

Student Name _____

P

Geometry
Test Booklet

Practice Test

TEST BOOKLET SECURITY BARCODE



Unit 1

Directions:

Today, you will take Unit 1 of the Geometry Practice Test. Unit 1 has two sections. In the first section, you may not use a calculator. In the second section, you may use a calculator. **You will not be allowed to return to the first section of the test after you start the calculator section.** You must complete both the non-calculator and calculator sections of Unit 1 within the time allowed.

Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your answer document. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely. If a question asks you to show or explain your work, you must do so to receive full credit. Only responses written within the provided space will be scored.

If you do not know the answer to a question, you may go on to the next question. When you finish the first section, you may review your answers and any questions you did not answer in this section **ONLY**. Once you have reviewed your answers, continue to the calculator section. When you are ready to go on to the calculator section, raise your hand to receive your calculator.

Directions for Completing the Answer Grids

1. Work the problem and find an answer.
2. Write your answer in the boxes at the top of the grid.
3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
4. Under each box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.
5. Do not fill in a circle under an unused box.
6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
7. See below for examples on how to correctly complete an answer grid.

EXAMPLES

To answer -3 in a question, fill in the answer grid as shown below.

-	3				
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
<input checked="" type="radio"/>	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

To answer $.75$ in a question, fill in the answer grid as shown below.

.	7	5			
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	<input checked="" type="radio"/>	5	5	5
6	6	6	6	6	6
7	<input checked="" type="radio"/>	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

GO ON TO NEXT PAGE

Unit 1 - Section 1 (Non-Calculator)

This unit has two sections: a non-calculator section and a calculator section.

You will now take the non-calculator section of this unit in which you may not use a calculator. You will not be allowed to return to the first section of the test after you start the calculator section. You must complete both sections within the time allowed for this unit.

Once you finish the non-calculator section, read the directions in your test booklet on how to continue.

Use the information provided to answer Part A and Part B for question 1.

The equation $x^2 + y^2 - 4x + 2y = b$ describes a circle.

1. Part A

Determine the y -coordinate of the center of the circle.

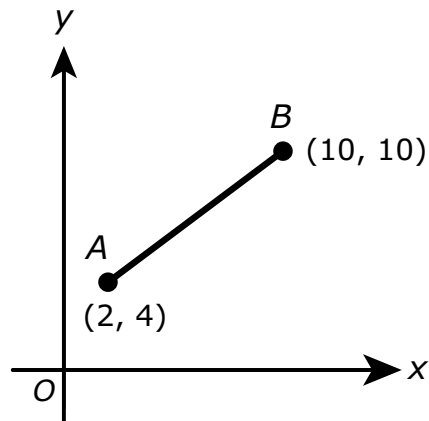
Enter your answer in the box.

Part B

The radius of the circle is 7 units. What is the value of b in the equation?

Enter your answer in the box.

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

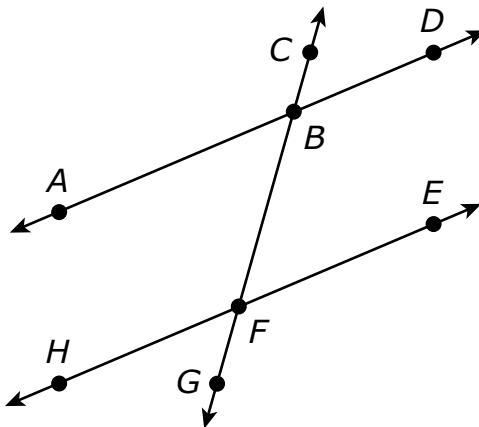


If the ratio of the length of \overline{AC} to the length of \overline{CB} is 3:1, what is the y-coordinate of point C ?

Enter your answer in the box.

Use the information provided to answer Part A and Part B for question 3.

In the figure shown, \overleftrightarrow{CF} intersects \overleftrightarrow{AD} and \overleftrightarrow{EH} at points B and F , respectively.



3. Part A

- Given: $\angle CBD \cong \angle BFE$
- Prove: $\angle ABF \cong \angle BFE$

Statement	Reason
$\angle CBD \cong \angle BFE$	Given
$\angle CBD \cong \angle ABF$	
$\angle ABF \cong \angle BFE$	

Which **two** of the given reasons could be used to correctly complete the proof?

- A. Definition of congruent angles
- B. Congruence of angles is reflexive
- C. Congruence of angles is symmetric
- D. Congruence of angles is transitive
- E. Vertical angles are congruent

Part B

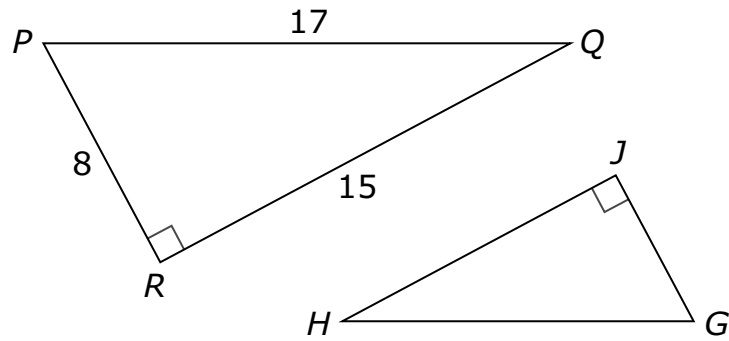
- Given: $m\angle CBD = m\angle BFE$
- Prove: $m\angle BFE + m\angle DBF = 180^\circ$

