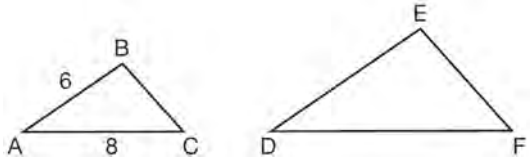
16 The vertices of $\triangle JKL$ have coordinates $J(5,1)$, $K(-2,-3)$, and $L(-4,1)$. Under which transformation is the image $\triangle J'K'L'$ *not* congruent to $\triangle JKL$?

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

17 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) $y = 2x - 16$

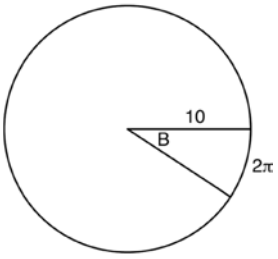
18 In the diagram below, $\triangle ABC \sim \triangle DEF$.




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 $\angle C \cong \angle F$

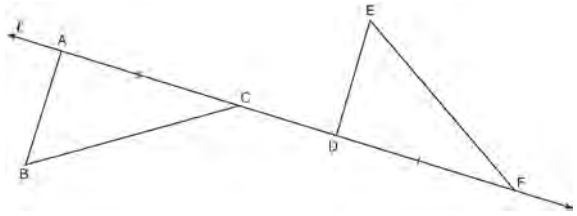
19 In the diagram below, the circle shown has radius 10. Angle *B* intercepts an arc with a length of $2\pi$.




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

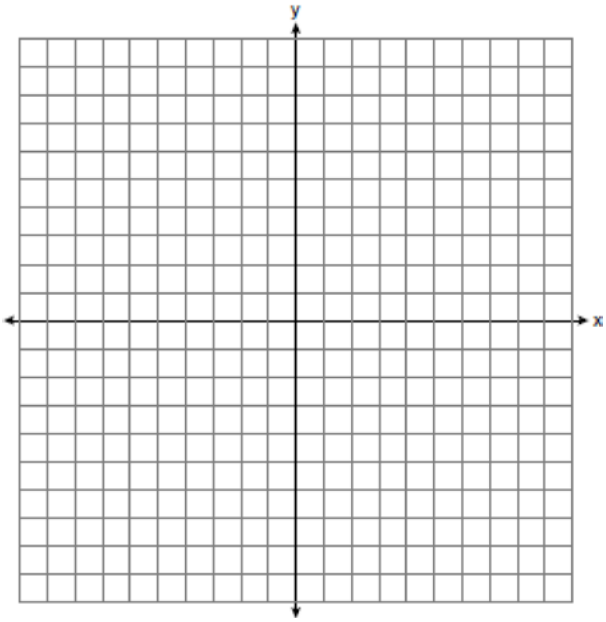
1) $10 + 2\pi$
2) $20\pi$
3) $\frac{\pi}{5}$
4) $\frac{5}{\pi}$

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




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

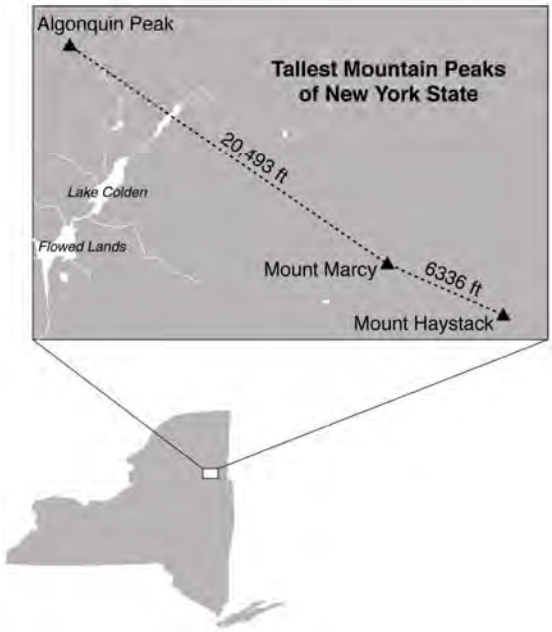
21 In rhombus *MATH*, the coordinates of the endpoints of the diagonal $\overline{MT}$ are $M(0,-1)$ and $T(4,6)$. Write an equation of the line that contains diagonal $\overline{AH}$. [Use of the set of axes below is optional.] Using the given information, explain how you know that your line contains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




22 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*?

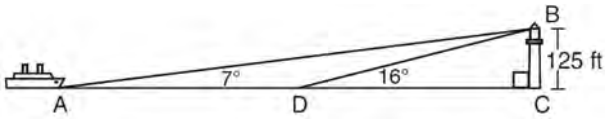
1) $y = -2x + 1$
2) $y = -2x + 4$
3) $y = 2x + 4$
4) $y = 2x + 1$

23 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.

24 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°.

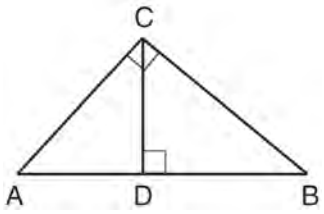



To the *nearest foot*, determine and state how far the ship traveled from point *A* to point *D*.

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

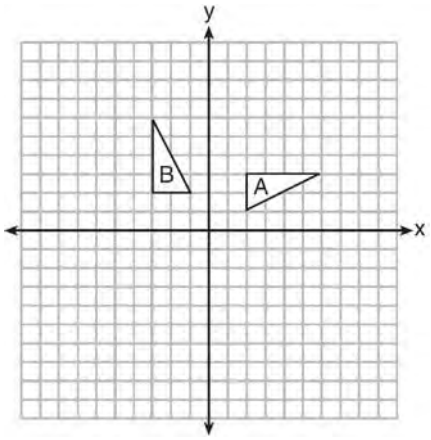
26 In the diagram below, $\overline{CD}$ is the altitude drawn to the hypotenuse $\overline{AB}$ of right triangle *ABC*.




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

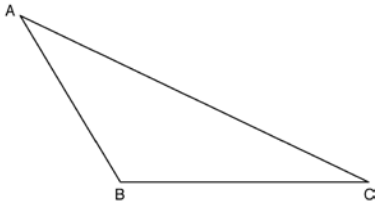
1) $AD = 2$ and $DB = 36$
2) $AD = 3$ and $AB = 24$
3) $AD = 6$ and $DB = 12$
4) $AD = 8$ and $AB = 17$

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

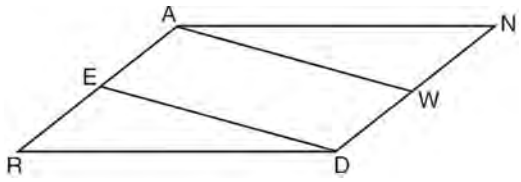



1) line reflection
2) rotation
3) dilation
4) translation

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

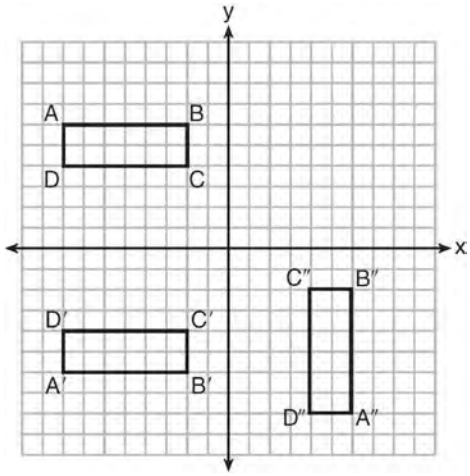


29 Given: Parallelogram $ANDR$ with $\overline{AW}$ and $\overline{DE}$ bisecting $\overline{NWD}$ and $\overline{REA}$ at points $W$ and $E$, respectively




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

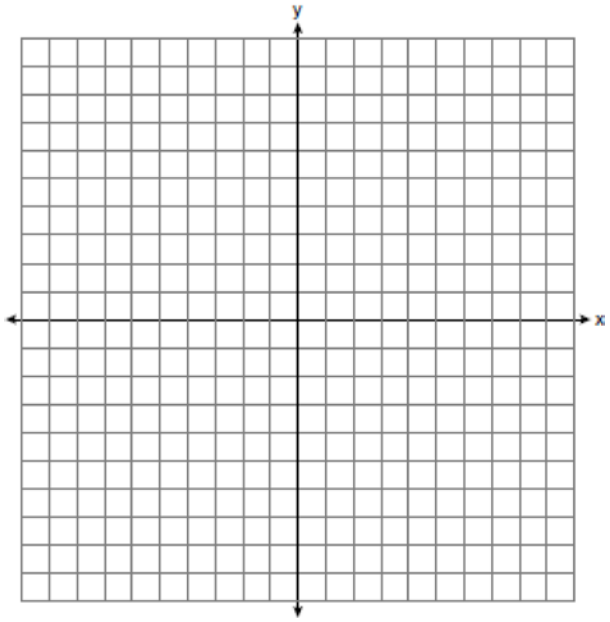
30 A sequence of transformations maps rectangle $ABCD$ onto rectangle $A''B''C''D''$, as shown in the diagram below.



