

Maryland MCAP  
Geometry Practice

Exam Materials  
Pages 2 - 45

Answer Key Materials  
Pages 46 - 54

Student Name \_\_\_\_\_



**Geometry**

**Test Booklet**

*Practice Test*

# Section 1

## (Non-Calculator)

**Directions:**

Today, you will take Section 1 of the Geometry Practice Test. You will not 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 entered within the space provided 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 section 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"/>	<input type="radio"/>
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To answer  $.75$  in a question, fill in the answer grid as shown below.

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- 1 The equation shown represents a circle in the  $xy$ -plane.

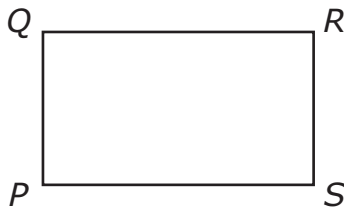
$$(x + 4)^2 + (y - 3)^2 = 36$$

Which statement includes the correct center and the correct radius for this circle?

- A The center is located at  $(4, -3)$ , and the radius is 6.
- B The center is located at  $(4, -3)$ , and the radius is 36.
- C The center is located at  $(-4, 3)$ , and the radius is 6.
- D The center is located at  $(-4, 3)$ , and the radius is 36.

2 Given: Parallelogram  $PQRS$  with  $m\angle P = 90^\circ$

Prove: Parallelogram  $PQRS$  is a rectangle.



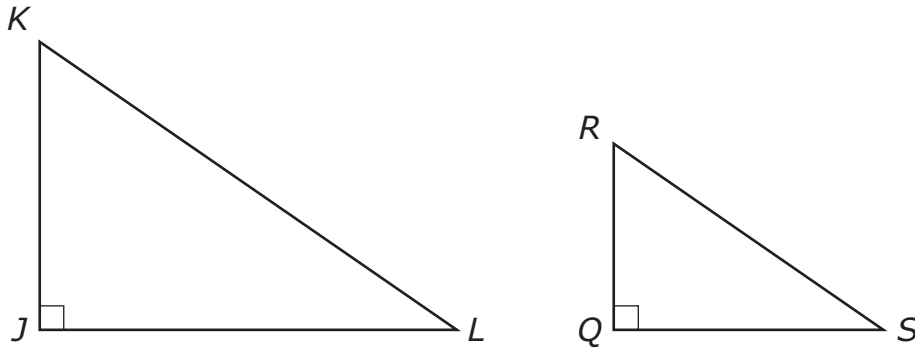
An incomplete proof is shown in the table.

Step	Statement	Reason
1	Parallelogram $PQRS$ with $m\angle P = 90^\circ$	Given
2	$\angle P$ and $\angle Q$ are supplementary.	?
3	$m\angle P + m\angle Q = 180^\circ$	Definition of supplementary angles
4	$90^\circ + m\angle Q = 180^\circ$	Substitution
5	$m\angle Q = 90^\circ$	Subtraction Property of Equality
6	$\angle P \cong \angle R$ and $\angle Q \cong \angle S$	?
7	$m\angle P = m\angle R$ and $m\angle Q = m\angle S$	Congruent angles have the same measure.
8	$m\angle R = m\angle S = 90^\circ$	Substitution
9	$\angle P, \angle Q, \angle R,$ and $\angle S$ are right angles.	Definition of a right angle
10	$PQRS$ is a rectangle.	Definition of a rectangle

What are the reasons for Step 2 and Step 6 that can be used to complete the proof?

- A** Step 2: Definition of a linear pair  
Step 6: Vertical angles are congruent.
- B** Step 2: Definition of a linear pair  
Step 6: Opposite angles of a parallelogram are congruent.
- C** Step 2: Consecutive angles of a parallelogram are supplementary.  
Step 6: Vertical angles are congruent.
- D** Step 2: Consecutive angles of a parallelogram are supplementary.  
Step 6: Opposite angles of a parallelogram are congruent.

3 In the figure,  $\angle K \cong \angle R$ .



Which angles have a cosine that is equal to  $\sin(L)$ ?

Select **all** that apply.

- A**  $\angle J$
- B**  $\angle K$
- C**  $\angle L$
- D**  $\angle Q$
- E**  $\angle R$
- F**  $\angle S$



- 4** In the  $xy$ -plane,  $\triangle RST$  is first reflected across the  $x$ -axis, then reflected across the  $y$ -axis, and finally rotated  $180^\circ$  about the origin to obtain the image  $\triangle R'S'T'$ .