Statement	Reason
$m\angle CBD = m\angle BFE$	Given
$m\angle CBD + m\angle DBF = 180^\circ$	
$m\angle BFE + m\angle DBF = 180^\circ$	

Which **two** of the given reasons could be used to correctly complete the

- A.** Adjacent angles are congruent
- B.** Adjacent angles are supplementary
- C.** Linear pairs of angles are supplementary
- D.** Reflexive property of equality
- E.** Substitution property of equality
- F.** Transitive property of equality

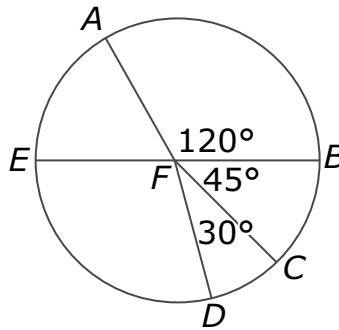
4. In this figure, triangle $G H J$ is similar to triangle $P Q R$.



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

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

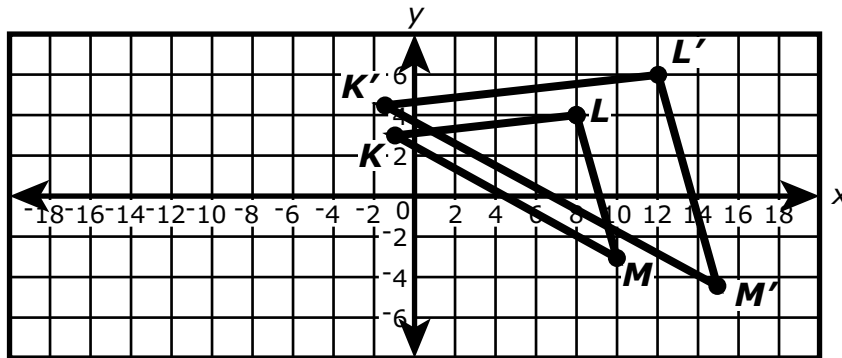
5. The circle with center F is divided into sectors. In circle F , \overline{EB} is a diameter. The length of \overline{FB} is 3 units.



Select the correct expression that represents the arc length of \widehat{AED} .

- A. π
- B. $\frac{11\pi}{4}$
- C. $\frac{13\pi}{4}$
- D. $\frac{7\pi}{4}$

6. Triangle KLM is the pre-image of $\triangle K'L'M'$, before a transformation. Determine if these two figures are similar.



Which statements are true?

Select **all** that apply.

- A. Triangle KLM is similar to $\triangle K'L'M'$.
- B. Triangle KLM is not similar to $\triangle K'L'M'$.
- C. There was a dilation of scale factor 0.5 centered at the origin.
- D. There was a dilation of scale factor 1 centered at the origin.
- E. There was a dilation of scale factor 1.5 centered at the origin.
- F. There was a translation left 0.5 and up 1.5.
- G. There was a translation left 1.5 and up 0.5.

7. The degree measure of an angle in a right triangle is x , and $\sin x = \frac{1}{3}$.

Which of these expressions are also equal to $\frac{1}{3}$?

Select **all** that apply.

- A. $\cos(x)$
- B. $\cos(x - 45^\circ)$
- C. $\cos(45^\circ - x)$
- D. $\cos(60^\circ - x)$
- E. $\cos(90^\circ - x)$





You have come to the end of the non-calculator section in Unit 1 of the test.

- **You may review your answers in the non-calculator section ONLY. You will not be allowed to return to the non-calculator section once you have received your calculator.**
- **When you are ready to go on to the calculator section, raise your hand to receive your calculator.**





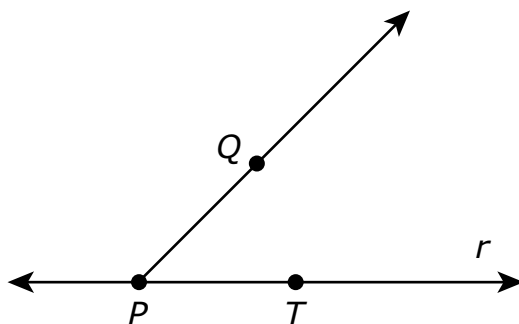
Unit 1 - Section 2 (Calculator)

Once you have received your calculator, continue into the calculator section.

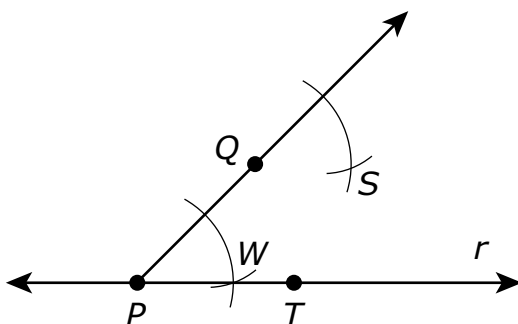


Use the information provided to answer Part A and Part B for question 8.

