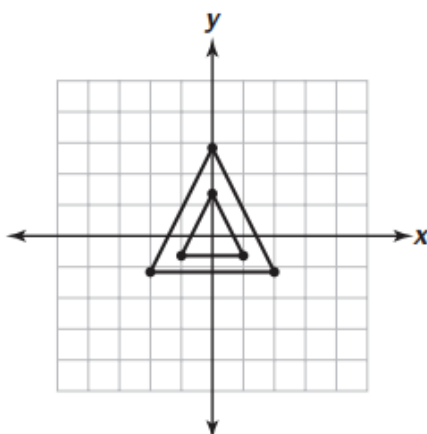


The smaller triangle is transformed to create the larger triangle. Which of these is the scale factor of the dilation centered at the point (0, 0)?



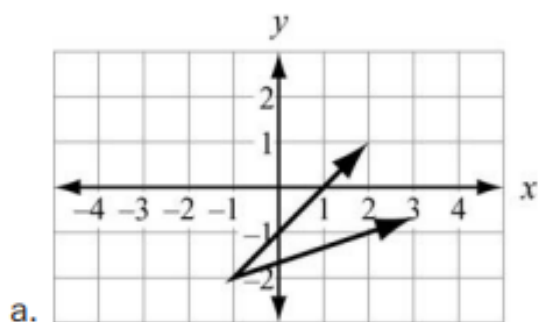
- A. 4
- B. 2
- C. 1
- D. $\frac{1}{2}$

A sandcastle mold is in the shape of a cylinder with a diameter of 6 inches and a height of 8 inches.

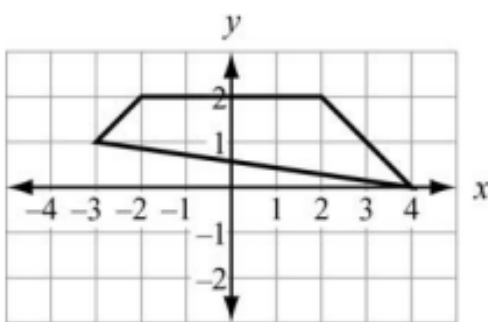
To the nearest cubic inch, how much sand will fit in the sandcastle mold? Explain how you determined your answer. In your explanation, use the word pi instead of the symbol π . Write your answer on the lines provided.

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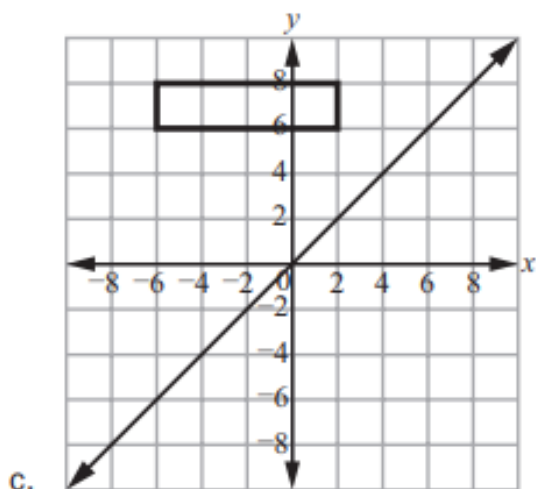
1. Draw the image of each figure, using the given transformation.



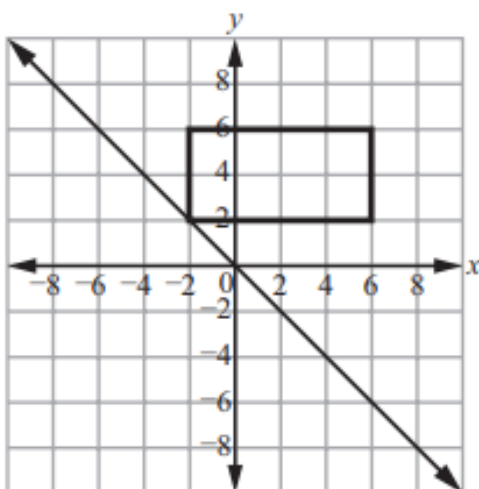
Use the translation $(x, y) \rightarrow (x - 3, y + 1)$.



Reflect across the x -axis.

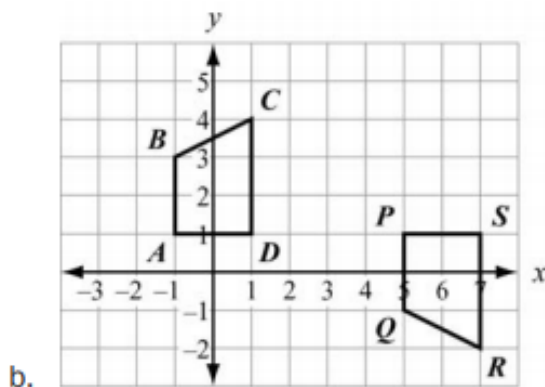
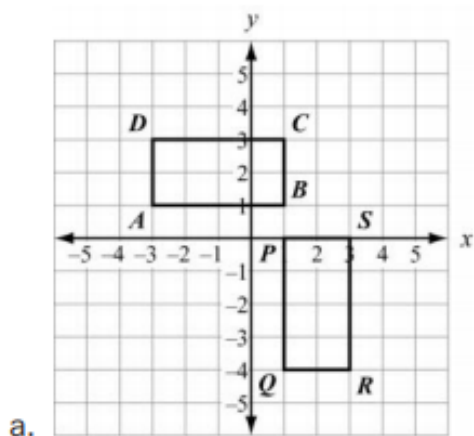


Reflect across the line $y = x$.

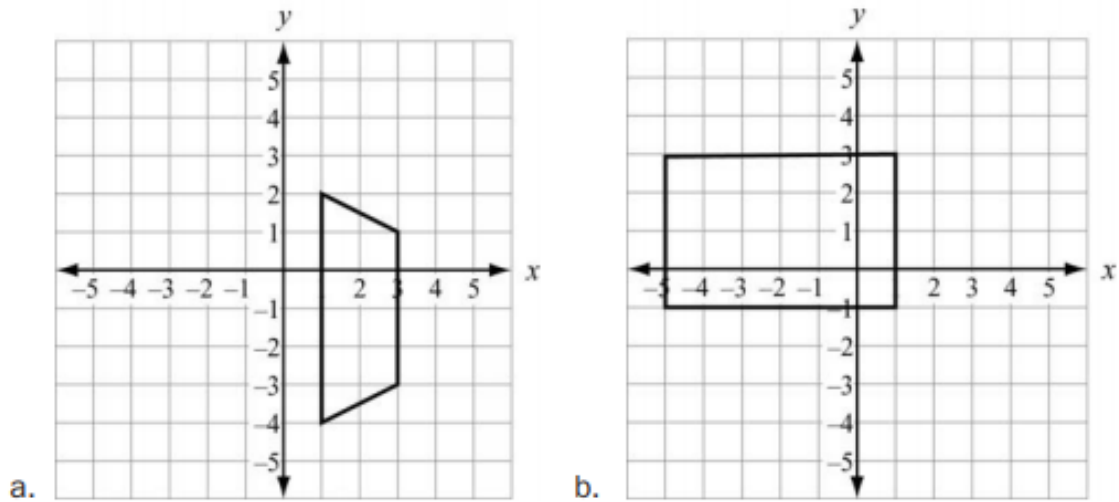


Identify the vertices. The reflection image of each point (x, y) across the line $y = -x$ is $(-y, -x)$.

2. Specify a sequence of transformations that will map $ABCD$ to $PQRS$ in each case.

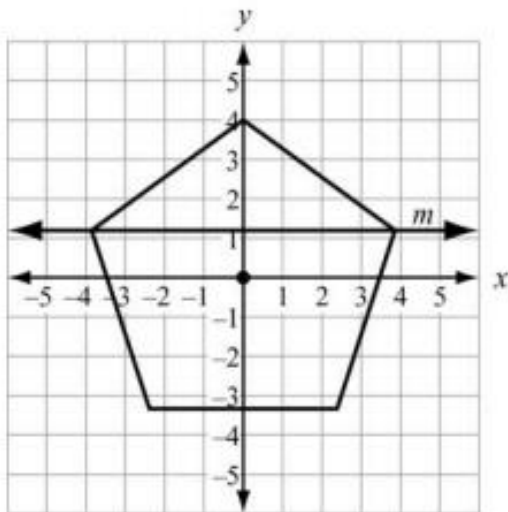


3. Describe every transformation that maps each given figure to itself.



4. Describe every transformation that maps this figure to itself: a regular hexagon (6 sides) that is centered about the origin and that has a vertex at $(4, 0)$.

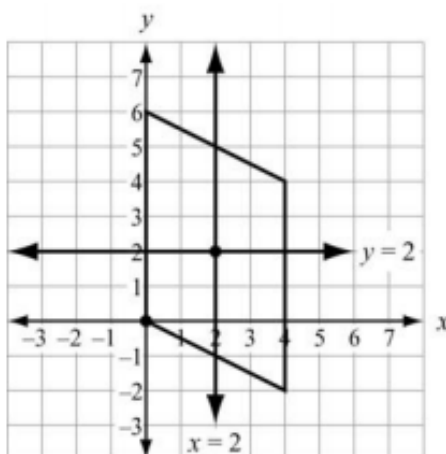
1. A regular pentagon is centered about the origin and has a vertex at $(0, 4)$.



