ΔABC is dilated from center A by a factor not equal to 1 to form ΔAKL. Which of the statements must be true?

Select *all* that apply.

Ⓐ $\overline{AB}$ and $\overline{AK}$ lie on the same line.

Ⓑ The line containing $\overline{BC}$ is parallel to the line containing $\overline{KL}$.

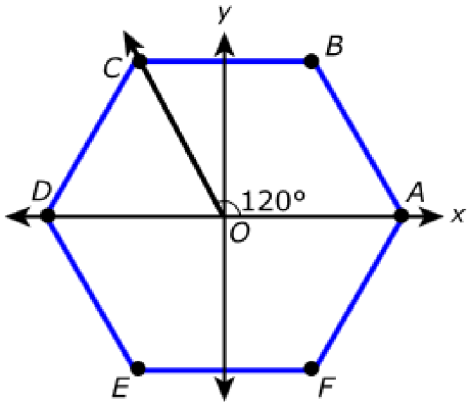
Ⓒ $\angle ABC \cong \angle ACB$

Ⓓ $\angle ABC \cong \angle AKL$

Ⓔ $\Delta ABC \sim \Delta AKL$

Ⓕ $\Delta ABC \cong \Delta AKL$

This diagram shows regular hexagon $ABCDEF$ with center at O.

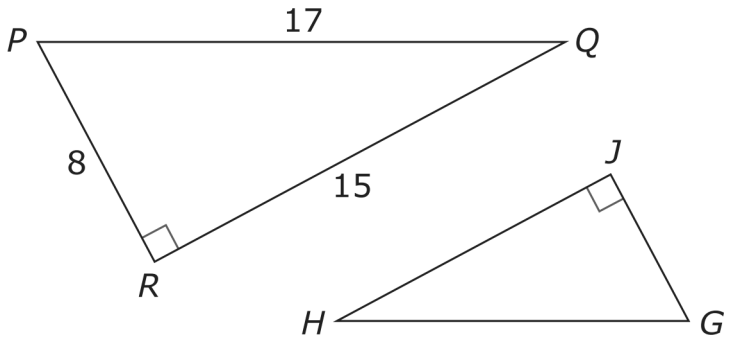


Justine made these claims.

- The only lines of symmetry for regular hexagon $ABCDEF$ are the lines that contain one vertex and O.
- The only angle of rotation that shows rotational symmetry is 120°.

Explain why Justine is correct or incorrect.

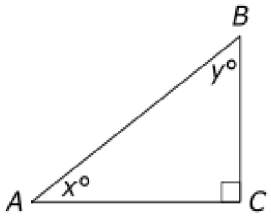
In this figure, triangle *GHJ* is similar to triangle *PQR*.



Based on this information, which ratio represents $\tan H$?

Ⓐ $\frac{8}{15}$ Ⓑ $\frac{8}{17}$ Ⓒ $\frac{15}{8}$ Ⓓ $\frac{17}{8}$

The figure shows triangle *ABC*.



Select *all* expressions that *must be* equivalent to $\cos A$.

Ⓐ $\sin x^\circ$

Ⓑ $\sin y^\circ$

Ⓒ $\cos y^\circ$

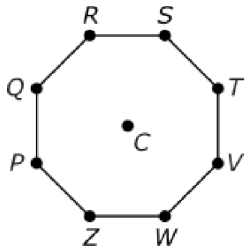
Ⓓ $\cos(90 - y)^\circ$

Ⓔ $\cos(90 - x)^\circ$

Ⓕ $\sin(90 - y)^\circ$

Ⓖ $\sin(90 - x)^\circ$

Octagon *PQRSTVWZ* is a regular octagon with its center at point *C*.



Which transformations will map octagon *PQRSTVWZ* onto itself?

Select *each* correct transformation.

Ⓐ reflecting over $\overline{QV}$

Ⓑ reflecting over $\overline{RW}$

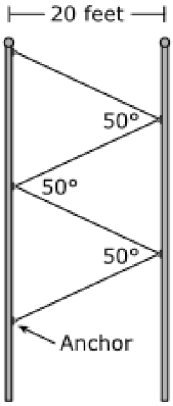
Ⓒ reflecting over $\overline{TZ}$

Ⓓ rotating 45° clockwise around point *Z*

Ⓔ rotating 135° clockwise around point *C*

Ⓕ rotating 90° counterclockwise around point *C*

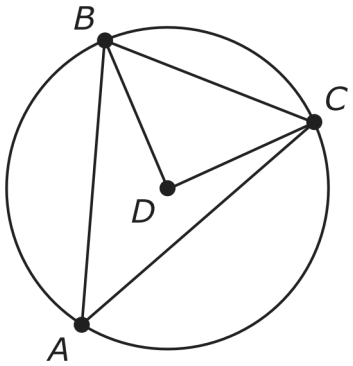
City workers will be hanging cable between two poles. The poles are 20 feet apart and perpendicular to the ground. The cable will cross back and forth between equally spaced anchors placed on the poles and will be pulled tight. A section of the design is shown in the figure.