The figure shows line r , points P and T on line r , and point Q not on line r . Also shown is ray PQ .



8. Part A



Consider the partial construction of a line parallel to r through point Q . What would be the final step in the construction?

- A. draw a line through P and S
- B. draw a line through Q and S
- C. draw a line through T and S
- D. draw a line through W and S

**Part B**

Once the construction is complete, which of the reasons listed contribute to proving the validity of the construction?

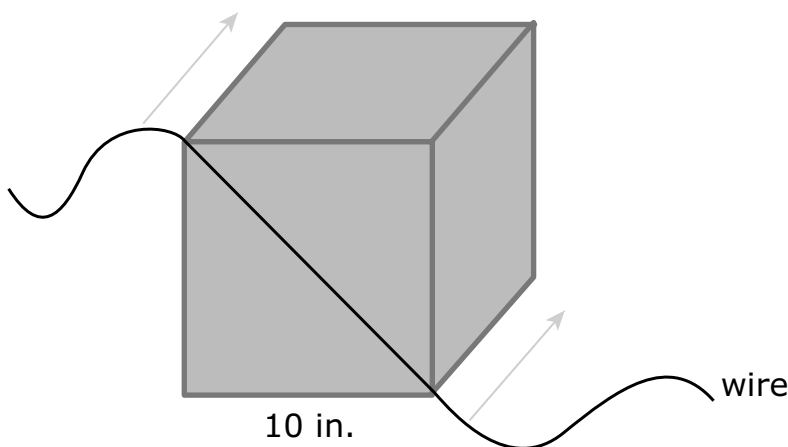
- A.** When two lines are cut by a transversal and the corresponding angles are congruent, the lines are parallel.
- B.** When two lines are cut by a transversal and the vertical angles are congruent, the lines are parallel.
- C.** definition of segment bisector
- D.** definition of an angle bisector



9. Part A

Daniel buys a block of clay for an art project. The block is shaped like a cube with edge lengths of 10 inches.

Daniel decides to cut the block of clay into two pieces. He places a wire across the diagonal of one face of the cube, as shown in the figure. Then he pulls the wire straight back to create two congruent chunks of clay.



Daniel wants to keep one chunk of the clay for later use. To keep that chunk from drying out, he wants to place a piece of plastic sheeting on the surface he exposed when he cut through the cube. Describe this newly exposed two-dimensional cross section, and find its area. Round your answer to the nearest whole square inch. Show your work.

Enter your answers and your work in the space provided.

Part B

Daniel wants to reshape the other chunk of clay to make a set of clay spheres. He wants each sphere to have a diameter of 4 inches. Find the maximum number of spheres that Daniel can make from the chunk of clay. Show your work.

Enter your answer and your work in the space provided.



- 10.** In the xy -coordinate plane, $\triangle ABC$ has vertices at $A(1, -2)$, $B(1, 0.5)$, and $C(2, 1)$ and $\triangle DEF$ has vertices at $D(4, -3)$, $E(4, 2)$, and $F(6, 3)$.

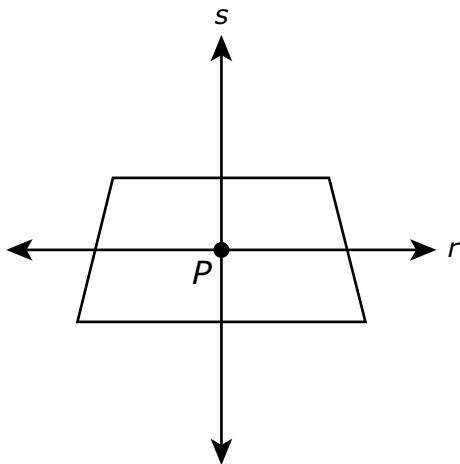
The triangles are similar because $\triangle DEF$ is the image of $\triangle ABC$ under a dilation. What is the center and the scale factor for this dilation?

Select the **two** true statements.

- A.** The center of dilation is at $(-2, -1)$.
- B.** The center of dilation is at $(-1, -2)$.
- C.** The center of dilation is at $(0, 0)$.
- D.** The scale factor is $\frac{1}{2}$.
- E.** The scale factor is 2.
- F.** The scale factor is 4.



11. The figure shows two perpendicular lines, s and r , intersecting at point P in the interior of a trapezoid. Line r is parallel to the bases and bisects both legs of the trapezoid. Line s bisects both bases of the trapezoid.



Which transformation will always carry the figure onto itself?

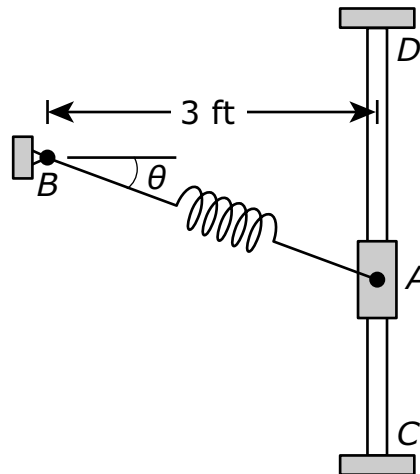
Select **all** that apply.

