

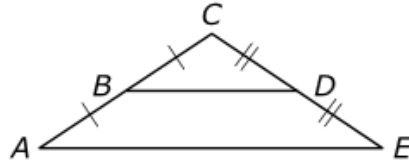


Math

Spring 2017

Geometry

Released Items



Given: B is the midpoint of \overline{AC} and D is the midpoint of \overline{CE} .

Prove: $\overline{BD} \parallel \overline{AE}$

Statement	Reason
1) B is the midpoint of \overline{AC} ; D is the midpoint of \overline{CE} .	1) Given
2) $BC = \frac{1}{2}AC$; $CD = \frac{1}{2}CE$	2) Midpoint theorem
3) $\frac{BC}{AC} = \frac{1}{2}$; $\frac{1}{2} = \frac{CD}{CE}$	3) Division property of equality
4) $\frac{BC}{AC} = \frac{CD}{CE}$	4) Transitive property of equality
5) $\angle C \cong \angle C$	5) Reflexive property of congruence
6)	6)
7)	7)
8) $\overline{BD} \parallel \overline{AE}$	8) If corresponding angles are congruent, then the lines are parallel.

Select from the drop-down menus to correctly complete each statement.

In step 6 of the proof, the statement is

$\triangle ACE \cong \triangle BCD$
 $\triangle ACE \sim \triangle BCD$

and the reason is

SSS congruence
 SAS congruence
 ASA congruence
 AAS congruence
 HL congruence
 SSS similarity AA
 similarity
 HL similarity

In step 7 of the proof, the statement is

$\angle CAE \cong \angle CEA$
 $\angle AEC \cong \angle CBD$
 $\angle CAE \cong \angle CBD$
 $BD = \frac{1}{2}AE$
 $BC/AC = CD/CE = BD/AE$

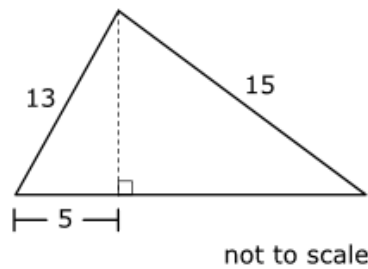
and the reason is

Corresponding angles of congruent triangles are congruent
 Corresponding angles of similar triangles are congruent
 Corresponding sides of similar triangles are proportional
 If the lines are parallel, then corresponding angles are congruent
 If the lines are parallel, then alternate interior angles are congruent
 In an isosceles triangle, base angles are congruent
 Vertical angles are congruent
 Midpoint Theorem

2.

VF902938

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



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?

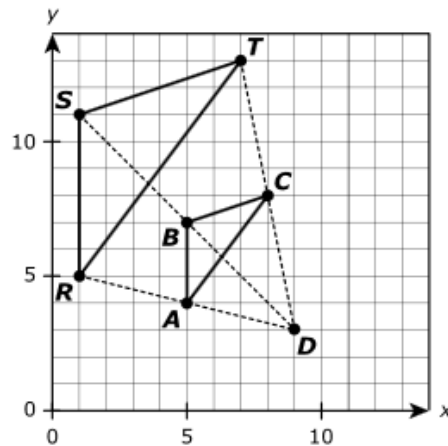
Enter your answer in the box.

 inches

3.

VF646431

On the xy -coordinate plane, $\triangle ABC$ has been dilated from center D to form $\triangle RST$.



Select from the drop-down menus to correctly complete the sentences.

In the figure, the length of any line segment in the image is the length of the corresponding line segment in the preimage. The scale factor of the dilation is .

Part A

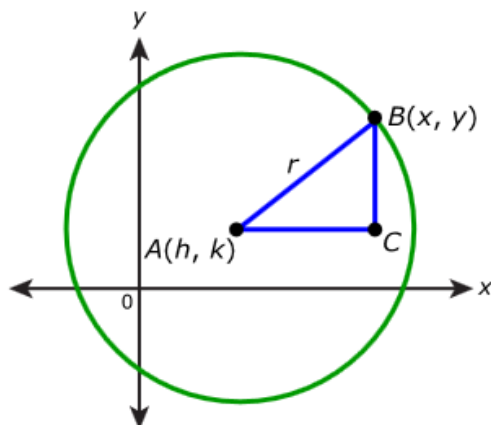
The figure shows a circle in the coordinate plane.