Which transformation maps the pentagon to itself?

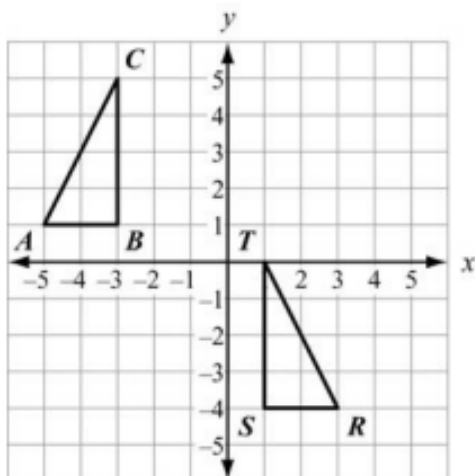
- A. a reflection across line m
- B. a reflection across the x -axis
- C. a clockwise rotation of 100° about the origin
- D. a clockwise rotation of 144° about the origin

2. A parallelogram has vertices at $(0, 0)$, $(0, 6)$, $(4, 4)$, and $(4, -2)$.



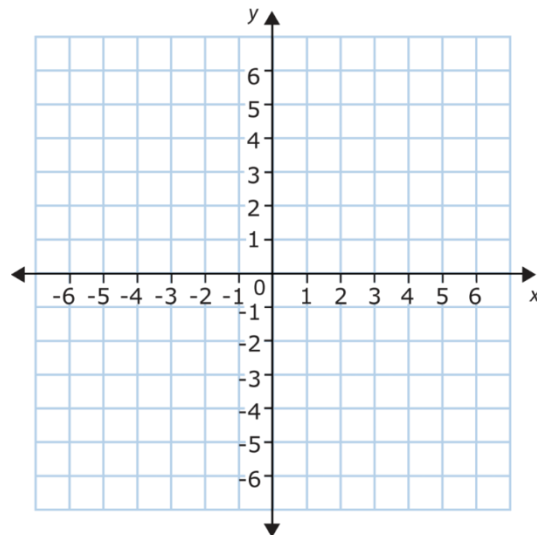
Which transformation maps the parallelogram to itself?

- A. a reflection across the line $x = 2$
 - B. a reflection across the line $y = 2$
 - C. a rotation of 180° about the point $(2, 2)$
 - D. a rotation of 180° about the point $(0, 0)$
3. Which sequence of transformations maps $\triangle ABC$ to $\triangle RST$?



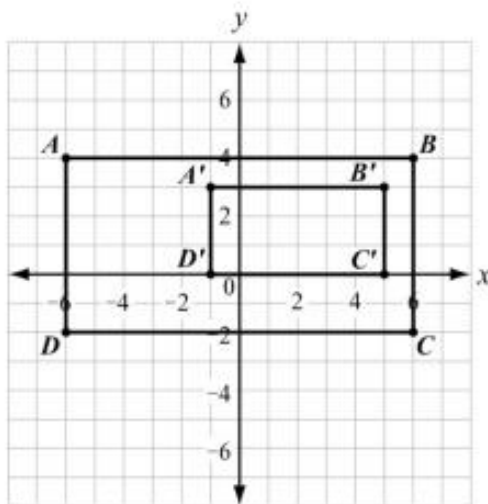
- A. Reflect $\triangle ABC$ across the line $x = -1$. Then translate the result 1 unit down.
- B. Reflect $\triangle ABC$ across the line $x = -1$. Then translate the result 5 units down.
- C. Translate $\triangle ABC$ 6 units to the right. Then rotate the result 90° clockwise about the point $(1, 1)$.
- D. Translate $\triangle ABC$ 6 units to the right. Then rotate the result 90° counterclockwise about the point $(1, 1)$.

1. Draw a triangle with vertices at $A(0, 1)$, $B(-3, 3)$, and $C(1, 3)$. Dilate the triangle using a scale factor of 1.5 and a center of $(0, 0)$. Sketch and name the dilated triangle $A'B'C'$.



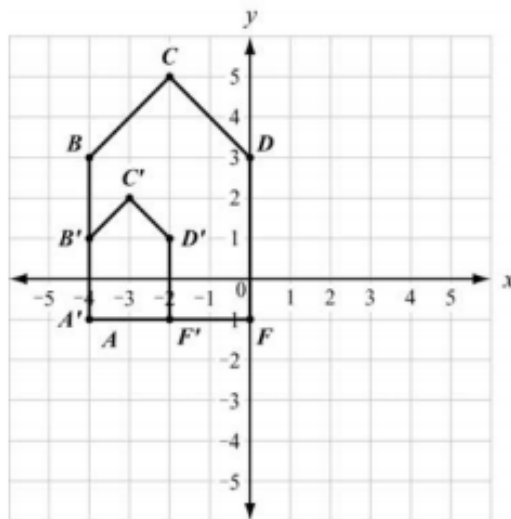
2. Line segment CD is 5 inches long. If line segment CD is dilated to form line segment $C'D'$ with a scale factor of 0.6, what is the length of line segment $C'D'$?

3. Figure $A'B'C'D'$ is a dilation of figure $ABCD$.



- Determine the center of dilation.
- Determine the scale factor of the dilation.
- What is the relationship between the sides of the pre-image and the corresponding sides of the image?

1. Figure $A'B'C'D'F'$ is a dilation of figure $ABCDF$ by a scale factor of $\frac{1}{2}$. The dilation is centered at $(-4, -1)$.



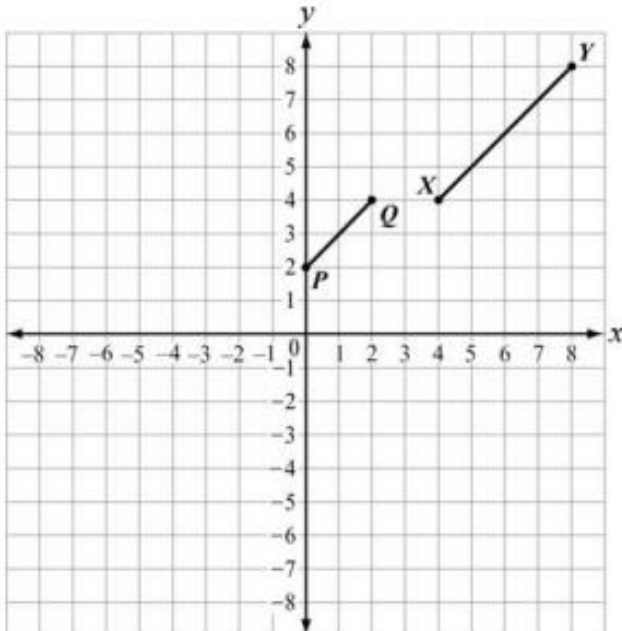
Which statement is true?

- A. $\frac{AB}{A'B'} = \frac{B'C'}{BC}$
 B. $\frac{AB}{A'B'} = \frac{BC}{B'C'}$
 C. $\frac{AB}{A'B'} = \frac{BC}{D'F'}$
 D. $\frac{AB}{A'B'} = \frac{D'F'}{BC}$

2. Which transformation results in a figure that is similar to the original figure but has a greater area?

- A. a dilation of $\triangle QRS$ by a scale factor of 0.25
 B. a dilation of $\triangle QRS$ by a scale factor of 0.5
 C. a dilation of $\triangle QRS$ by a scale factor of 1
 D. a dilation of $\triangle QRS$ by a scale factor of 2

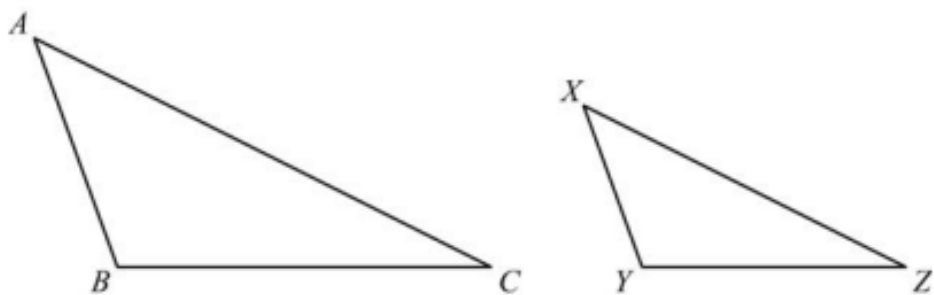
3. In the coordinate plane, segment \overline{PQ} is the result of a dilation of segment \overline{XY} by a scale factor of $\frac{1}{2}$.



Which point is the center of dilation?

- A. $(-4, 0)$
 B. $(0, -4)$
 C. $(0, 4)$
 D. $(4, 0)$

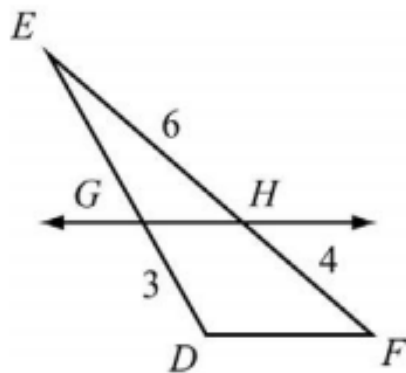
1. In the triangles shown, $\triangle ABC$ is dilated by a factor of $\frac{2}{3}$ to form $\triangle XYZ$.



