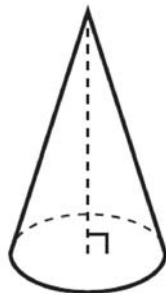

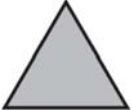
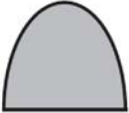
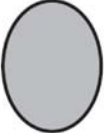


0116geo

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

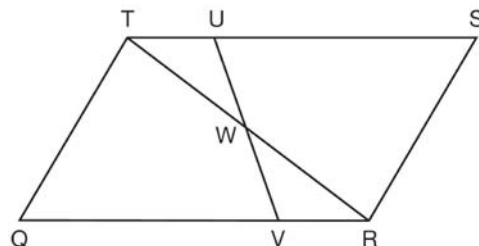


Which drawing can *not* be a cross section of a cone?

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

- 2 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) $y = 2x - 16$

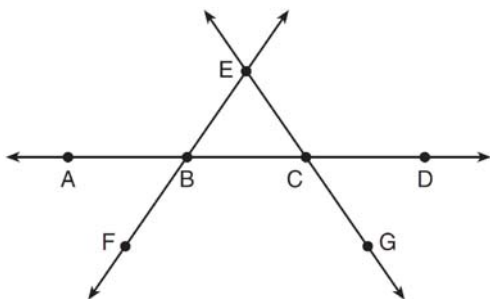
- 3 In parallelogram $QRST$ shown below, diagonal \overline{TR} is drawn, U and V are points on \overline{TS} and \overline{QR} , respectively, and \overline{UV} intersects \overline{TR} at W .



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

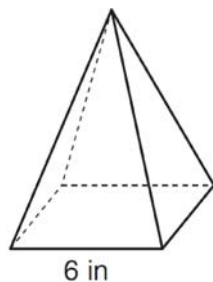
- 1) 37°
- 2) 60°
- 3) 72°
- 4) 83°
- 4 A fish tank in the shape of a rectangular prism has dimensions of 14 inches, 16 inches, and 10 inches. The tank contains 1680 cubic inches of water. What percent of the fish tank is empty?
- 1) 10
- 2) 25
- 3) 50
- 4) 75
- 5 Which transformation would result in 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) $(x, y) \rightarrow (x + 2, y - 5)$

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



Which statement is always true?

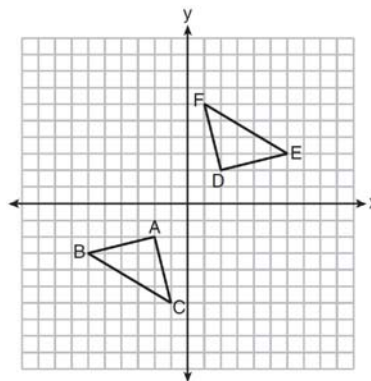
- 1) $\overline{AB} \cong \overline{DC}$
 - 2) $\overline{FB} \cong \overline{EB}$
 - 3) \overleftrightarrow{BD} bisects \overleftrightarrow{GE} at C .
 - 4) \overleftrightarrow{AC} bisects \overleftrightarrow{FE} at B .
- 7 As shown in the diagram below, a regular pyramid has a square base whose side 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

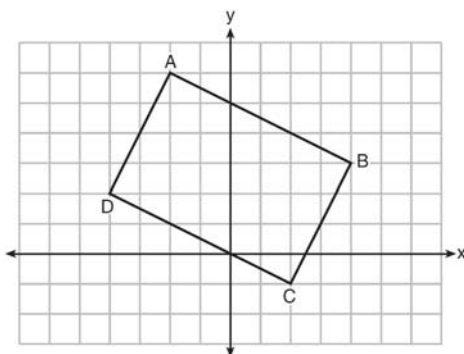
- 8 Triangle ABC and triangle DEF are graphed on the set of axes below.



Which sequence of transformations maps triangle ABC onto triangle DEF ?

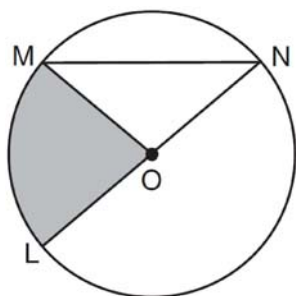
- 1) a reflection over the x -axis followed by a reflection over the y -axis
 - 2) a 180° rotation about the origin followed by a reflection over the line $y = x$
 - 3) a 90° clockwise rotation about the origin followed by a reflection over the y -axis
 - 4) a translation 8 units to the right and 1 unit up followed by a 90° counterclockwise rotation about the origin
- 9 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) $\sin \angle A = \cos \angle B$
- 10 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

- 11 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?