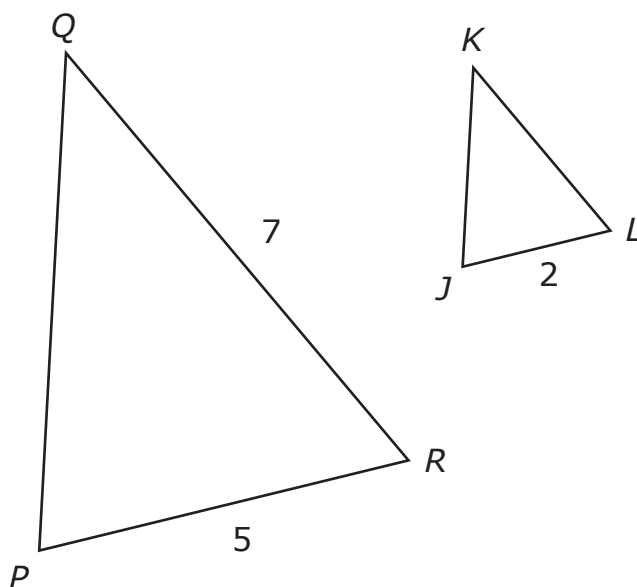
Which statements correctly describe the relationship between  $\triangle RST$  and  $\triangle R'S'T'$ ?

Select **all** that apply.

- A** The length of each side of  $\triangle R'S'T'$  is less than the length of a corresponding side of  $\triangle RST$ .
- B** The length of each side of  $\triangle R'S'T'$  is equal to the length of a corresponding side of  $\triangle RST$ .
- C** The length of each side of  $\triangle R'S'T'$  is greater than the length of a corresponding side of  $\triangle RST$ .
- D** The location of each vertex of  $\triangle R'S'T'$  cannot be the same as the location of each vertex of  $\triangle RST$ .
- E** The location of each vertex of  $\triangle R'S'T'$  must be the same as the location of each vertex of  $\triangle RST$ .

5 Given:  $\angle P \cong \angle J$ ,  $\angle Q \cong \angle K$

Prove:  $KL = 2.8$



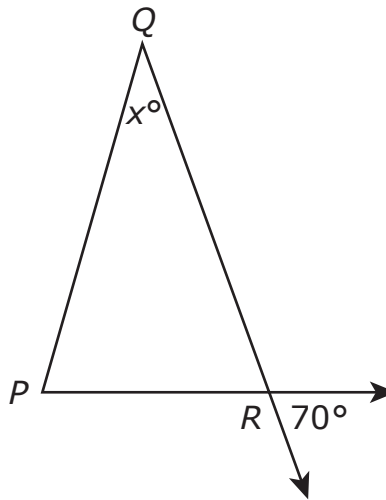
An incomplete proof is shown in the table.

Step	Statement	Reason
1	$\angle P \cong \angle J$ , $\angle Q \cong \angle K$ , $PR = 5$ , $QR = 7$ , and $JL = 2$ .	Given
2	$\triangle PQR \sim \triangle JKL$	?
3	$\frac{KL}{QR} = \frac{JL}{PR}$	?
4	$\frac{KL}{7} = \frac{2}{5}$	Substitution
5	$KL = \frac{14}{5} = 2.8$	Multiplication property of equality

What are the reasons for Step 2 and Step 3 that can be used to complete the proof?

- A** Step 2: AA Similarity  
Step 3: Corresponding sides of similar triangles are proportional.
- B** Step 2: AA Similarity  
Step 3: The measures of corresponding angles of similar triangles are equal.
- C** Step 2: SAS Similarity  
Step 3: Corresponding sides of similar triangles are proportional.
- D** Step 2: SAS Similarity  
Step 3: The measures of corresponding angles of similar triangles are equal.

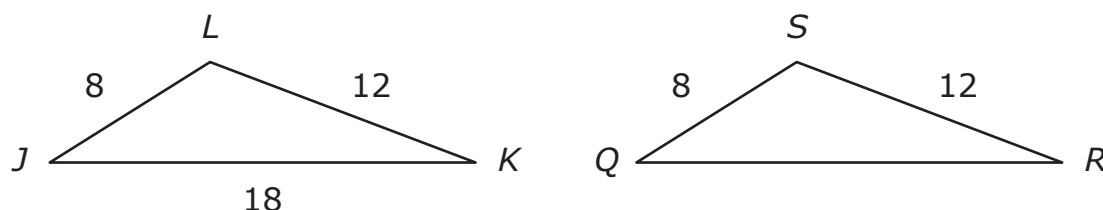
- 6 In the figure shown,  $\overline{QP} \cong \overline{QR}$ .



What is the value of  $x$ ?

Enter your answer in the space provided.

7 Two triangles are shown.



Which statement describes the additional information needed to prove  $QR = 18$ ?