Given that $m\angle A = 50^\circ$ and $m\angle B = 100^\circ$, what is $m\angle Z$?

- A. 15°
- B. 25°
- C. 30°
- D. 50°

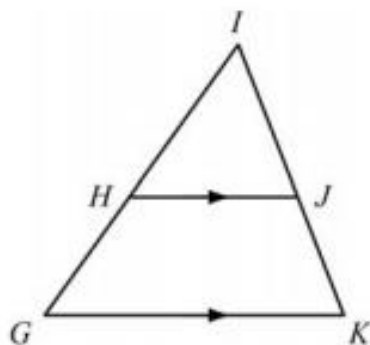
2. In the triangle shown, $\overline{GH} \parallel \overline{DF}$.



What is the length of \overline{GE} ?

- A. 2.0
- B. 4.5
- C. 7.5
- D. 8.0

3. Use this triangle to answer the question.



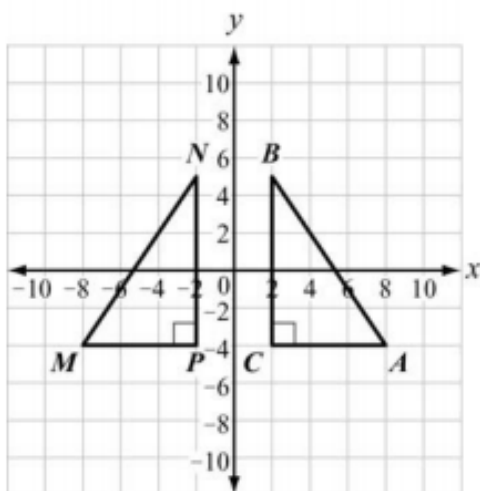
This is a proof of the statement “If a line is parallel to one side of a triangle and intersects the other two sides at distinct points, then it separates these sides into segments of proportional lengths.”

Step	Statement	Justification
1	\overline{GK} is parallel to \overline{HJ} .	Given
2	$\angle HGK \cong \angle IHJ$ $\angle IKG \cong \angle IJH$?
3	$\triangle GIK \sim \triangle HIJ$	AA Similarity
4	$\frac{IG}{IH} = \frac{IK}{IJ}$	Corresponding sides of similar triangles are proportional.
5	$\frac{HG + IH}{IH} = \frac{JK + IJ}{IJ}$	Segment Addition Postulate
6	$\frac{HG}{IH} = \frac{JK}{IJ}$	Subtraction Property of Equality

Which reason justifies Step 2?

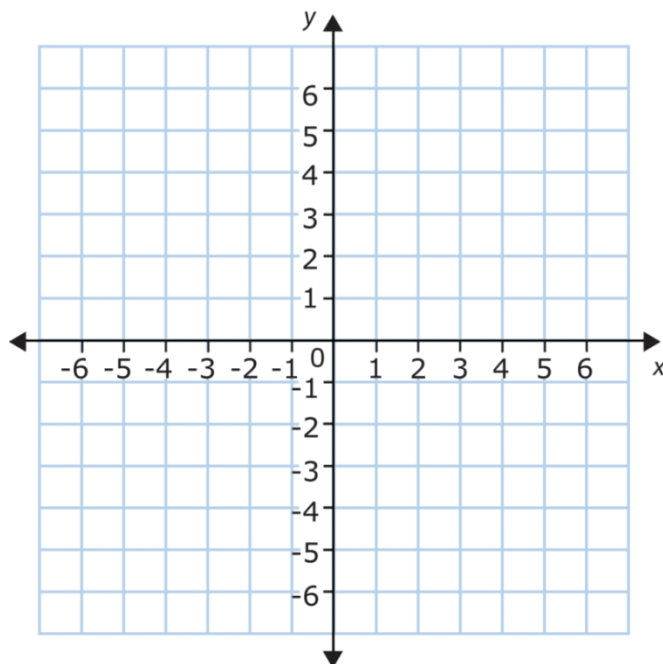
- A. Alternate interior angles are congruent.
- B. Alternate exterior angles are congruent.
- C. Corresponding angles are congruent.
- D. Vertical angles are congruent.

1. Is $\triangle ABC$ congruent to $\triangle MNP$? Explain.

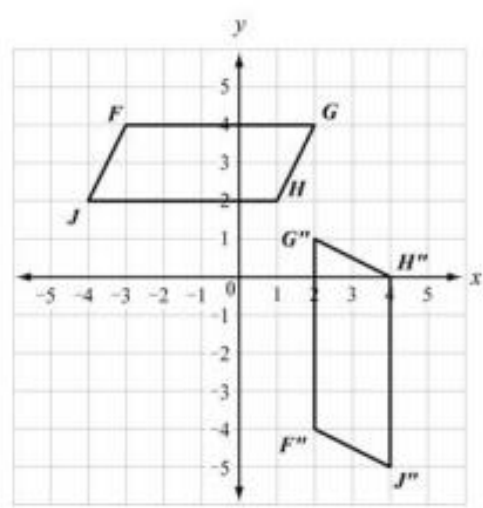


(scale unit = 2)

2. Rectangle $WXYZ$ has coordinates $W(1, 2)$, $X(3, 2)$, $Y(3, -3)$, and $Z(1, -3)$.
- Graph the image of rectangle $WXYZ$ after a rotation of 90° clockwise about the origin. Label the image $W'X'Y'Z'$.
 - Translate rectangle $W'X'Y'Z'$ 2 units left and 3 units up.
 - Is rectangle $WXYZ$ congruent to rectangle $W''X''Y''Z''$? Explain.



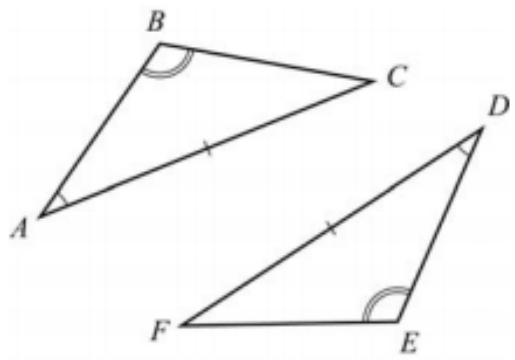
1. Parallelogram $FGHJ$ was translated 3 units down to form parallelogram $F'G'H'J'$. Parallelogram $F'G'H'J'$ was then rotated 90° counterclockwise about point G' to obtain parallelogram $F''G''H''J''$.



Which statement is true about parallelogram $FGHJ$ and parallelogram $F''G''H''J''$?

- A. The figures are both similar and congruent.
- B. The figures are neither similar nor congruent.
- C. The figures are similar but not congruent.
- D. The figures are congruent but not similar.

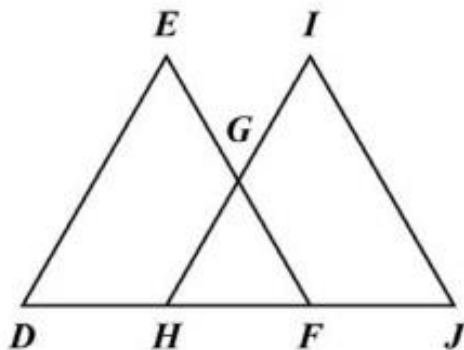
2. Consider the triangles shown.



Which can be used to prove the triangles are congruent?

- A. SSS
- B. ASA
- C. SAS
- D. AAS

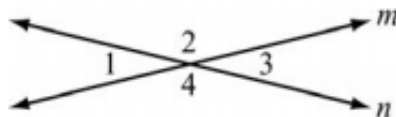
3. In this diagram, $\overline{DE} \cong \overline{JI}$ and $\angle D \cong \angle J$.



Which additional information is sufficient to prove that $\triangle DEF$ is congruent to $\triangle JIH$?

- A. $\overline{ED} \cong \overline{IH}$
- B. $\overline{DH} \cong \overline{JF}$
- C. $\overline{HG} \cong \overline{GI}$
- D. $\overline{HF} \cong \overline{JF}$

1. In this diagram, line m intersects line n .



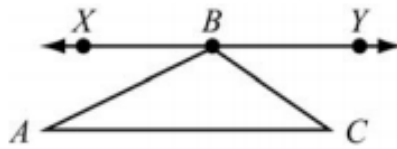
Write a two-column proof to show that vertical angles $\angle 1$ and $\angle 3$ are congruent.

Solution:

Construct a proof using intersecting lines.

Step	Statement	Justification
1	Line m intersects line n .	Given
2	$\angle 1$ and $\angle 2$ form a linear pair. $\angle 2$ and $\angle 3$ form a linear pair.	Definition of a linear pair
3	$m\angle 1 + m\angle 2 = 180^\circ$ $m\angle 2 + m\angle 3 = 180^\circ$	Angles that form a linear pair have measures that sum to 180° .
4	$m\angle 1 + m\angle 2 = m\angle 2 + m\angle 3$	Substitution
5	$m\angle 1 = m\angle 3$	Subtraction Property of Equality
6	$\angle 1 \cong \angle 3$	Definition of congruent angles

2. In this diagram, \overline{XY} is parallel to \overline{AC} , and point B lies on \overline{XY} .



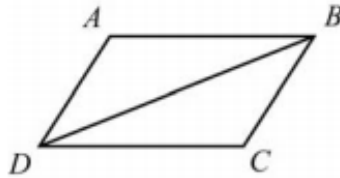
Write a paragraph to prove that the sum of the angles in a triangle is 180° .