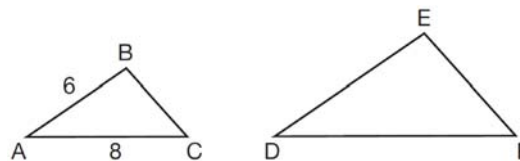
- 1) no and $C'(1,2)$
 - 2) no and $D'(2,4)$
 - 3) yes and $A'(6,2)$
 - 4) yes and $B'(-3,4)$
- 12 In the diagram below of circle O , the area of the shaded sector LOM is $2\pi \text{ cm}^2$.



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

- 1) 10°
- 2) 20°
- 3) 40°
- 4) 80°

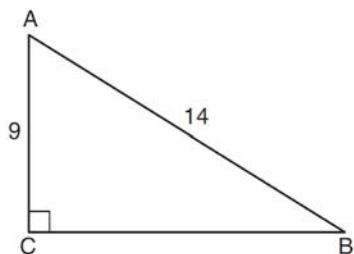
- 13 In the diagram below, $\triangle ABC \sim \triangle DEF$.



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 $\angle C \cong \angle F$
- 14 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
- 15 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) $25\sqrt{2}$

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

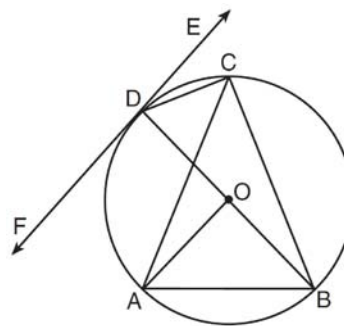


What is the measure of $\angle A$, to the nearest degree?

- 1) 33
 - 2) 40
 - 3) 50
 - 4) 57
- 17 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
- 18 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
- 19 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

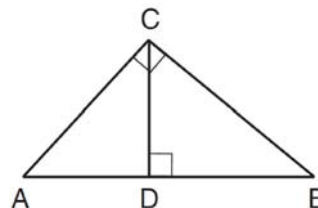
- 20 The ratio of similarity of $\triangle BOY$ to $\triangle GRL$ is 1:2. If $BO = x + 3$ and $GR = 3x - 1$, then the length of \overline{GR} is
- 1) 5
 - 2) 7
 - 3) 10
 - 4) 20

- 21 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) $\angle FDB$
- 22 In the diagram below, \overline{CD} is the altitude drawn to the hypotenuse \overline{AB} of right triangle ABC .



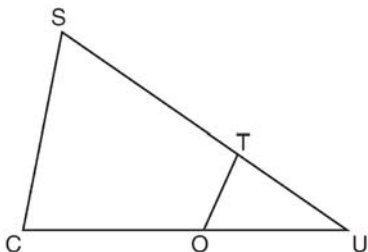
Which lengths would *not* produce an altitude that measures $6\sqrt{2}$?

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

- 23 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

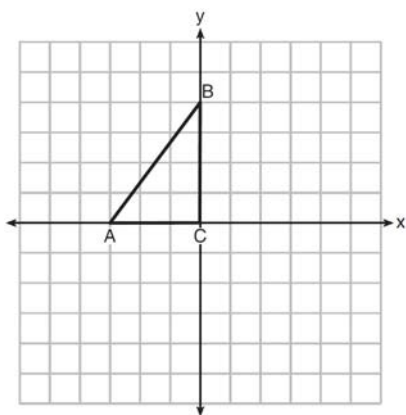
- 24 In $\triangle SCU$ shown below, points T and O are on \overline{SU} and \overline{CU} , respectively. Segment OT is drawn so that $\angle C \cong \angle OTU$.



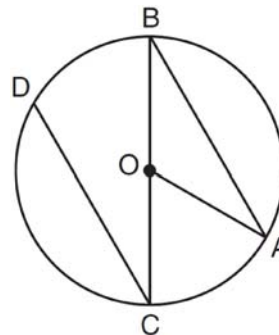
If $TU = 4$, $OU = 5$, and $OC = 7$, what is the length of ST ?

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

- 25 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 $x = 1$.

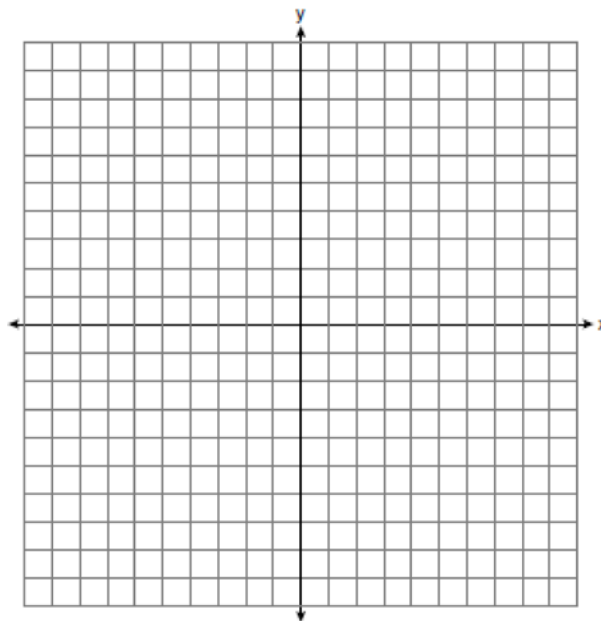


- 26 In the diagram below of circle O with diameter \overline{BC} and radius \overline{OA} , chord \overline{DC} is parallel to chord \overline{BA} .