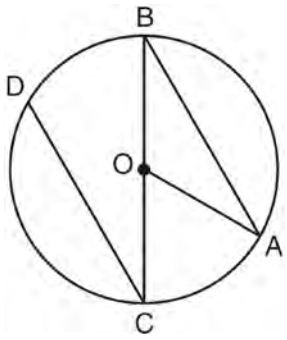

Which sequence of transformations maps $ABCD$ onto $A'B'C'D'$ and then maps $A'B'C'D'$ onto $A''B''C''D''$?

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

31 Directed line segment $PT$ has endpoints whose coordinates are $P(-2,1)$ and $T(4,7)$. Determine the coordinates of point $J$ that divides the segment in the ratio 2 to 1. [The use of the set of axes below is optional.]

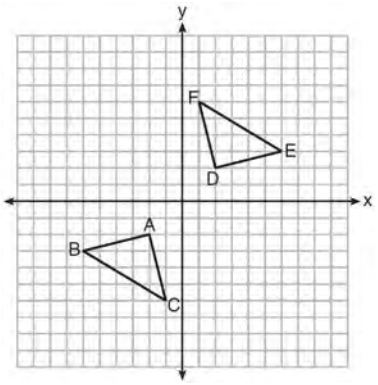



32 In the diagram below of circle $O$ with diameter $\overline{BC}$ and radius $\overline{OA}$, chord $\overline{DC}$ is parallel to chord $\overline{BA}$.




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

33 Triangle *ABC* and triangle *DEF* are graphed on the set of axes below.

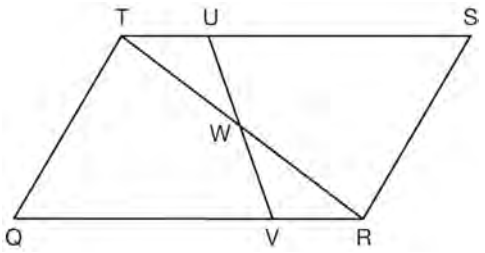



Which sequence of transformations maps triangle *ABC* onto triangle *DEF*?

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

34 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.

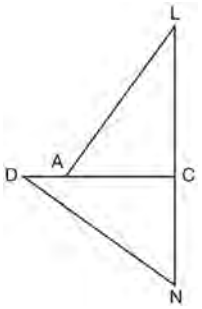
35 In parallelogram *QRST* shown below, diagonal $\overline{TR}$ is drawn, *U* and *V* are points on $\overline{TS}$ and $\overline{QR}$, respectively, and $\overline{UV}$ intersects $\overline{TR}$ at *W*.




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

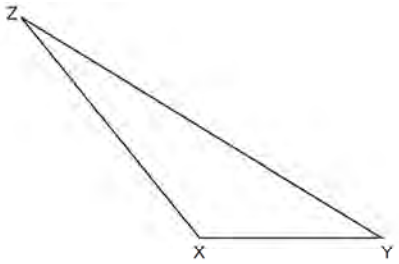
1) 37°
2) 60°
3) 72°
4) 83°

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



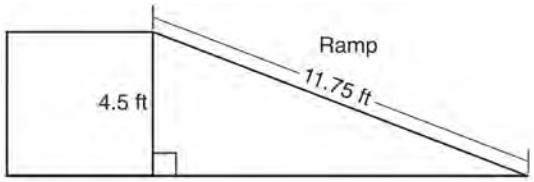

a) Prove that $\triangle LAC \cong \triangle DNC$.
b) Describe a sequence of rigid motions that will map $\triangle LAC$ onto $\triangle DNC$.

37 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 $\triangle XYZ$.



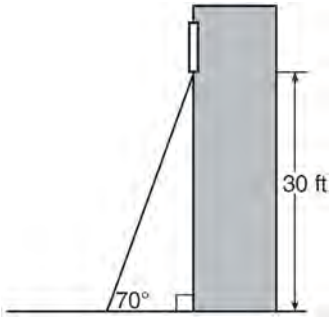



38 The diagram below shows a ramp connecting the ground to a loading platform 4.5 feet above the ground. The ramp measures 11.75 feet from the ground to the top of the loading platform.

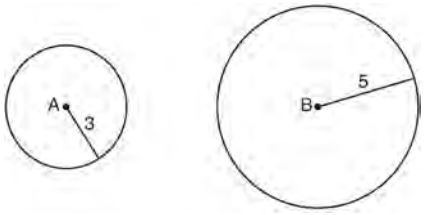



Determine and state, to the *nearest degree*, the angle of elevation formed by the ramp and the ground.

39 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.




40 As shown in the diagram below, circle *A* has a radius of 3 and circle *B* has a radius of 5.

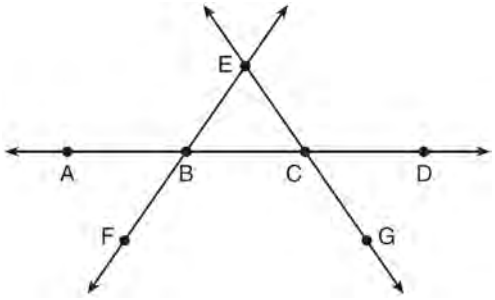



Use transformations to explain why circles *A* and *B* are similar.

41 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

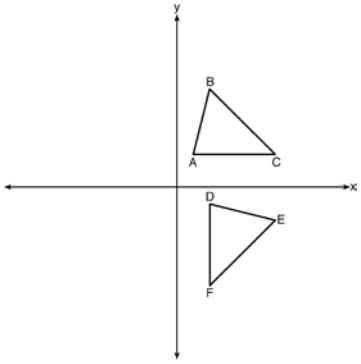
42 In the diagram below, $\overleftrightarrow{FE}$ bisects $\overline{AC}$ at $B$, and $\overleftrightarrow{GE}$ bisects $\overline{BD}$ at $C$.




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 $B$.

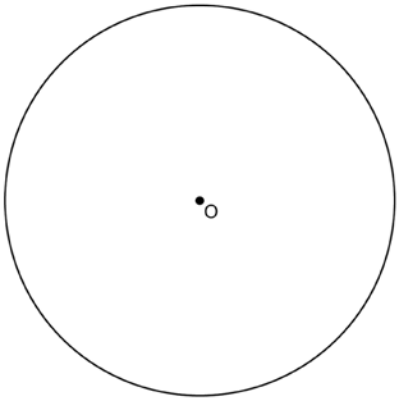
43 The image of $\triangle ABC$ after a rotation of 90° clockwise about the origin is $\triangle DEF$, as shown below.




Which statement is true?

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

44 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.

45 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) $3x - 2y = 5$

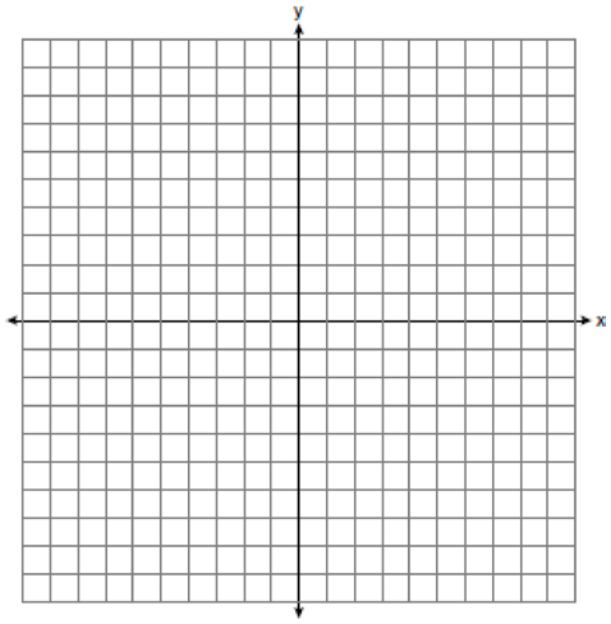
46 What are the coordinates of the point on the directed line segment from $K(-5,-4)$ to $L(5,1)$ that partitions the segment into a ratio of 3 to 2?
1) $(-3,-3)$
2) $(-1,-2)$
3) $\left(0,-\frac{3}{2}\right)$
4) $(1,-1)$

47 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

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

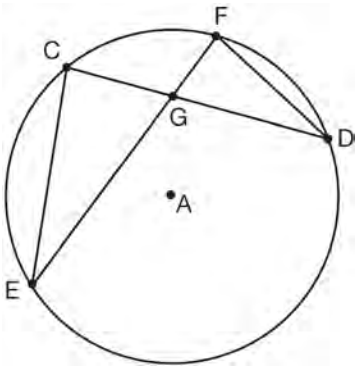
49 A line that passes through the points whose coordinates are $(1,1)$ and $(5,7)$ is dilated by a scale factor of 3 and centered at the origin. The image of the line
1) is perpendicular to the original line
2) is parallel to the original line
3) passes through the origin
4) is the original line

50 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.]




51 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

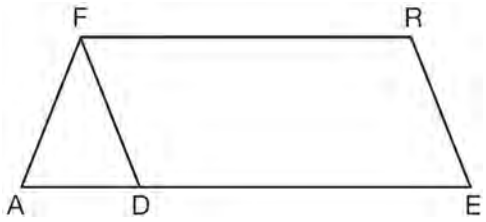
52 In the diagram of circle $A$ shown below, chords $\overline{CD}$ and $\overline{EF}$ intersect at $G$, and chords $\overline{CE}$ and $\overline{FD}$ are drawn.