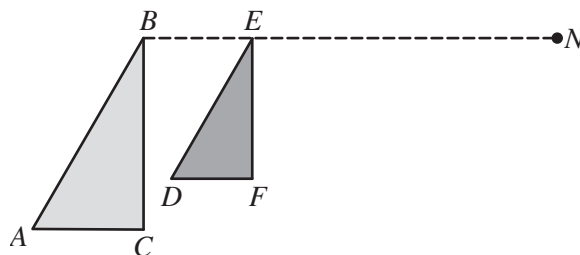
- A** If  $\angle J \cong \angle Q$ , then  $\triangle JKL \cong \triangle QRS$  because of SSS postulate, and therefore,  $QR = 18$  because corresponding sides of congruent triangles are congruent.
- B** If  $\angle J \cong \angle Q$ , then  $\triangle JKL \cong \triangle QRS$  because of SAS postulate, and therefore,  $QR = 18$  because corresponding sides of congruent triangles are congruent.
- C** If  $\angle L \cong \angle S$ , then  $\triangle JKL \cong \triangle QRS$  because of SSS postulate, and therefore,  $QR = 18$  because corresponding sides of congruent triangles are congruent.
- D** If  $\angle L \cong \angle S$ , then  $\triangle JKL \cong \triangle QRS$  because of SAS postulate, and therefore,  $QR = 18$  because corresponding sides of congruent triangles are congruent.

- 8 Starting with  $\overline{PQ}$  (not shown) a square will be constructed using a compass and straightedge so that  $\overline{PQ}$  is one of its sides.

Which other constructions **must** be completed during the construction of the square?

Select **all** that apply.

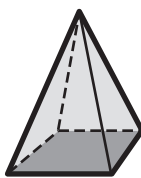
- A A bisector of a right angle
  - B The perpendicular bisector of  $\overline{PQ}$
  - C A right angle with vertex  $P$  or vertex  $Q$
  - D A segment with the same length as  $\overline{PQ}$
  - E An arc of a circle with center  $P$  or center  $Q$
- 9 In the following figure,  $\triangle DEF$  is mapped onto  $\triangle ABC$  by a dilation with center  $N$ .



If  $EN = 16$  and  $BN = 20$ , what is the scale factor of the dilation?

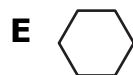
Enter your answer in the space provided.

- 10** The square pyramid shown in the following figure will be sliced by a plane.

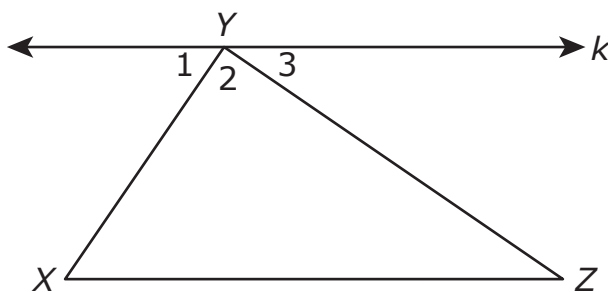


Which of the following two-dimensional shapes are possible cross-sections when the pyramid is sliced by a plane?

Select **all** that apply.



- 11** Given:  $\triangle XYZ$  with line  $k$  containing point  $Y$ , and  $k \parallel \overline{XZ}$ .



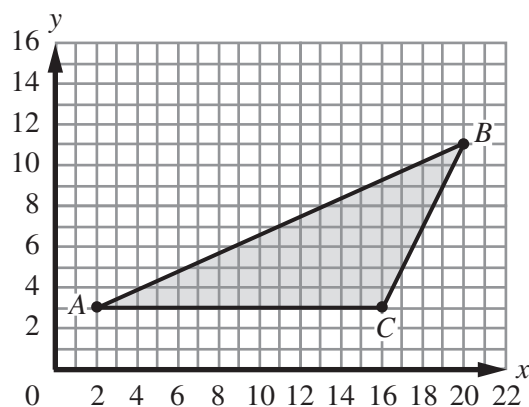
Which statement will **most likely** be used to prove that  $m\angle X + m\angle XYZ + m\angle Z = 180^\circ$ ?

- A**  $m\angle 1 = m\angle X$
- B**  $m\angle 1 = m\angle 3$
- C**  $m\angle 2 = 90^\circ$
- D**  $m\angle 2 + m\angle Z = 180^\circ$



**12** Use the given information to answer the question.

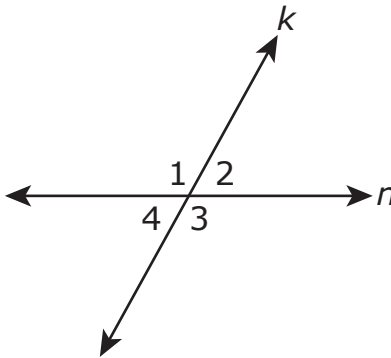
Triangle  $ABC$  is shown in the following  $xy$ -plane with  $A(2, 3)$ ,  $B(20, 11)$ , and  $C(16, 3)$ .