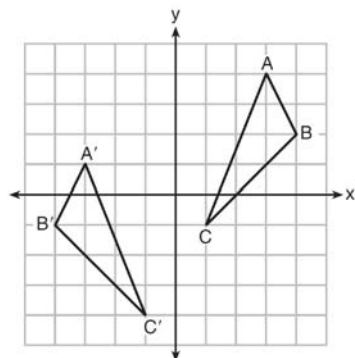


If $m\angle BCD = 30^\circ$, determine and state $m\angle AOB$.

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

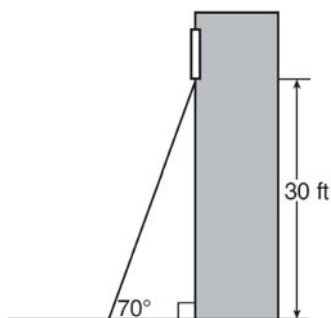


- 28 As graphed on the set of axes below, $\triangle A'B'C'$ is the image of $\triangle ABC$ after a sequence of transformations.

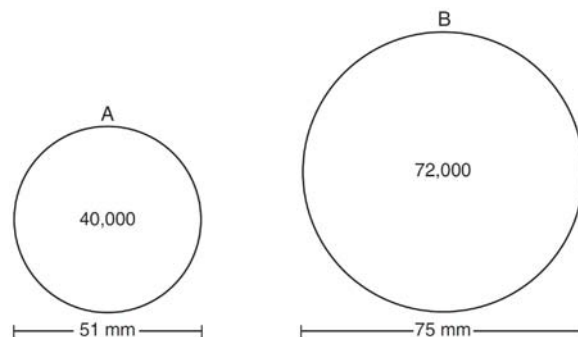


Is $\triangle A'B'C'$ congruent to $\triangle ABC$? Use the properties of rigid motion to explain your answer.

- 29 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.



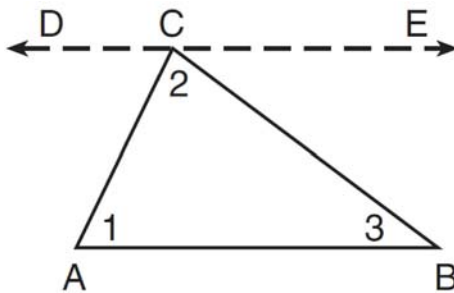
- 30 During an experiment, the same type of bacteria is grown in two petri dishes. Petri dish A has a diameter of 51 mm and has approximately 40,000 bacteria after 1 hour. Petri dish B has a diameter of 75 mm and has approximately 72,000 bacteria after 1 hour.



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

- 31 Line ℓ is mapped onto line m by a dilation centered at the origin with a scale factor of 2. The equation of line ℓ is $3x - y = 4$. Determine and state an equation for line m .
- 32 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.

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



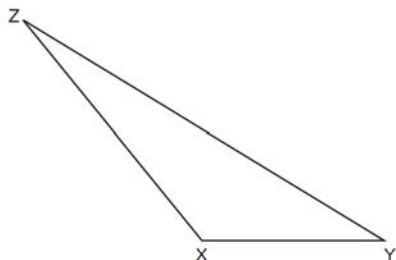
Given: $\triangle ABC$

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

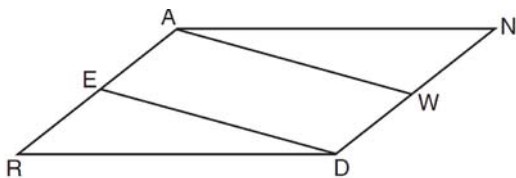
Fill in the missing reasons below.

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

- 34 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 $\triangle XYZ$.

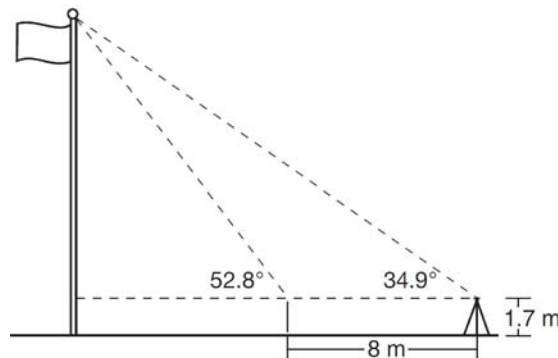


- 35 Given: Parallelogram $ANDR$ with \overline{AW} and \overline{DE} bisecting \overline{NWD} and \overline{REA} at points W and E , respectively



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

- 36 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.