The center of the circle is the point $A(h, k)$.

The point $B(x, y)$ is a point on the circle.

Triangle ABC is a right triangle, with point C the vertex of the right angle.

The variable r represents the radius of the circle.



The variables h , k , x , and y can be used to write absolute value expressions for the lengths of the legs of triangle ABC . Create these expressions.

Drag and drop each variable into the correct boxes.

h k x y

$$AC = \left| \boxed{} - \boxed{} \right| \quad BC = \left| \boxed{} - \boxed{} \right|$$

Part B

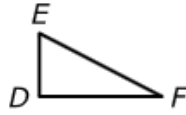
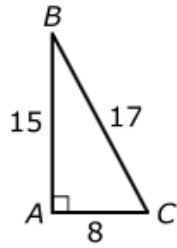
Because $\triangle ABC$ is a right triangle, the lengths of its sides are related by the Pythagorean Theorem. This relationship also gives an equation for the circle. Use the center, the given point on the circle, and the radius to write an equation that represents this relationship.

Enter your equation in the space provided. Enter **only** your equation.

$$(\boxed{} - \boxed{})^2 + (\boxed{} - \boxed{})^2 = \boxed{}^2$$

	$+$	$-$	\times	\div	$\frac{\square}{\square}$	\square^{\square}
	y^x	$\sqrt{}$	$\sqrt[3]{}$	$=$	(\cdot)	$\%$

The figures shown are three similar triangles such that $\triangle ABC \sim \triangle DFE \sim \triangle HIG$.

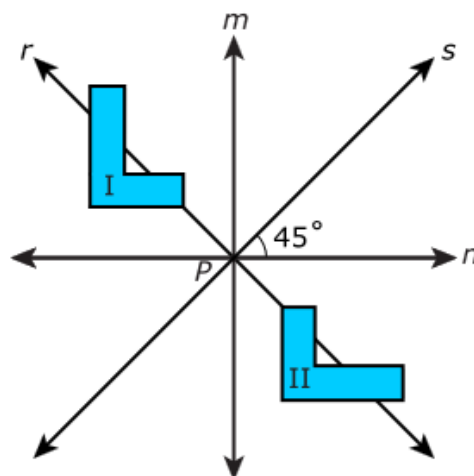


Find the values of $\cos F$ and $\cos I$.

Select **both** correct values.

- A. $\cos F = \frac{8}{17}$
- B. $\cos F = \frac{8}{15}$
- C. $\cos F = \frac{15}{17}$
- D. $\cos I = \frac{8}{17}$
- E. $\cos I = \frac{8}{15}$
- F. $\cos I = \frac{15}{17}$

In the illustration, line m is perpendicular to line n , and line r is perpendicular to line s .

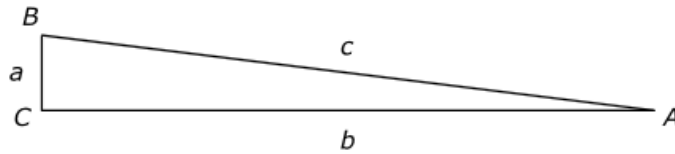


Della makes a conjecture that figure I is congruent to figure II. Select **each** transformation or combination of transformations that can help Della prove her conjecture.

Select **all** that apply.

- A. Rotate figure I 180° around point P .
- B. Reflect figure I across line s .
- C. Reflect figure I across line m , and then reflect the image across line n .
- D. Reflect figure I across line n , and then rotate the image 90° counterclockwise around point P .
- E. Rotate figure I 90° clockwise around point P , and then reflect the image across line n .
- F. Rotate figure I 180° around point P , and then reflect the image across line r .

An entrance ramp from a walkway will be installed at a public library, as modeled in the figure.



In the figure, a represents the amount that the ramp rises, b represents the distance from the walkway to the base of the library, and c represents the length of the ramp.

Part A

If $\angle B$ measures x° , what is the measure of $\angle A$?

Enter your answer in the space provided. Enter **only** your answer.