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) $\triangle CEG \sim \triangle FDG$

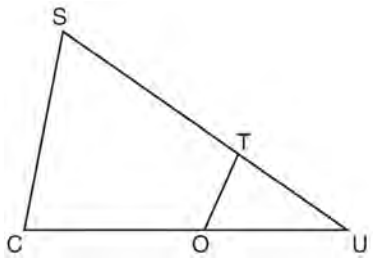
53 In the diagram of parallelogram $FRED$ shown below, $\overline{ED}$ is extended to $A$, and $\overline{AF}$ is drawn such that $\overline{AF} \cong \overline{DF}$.




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

1) 124°
2) 112°
3) 68°
4) 56°

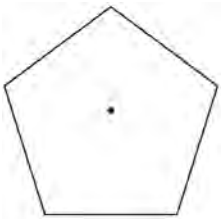
54 In $\triangle SCU$ shown below, points $T$ and $O$ are on $\overline{SU}$ and $\overline{CU}$, respectively. Segment $OT$ is drawn so that $\angle C \cong \angle OTU$.




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

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

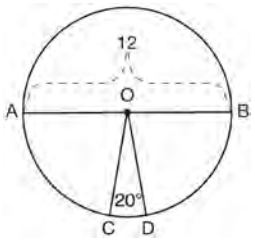
55 A regular pentagon is shown in the diagram below.



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°

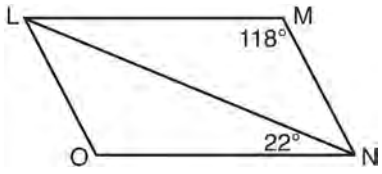
56 In the diagram below of circle $O$, diameter $\overline{AB}$ and radii $\overline{OC}$ and $\overline{OD}$ are drawn. The length of $\overline{AB}$ is 12 and the measure of $\angle COD$ is 20 degrees.




If $\overset{\frown}{AB} \cong \overset{\frown}{BD}$, find the area of sector $BOD$ in terms of $\pi$.

57 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

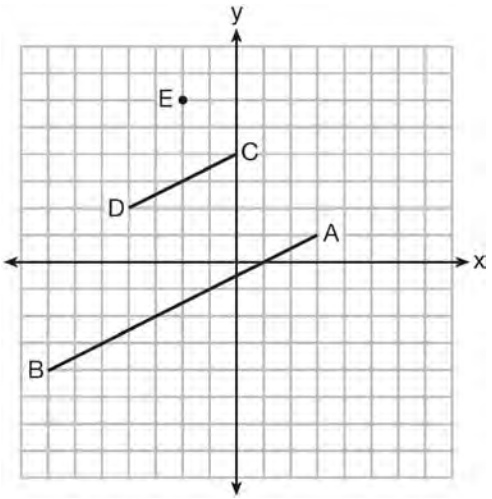
58 The diagram below shows parallelogram $LMNO$ with diagonal $\overline{LN}$, $m\angle M = 118°$, and $m\angle LNO = 22°$.




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

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

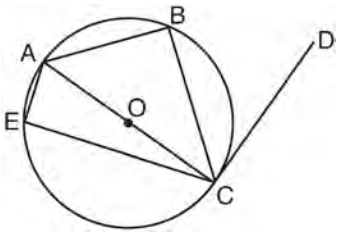
60 In the diagram below, $\overline{CD}$ is the image of $\overline{AB}$ after a dilation of scale factor $k$ with center $E$.




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) $\frac{EA}{EC}$

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

62 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.



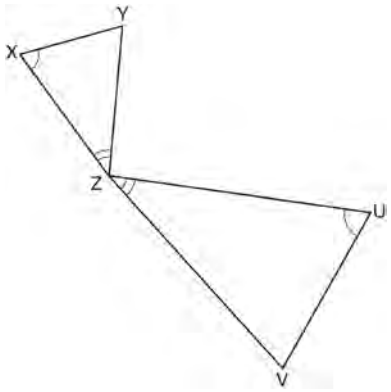

Which statement is *not* always true?

1) $\angle ACB \cong \angle BCD$
2) $\angle ABC \cong \angle ACD$
3) $\angle BAC \cong \angle DCB$
4) $\angle CBA \cong \angle AEC$

63 A triangle is dilated by a scale factor of 3 with the center of dilation at the origin. Which statement is true?

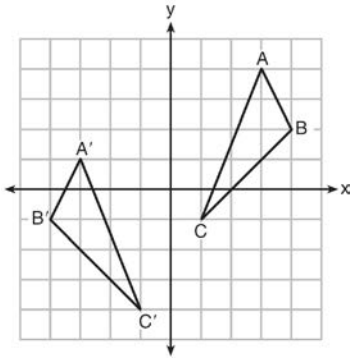
1) The area of the image is nine times the area of the original triangle.
2) The perimeter of the image is nine times the perimeter of the original triangle.
3) The slope of any side of the image is three times the slope of the corresponding side of the original triangle.
4) The measure of each angle in the image is three times the measure of the corresponding angle of the original triangle.

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



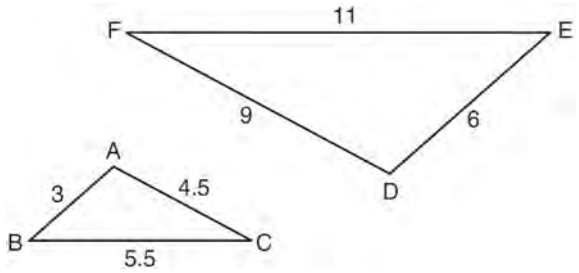

Describe a sequence of similarity transformations that shows $\triangle XYZ$ is similar to $\triangle UVZ$.

65 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.

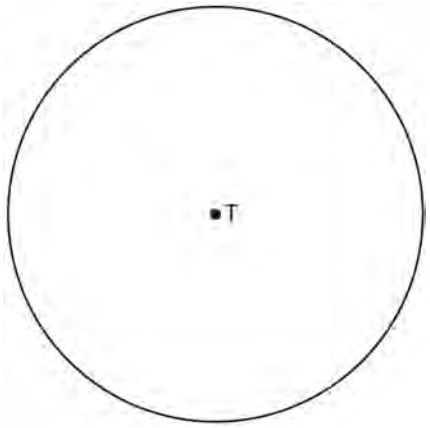
66 In the diagram below, $\triangle DEF$ is the image of $\triangle ABC$ after a clockwise rotation of 180° and a dilation where $AB = 3$, $BC = 5.5$, $AC = 4.5$, $DE = 6$, $FD = 9$, and $EF = 11$.




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

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



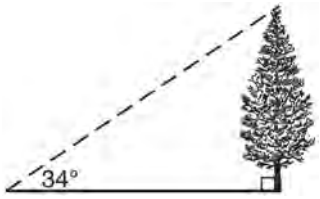

68 The endpoints of one side of a regular pentagon are $(-1,4)$ and $(2,3)$. What is the perimeter of the pentagon?

1) $\sqrt{10}$
2) $5\sqrt{10}$
3) $5\sqrt{2}$
4) $25\sqrt{2}$

69 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) $y = 3x - 6$

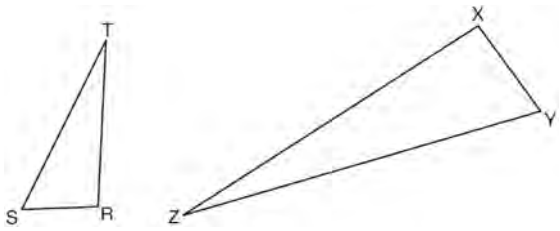
70 As shown in the diagram below, the angle of elevation from a point on the ground to the top of the tree is 34°.



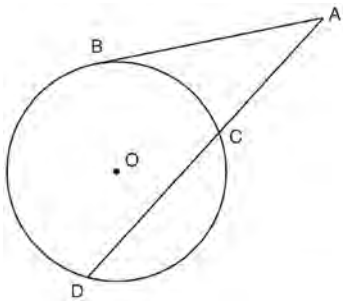

If the point is 20 feet from the base of the tree, what is the height of the tree, to the *nearest tenth of a foot*?

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

71 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.