Solution:

\overline{AC} and \overline{XY} are parallel, so \overline{AB} is a transversal. The alternate interior angles formed by the transversal are congruent. So, $m\angle A = m\angle ABX$. Similarly, \overline{BC} is a transversal, so $m\angle C = m\angle CBY$. The sum of the angle measures that make a straight line is 180° .

So, $m\angle ABX + m\angle ABC + m\angle CBY = 180^\circ$. Now, substitute $m\angle A$ for $m\angle ABX$ and $m\angle C$ for $m\angle CBY$ to get $m\angle A + m\angle ABC + m\angle C = 180^\circ$.

3. In this diagram, $ABCD$ is a parallelogram and \overline{BD} is a diagonal.



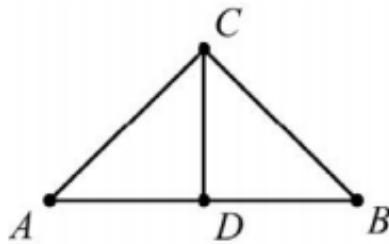
Write a two-column proof to show that \overline{AB} and \overline{CD} are congruent.

Solution:

Construct a proof using properties of the parallelogram and its diagonal.

Step	Statement	Justification
1	$ABCD$ is a parallelogram.	Given
2	\overline{BD} is a diagonal.	Given
3	\overline{AB} is parallel to \overline{DC} . \overline{AD} is parallel to \overline{BC} .	Definition of parallelogram
4	$\angle ABD \cong \angle CDB$ $\angle DBC \cong \angle BDA$	Alternate interior angles are congruent.
5	$\overline{BD} \cong \overline{BD}$	Reflexive Property of Congruence
6	$\triangle ADB \cong \triangle CBD$	ASA
7	$\overline{AB} \cong \overline{CD}$	CPCTC

1. In this diagram, \overline{CD} is the perpendicular bisector of \overline{AB} . The two-column proof shows that \overline{AC} is congruent to \overline{BC} .

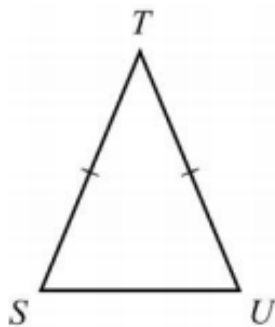


Step	Statement	Justification
1	\overline{CD} is the perpendicular bisector of \overline{AB} .	Given
2	$\overline{AD} \cong \overline{BD}$	Definition of bisector
3	$\overline{CD} \cong \overline{CD}$	Reflexive Property of Congruence
4	$\angle ADC$ and $\angle BDC$ are right angles.	Definition of perpendicular lines
5	$\angle ADC \cong \angle BDC$	All right angles are congruent.
6	$\triangle ADC \cong \triangle BDC$	_____ ? _____
7	$\overline{AC} \cong \overline{BC}$	CPCTC

Which of the following would justify Step 6?

- A. AAS
- B. ASA
- C. SAS
- D. SSS

2. In this diagram, STU is an isosceles triangle where \overline{ST} is congruent to \overline{UT} . The paragraph proof shows that $\angle S$ is congruent to $\angle U$.

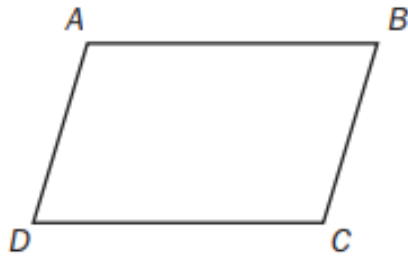


It is given that \overline{ST} is congruent to \overline{UT} . Draw \overline{TV} such that V is on \overline{SU} and \overline{TV} bisects $\angle T$. By the definition of an angle bisector, $\angle STV$ is congruent to $\angle UTV$. By the Reflexive Property of Congruence, \overline{TV} is congruent to \overline{TV} . Triangle STV is congruent to triangle UTV by SAS. $\angle S$ is congruent to $\angle U$ by _____ ? _____.

Which step is missing in the proof?

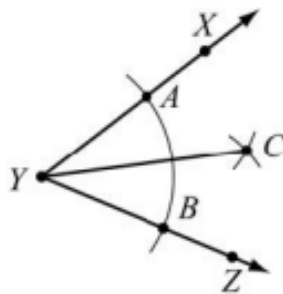
- A. CPCTC
 - B. Reflexive Property of Congruence
 - C. Definition of right angles
 - D. Angle Congruence Postulate
1. Which information is needed to show that a parallelogram is a rectangle?
- A. The diagonals bisect each other.
 - B. The diagonals are congruent.
 - C. The diagonals are congruent and perpendicular.
 - D. The diagonals bisect each other and are perpendicular.

2. Look at quadrilateral $ABCD$.



Which information is needed to show that quadrilateral $ABCD$ is a parallelogram?

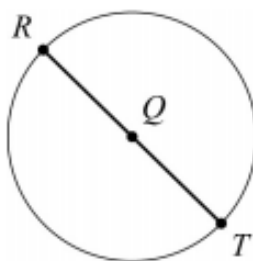
- A. Use the distance formula to show that diagonals AC and BD have the same length.
 - B. Use the slope formula to show that segments AB and CD are perpendicular and segments AD and BC are perpendicular.
 - C. Use the slope formula to show that segments AB and CD have the same slope and segments AD and BC have the same slope.
 - D. Use the distance formula to show that segments AB and AD have the same length and segments CD and BC have the same length.
3. Consider the construction of the angle bisector shown.



Which could have been the first step in creating this construction?

- A. Place the compass point on point A and draw an arc inside $\angle Y$.
- B. Place the compass point on point B and draw an arc inside $\angle Y$.
- C. Place the compass point on vertex Y and draw an arc that intersects \overline{YX} and \overline{YZ} .
- D. Place the compass point on vertex Y and draw an arc that intersects point C .

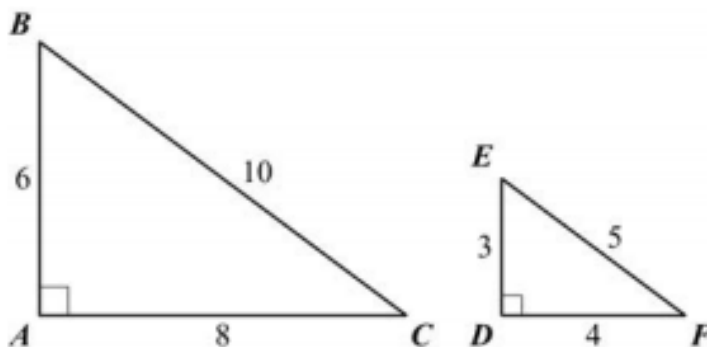
4. Consider the beginning of a construction of a square inscribed in circle Q .
- Step 1: Label point R on circle Q .
- Step 2: Draw a diameter through R and Q .
- Step 3: Label the point where the diameter intersects the circle as point T .



What is the next step in this construction?

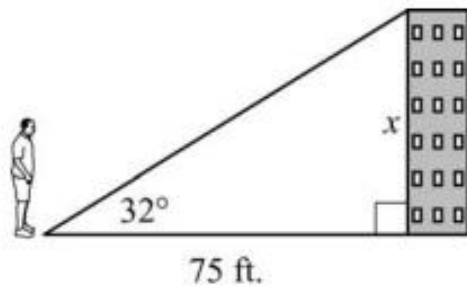
- A. Draw radius \overline{SQ} .
- B. Label point S on circle Q .
- C. Construct a line segment parallel to \overline{RT} .
- D. Construct the perpendicular bisector of \overline{RT} .

1. Triangles ABC and DEF are similar.



- a. Find the ratio of the side opposite angle B to the hypotenuse in $\triangle ABC$.
- b. What angle in $\triangle DEF$ corresponds to angle B ?
- c. Find the ratio of the side opposite angle E to the hypotenuse in $\triangle DEF$.
- d. How does the ratio in part (a) compare to the ratio in part (c)?
- e. Which trigonometric ratio does this represent?

2. Ricardo is standing 75 feet away from the base of a building. The angle of elevation from the ground where Ricardo is standing to the top of the building is 32° .

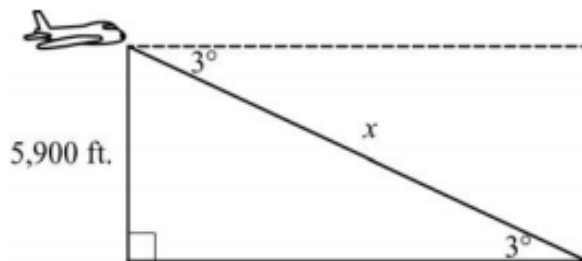


Note: Figure not drawn to scale.

What is x , the height of the building, to the nearest tenth of a foot?

$$\begin{bmatrix} \sin 32^\circ = 0.5299 \\ \cos 32^\circ = 0.8480 \\ \tan 32^\circ = 0.6249 \end{bmatrix}$$

3. An airplane is at an altitude of 5,900 feet. The airplane descends at an angle of 3° .

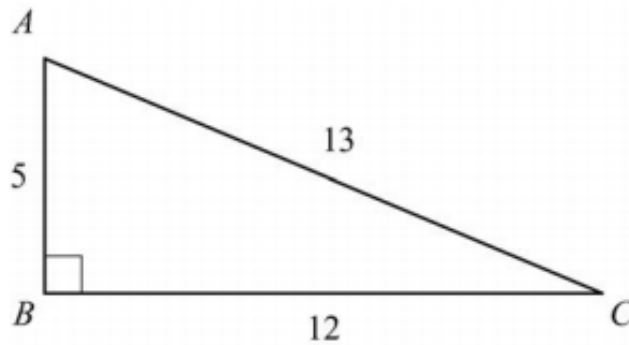


Note: Figure not drawn to scale.