- A. a reflection across line r
- B. a reflection across line s
- C. a rotation of 90° clockwise about point P
- D. a rotation of 180° clockwise about point P
- E. a rotation of 270° clockwise about point P



Use the information provided to answer Part A and Part B for question 12.

A spring is attached at one end to support B and at the other end to collar A , as represented in the figure. Collar A slides along the vertical bar between points C and D . In the figure, the angle θ is the angle created as the collar moves between points C and D .



12. Part A

When $\theta = 28^\circ$, what is the distance from point A to point B to the nearest tenth of a foot?

Enter your answer in the box.

Part B

When the spring is stretched and the distance from point A to point B is 5.2 feet, what is the value of θ to the nearest tenth of a degree?

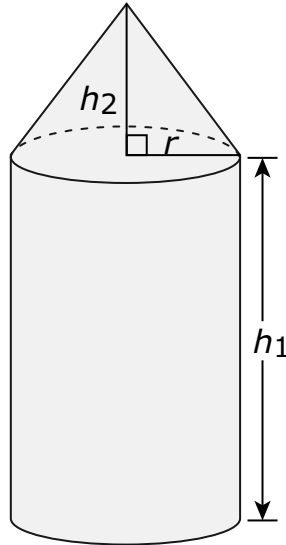
- A. 35.2°
- B. 45.1°
- C. 54.8°
- D. 60.0°



- 13.** A rectangle will be rotated 360° about a line that contains the point of intersection of its diagonals and is parallel to a side. What three-dimensional shape will be created as a result of the rotation?
- A.** a cube
 - B.** a rectangular prism
 - C.** a cylinder
 - D.** a sphere



14. 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.



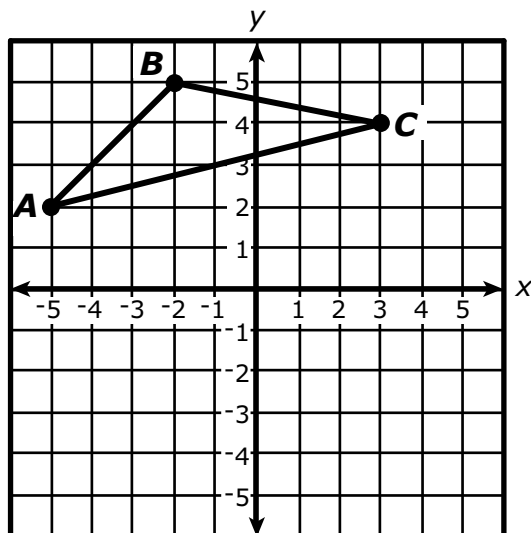
Dump trucks deliver fertilizer in loads that are 4 feet tall, 6 feet wide, and 12 feet long. Farmer Supply wants to be able to store 2 dump-truck loads of fertilizer.

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.

Enter your answer and your work in the space provided.



15. Triangle ABC is shown in the xy -coordinate plane.



The triangle will be rotated 180° clockwise around the point $(3, 4)$ to create $\triangle A'B'C'$. Which characteristics of $\triangle A'B'C'$ will be the same for the corresponding characteristics of $\triangle ABC$?

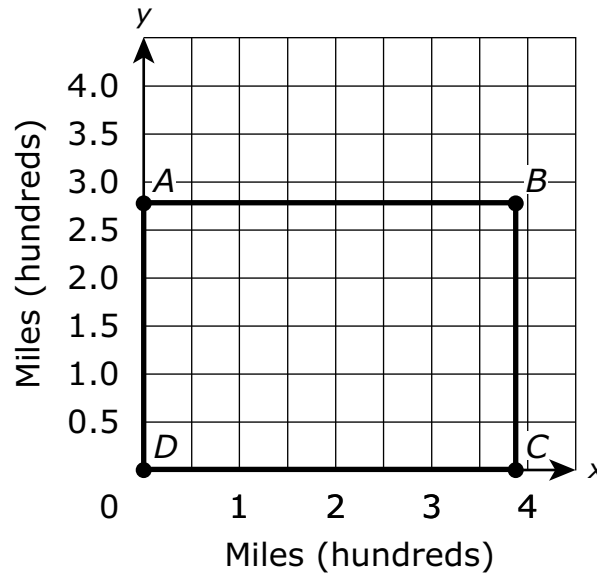
Select **all** that apply.

- A. the coordinates of A'
- B. the coordinates of B'
- C. the perimeter of $\triangle A'B'C'$
- D. the area of $\triangle A'B'C'$
- E. the measure of $\angle B'$
- F. the length of segment $A'B'$



Use the information provided to answer Part A and Part B for question 16.

The figure shows rectangle $ABCD$ in the coordinate plane with point A at $(0, 2.76)$, B at $(3.87, 2.76)$, C at $(3.87, 0)$, and D at the origin. Rectangle $ABCD$ can be used to approximate the size of the state of Colorado with the x and y scales representing hundreds of miles.



16. Part A

Based on the information given, how many miles is the perimeter of Colorado?

Enter your answer in the box.