	+	-	\times	\div	$\frac{\square}{\square}$	$\frac{\square}{\square}$
	y^x	$\sqrt{\quad}$	$\sqrt[3]{\quad}$	=	(-)	%

Part B

The length of the ramp will be 25 feet. If the ramp needs to rise 1.3 feet, which of the following is closest to the distance, in feet, from the walkway to the base of the library?

- A. 23.70
- B. 24.97
- C. 25.03
- D. 26.30

Part C

For each trigonometric expression, indicate if the expression is equivalent to the measure of $\angle A$ or the measure of $\angle B$.

Drag and drop the measure of $\angle A$ or the measure of $\angle B$ into each box.

Measure of $\angle A$

Measure of $\angle B$

$$\sin^{-1}\left(\frac{a}{c}\right)$$

$$\cos^{-1}\left(\frac{a}{c}\right)$$

$$\tan^{-1}\left(\frac{a}{b}\right)$$

$$\tan^{-1}\left(\frac{b}{a}\right)$$

Part D

If the length of the ramp will be 25 feet but the rise of the ramp will be 3.0 feet, approximately what will be the measure, in degrees, of the angle of elevation, $\angle A$?

- A. 3°
- B. 5°
- C. 7°
- D. 9°

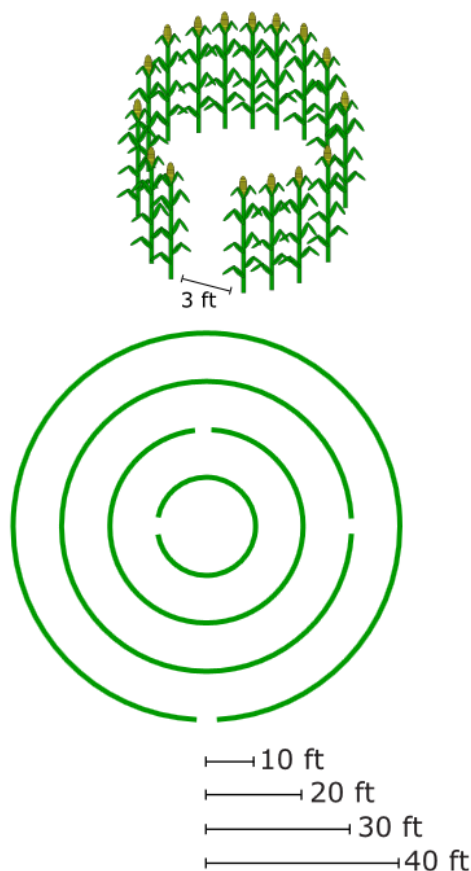
Part A

Tina and her family live on a farm. Each summer they design and plant a corn maze for local children to enjoy in the autumn. This year Tina is designing the maze. Here are the details of her proposed design.

The corn is to be planted in four concentric circles, as shown in the diagram.

The radii of the circles of corn are as marked in the diagram.

A 3-foot arc of each circle of corn will not be planted, as shown in the picture.



Find the total length of the circles, in feet, which will be planted with corn. Show your work.

Enter your answer and show your work in the space provided.



▶ Math symbols

▶ Relations

▶ Geometry

▶ Groups

▶ Trigonometry

▶ Statistics

▶ Greek

Part B

Tina's parents want to make a gravel walkway that will extend 6 feet from the outer circle of the maze all the way around the maze. Find the area of the walkway. Round your answer to the nearest square foot, if necessary. Show your work.

Enter your answer and show your work in the space provided.

[▶ Math symbols](#)[▶ Relations](#)[▶ Geometry](#)[▶ Groups](#)[▶ Trigonometry](#)[▶ Statistics](#)[▶ Greek](#)**Part C**