Let *n* represent the total number of anchors placed on the two poles. Create an expression to represent the length, in feet, of cable needed for *n* anchors.

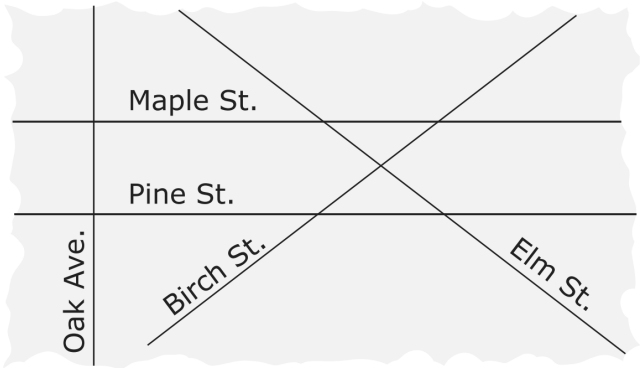
Explain how you determined the values in your expression.

The figure shows $\triangle ABC$ inscribed in circle D.



If $m\angle CBD = 44^\circ$, find $m\angle BAC$, in degrees.

The diagram represents a portion of a small city. Maple Street and Pine Street run exactly east to west. Oak Avenue runs exactly north to south. All of the streets remain straight.



Which statements must be true, based only on the given information?

Select *all* that apply.

Ⓐ Birch Street and Elm Street intersect at right angles.

Ⓑ Maple Street and Pine Street are parallel.

Ⓒ If more of the map is shown, Elm Street and Oak Avenue will not intersect.

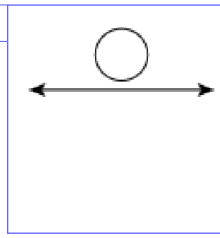
Ⓓ Pine Street intersects both Birch Street and Elm Street.

Ⓔ Oak Avenue and Maple Street are perpendicular.

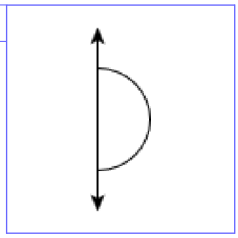
Each of the two-dimensional figures shown will be rotated 360° about the respective line, creating a three-dimensional figure.

Match the two-dimensional figures with the three-dimensional figures to identify the correct representation of the resulting three-dimensional figure.

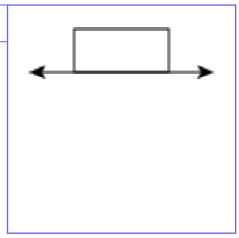
A



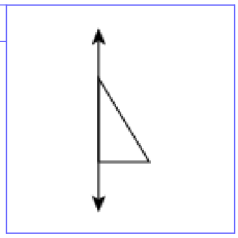
B



C



D



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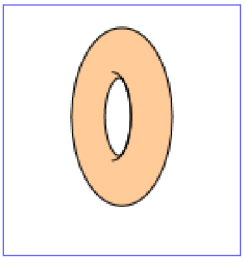

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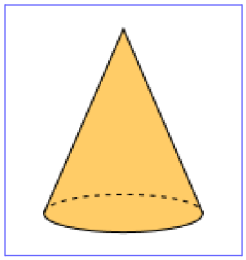

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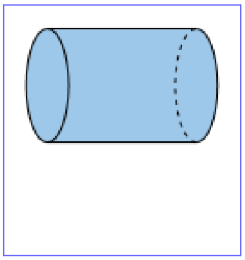

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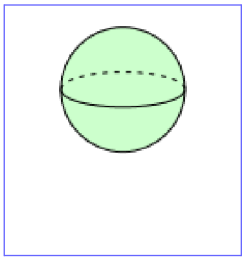


Triangle ABC has sides with lengths of 3, 6, and 8. Classify each of the transformations described as producing a triangle *similar* to triangle *ABC* or a triangle *not similar* to triangle *ABC*.

Write the letter of each transformation in the appropriate box.