About how far will the airplane travel in the air until it reaches the ground?

$$\begin{bmatrix} \sin 3^\circ = 0.0523 \\ \cos 3^\circ = 0.9986 \\ \tan 3^\circ = 0.0524 \end{bmatrix}$$

4. Triangle ABC is a right triangle.



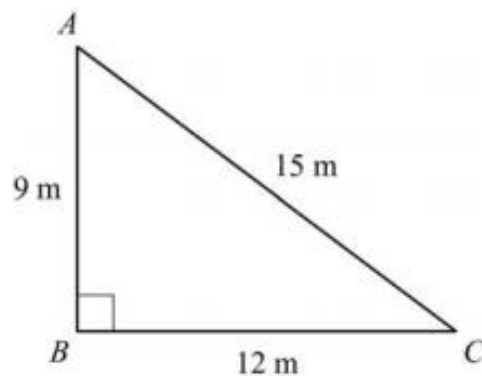
What is the best approximation for $m\angle C$?

$$\left[\begin{array}{l} \sin 67.4^\circ \approx 0.923 \\ \cos 22.6^\circ \approx 0.923 \\ \tan 42.7^\circ \approx 0.923 \end{array} \right]$$

1. In right triangle ABC , angle A and angle B are complementary angles. The value of $\cos A$ is $\frac{5}{13}$. What is the value of $\sin B$?

- A. $\frac{5}{13}$
- B. $\frac{12}{13}$
- C. $\frac{13}{12}$
- D. $\frac{13}{5}$

2. Triangle ABC is given below.



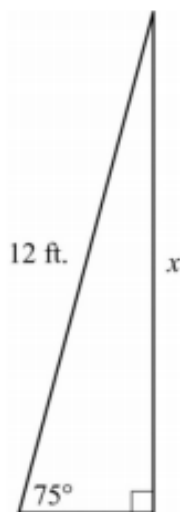
- A. $\frac{3}{5}$
- B. $\frac{3}{4}$
- C. $\frac{4}{5}$
- D. $\frac{5}{3}$

What is the value of $\cos A$?

3. In right triangle HJK , $\angle J$ is a right angle and $\tan \angle H = 1$. Which statement about triangle HJK must be true?

- A. $\sin \angle H = \frac{1}{2}$
- B. $\sin \angle H = 1$
- C. $\sin \angle H = \cos \angle H$
- D. $\sin \angle H = \frac{1}{\cos \angle H}$

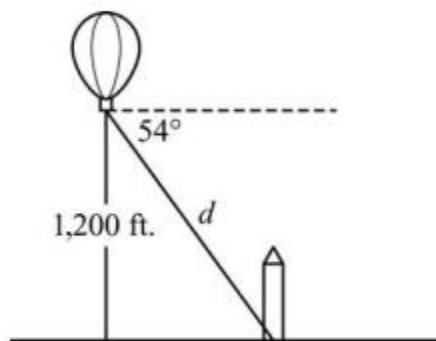
4. A 12-foot ladder is leaning against a building at a 75° angle with the ground.



- A. $\sin 75^\circ = \frac{12}{x}$
- B. $\tan 75^\circ = \frac{12}{x}$
- C. $\cos 75^\circ = \frac{x}{12}$
- D. $\sin 75^\circ = \frac{x}{12}$

Which equation can be used to find how high the ladder reaches up the side of the building?

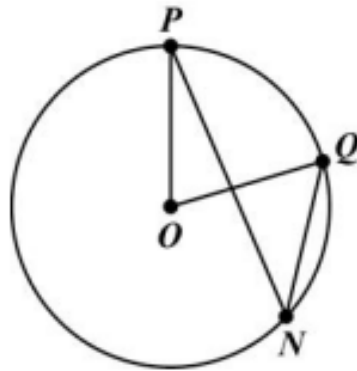
5. A hot air balloon is 1,200 feet above the ground. The angle of depression from the basket of the hot air balloon to the base of a monument is 54° .



- A. $\sin 54^\circ = \frac{d}{1200}$
- B. $\sin 54^\circ = \frac{1200}{d}$
- C. $\cos 54^\circ = \frac{d}{1200}$
- D. $\cos 54^\circ = \frac{1200}{d}$

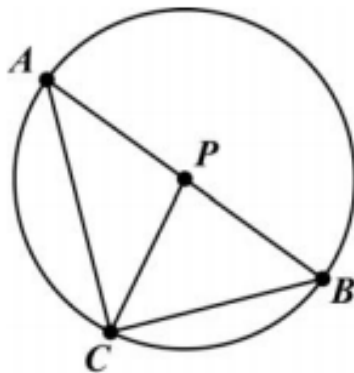
Which equation can be used to find the distance, d , in feet, from the basket of the hot air balloon to the base of the monument?

1. $\angle PNQ$ is inscribed in circle O and $m\widehat{PQ} = 70^\circ$.



- What is the measure of $\angle POQ$?
- What is the relationship between $\angle POQ$ and $\angle PNQ$?
- What is the measure of $\angle PNQ$?

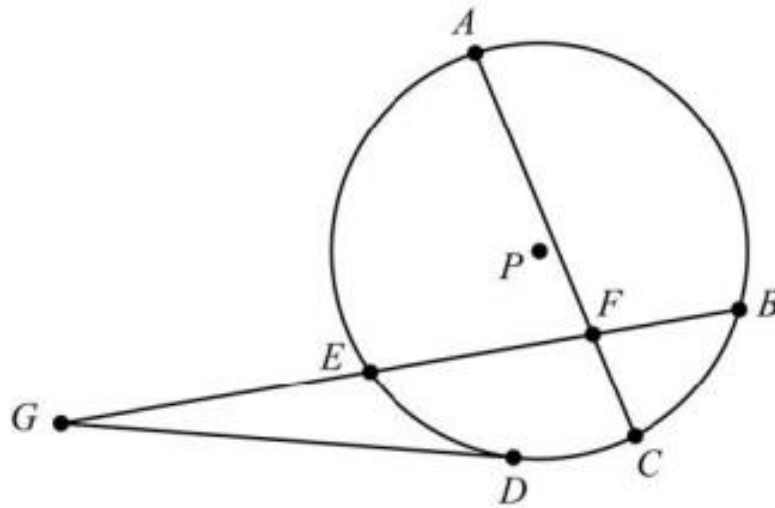
2. In circle P below, \overline{AB} is a diameter.



If $m\angle APC = 100^\circ$, find the following:

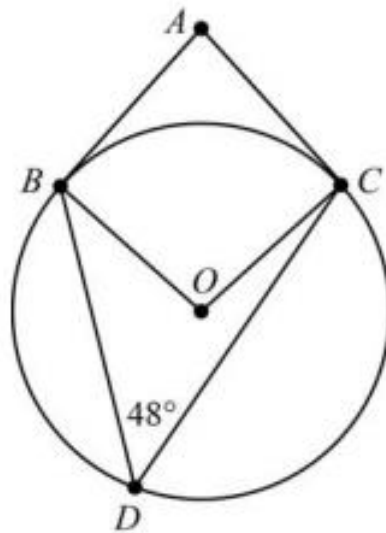
- $m\angle BPC$
- $m\angle BAC$
- $m\widehat{BC}$
- $m\widehat{AC}$

3. In circle P below, \overline{DG} is a tangent. $AF = 8$, $EF = 6$, $BF = 4$, and $EG = 8$.



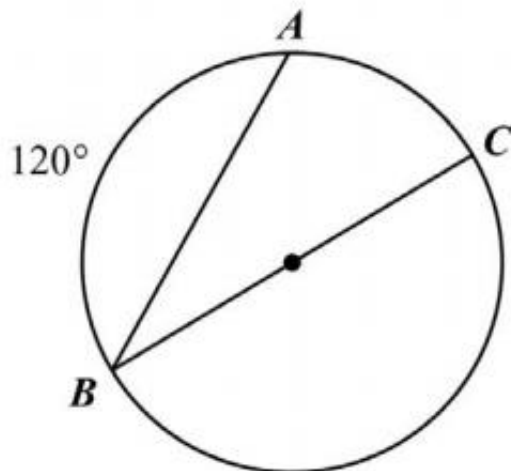
Find CF and DG .

4. In this circle, \overline{AB} is tangent to the circle at point B , \overline{AC} is tangent to the circle at point C , and point D lies on the circle. What is $m\angle BAC$?



1. Circle P is dilated to form circle P' . Which statement is ALWAYS true?
- The radius of circle P is equal to the radius of circle P' .
 - The length of any chord in circle P is greater than the length of any chord in circle P' .
 - The diameter of circle P is greater than the diameter of circle P' .
 - The ratio of the diameter to the circumference is the same for both circles.