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

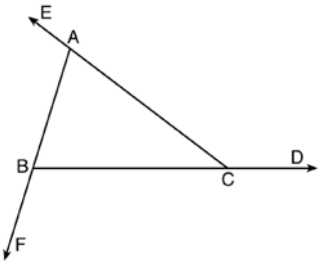



Prove the theorem: If a secant and a tangent are drawn to a circle from an external point, the product of the lengths of the secant segment and its external segment equals the length of the tangent segment squared. ($AC \cdot AD = AB^2$)

73 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

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

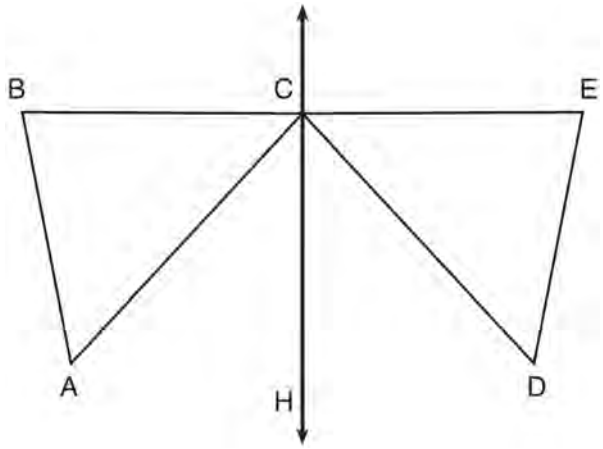



75 Given: $D$ is the image of $A$ after a reflection over $\overleftrightarrow{CH}$.

$\overleftrightarrow{CH}$ is the perpendicular bisector of $\overline{BCE}$

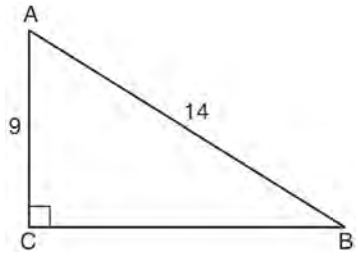
$\triangle ABC$ and $\triangle DEC$ are drawn

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




76 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 $1920 \text{ kg/m}^3$. The maximum capacity of the contractor's trailer is 900 kg. Can the trailer hold the weight of 500 bricks? Justify your answer.

77 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

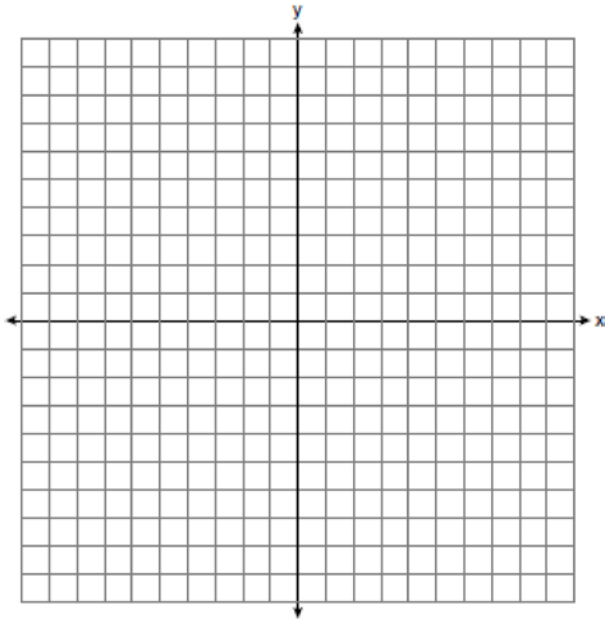
78 If the rectangle below is continuously rotated about side *w*, which solid figure is formed?


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

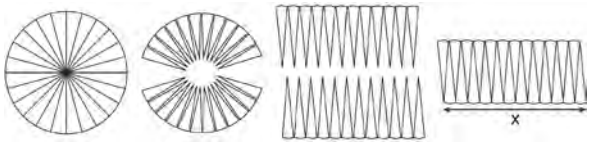
79 The diameter of a basketball is approximately 9.5 inches and the diameter of a tennis ball is approximately 2.5 inches. The volume of the basketball is about how many times greater than the volume of the tennis ball?

1) 3591
2) 65
3) 55
4) 4

80 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.]



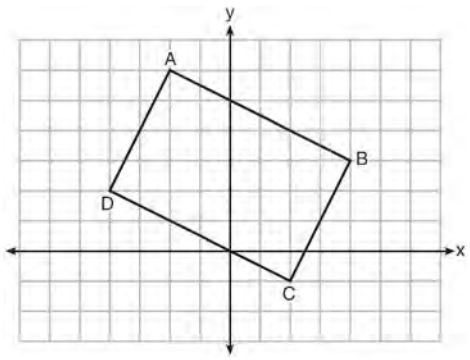

81 A circle with a radius of 5 was divided into 24 congruent sectors. The sectors were then rearranged, as shown in the diagram below.




To the *nearest integer*, the value of *x* is

1) 31
2) 16
3) 12
4) 10

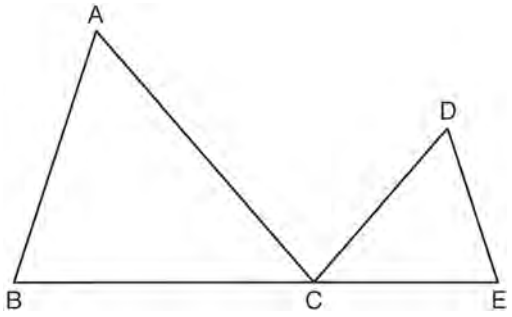
82 Quadrilateral *ABCD* is graphed on the set of axes below.




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 $B'(-3,4)$

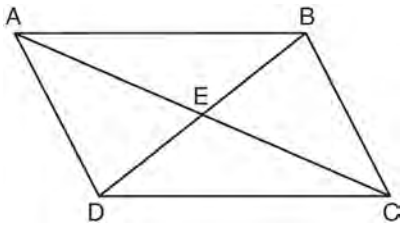
83 In the diagram below, $\triangle ABC \sim \triangle DEC$.




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

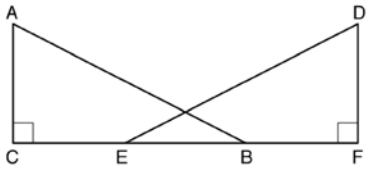
1) 12.5
2) 14.0
3) 14.8
4) 17.5

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

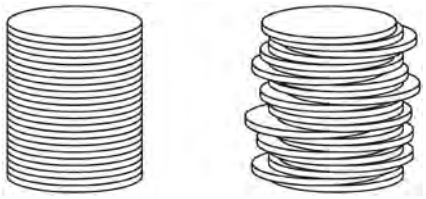



Prove: $\triangle AED \cong \triangle CEB$
Describe a single rigid motion that maps $\triangle AED$ onto $\triangle CEB$.

85 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 $\triangle ABC \cong \triangle DEF$.

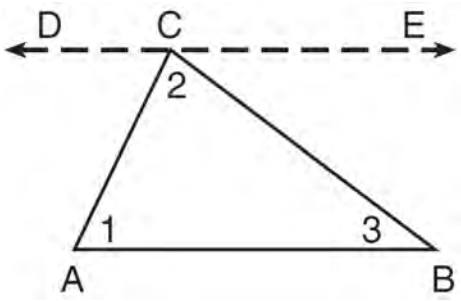



86 Two stacks of 23 quarters each are shown below. One stack forms a cylinder but the other stack does not form a cylinder.



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

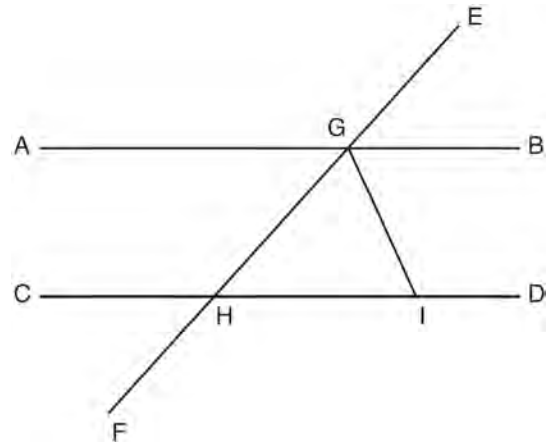
87 Given the theorem, "The sum of the measures of the interior angles of a triangle is 180°," complete the proof for this theorem.




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

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

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




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

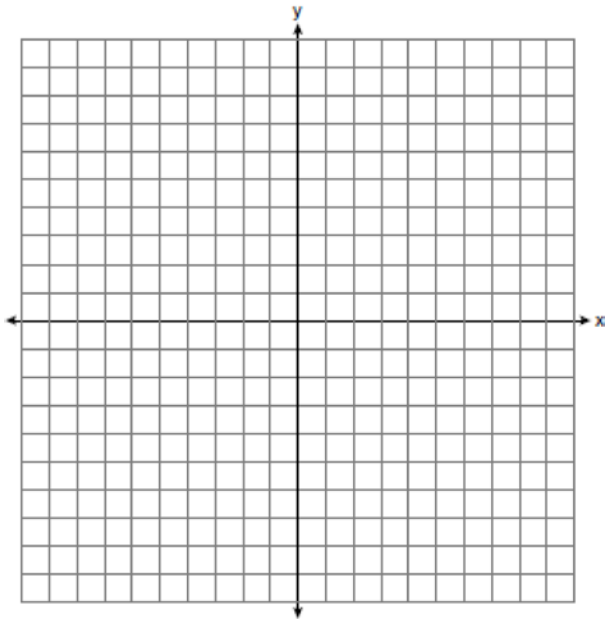
89 After a reflection over a line, $\triangle A'B'C'$ is the image of $\triangle ABC$. Explain why triangle $ABC$ is congruent to triangle $\triangle A'B'C'$.

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

91 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

92 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.]