A **Multiply each side length by 3.5**

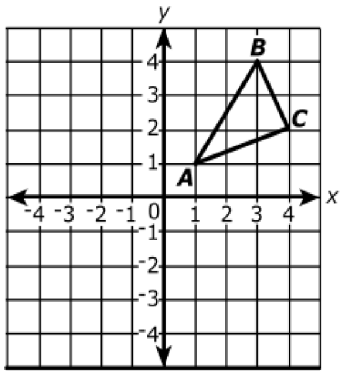
B **Add 12 to each side length**

C **Subtract 2 from each side length**

D **Divide each side length by 0.75**

Similar to Triangle *ABC*	**Not Similar to Triangle** *ABC*

Triangle ABC is defined in the coordinate plane by the points $A = (1, 1)$, $B = (3, 4)$, and $C = (4, 2)$, as shown.



Under which transformations will the image of triangle ABC be similar to the preimage?

Select *all* that apply.

Ⓐ $T(x, y) \rightarrow (-x, -y)$

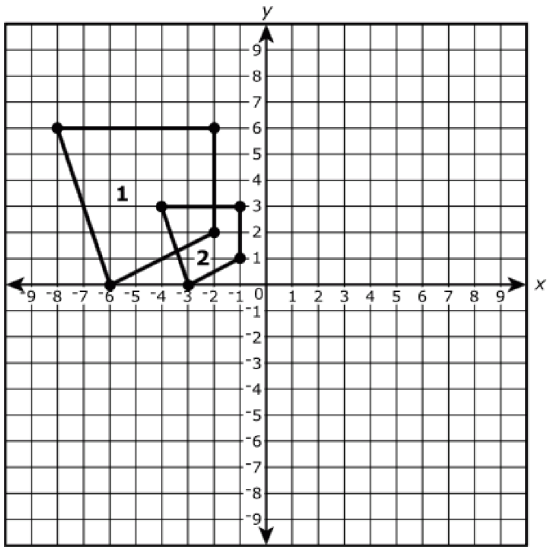
Ⓑ $T(x, y) \rightarrow (x + 2, 2y)$

Ⓒ $T(x, y) \rightarrow (0.5x, 0.5y)$

Ⓓ $T(x, y) \rightarrow (x + 4, y - 2)$

Ⓔ $T(x, y) \rightarrow (2x, 3y)$

The diagram shows two quadrilaterals graphed on a coordinate plane.



Which transformation on quadrilateral 1 can be used to verify that it is similar to quadrilateral 2?

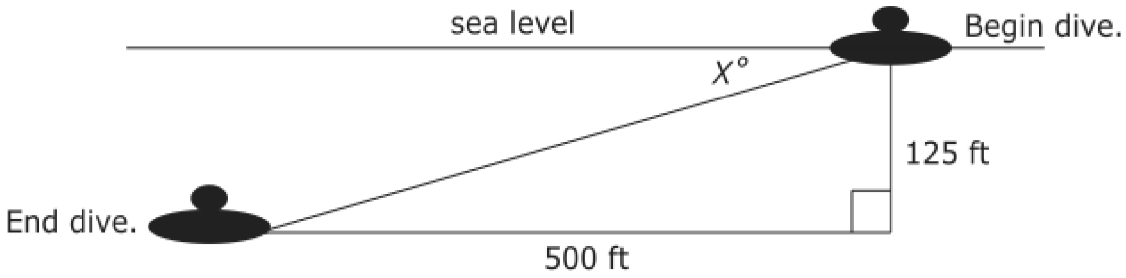
Ⓐ A dilation by a scale factor of $\frac{1}{2}$ centered at the origin.

Ⓑ A dilation by a scale factor of $\frac{1}{2}$ centered at $(-6, 0)$.

Ⓒ A dilation by a scale factor of $\frac{3}{4}$ centered at the origin.

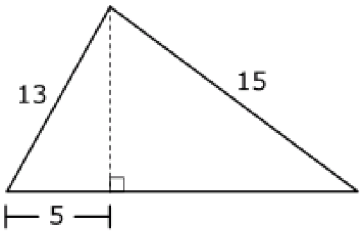
Ⓓ A dilation by a scale factor of 2 centered at the origin.

A submarine dives as shown in the diagram.



To the nearest degree, determine the dive angle whose measure is *X*.

A triangular banner is to be made according to the specifications in the figure shown, with dimensions given in inches.



not to scale

Wooden sticks will be used to outline the perimeter of the banner in order to attach the interior material. How many inches of wooden sticks will be required?

A landscaper is designing a display of flowers for an area in a public park. The flower seeds will be planted at points that lie on a circle that has a diameter of 8 feet. The point where any seed is planted must be at least 2 feet away from the seeds on either side of it.

Part A

What is the maximum number of flower seeds that can be planted using the design?