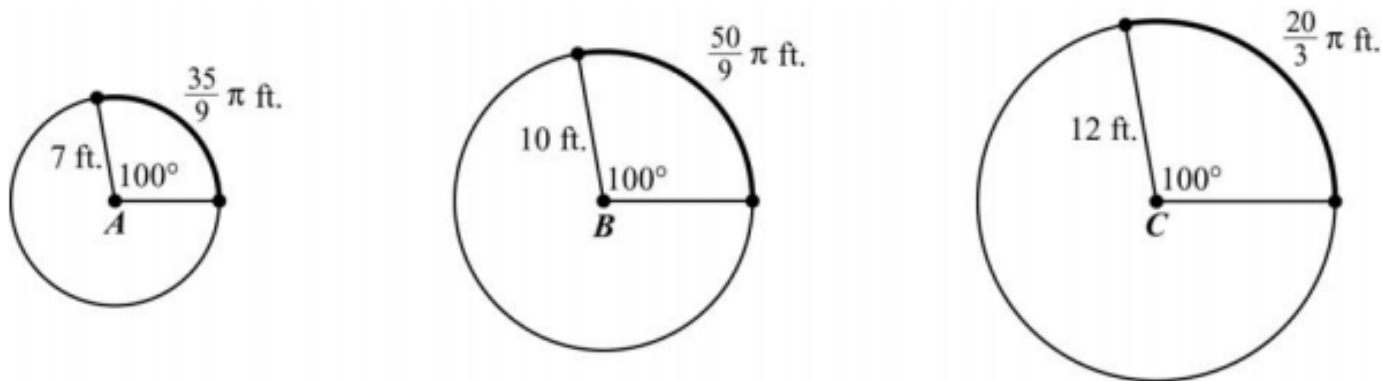
2. In the circle shown, \overline{BC} is a diameter and $m\widehat{AB} = 120^\circ$.



- A. 15°
 B. 30°
 C. 60°
 D. 120°

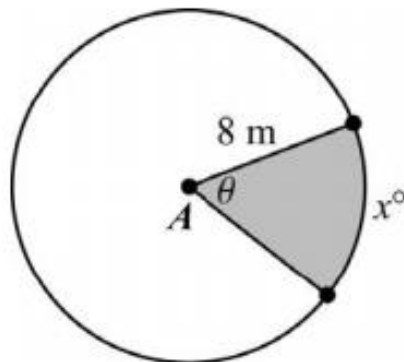
What is the measure of $\angle ABC$?

1. Circles A, B, and C have a central angle measuring 100° . The length of each radius and the length of each intercepted arc are shown.



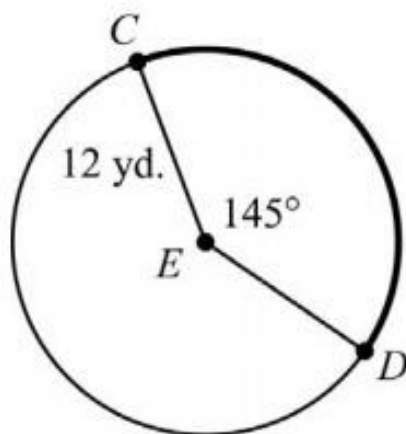
- What is the ratio of the radius of circle B to the radius of circle A?
- What is the ratio of the length of the intercepted arc of circle B to the length of the intercepted arc of circle A?
- Compare the ratios in parts (a) and (b).
- What is the ratio of the radius of circle C to the radius of circle B?
- What is the ratio of the length of the intercepted arc of circle C to the length of the intercepted arc of circle B?
- Compare the ratios in parts (d) and (e).
- Based on your observations of circles A, B, and C, what conjecture can you make about the length of the arc intercepted by a central angle and the radius?
- What is the ratio of arc length to radius for each circle?

2. Circle A is shown.



If $x = 50$, what is the area of the shaded sector of circle A?

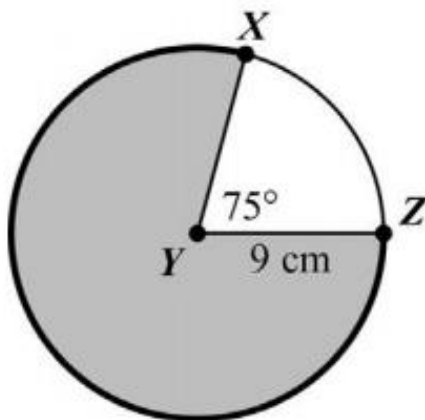
1. Circle E is shown.



- A. $\frac{29}{72}\pi$ yd.
- B. $\frac{29}{6}\pi$ yd.
- C. $\frac{29}{3}\pi$ yd.
- D. $\frac{29}{2}\pi$ yd.

What is the length of \widehat{CD} ?

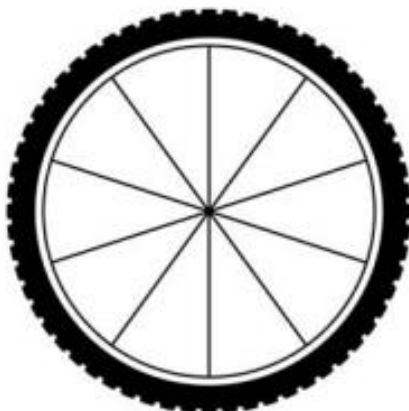
2. Circle Y is shown.



- A. $\frac{57}{4}\pi$ cm²
- B. $\frac{135}{8}\pi$ cm²
- C. $\frac{405}{8}\pi$ cm²
- D. $\frac{513}{8}\pi$ cm²

What is the area of the shaded part of the circle?

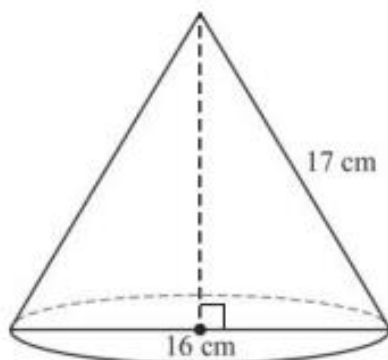
3. The spokes of a bicycle wheel form 10 congruent central angles. The diameter of the circle formed by the outer edge of the wheel is 18 inches.



What is the length, to the nearest 0.1 inch, of the outer edge of the wheel between two consecutive spokes?

- A. 1.8 inches
- B. 5.7 inches
- C. 11.3 inches
- D. 25.4 inches

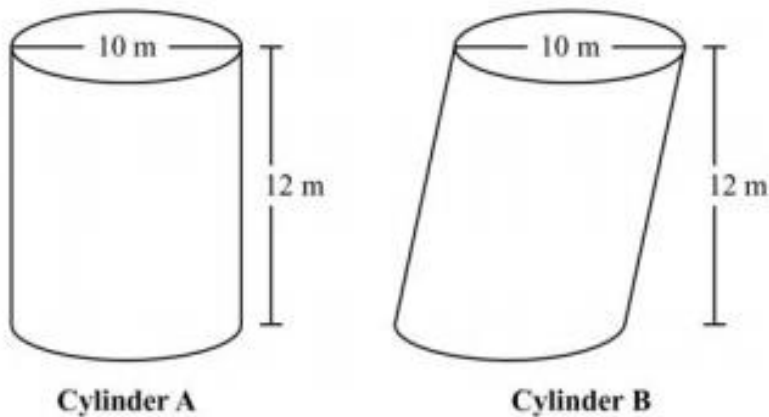
1. What is the volume of the cone shown below?



2. A sphere has a radius of 3 feet. What is the volume of the sphere?

3. A cylinder has a radius of 10 cm and a height of 9 cm. A cone has a radius of 10 cm and a height of 9 cm. Show that the volume of the cylinder is three times the volume of the cone.

4. Cylinder A and Cylinder B are shown below. What is the volume of each cylinder?



1. Jason constructed two cylinders using solid metal washers. The cylinders have the same height, but one of the cylinders is slanted as shown.



Which statement is true about Jason's cylinders?

- A. The cylinders have different volumes because they have different radii.
- B. The cylinders have different volumes because they have different surface areas.
- C. The cylinders have the same volume because each of the washers has the same height.
- D. The cylinders have the same volume because they have the same cross-sectional area at every plane parallel to the bases.

2. What is the volume of a cylinder with a radius of 3 in. and a height of $\frac{9}{2}$ in.?
- A. $\frac{81}{2}\pi$ in.³
 - B. $\frac{27}{4}\pi$ in.³
 - C. $\frac{27}{8}\pi$ in.³
 - D. $\frac{9}{4}\pi$ in.³

1. A city has a population of 6,688 people. The area of the city is approximately 7.267 square miles.

How many people per square mile live in the city?

2. This is a hand drawing of a mountain.



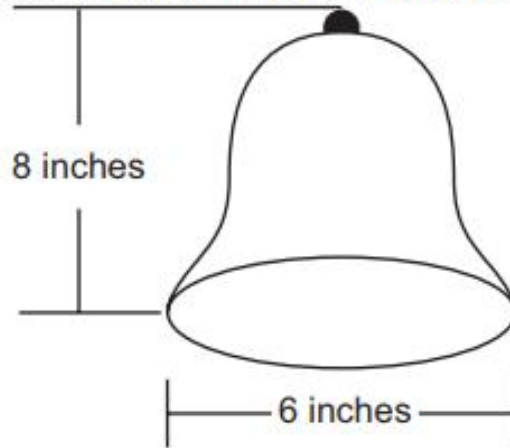
Explain which geometric shape could be used to estimate the total amount of Earth the mountain is made of.