Part B

At the end of 2010, the population of Colorado was 5,029,196 people. Based on the information given, what was the population density at the end of 2010?

- A. 25 people per square mile
- B. 47 people per square mile
- C. 2,269 people per square mile
- D. 7,586 people per square mile





You have come to the end of the calculator section in Unit 1 of the test.

- **Review your answers in the calculator section of Unit 1 only.**
- **Then, close your test booklet and answer document and raise your hand to turn in your test materials.**







Unit 2 (Calculator)

Directions:

Today, you will take Unit 2 of the Geometry Practice Test. You will be able to use a calculator.

Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your answer document. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely. If a question asks you to show or explain your work, you must do so to receive full credit. Only responses written within the provided space will be scored.

If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this unit ONLY. Do not go past the stop sign.



Directions for Completing the Answer Grids

1. Work the problem and find an answer.
2. Write your answer in the boxes at the top of the grid.
3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
4. Under each box, fill in the circle that matches the number or symbol you wrote above. Make a solid mark that completely fills the circle.
5. Do not fill in a circle under an unused box.
6. Fractions cannot be entered into an answer grid and will not be scored. Enter fractions as decimals.
7. See below for examples on how to correctly complete an answer grid.

EXAMPLES

To answer -3 in a question, fill in the answer grid as shown below.

-	3				
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
<input checked="" type="radio"/>	3	3	3	3	3
4	4	4	4	4	4
5	5	5	5	5	5
6	6	6	6	6	6
7	7	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9

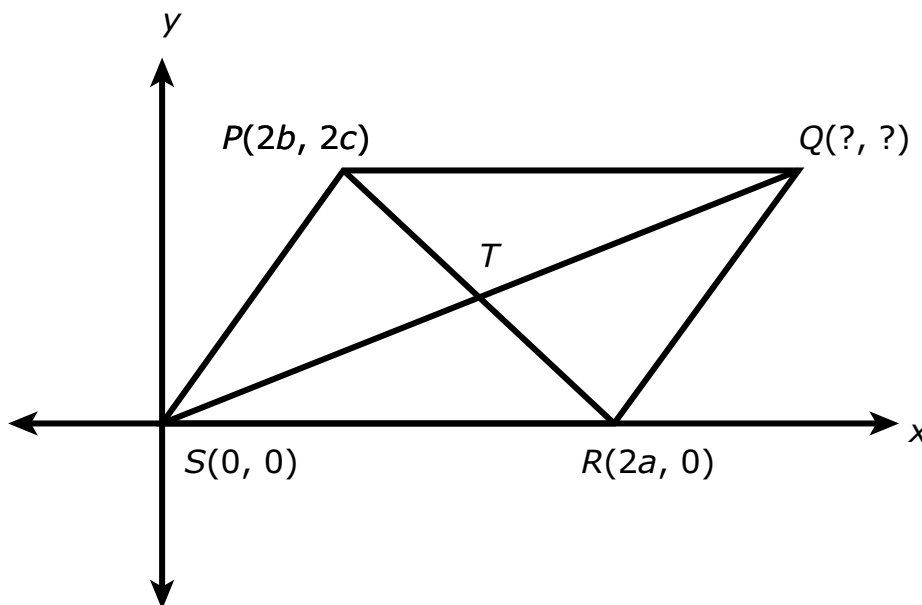
To answer $.75$ in a question, fill in the answer grid as shown below.

.	7	5			
<input type="radio"/>	<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
0	0	0	0	0	0
1	1	1	1	1	1
2	2	2	2	2	2
3	3	3	3	3	3
4	4	4	4	4	4
5	5	<input checked="" type="radio"/>	5	5	5
6	6	6	6	6	6
7	<input checked="" type="radio"/>	7	7	7	7
8	8	8	8	8	8
9	9	9	9	9	9



Use the information provided to answer Part A and Part B for question 17.

The figure shows parallelogram $PQRS$ on a coordinate plane. Diagonals \overline{SQ} and \overline{PR} intersect at point T .



17. Part A

Find the coordinates of point Q in terms of a , b , and c .

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

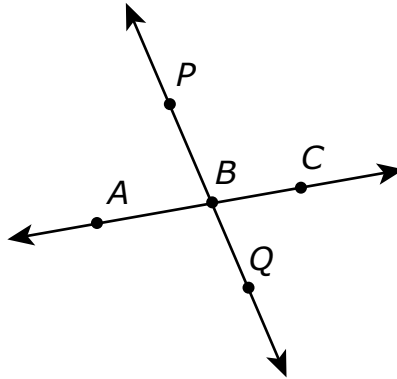
Part B

Since $PQRS$ is a parallelogram, \overline{SQ} and \overline{PR} bisect each other. Use the coordinates to verify that \overline{SQ} and \overline{PR} bisect each other.

Enter your justification in the space provided.



- 18.** 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.