Part B

After planting the flower seeds, the landscaper has 20 seeds left over. The landscaper wants to plant all of the remaining seeds in another circle so that the seeds are 2 feet apart. To the nearest tenth of a foot, what is the diameter of the smallest circle that the landscaper can use to plant all of the remaining seeds?

Part A

Suppose that $y = 2x - 3$. The following points lie on the graph of this equation:

$A(a, 2a - 3)$ $B(b, 2b - 3)$ $C(c, 2c - 3)$

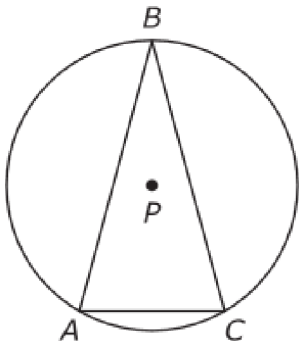
Amy claims that the slopes of $\overline{AB}$, $\overline{BC}$ and $\overline{AC}$ are equal. Prove that Amy's claim is correct. Show your work and explain your reasoning.

Part B

Are the points $(-1, 1)$ and $(1, -1)$ on the graph of $y = 2x - 3$?

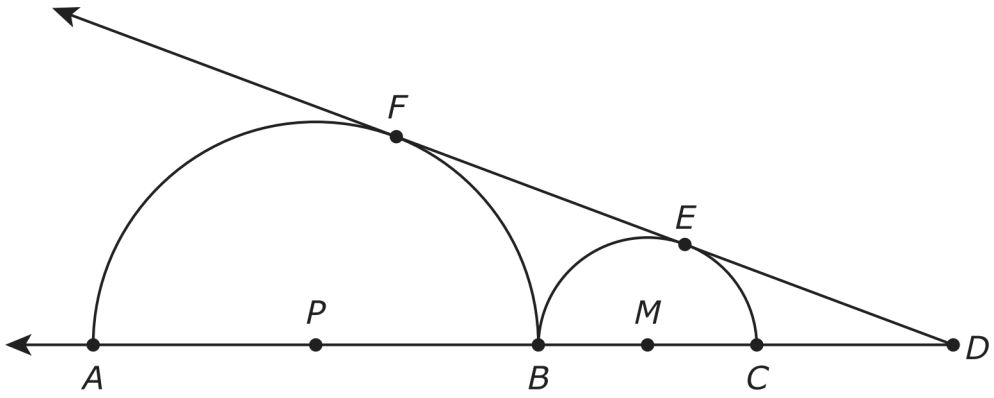
Show your work and explain your reasoning.

The figure shows a circle with center P and inscribed isosceles $\angle ABC$.



If $\overline{AC}$ has the same length as the radius of the circle, what is the measure of $\triangle ABC$?

The figure shows two semicircles with centers P and M. The semicircles are tangent to each other at point B, and $\overleftrightarrow{DE}$ is tangent to both semicircles at F and E.



If $PB = BC = 6$, what is ED?

Ⓐ 6 Ⓑ $\sqrt{48}$ Ⓒ 8 Ⓓ $\sqrt{72}$

Part A

A circle in the xy-coordinate plane has the equation $x^2 + y^2 + 6y - 4 = 0$. If the equation of the circle is written in the form $x^2 + (y + k)^2 = c$, where k and c are constants, what is the value of k?

Part B

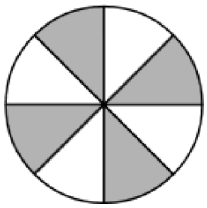
What is the radius of the circle?

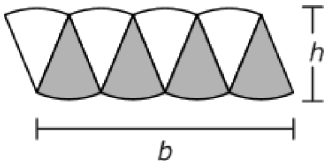
Ⓐ 2

Ⓑ 4

Ⓒ $\sqrt{13}$

Ⓓ 13





The figure illustrates an informal argument for the formula for the area of a circle. The circle is divided into congruent sectors, and the sectors are rearranged to form a shape that resembles a parallelogram, as shown. As the number of sectors increases, the rearranged shape more closely resembles a parallelogram with area A, given by the formula $A = bh$, where b is the base and h is the height of the parallelogram.

Select the correct value for b and h to develop the area of a circle in terms of r, the radius of the circle.

Part A

$b =$?

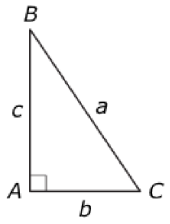
Ⓐ π Ⓑ r Ⓒ πr Ⓓ 2π Ⓔ $2\pi r$

Part B

$h =$?