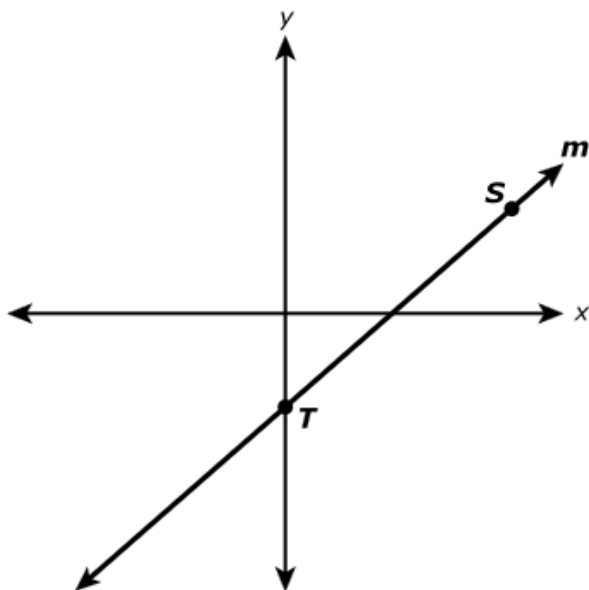
Tina's parents want to place a cylindrical granite pillar at the center of the corn maze. The column has a diameter of 5 feet and is 10 feet tall. Granite weighs approximately 168 pounds per cubic foot.

Tina's neighbor has a small crane that is rated to lift 20,000 pounds. Find the weight of the granite column to determine whether Tina's family can use the neighbor's crane to move the pillar, or if they need to rent a larger crane. Show your work.

Enter your answer and show your work in the space provided.

[▶ Math symbols](#)[▶ Relations](#)[▶ Geometry](#)[▶ Groups](#)[▶ Trigonometry](#)[▶ Statistics](#)[▶ Greek](#)

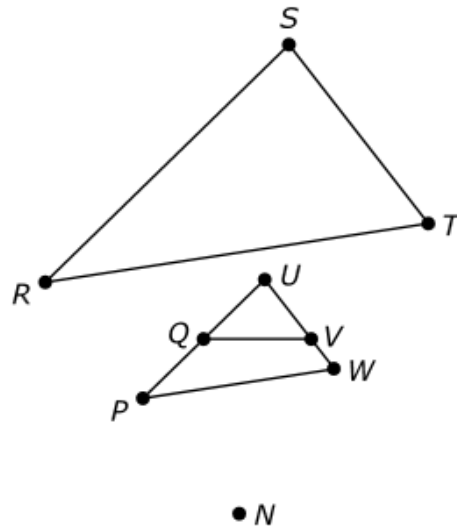
Line m is shown on the coordinate plane.



Which is the **best** definition of line segment ST ?

- A. all points on line m
- B. the two points S and T
- C. point S , point T , and all points on line m between S and T
- D. the points on line m starting at point T and extending beyond point S

Three triangles are shown.



Conditions about the triangles are given:

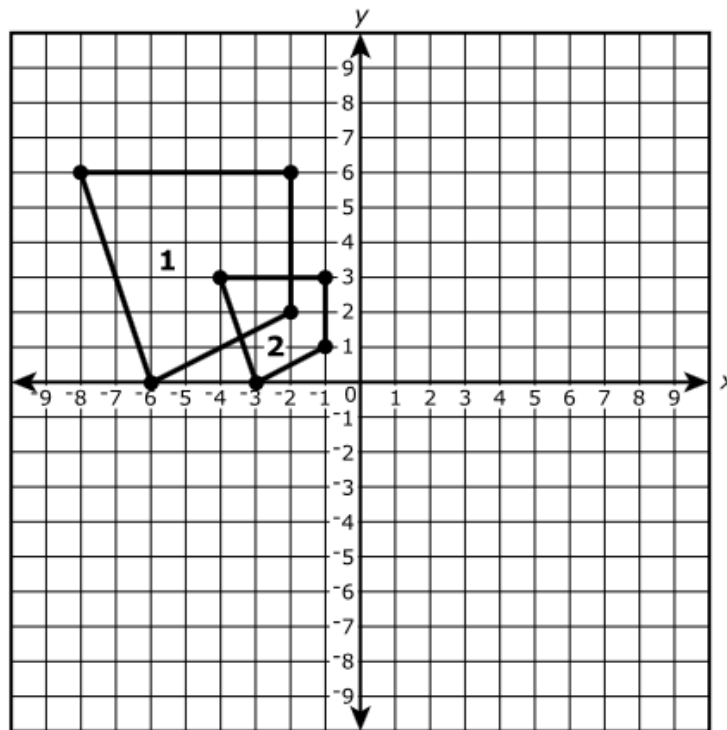
- $\angle S \cong \angle U$
- \overline{SR} is the image of \overline{UP} under a dilation with scale factor 2 and center N .
- \overline{ST} is the image of \overline{UW} under a dilation with scale factor 2 and center N .
- \overline{UQ} is the image of \overline{UP} under a dilation with scale factor $\frac{1}{2}$ and center U .
- \overline{UV} is the image of \overline{UW} under a dilation with scale factor $\frac{2}{3}$ and center U .