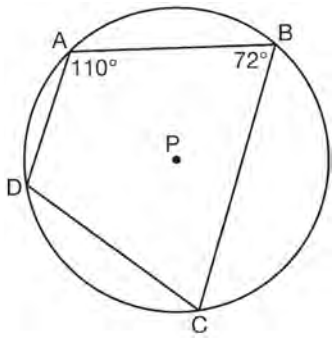



93 The endpoints of $\overline{DEF}$ are $D(1,4)$ and $F(16,14)$. Determine and state the coordinates of point $E$, if $DE:EF = 2:3$.

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

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

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

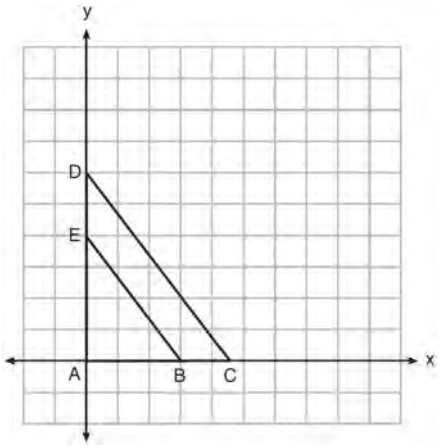



What is m∠*ADC*?
1) 70°
2) 72°
3) 108°
4) 110°

96 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.

97 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) $y = 3x - 1$

98 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) $\frac{4}{3}$

99 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

100 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.

101 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

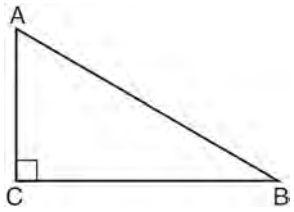
102 If $\triangle ABC$ is dilated by a scale factor of 3, which statement is true of the image $\triangle A'B'C'$?
1) $3A'B' = AB$
2) $B'C' = 3BC$
3) $m\angle A' = 3(m\angle A)$
4) $3(m\angle C') = m\angle C$

103 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

104 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

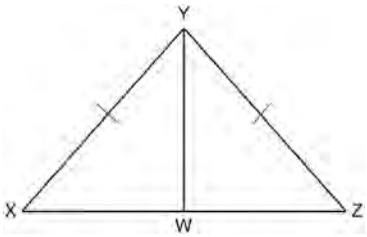
105 In isosceles $\triangle MNP$, line segment $NO$ bisects vertex $\angle MNP$, as shown below. If $MP = 16$, find the length of $\overline{MO}$ and explain your answer.


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

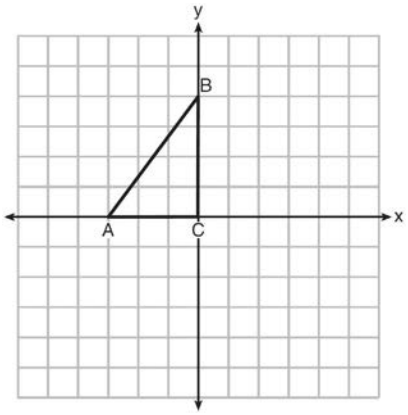



Which equation is always true?
1) $\sin A = \sin B$
2) $\cos A = \cos B$
3) $\cos A = \sin C$
4) $\sin A = \cos B$

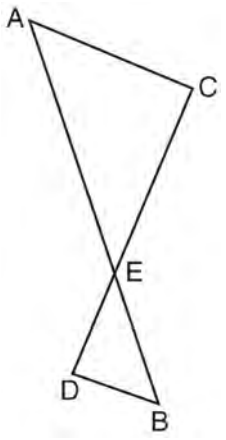
107 Given: $\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, and $\overline{YW}$ bisects $\angle XYZ$
Prove that $\angle YWZ$ is a right angle.



108 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 $x = 1$.




109 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?

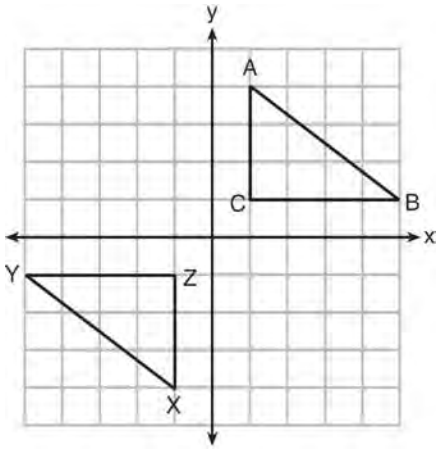
1) $\frac{CE}{DE} = \frac{EB}{EA}$

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

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

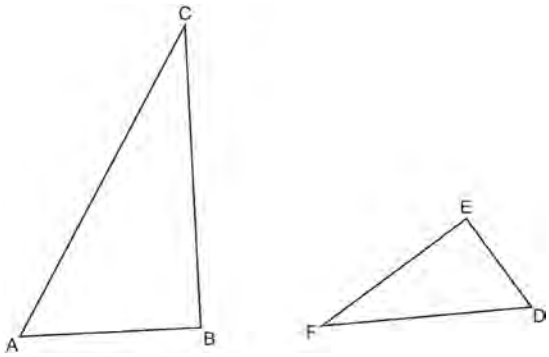
4) $\frac{ED}{EC} = \frac{AC}{BD}$

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




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

111 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?

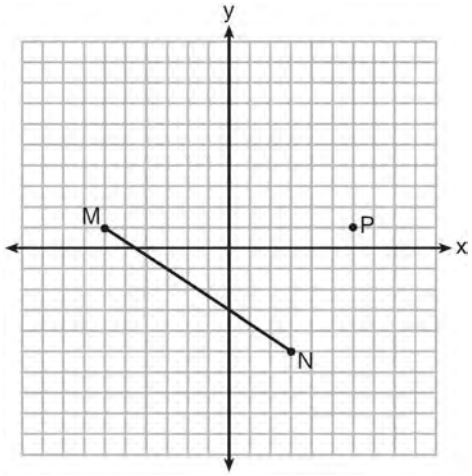
1) $\angle CAB \cong \angle DEF$

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

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

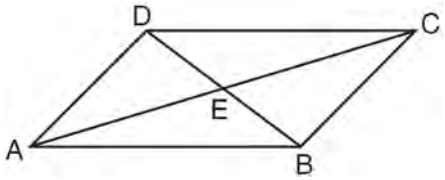
4) $\frac{AB}{DE} = \frac{FE}{CB}$

112 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 $\overline{MN}$?



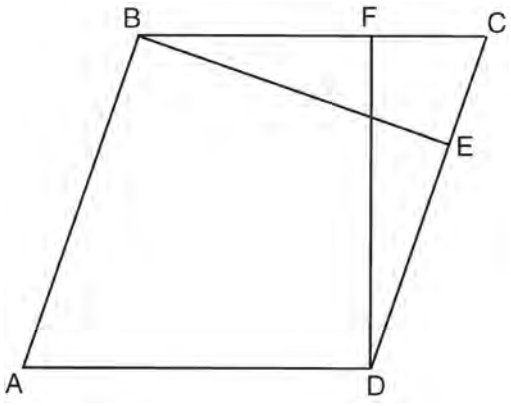

1) $y = -\frac{2}{3}x + 5$
2) $y = -\frac{2}{3}x - 3$
3) $y = \frac{3}{2}x + 7$
4) $y = \frac{3}{2}x - 8$

113 In parallelogram $ABCD$ shown below, diagonals $\overline{AC}$ and $\overline{BD}$ intersect at $E$.



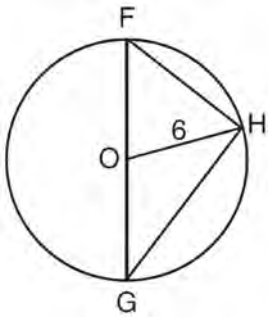

Prove: $\angle ACD \cong \angle CAB$

114 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.

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

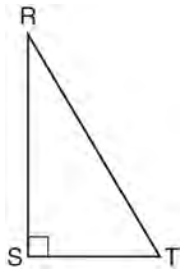



What is the area of the sector formed by angle $FOH$?

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

116 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

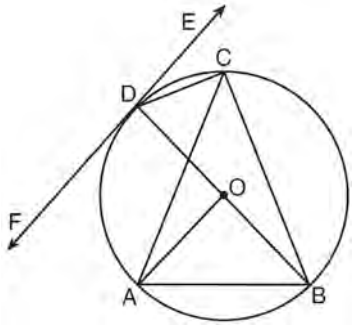
117 Which object is formed when right triangle $RST$ shown below is rotated around leg $\overline{RS}$?




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

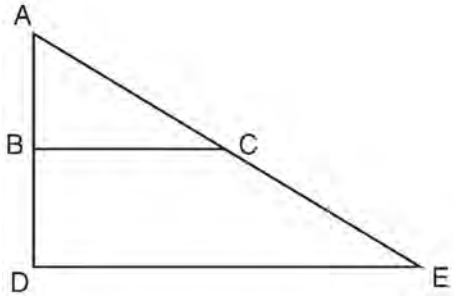
118 A shipping container is in the shape of a right rectangular prism with a length of 12 feet, a width of 8.5 feet, and a height of 4 feet. The container is completely filled with contents that weigh, on average, 0.25 pound per cubic foot. What is the weight, in pounds, of the contents in the container?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

119 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."