Ⓐ π Ⓑ r Ⓒ $r \times r$ Ⓓ $2r$ Ⓔ 2π

The figure shows right $\triangle ABC$.



Which of the listed values are equal to the sine of B?

Select *all* that apply.

Ⓐ $\frac{b}{c}$

Ⓑ $\frac{c}{a}$

Ⓒ $\frac{b}{a}$

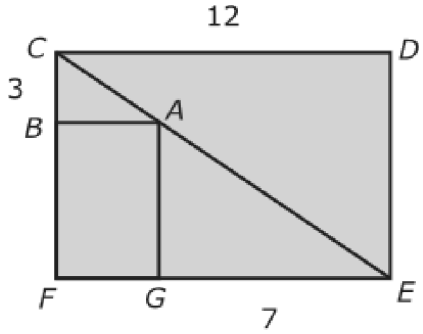
Ⓓ the cosine of B

Ⓔ the cosine of C

Ⓕ the cosine of $(90^\circ - B)$

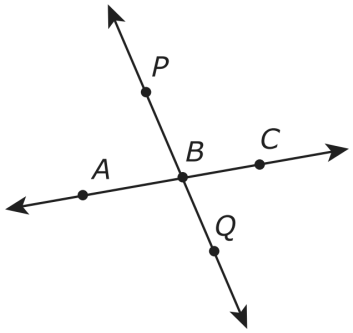
Ⓖ the sine of $(90^\circ - C)$

In the diagram, quadrilaterals $FBAG$ and $CDEF$ are rectangles.



How long is $\overline{DE}$ rounded to the nearest tenth?

The figure shows line AC and line PQ intersecting at point B. Lines $A'C'$ and $P'Q'$ will be the images of lines AC and PQ, respectively, under a dilation with center P and scale factor 2.



Which statement about the image of lines AC and PQ would be true under the dilation?

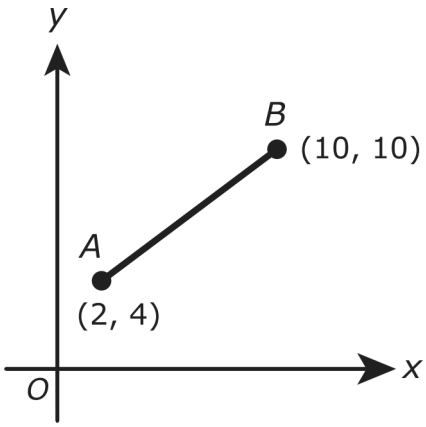
Ⓐ Line $A'C'$ will be parallel to line AC, and line $P'Q'$ will be parallel to line PQ.

Ⓑ Line $A'C'$ will be parallel to line AC, and line $P'Q'$ will be the same line as line PQ.

Ⓒ Line $A'C'$ will be perpendicular to line AC, and line $P'Q'$ will be parallel to line PQ.

Ⓓ Line $A'C'$ will be perpendicular to line AC, and line $P'Q'$ will be the same line as line PQ.

In the coordinate plane shown, point C (not shown) lies on $\overline{AB}$.



If the ratio of the length of $\overline{AC}$ to the length of $\overline{CB}$ is 3 : 1, what is the y-coordinate of point C?

In the coordinate plane, line p has slope 8 and y-intercept $(0, 5)$. Line r is the result of dilating line p by a factor of 3 with center $(0, 3)$. What is the slope and y-intercept of line r?

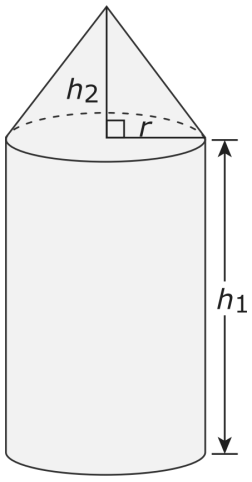
Ⓐ Line r has slope 5 and y-intercept $(0, 2)$.

Ⓑ Line r has slope 8 and y-intercept $(0, 5)$.

Ⓒ Line r has slope 8 and y-intercept $(0, 9)$.

Ⓓ Line r has slope 11 and y-intercept $(0, 8)$.

The Farmer Supply is building a storage building for fertilizer that has a cylindrical base and a cone-shaped top. The county laws say that the storage building must have a maximum width of 8 feet and a maximum height of 14 feet.



Dump trucks deliver fertilizer in loads that are 4 feet tall, 6 feet wide, and 12 feet long. Farmer Supply wants to be able to store 2 dump-truck loads of fertilizer.

Determine a height of the cylinder, h_1, and a height of the cone, h_2, that Farmer Supply should use in the design. Show that your design will be able to store at least two dump-truck loads of fertilizer.