3. A construction company is preparing 10 acres of land for a new housing community. The land contains large rocks that need to be removed. A machine removes 10 rocks from 360 square feet of land.

1 acre = 43,560 square feet

About how many rocks will need to be removed from the 10 acres of land?

4. A company needs to package this bell in a rectangular box.



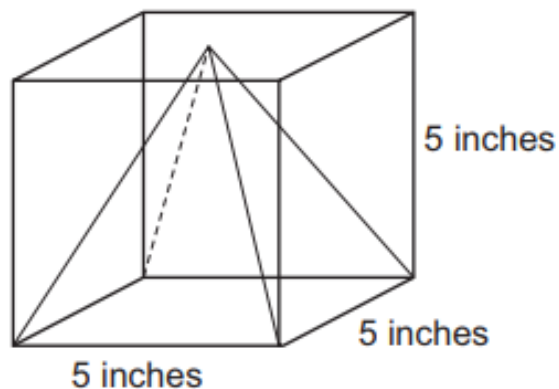
What are the smallest dimensions (length, width, and height) the rectangular box can have so that the lid of the box can also close?

1. Joe counts 250 peach trees on 25% of the land he owns. He determined that there are 10 trees for every 1,000 square feet of land. About how many acres of land does Joe own?

1 acre = 43,560 square feet

- A. 2.3 acres
- B. 10 acres
- C. 43.56 acres
- D. 2,500 acres

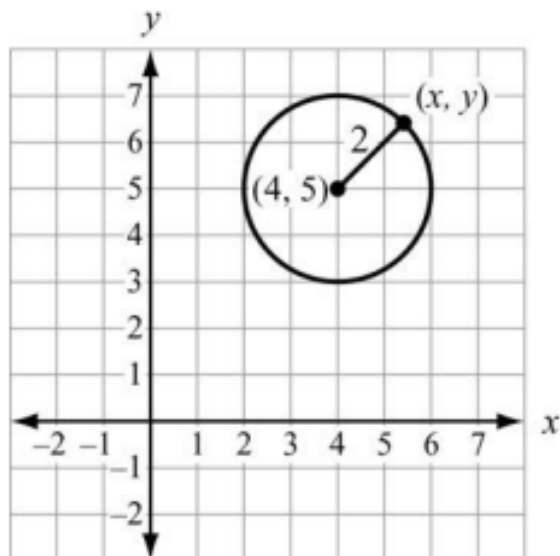
2. A square pyramid is packaged inside a box.



The space inside the box around the pyramid is then filled with protective foam. About how many cubic inches of foam is needed to fill the space around the pyramid?

- A. 8 cubic inches
- B. 41 cubic inches
- C. 83 cubic inches
- D. 125 cubic inches

1. What is the equation of the circle with a center at $(4, 5)$ and a radius of 2?



2. What is the center and radius of the circle given by $8x^2 + 8y^2 - 16x - 32y + 24 = 0$?

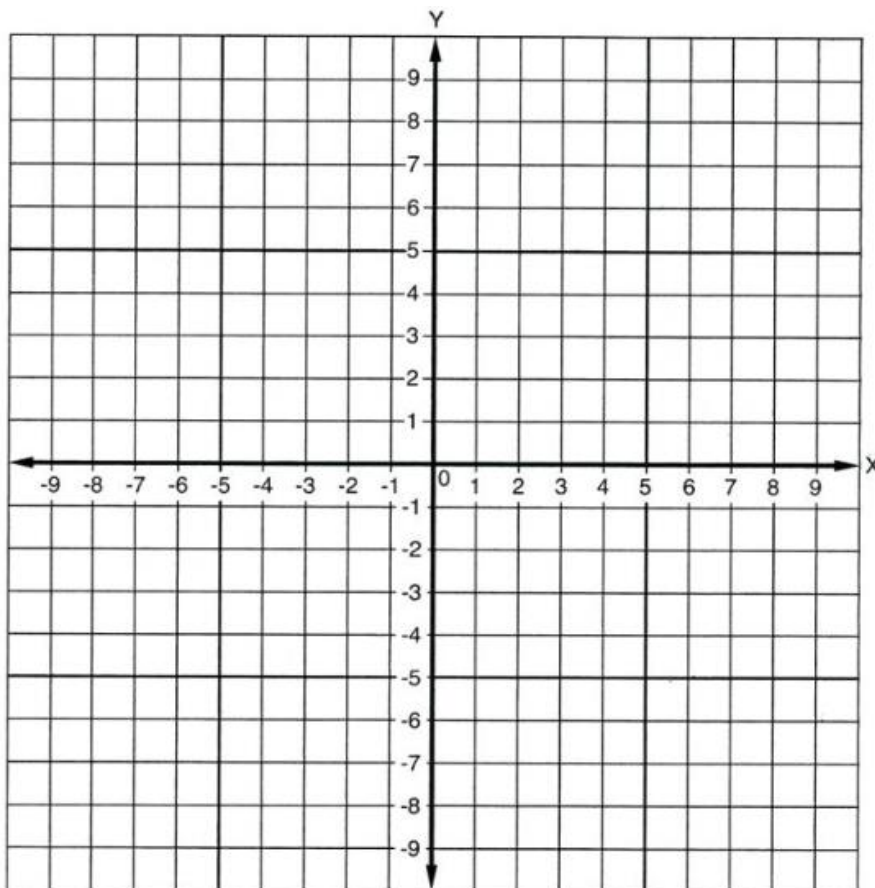
1. Which is an equation for the circle with a center at $(-2, 3)$ and a radius of 3?

- A. $x^2 + y^2 + 4x - 6y + 22 = 0$
- B. $2x^2 + 2y^2 + 3x - 3y + 4 = 0$
- C. $x^2 + y^2 + 4x - 6y + 4 = 0$
- D. $3x^2 + 3y^2 + 4x - 6y + 4 = 0$

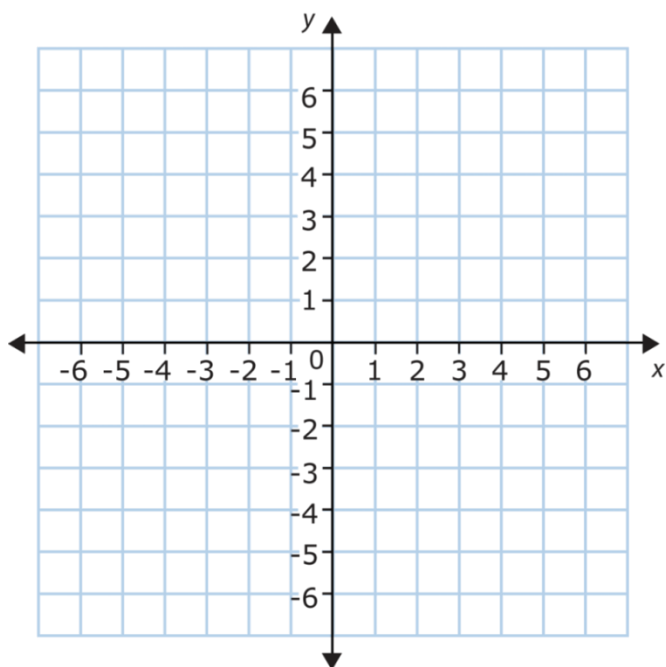
2. What is the center of the circle given by the equation $x^2 + y^2 - 10x - 11 = 0$?

- A. $(5, 0)$
- B. $(0, 5)$
- C. $(-5, 0)$
- D. $(0, -5)$

1. Quadrilateral $ABCD$ has vertices $A(-1, 3)$, $B(3, 5)$, $C(4, 3)$, and $D(0, 1)$. Is $ABCD$ a rectangle? Explain how you know.



2. Circle C has a center of $(-2, 3)$ and a radius of 4. Does point $(-4, 6)$ lie on circle C ?
5. The line p is represented by the equation $y = 4x + 1$. What is the equation of the line that is perpendicular to line p and passes through the point $(8, 5)$?
6. For what value of n are the lines $7x + 3y = 8$ and $nx + 3y = 8$ perpendicular?
7. Quadrilateral $ABCD$ has vertices $A(4, 0)$, $B(3, 3)$, $C(-3, 1)$, and $D(-2, -2)$. Prove that $ABCD$ is a rectangle.



8. Given the points $A(-1, 2)$ and $B(7, 8)$, find the coordinates of the point P on directed line segment \overline{AB} that partitions \overline{AB} in the ratio 1:3.
9. Find the area of rectangle $ABCD$ with vertices $A(-3, 0)$, $B(3, 2)$, $C(4, -1)$, and $D(-2, -3)$.

1. Which information is needed to show that a parallelogram is a rectangle?

- A. The diagonals bisect each other.
- B. The diagonals are congruent.
- C. The diagonals are congruent and perpendicular.
- D. The diagonals bisect each other and are perpendicular.