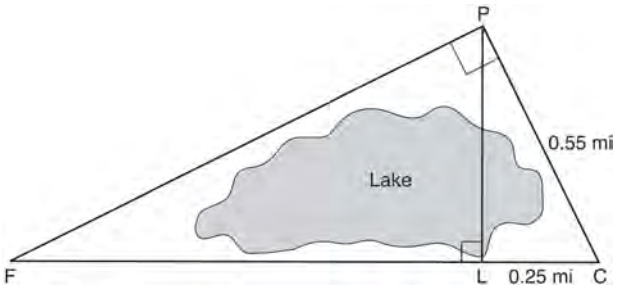

Which angle is Sam referring to?
1) $\angle AOB$
2) $\angle BAC$
3) $\angle DCB$
4) $\angle FDB$

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




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

121 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.

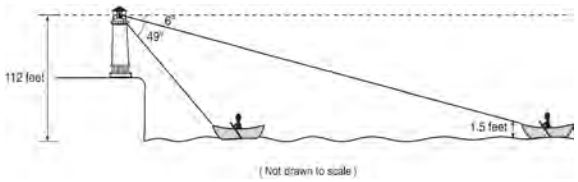



If the path from the park ranger station to the campground is 0.55 mile, determine and state, to the *nearest hundredth of a mile*, the distance between the park ranger station and the lifeguard chair. Gerald believes the distance from the first aid station to the campground is at least 1.5 miles. Is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

122 What are the coordinates of the center and length of the radius of the circle whose equation is $x^2 + 6x + y^2 - 4y = 23$?

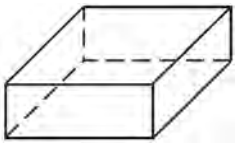
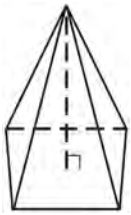
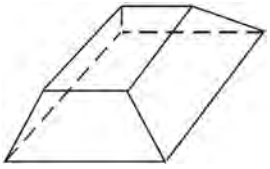
1) $(3,-2)$ and 36
2) $(3,-2)$ and 6
3) $(-3,2)$ and 36
4) $(-3,2)$ and 6

123 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.

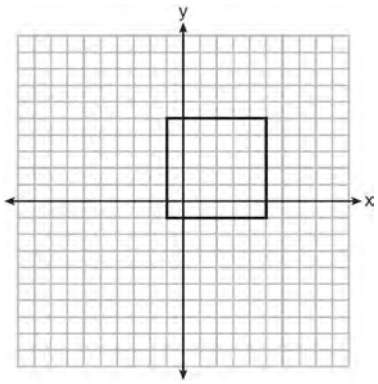



At 5:00, the observer in the lighthouse measured the angle of depression to the front of the canoe to be 6°. Five minutes later, the observer measured and saw the angle of depression to the front of the canoe had increased by 49°. Determine and state, to the *nearest foot per minute*, the average speed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

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

1) 
2) 
3) 
4) 

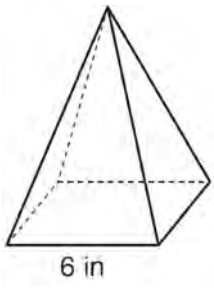
125 In the diagram below, a square is graphed in the coordinate plane.




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

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

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

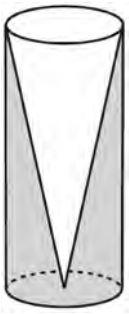



If the altitude of the pyramid measures 12 inches, its volume, in cubic inches, is

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

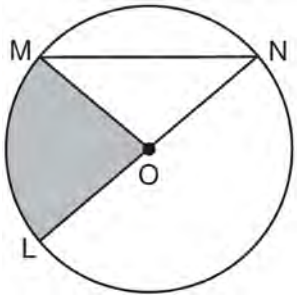
127 A flagpole casts a shadow 16.60 meters long. Tim stands at a distance of 12.45 meters from the base of the flagpole, such that the end of Tim's shadow meets the end of the flagpole's shadow. If Tim is 1.65 meters tall, determine and state the height of the flagpole to the *nearest tenth of a meter*.

128 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?



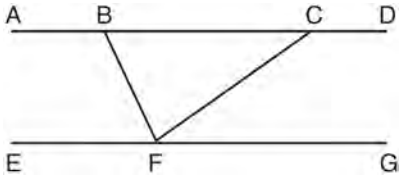
Walter goes to a hobby store to buy the wax for his candles. The wax costs $0.10 per ounce. If the weight of the wax is 0.52 ounce per cubic inch, how much will it cost Walter to buy the wax for 100 candles? If Walter spent a total of $37.83 for the molds and charges $1.95 for each candle, what is Walter's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

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




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

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




Which statement will allow Steve to prove $\overline{ABCD} \parallel \overline{EFG}$?
1) $\angle CFG \cong \angle FCB$
2) $\angle ABF \cong \angle BFC$
3) $\angle EFB \cong \angle CFB$
4) $\angle CBF \cong \angle GFC$

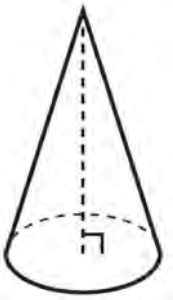
131 A wooden cube has an edge length of 6 centimeters and a mass of 137.8 grams. Determine the density of the cube, to the *nearest thousandth*. State which type of wood the cube is made of, using the density table below.

| 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 |

132 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

133 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

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



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

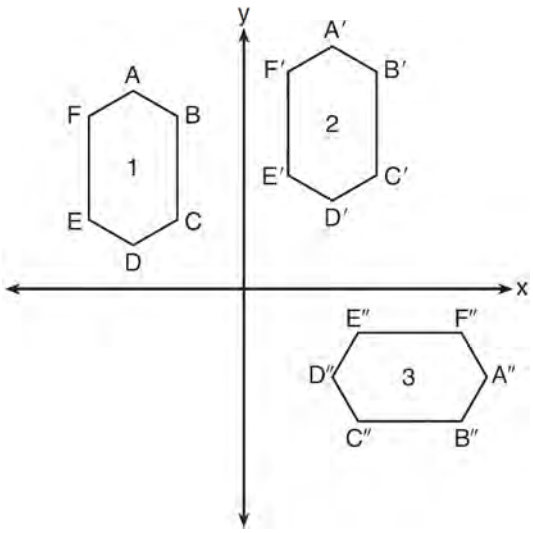
1) 

2) 

3) 

4) 

135 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

# Geometry Common Core State Standards Regents at Random
## Answer Section

1 ANS:

$\frac{120}{230} = \frac{x}{315}$

$x = 164$

PTS: 2 REF: 081527geo NAT: G.SRT.5 TOP: Triangle Similarity

2 ANS:

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

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

3 ANS:

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

$x \approx 9.115$

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

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

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

4 ANS: 1

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

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

PTS: 2 REF: 061509geo NAT: G.GPE.5 TOP: Parallel and Perpendicular Lines

5 ANS:

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

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

$x = 120$

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

6 ANS: 3

$5 \cdot \frac{10}{4} = \frac{50}{4} = 12.5$

PTS: 2 REF: 081512geo NAT: G.C.1 TOP: Properties of Circles

7 ANS: 3 PTS: 2 REF: 081502geo NAT: G.CO.6
TOP: Properties of Transformations

8 ANS: 3

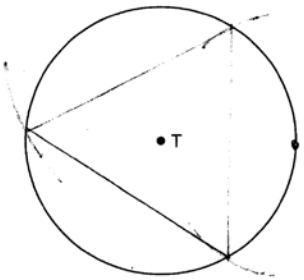
$\frac{9}{5} = \frac{9.2}{x}$ $5.1 + 9.2 = 14.3$

$9x = 46$

$x \approx 5.1$

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

9 ANS:




PTS: 2 REF: 081526geo NAT: G.CO.13 TOP: Constructions

10 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.1 TOP: Equations of Circles

11 ANS: 3 PTS: 2 REF: 011605geo NAT: G.CO.6
TOP: Properties of Transformations

12 ANS: 4

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

$230 \approx s$

PTS: 2 REF: 081521geo NAT: G.GMD.3 TOP: Volume

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

14 ANS:

$\tan 52.8 = \frac{h}{x}$ $\quad h = x\tan 52.8$ $\quad \tan 34.9 = \frac{h}{x+8}$ $\quad h = (x+8)\tan 34.9$

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

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

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

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

$x \approx 9$

$\tan 52.8 \approx \frac{h}{9}$ $\quad 11.86 + 1.7 \approx 13.6$

$x \approx 11.86$

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

15 ANS: 4

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

PTS: 2 REF: 081517geo NAT: G.SRT.2 TOP: Triangle Similarity

16 ANS: 4 PTS: 2 REF: 061502geo NAT: G.CO.6
TOP: Properties of Transformations

17 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.5 TOP: Parallel and Perpendicular Lines

18 ANS: 1

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

PTS: 2 REF: 011613geo NAT: G.SRT.5 TOP: Triangle Similarity

19 ANS: 3

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

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

20 ANS:

Translations preserve distance. If point $D$ is mapped onto point $A$, point $F$ would map onto point $C$. $\triangle DEF \cong \triangle ABC$ as $\overline{AC} \cong \overline{DF}$ and points are collinear on line $\ell$ and a reflection preserves distance.