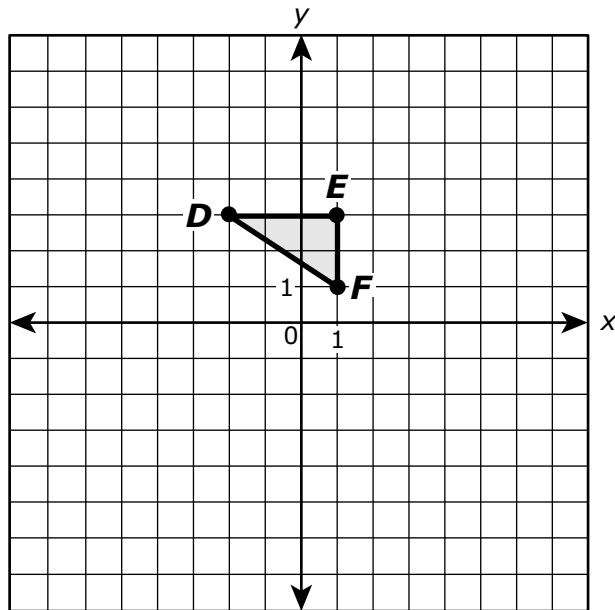


Which statement about the image of lines AC and PQ would be true under the dilation?

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



19. In the xy -coordinate plane, $\triangle ABC$ has vertices $A(-4, 6)$, $B(2, 6)$, and $C(2, 2)$. $\triangle DEF$ is shown in the plane.

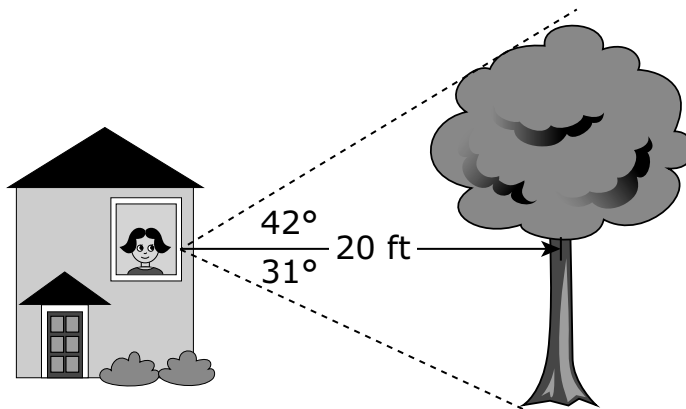


What is the scale factor and the center of dilation that maps $\triangle ABC$ to $\triangle DEF$?

- A. The scale factor is 2, and the center of dilation is point B .
- B. The scale factor is 2, and the center of dilation is the origin.
- C. The scale factor is $\frac{1}{2}$, and the center of dilation is point B .
- D. The scale factor is $\frac{1}{2}$, and the center of dilation is the origin.



- 20.** Mariela is standing in a building and looking out of a window at a tree. The tree is 20 feet away from Mariela. Mariela’s line of sight to the top of the tree creates a 42° angle of elevation, and her line of sight to the base of the tree creates a 31° angle of depression.

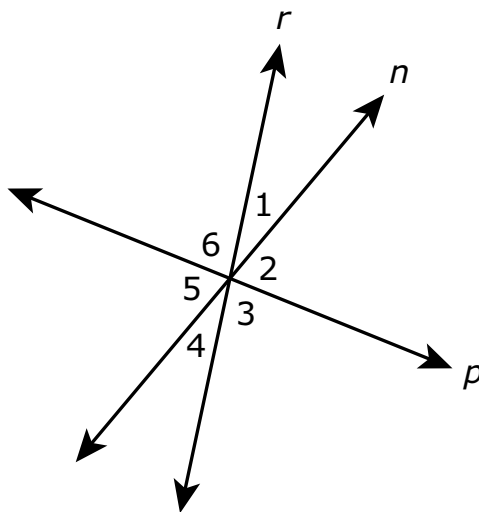


What is the height, in feet, of the tree?

Enter your answer in the box.



21. The figure shows lines r , n , and p intersecting to form angles numbered 1, 2, 3, 4, 5, and 6. All three lines lie in the same plane.



not to scale

Based on the figure, which of the individual statements would provide enough information to conclude that line r is perpendicular to line p ?

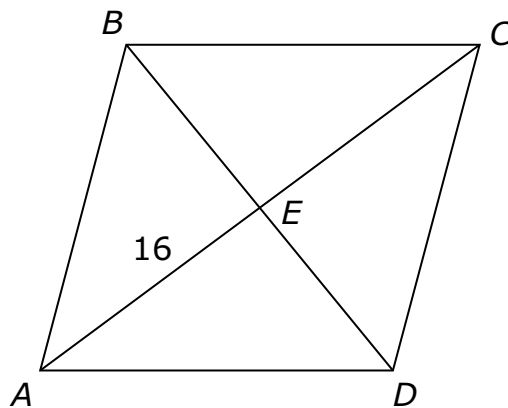
Select **all** that apply.

- A. $m\angle 2 = 90^\circ$
- B. $m\angle 6 = 90^\circ$
- C. $m\angle 3 = m\angle 6$
- D. $m\angle 1 + m\angle 6 = 90^\circ$
- E. $m\angle 3 + m\angle 4 = 90^\circ$
- F. $m\angle 4 + m\angle 5 = 90^\circ$



Use the information provided to answer Part A and Part B for question 22.