Determine whether each statement is true or false.

Select one cell per row.

Statement	True	False
$\triangle UPW \sim \triangle SRT$	<input type="checkbox"/>	<input type="checkbox"/>
$\triangle UPW \sim \triangle UQV$	<input type="checkbox"/>	<input type="checkbox"/>
$\triangle UQV \sim \triangle SRT$	<input type="checkbox"/>	<input type="checkbox"/>

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?

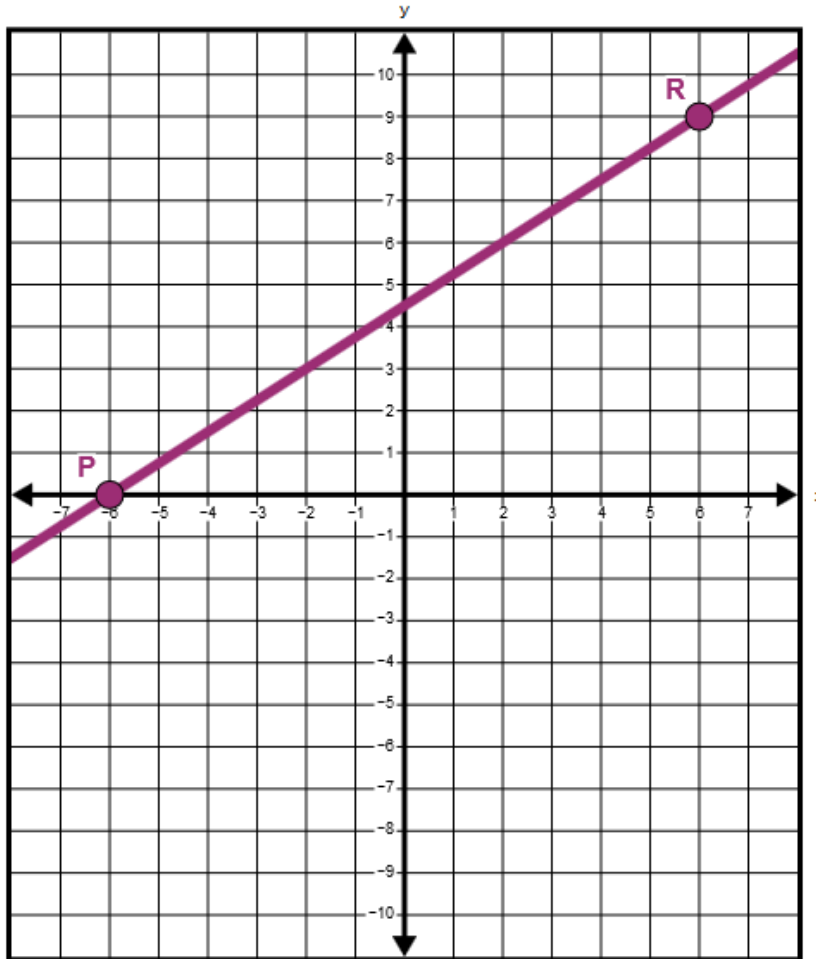
- A. A dilation by a scale factor of $\frac{1}{2}$ centered at the origin.
- B. A dilation by a scale factor of $\frac{1}{2}$ centered at $(-6, 0)$.
- C. A dilation by a scale factor of $\frac{3}{4}$ centered at the origin.
- D. A dilation by a scale factor of 2 centered at the origin.

12.

M43325

The graph shows \overleftrightarrow{PR} with point P located at $(-6, 0)$ and point R located at $(6, 9)$. Point Q is located on \overline{PR} between points P and R so that the length of \overline{QR} is twice the length of \overline{PQ} . What are the coordinates of point Q ?

Select the place on the coordinate plane to plot the point.



13.

M40991

A cylindrical can containing vegetable oil has a diameter of 12 inches and a height of 15 inches. Find the volume of the can, in cubic inches, rounded to the nearest whole number.

Enter your answer in the box.