PTS: 4 REF: 081534geo NAT: G.CO.6 TOP: Properties of Transformations

21 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.

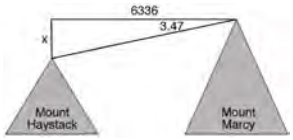
PTS: 4 REF: fall1411geo NAT: G.GPE.4 TOP: Quadrilaterals in the Coordinate Plane

22 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.1 TOP: Line Dilations

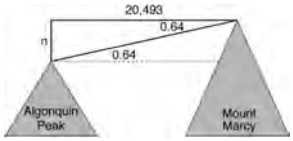
23 ANS:




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

$M \approx 384$

$4960 + 384 = 5344$




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

$A \approx 229$

$5344 - 229 = 5115$

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

24 ANS:

$\tan 7 = \frac{125}{x}$ $\tan 16 = \frac{125}{y}$ $1018 - 436 \approx 582$

$x \approx 1018$ $y \approx 436$

PTS: 4 REF: 081532geo NAT: G.SRT.8 TOP: Using Trigonometry to Find a Side

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

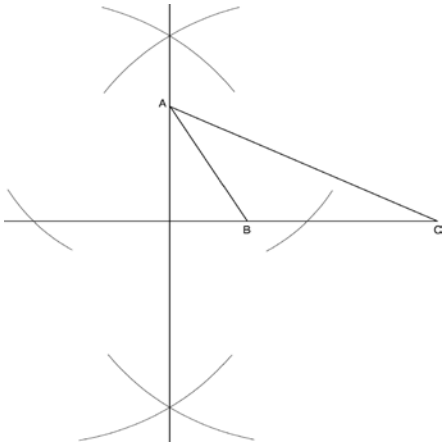
26 ANS: 2

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

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

27 ANS: 2 PTS: 2 REF: 081513geo NAT: G.CO.5 TOP: Identifying Transformations

28 ANS:




PTS: 2 REF: fall1409geo NAT: G.CO.12 TOP: Constructions

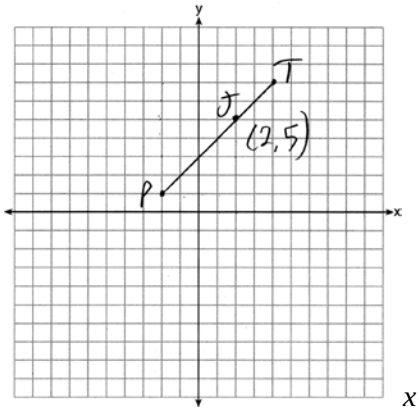
29 ANS:

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.CO.11 TOP: Quadrilateral Proofs

30 ANS: 1 PTS: 2 REF: 081507geo NAT: G.CO.5
TOP: Identifying Transformations

31 ANS:

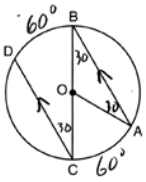



$x = \frac{2}{3}(4 - -2) = 4 \quad -2 + 4 = 2 \quad J(2,5)$

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

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

32 ANS:




$180 - 2(30) = 120$

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

33 ANS: 1 PTS: 2 REF: 011608geo NAT: G.CO.5
TOP: Identifying Transformations

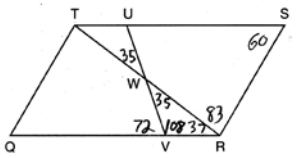
34 ANS:

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

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

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

35 ANS: 3



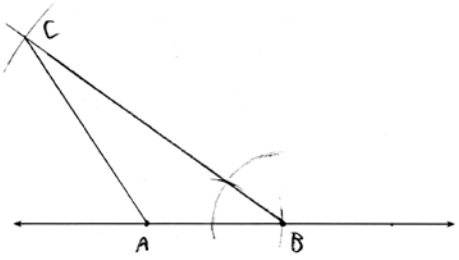

PTS: 2 REF: 011603geo NAT: G.CO.11 TOP: Parallelograms

36 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.SRT.4 TOP: Triangle Proofs

37 ANS:




SAS ≅ SAS

PTS: 4 REF: 011634geo NAT: G.CO.12 TOP: Constructions

38 ANS:

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

$x \approx 23$

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

39 ANS:

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

$L \approx 32$

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

40 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.1 TOP: Properties of Circles

41 ANS: 4

$\frac{-2-1}{-1--3} = \frac{-3}{2}$ $\frac{3-2}{0-5} = \frac{1}{-5}$ $\frac{3-1}{0--3} = \frac{2}{3}$ $\frac{2--2}{5--1} = \frac{4}{6} = \frac{2}{3}$

PTS: 2 REF: 081522geo NAT: G.GPE.4 TOP: Quadrilaterals in the Coordinate Plane

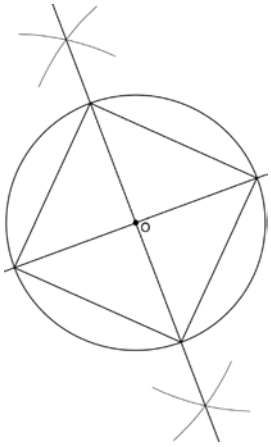
42 ANS: 1 PTS: 2 REF: 011606geo NAT: G.CO.9
TOP: Line Bisectors

43 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.6 TOP: Properties of Transformations

44 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.13 TOP: Constructions

45 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.1 TOP: Line Dilations

46 ANS: 4

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

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

$-5 + 6$ $-4 + 3$

$1$ $-1$

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

47 ANS: 2

$s^2 + s^2 = 7^2$

$2s^2 = 49$

$s^2 = 24.5$

$s \approx 4.9$

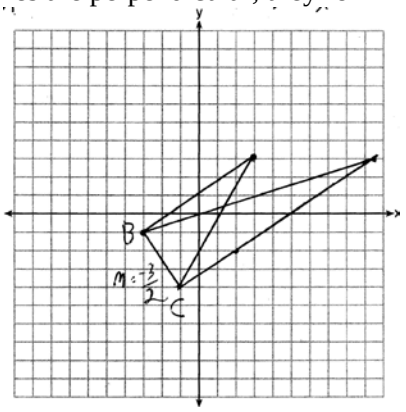
PTS: 2 REF: 081511geo NAT: G.SRT.8 TOP: Inscribed Quadrilaterals

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

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

50 ANS:

The slopes of perpendicular line are opposite reciprocals. Since the lines are perpendicular, they form right angles and a right triangle. $m_{\overline{BC}} = -\frac{3}{2}$




$-1 = \frac{2}{3}(-3) + b$ or $-4 = \frac{2}{3}(-1) + b$

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

$-1 = -2 + b$

$1 = b$

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

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

$3 = x$

$\frac{-12}{3} = \frac{-2}{3} + b$

$-\frac{10}{3} = b$

$3 = \frac{2}{3}x - \frac{10}{3}$

$9 = 2x - 10$

$19 = 2x$

$9.5 = x$

PTS: 4 REF: 081533geo NAT: G.GPE.4 TOP: Triangles in the Coordinate Plane

51 ANS: 2

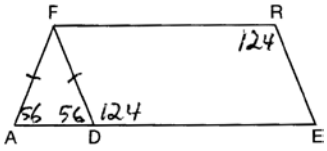
$SA = 6 \cdot 12^2 = 864$

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

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

52 ANS: 1 PTS: 2 REF: 061508geo NAT: G.SRT.5
TOP: Chords, Secants and Tangents

53 ANS: 3




PTS: 2 REF: 081508geo NAT: G.CO.11 TOP: Parallelograms

54 ANS: 3

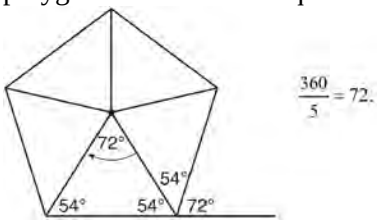
$\frac{12}{4} = \frac{x}{5}$ $15 - 4 = 11$

$x = 15$

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

55 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.




$\frac{360}{5} = 72.$

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

56 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.5 TOP: Sectors

57 ANS: 1

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

PTS: 2 REF: 011623geo NAT: G.MG.3 TOP: Circumference

58 ANS:

Opposite angles in a parallelogram are congruent, so $m\angle O = 118°$. The interior angles of a triangle equal 180°. $180 - (118 + 22) = 40$.

PTS: 2 REF: 061526geo NAT: G.CO.11 TOP: Parallelograms

59 ANS: 1 PTS: 2 REF: 081504geo NAT: G.SRT.7
TOP: Cofunctions

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

61 ANS:

$\ell: y = 3x - 4$

$m: y = 3x - 8$

PTS: 2 REF: 011631geo NAT: G.SRT.1 TOP: Directed Line Segments

62 ANS: 1 PTS: 2 REF: 061520geo NAT: G.C.2
TOP: Chords, Secants and Tangents

63 ANS: 1
$3^2 = 9$

PTS: 2 REF: 081520geo NAT: G.SRT.2 TOP: Polygon Dilations

64 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, $\triangle XYZ \sim \triangle UVZ$.