The figure shows parallelogram $ABCD$ with $AE = 16$.



not drawn to scale

22. Part A

Let $BE = x^2 - 48$ and let $DE = 2x$. What are the lengths of \overline{BE} and \overline{DE} ? Justify your answer.

Enter your answer and your justification in the space provided.

Part B

What conclusion can be made regarding the specific classification of parallelogram $ABCD$? Justify your answer.

Enter your answer and your justification in the space provided.



23. The table shows the approximate measurements of the Great Pyramid of Giza in Egypt and the Pyramid of Kukulcan in Mexico.

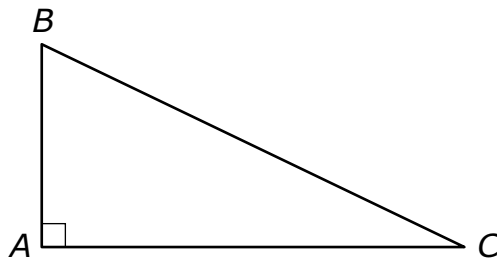
Pyramid	Height (meters)	Area of Base (square meters)
Great Pyramid of Giza	147	52,900
Pyramid of Kukulcan	30	3,025

Approximately what is the difference between the volume of the Great Pyramid of Giza and the volume of the Pyramid of Kukulcan?

- A. 1,945,000 cubic meters
- B. 2,562,000 cubic meters
- C. 5,835,000 cubic meters
- D. 7,686,000 cubic meters



24.



In right triangle ABC , $m\angle B \neq m\angle C$. Let $\sin B = r$ and $\cos B = s$. What is $\sin C - \cos C$?

- A. $r + s$
- B. $r - s$
- C. $s - r$
- D. $\frac{r}{s}$

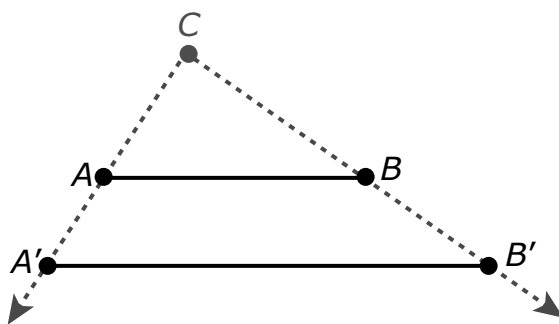


25. A dilation centered at point C with a scale factor of k , where $k > 0$, can be defined as follows:

1. The image of point C is itself. That is, $C' = C$.
2. For any point P other than C , the point P' is on \overrightarrow{CP} , and $CP' = k \cdot CP$.

Use this definition and the diagram shown to prove the following theorem:

If $\overline{A'B'}$ is the image of \overline{AB} after a dilation centered at point C with a scale factor of k , where $k > 0$, then $A'B' = k \cdot AB$.



Be sure to explain how you would use the diagram to prove the theorem, and show justifications for each statement in the proof.

Enter your proof, your explanation, and your justifications in the space provided.

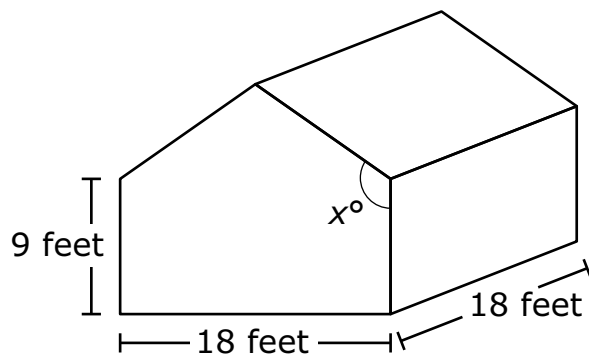


GO ON TO NEXT PAGE



Use the information provided to answer Part A through Part C for question 26.

The figure shows the design of a shed that will be built. Use the figure to answer all parts of the task.



The base of the shed will be a square measuring 18 feet by 18 feet. The height of the rectangular sides will be 9 feet. The measure of the angle made by the roof with the side of the shed can vary and is labeled as x° . Different roof angles create different surface areas of the roof. The surface area of the roof will determine the number of roofing shingles needed in constructing the shed. To meet drainage requirements, the roof angle must be at least 117° .

26. Part A

The builder of the shed is considering using an angle that measures 125° . Determine the surface area of the roof if the 125° angle is used. Explain or show your process.

Enter your answer and your work or explanation in the space provided.

Part B

Without changing the measurements of the base of the shed, the builder is also considering using a roof angle that will create a roof surface area that is 10% less than the area obtained in Part A. Less surface area will require less roofing shingles. Will such an angle meet the specified drainage requirements? Explain how you came to your conclusion.

Enter your answer and your explanation in the space provided.