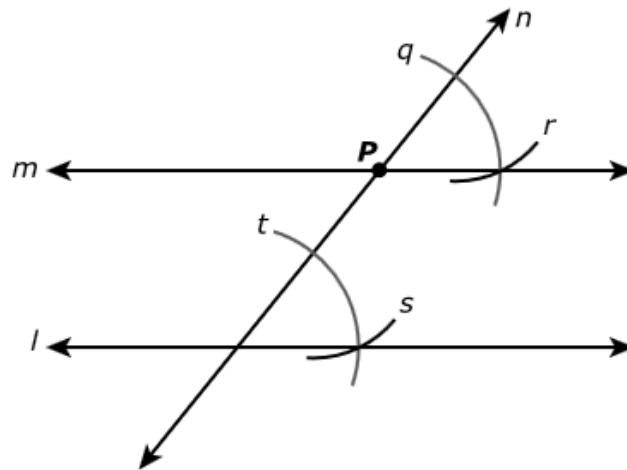
cubic inches

Leon needs to construct a line parallel to line l that contains point P , using a compass and straightedge.

P



The figure shows Leon's construction.



Part A

Which answer choice contains the steps Leon took to perform his construction listed in the correct order?

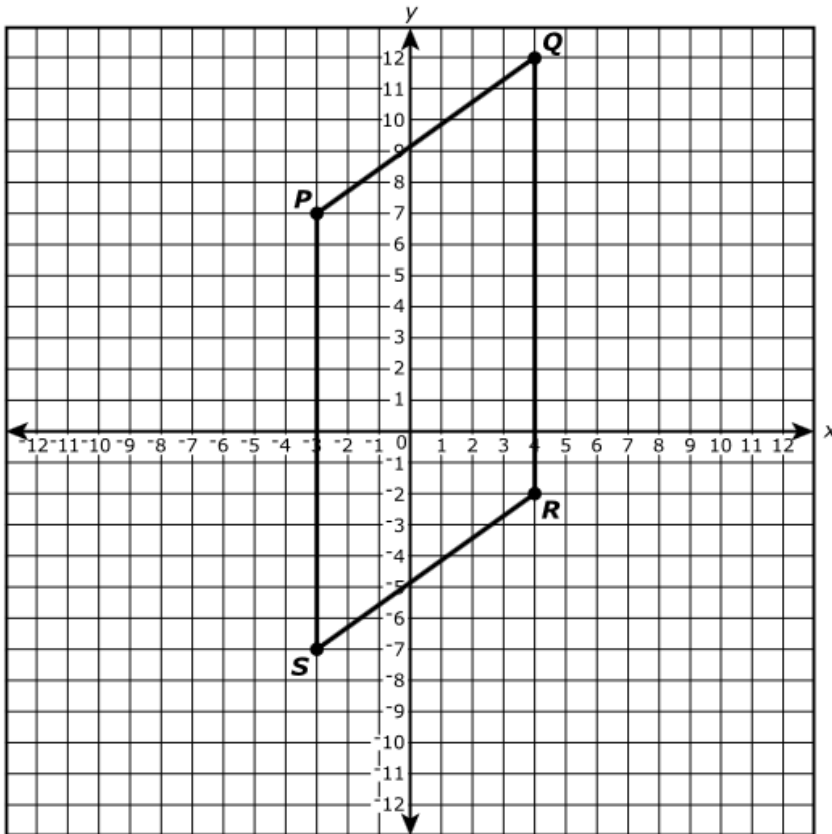
- A. Step 1: Draw arc s ; draw arc r congruent to arc s .
Step 2: Draw line n .
Step 3: Draw arc t ; draw arc q congruent to arc t .
Step 4: Draw line m .
- B. Step 1: Draw line n .
Step 2: Draw arc t ; draw arc q congruent to arc t .
Step 3: Draw arc s ; draw arc r congruent to arc s .
Step 4: Draw line m .
- C. Step 1: Draw line m .
Step 2: Draw line n .
Step 3: Draw arc t ; draw arc q congruent to arc t .
Step 4: Draw arc s ; draw arc r congruent to arc s .
- D. Step 1: Draw line m .
Step 2: Draw arc t ; draw arc q congruent to arc t .
Step 3: Draw arc s ; draw arc r congruent to arc s .
Step 4: Draw line n .