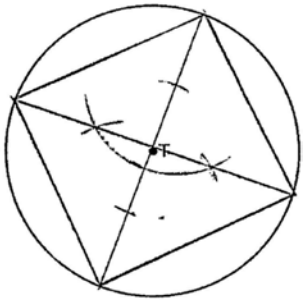
PTS: 2 REF: spr1406geo NAT: G.SRT.2 TOP: Triangle Similarity

65 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.6 TOP: Properties of Transformations

66 ANS: 4 PTS: 2 REF: 081514geo NAT: G.SRT.5
TOP: Triangle Similarity

67 ANS:



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

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

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

69 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.1 TOP: Line Dilations

70 ANS: 3

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

$T \approx 13.5$

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

71 ANS:

$\frac{6}{14} = \frac{9}{21}$ SAS

$126 = 126$

PTS: 2 REF: 081529geo NAT: G.SRT.2 TOP: Triangle Similarity

72 ANS:

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

PTS: 6 REF: spr1413geo NAT: G.SRT.4 TOP: Similarity Proofs

73 ANS: 2

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

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

74 ANS:

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

PTS: 4 REF: fall1410geo NAT: G.CO.10 TOP: Interior and Exterior Angles of Triangles

75 ANS:

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

PTS: 6 REF: spr1414geo NAT: G.CO.6 TOP: Properties of Transformations

76 ANS:

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

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

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

77 ANS: 3

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

$A \approx 50°$

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

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

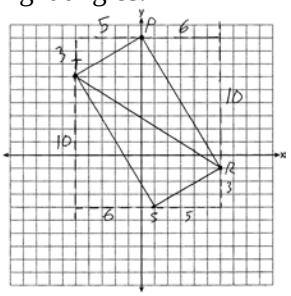
79 ANS: 3

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

PTS: 2 REF: 011614geo NAT: G.MG.1 TOP: Volume

80 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.4 TOP: Quadrilaterals in the Coordinate Plane

81 ANS: 2

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

PTS: 2 REF: 061523geo NAT: G.GMD.1 TOP: Properties of Circles

82 ANS: 4 PTS: 2 REF: 011611geo NAT: G.CO.6
TOP: Properties of Transformations

83 ANS: 4

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

PTS: 2 REF: 061521geo NAT: G.SRT.5 TOP: Triangle Similarity

84 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.CO.11 TOP: Quadrilateral Proofs

85 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.6 TOP: Properties of Transformations

86 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.1 TOP: Cavalieri's Principle

87 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.10 TOP: Triangle Proofs

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

PTS: 4 REF: 061532geo NAT: G.CO.9 TOP: Parallel Lines and Transversals

89 ANS:
Reflections are rigid motions that preserve distance.

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

90 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.

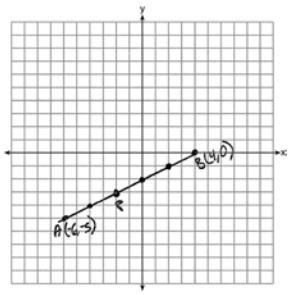
PTS: 2 REF: spr1407geo NAT: G.SRT.7 TOP: Cofunctions

91 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.2 TOP: Density

92 ANS:




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

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

$-6+4$ $-5+2$

$-2$ $-3$

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

93 ANS:

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

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

94 ANS: 1

$\frac{360°}{45°}=8$

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

95 ANS: 3 PTS: 2 REF: 081515geo NAT: G.C.3
TOP: Inscribed Quadrilaterals

96 ANS:

$\frac{16}{9}=\frac{x}{20.6}$ $D=\sqrt{36.6^2+20.6^2}\approx 42$

$x\approx 36.6$

PTS: 4 REF: 011632geo NAT: G.SRT.8 TOP: Pythagorean Theorem

97 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.1 TOP: Line Dilations

98 ANS: 1

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

PTS: 2 REF: 081523geo NAT: G.SRT.2 TOP: Polygon Dilations

99 ANS: 2 PTS: 2 REF: 081501geo NAT: G.CO.11
TOP: Parallelograms

100 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.7 TOP: Cofunctions

101 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.4 TOP: Triangles in the Coordinate Plane

102 ANS: 2 PTS: 2 REF: 061516geo NAT: G.SRT.5
TOP: Polygon Dilations

103 ANS: 2
$x^2 + y^2 + 6y + 9 = 7 + 9$

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

PTS: 2 REF: 061514geo NAT: G.GPE.1 TOP: Equations of Circles

104 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. $\tan x = \frac{69}{102}$

$x \approx 34.1$

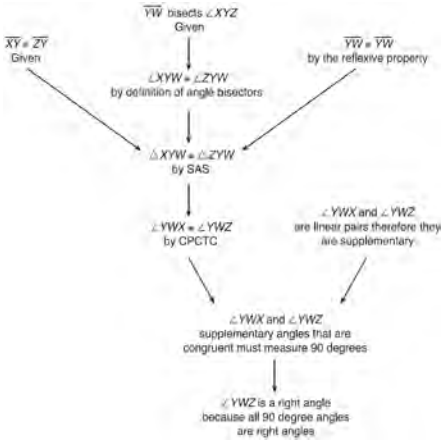
PTS: 2 REF: fall1401geo NAT: G.SRT.8 TOP: Using Trigonometry to Find an Angle

105 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.5 TOP: Isosceles Triangles

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

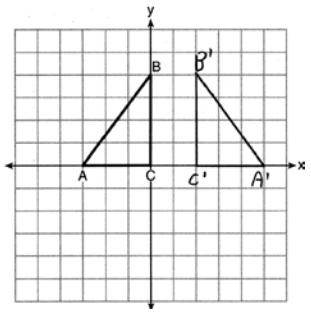
107 ANS:




$\triangle XYZ$, $\overline{XY} \cong \overline{ZY}$, 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.10 TOP: Triangle Proofs

108 ANS:




PTS: 2 REF: 011625geo NAT: G.CO.6 TOP: Properties of Transformations

109 ANS: 2 PTS: 2 REF: 081519geo NAT: G.SRT.5
TOP: Triangle Similarity

110 ANS:

The transformation is a rotation, which is a rigid motion.

PTS: 2 REF: 081530geo NAT: G.CO.6 TOP: Properties of Transformations

111 ANS: 3

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

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

$$90 = 90$$

PTS: 2 REF: 061515geo NAT: G.SRT.5 TOP: Triangle Similarity

112 ANS: 1

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

$1 = -4 + b$

$5 = b$

PTS: 2 REF: 081510geo NAT: G.GPE.5 TOP: Parallel and Perpendicular Lines

113 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.11 TOP: Quadrilateral Proofs

114 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.CO.11 TOP: Quadrilateral Proofs

115 ANS: 3

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

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

116 ANS: 3

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

PTS: 2 REF: 061503geo NAT: G.GPE.4 TOP: Properties of Circles

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

118 ANS: 3

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

$W = 408 \cdot 0.25 = 102$

PTS: 2 REF: 061507geo NAT: G.MG.2 TOP: Density

119 ANS: 3 PTS: 2 REF: 011621geo NAT: G.C.2
TOP: Chords, Secants and Tangents

120 ANS: 4 PTS: 2 REF: 081506geo NAT: G.SRT.2
TOP: Triangle Similarity

121 ANS:

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

$.9604 = y$

PTS: 4 REF: 061534geo NAT: G.SRT.8 TOP: Right Triangle Similarity

122 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.1 TOP: Equations of Circles

123 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.8 TOP: Using Trigonometry to Find a Side

124 ANS: 2 PTS: 2 REF: 061506geo NAT: G.GMD.4
TOP: Cross-Sections of Three-Dimensional Objects

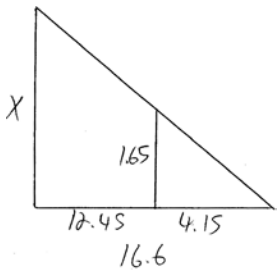
125 ANS: 1 PTS: 2 REF: 081505geo NAT: G.CO.3
TOP: Mapping a Polygon onto Itself

126 ANS: 2

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

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

127 ANS:




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

$4.15x = 27.39$

$x = 6.6$

PTS: 2 REF: 061531geo NAT: G.SRT.5 TOP: Triangle Similarity

128 ANS:

$V = \frac{1}{3}\pi\left(\frac{3}{2}\right)^2 \cdot 8 \approx 18.85 \cdot 100 = 1885$ $1885 \cdot 0.52 \cdot 0.10 = 98.02$ $1.95(100) - (37.83 + 98.02) = 59.15$

PTS: 6 REF: 081536geo NAT: G.MG.2 TOP: Density

129 ANS: 3

$\frac{x}{360} \cdot 3^2 \pi = 2\pi$

$x = 80$

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

130 ANS: 1

Alternate interior angles

PTS: 2 REF: 061517geo NAT: G.CO.9 TOP: Parallel Lines and Transversals

131 ANS:

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

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

132 ANS: 2

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

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

133 ANS: 4

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

$3x - 1 = 2x + 6$

$x = 7$

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

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

135 ANS: 4 PTS: 2 REF: 061504geo NAT: G.CO.5
TOP: Identifying Transformations