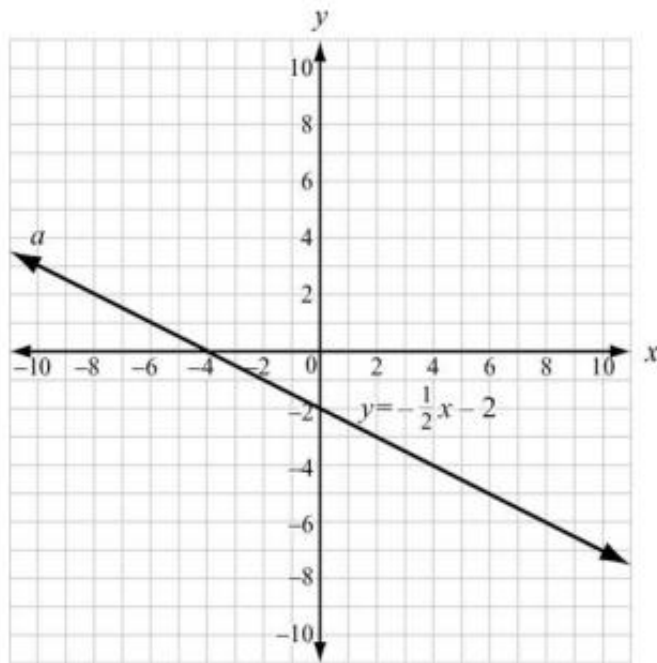
2. Which point is on a circle with a center of $(3, -9)$ and a radius of 5?

- A. $(-6, 5)$
- B. $(-1, 6)$
- C. $(1, 6)$
- D. $(6, -5)$

3. Given the points $P(2, -1)$ and $Q(-9, -6)$, what are the coordinates of the point on directed line segment \overline{PQ} that partitions \overline{PQ} in the ratio $\frac{3}{2}$?

- A. $\left(-\frac{23}{5}, -4\right)$
- B. $\left(-\frac{12}{5}, -3\right)$
- C. $\left(\frac{5}{3}, \frac{8}{3}\right)$
- D. $\left(-\frac{5}{3}, -\frac{8}{3}\right)$

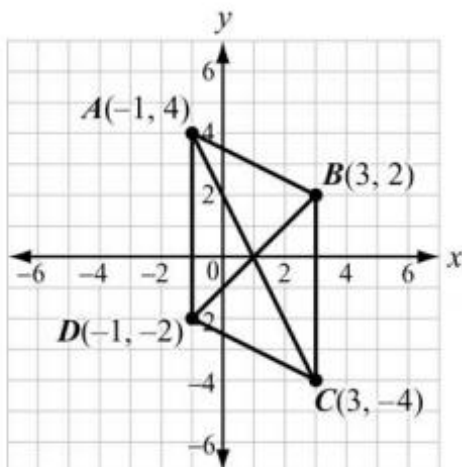
4. An equation of line a is $y = -\frac{1}{2}x - 2$.



Which is an equation of the line that is perpendicular to line a and passes through the point $(-4, 0)$?

- A. $y = -\frac{1}{2}x + 2$
- B. $y = -\frac{1}{2}x + 8$
- C. $y = 2x - 2$
- D. $y = 2x + 8$

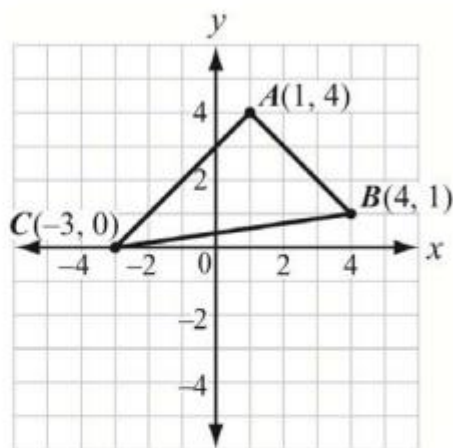
5. Parallelogram $ABCD$ has vertices as shown.



Which equation would be used in proving that the diagonals of parallelogram $ABCD$ bisect each other?

- A. $\sqrt{(3-1)^2 + (2-0)^2} = \sqrt{(1-3)^2 + (0+4)^2}$
B. $\sqrt{(3+1)^2 + (2+0)^2} = \sqrt{(1+3)^2 + (0-4)^2}$
C. $\sqrt{(-1-1)^2 + (4-0)^2} = \sqrt{(1-3)^2 + (0+4)^2}$
D. $\sqrt{(-1+1)^2 + (4+0)^2} = \sqrt{(1+3)^2 + (0-4)^2}$

6. Triangle ABC has vertices as shown.



What is the area of the triangle?

- A. $\sqrt{72}$ square units
B. 12 square units
C. $\sqrt{288}$ square units
D. 24 square units

A random survey was taken to gather information about grade level and car ownership status of students at a school. This table shows the results of the survey.

Car Ownership by Grade

	Owns a Car	Does Not Own a Car	Total
Junior	6	10	16
Senior	12	8	20
Total	18	18	36

Estimate the probability that a randomly selected student will be a junior, given that the student owns a car.

- This table shows the names of students in Mr. Leary's class who do or do not own bicycles and skateboards.

Bicycle and Skateboard Ownership			
Owns a Bicycle	Owns a Skateboard	Owns a Bicycle AND Skateboard	Does NOT Own a Bicycle OR Skateboard
Ryan	Brett	Joe	Amy
Sarah	Juan	Mike	Gabe
Mariko	Tobi	Linda	Abi
Nina		Rose	
Dion			

Let set A be the names of students who own bicycles, and let set B be the names of students who own skateboards.

- Find A and B . What does the set represent?
- Find A or B . What does the set represent?
- Find $(A \text{ or } B)'$. What does the set represent?

2. In a certain town, the probability that a person plays sports is 65%. The probability that a person is between the ages of 12 and 18 is 40%. The probability that a person plays sports and is between the ages of 12 and 18 is 25%. Are the events independent? How do you know?
3. A random survey was conducted to gather information about age and employment status. This table shows the data that were collected.

Employment Survey Results

Employment Status	Age (in Years)		Total
	Less than 18	18 or greater	
Has Job	20	587	607
Does Not Have Job	245	92	337
Total	265	679	944

- a. What is the probability that a randomly selected person surveyed has a job, given that the person is less than 18 years old?
- b. What is the probability that a randomly selected person surveyed has a job, given that the person is greater than or equal to 18 years old?
- c. Are having a job (A) and being 18 or greater (B) independent events? Explain.
- $P(A)$ = has a job
 - $P(A')$ = does not have a job
 - $P(B)$ = 18 years old or greater
 - $P(B')$ = less than 18 years old
2. For which set of probabilities would events A and B be independent?
- A. $P(A) = 0.25$; $P(B) = 0.25$; $P(A \text{ and } B) = 0.5$
- B. $P(A) = 0.08$; $P(B) = 0.4$; $P(A \text{ and } B) = 0.12$
- C. $P(A) = 0.16$; $P(B) = 0.24$; $P(A \text{ and } B) = 0.32$
- D. $P(A) = 0.3$; $P(B) = 0.15$; $P(A \text{ and } B) = 0.045$

1. In a particular state, the first character on a license plate is always a letter. The last character is always a digit from 0 to 9.

If V represents the set of all license plates beginning with a vowel, and O represents the set of all license plates that end with an odd number, which license plate belongs to the set V and O' ?



3. Assume that the following events are independent:

- The probability that a high school senior will go to college is 0.72.
- The probability that a high school senior will go to college and live on campus is 0.46.

What is the probability that a high school senior will live on campus, given that the person will go to college?

- A. 0.26
B. 0.33
C. 0.57
D. 0.64

4. A random survey was conducted about gender and hair color. This table records the data.

Hair Color

	Brown	Blonde	Red	Total
Male	548	876	82	1,506
Female	612	716	66	1,394
Total	1,160	1,592	148	2,900

What is the probability that a randomly selected person has blonde hair, given that the person selected is male?

- A. 0.51
 - B. 0.55
 - C. 0.58
 - D. 0.63
1. In Mr. Mabry's class, there are 12 boys and 16 girls. On Monday, 4 boys and 5 girls were wearing white shirts.
- a. If a student is chosen at random from Mr. Mabry's class, what is the probability of choosing a boy or a student wearing a white shirt?
 - b. If a student is chosen at random from Mr. Mabry's class, what is the probability of choosing a girl or a student not wearing a white shirt?
2. Terry has a number cube with sides labeled 1 through 6. He rolls the number cube twice.
- a. What is the probability that the sum of the two rolls is a prime number, given that at least one of the rolls is a 3?
 - b. What is the probability that the sum of the two rolls is a prime number or at least one of the rolls is a 3?

1. Mrs. Klein surveyed 240 men and 285 women about their vehicles. Of those surveyed, 155 men and 70 women said they own a red vehicle. If a person is chosen at random from those surveyed, what is the probability of choosing a woman or a person who does NOT own a red vehicle?

- A. $\frac{14}{57}$
B. $\frac{71}{105}$
C. $\frac{74}{105}$
D. $\frac{88}{105}$

2. Bianca spins two spinners that have four equal sections numbered 1 through 4. If she spins a 4 on at least one spin, what is the probability that the sum of her two spins is an odd number?

- A. $\frac{1}{4}$
B. $\frac{7}{16}$
C. $\frac{4}{7}$
D. $\frac{11}{16}$

3. Each letter of the alphabet is written on separate cards in red ink. The cards are placed in a container. Each letter of the alphabet is also written on separate cards in black ink. The cards are placed in the same container. What is the probability that a card randomly selected from the container has a letter written in black ink or the letter is A or Z?

- A. $\frac{1}{2}$
B. $\frac{7}{13}$
C. $\frac{15}{26}$
D. $\frac{8}{13}$