Part B

Next, Leon needs to construct a line that is perpendicular to line l and passes through point P . What should be his first step?

- A. Place the compass on line l and draw an arc that intersects point P .
- B. Place the compass point at point P and draw 2 arcs that intersect line l .
- C. Place the compass point at point P and draw 2 arcs that intersect line m .
- D. Place the compass point where arc t intersects line l and draw an arc that intersects line l .

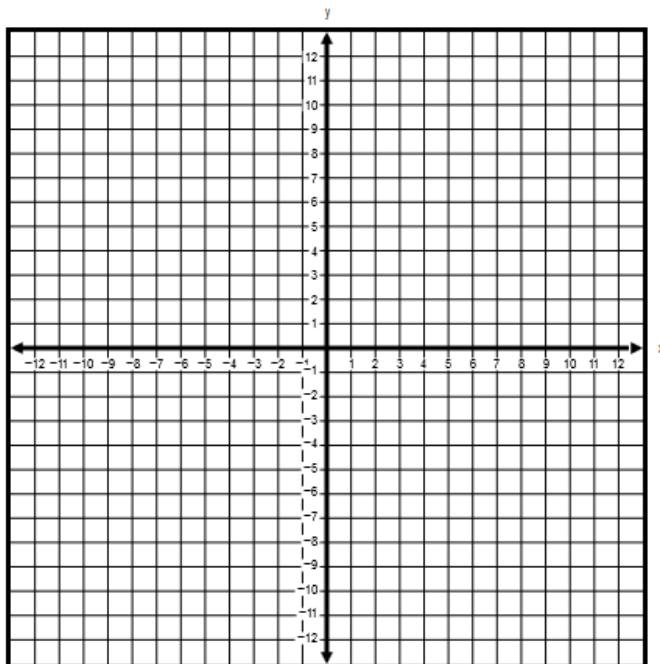
Quadrilateral $PQRS$ is shown on the coordinate plane.



Part A

Quadrilateral $PQRS$ is transformed by translating it right 6 units and then rotating it 90° clockwise about the origin. Graph the image of quadrilateral $PQRS$ after these two transformations.

Select locations on the coordinate plane to plot the points.



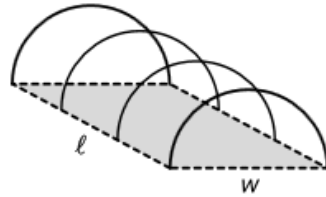
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Part B

Which transformations of quadrilateral $PQRS$ would result in the image of the quadrilateral being located only in the first quadrant of the coordinate plane?

Select **each** correct answer.

- A. a translation right 4 units
- B. a reflection across $x = 4$
- C. a reflection across $y = -x$
- D. a rotation of 90° counterclockwise about vertex Q
- E. a reflection across $x = 3$, then a translation up 8 units
- F. a reflection across the x -axis, then a translation up 13 units



The figure shows the design of a greenhouse with a rectangular floor. The front and back sides of the greenhouse are semicircles with a diameter of w , and the roof is half a cylinder. Consider greenhouse A with floor dimensions $w = 16$ feet and $l = 18$ feet.

Part A

A concrete slab 4 inches deep will be poured for the floor of greenhouse A . How many cubic feet of concrete are needed for the floor?

Enter your answer in the box.

cubic feet

Part B

The cylindrical roof of greenhouse A will be constructed from aluminum. The aluminum costs \$5.00 per square foot. What will be the cost of the minimum amount of aluminum needed to construct the roof? Give your answer to the nearest dollar.

Enter your answer in the box.

\$

Part C

One air freshener can keep up to 1,500 cubic feet of air fresh. What is the minimum number of air fresheners needed to keep the air in greenhouse A fresh?

Enter your answer in the box.

Part D

For greenhouses of this type, which of the listed floor dimensions will the total cubic feet of space in the greenhouse be greater than that of greenhouse A ?

Select **all** such dimensions.

- A. $w = 15$ feet and $l = 19$ feet
- B. $w = 15$ feet and $l = 20$ feet
- C. $w = 17$ feet and $l = 16$ feet
- D. $w = 18$ feet and $l = 15$ feet
- E. $w = 18$ feet and $l = 16$ feet