**Part C**

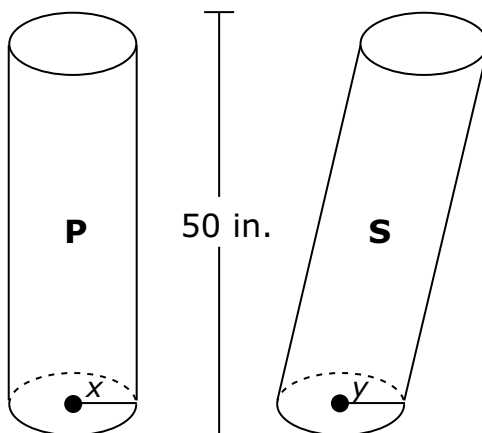
The roofing shingles cost \$27.75 for a bundle. Each bundle can cover approximately 35 square feet. Shingles must be purchased in full bundles. The builder has a budget of \$325 for shingles.

What is the greatest angle the builder can use and stay within budget? Explain or show your process.

Enter your answer and your work or explanation in the space provided.



27. Two cylinders each with a height of 50 inches are shown.



Which statements about cylinders P and S are true?

Select **all** that apply.

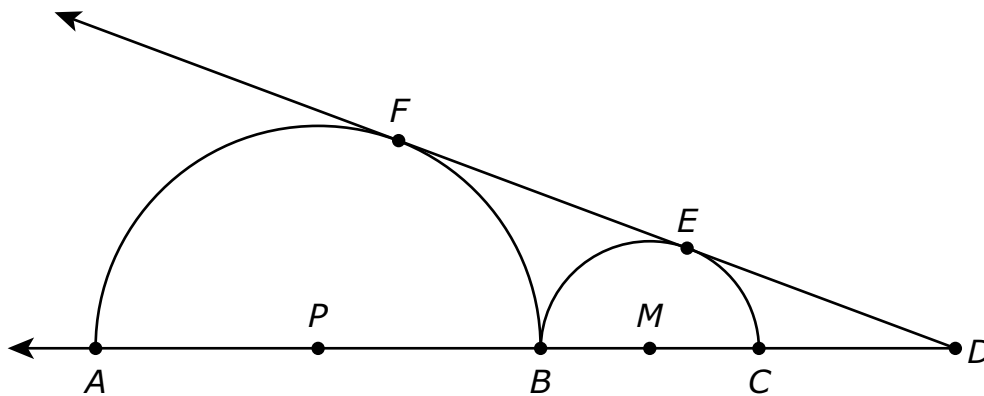
- A. If $x = y$, the volume of cylinder P is greater than the volume of cylinder S, because cylinder P is a right cylinder.
- B. If $x = y$, the volume of cylinder P is equal to the volume of cylinder S, because the cylinders are the same height.
- C. If $x = y$, the volume of cylinder P is less than the volume of cylinder S, because cylinder S is slanted.
- D. If $x < y$, the area of a horizontal cross section of cylinder P is greater than the area of a horizontal cross section of cylinder S.
- E. If $x < y$, the area of a horizontal cross section of cylinder P is equal to the area of a horizontal cross section of cylinder S.
- F. If $x < y$, the area of a horizontal cross section of cylinder P is less than the area of a horizontal cross section of cylinder S.



28. Triangle ABC has vertices at $A(1, 2)$, $B(4, 6)$, and $C(4, 2)$ in the coordinate plane. The triangle will be reflected over the x -axis and then rotated 180° about the origin to form $\triangle A'B'C'$. What are the vertices of $\triangle A'B'C'$?

- A.** $A'(1, -2)$, $B'(4, -6)$, $C'(4, -2)$
- B.** $A'(-1, -2)$, $B'(-4, -6)$, $C'(-4, -2)$
- C.** $A'(-1, 2)$, $B'(-4, 6)$, $C'(-4, 2)$
- D.** $A'(1, 2)$, $B'(4, 6)$, $C'(4, 2)$

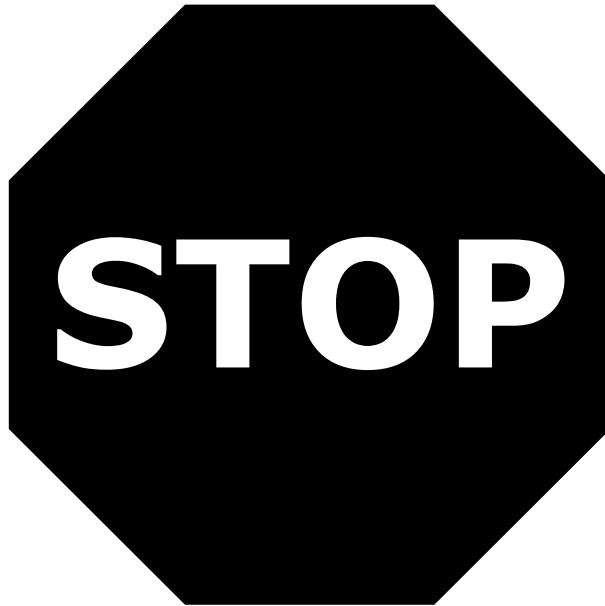
29. The figure shows two semicircles with centers P and M . The semicircles are tangent to each other at point B , and \overline{DE} is tangent to both semicircles at F and E .



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

- A.** 6
- B.** $\sqrt{48}$
- C.** 8
- D.** $\sqrt{72}$





You have come to the end of Unit 2 of the test.

- **Review your answers from Unit 2 only.**
- **Then, close your test booklet and answer document and raise your hand to turn in your test materials.**





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