What is the area, in square units, of  $\triangle ABC$ ?

Enter your answer in the space provided.

**13** Given: lines  $k$  and  $n$  intersect to form angles 1, 2, 3, and 4.



Prove:  $\angle 2 \cong \angle 4$

An incomplete proof is shown.

Step	Statement	Reason
1	Lines $k$ and $n$ intersect to form angles 1, 2, 3, and 4.	Given
2	Angles 1 and 2 form a linear pair. Angles 1 and 4 form a linear pair.	Definition of a linear pair
3	Angles 1 and 2 are supplementary. Angles 1 and 4 are supplementary.	Angles that form a linear pair are supplementary.
4	$m\angle 1 + m\angle 2 = 180^\circ$ $m\angle 1 + m\angle 4 = 180^\circ$	The sum of the measures of the angles is $180^\circ$ .
5	$m\angle 1 + m\angle 2 = m\angle 1 + m\angle 4$	Transitive Property
6	$m\angle 2 = m\angle 4$	?
7	$\angle 2 \cong \angle 4$	Angles that have the same measure are congruent.

Which reason for step 6 correctly completes the proof?

- A** Substitution
- B** Reflexive Property
- C** Subtraction Property of Equality
- D** Definition of Supplementary Angles





# Section 2

## (Calculator)

### Directions:

Today, you will take Section 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 entered within the space provided will be scored.

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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

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-	3					
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
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<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9

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

.	7	5				
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<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9	<input type="radio"/> 9



- 1** Line  $\ell$  in the  $xy$ -plane passes through the point  $(-4, 5)$  and is perpendicular to the line with the equation  $y = \frac{1}{2}x + 5$ .

What is the  $y$ -intercept of line  $\ell$ ?

Select one answer.

- A**  $-3$
- B**  $5$
- C**  $7$
- D**  $13$

- 2** In right  $\triangle XYZ$ , the length of the hypotenuse  $\overline{YZ}$  is 85 inches and  $\tan Z = \frac{3}{4}$ .

What is the length, in inches, of the leg  $\overline{XY}$ ?

Enter your answer in the space provided.

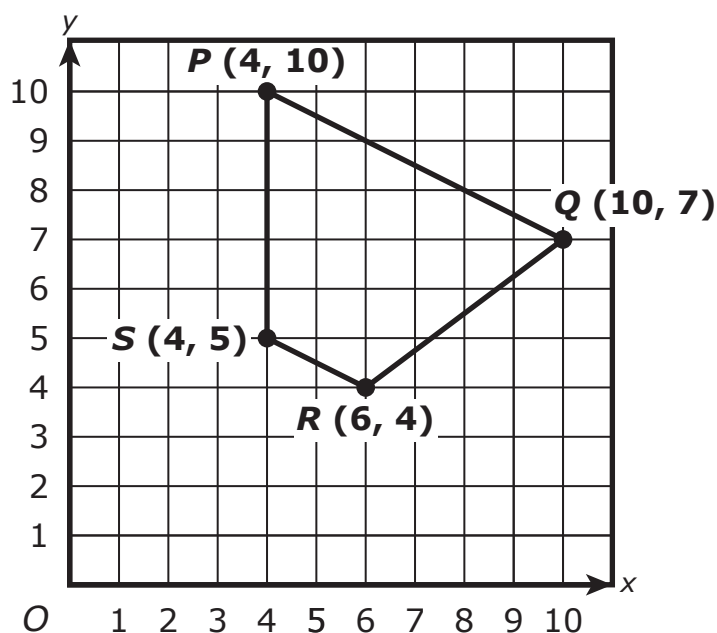
- 3** A can is in the shape of a right circular cylinder with an inner diameter of 7.5 centimeters and an inner height of 12.5 centimeters. The can is placed on its circular base, and 440 milliliters of juice is poured into the can.

Given that 1 milliliter is equivalent to 1 cubic centimeter, what is the height of the juice in the can to the nearest tenth of a centimeter?

Enter your answer in the space provided.



- 4 The coordinates of the vertices of quadrilateral  $PQRS$  are shown in the  $xy$ -plane.



**Part A**

Prove that quadrilateral  $PQRS$  is a trapezoid.

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

**Part B**

Determine whether quadrilateral  $PQRS$  is an isosceles trapezoid. Show your work or explain your answer.

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



## Mathematics

- 5** A bird flew from a point on the ground directly to the edge of the roof of a building. The height of the building is 40 feet, and the angle of elevation the bird's flight path made with the ground is  $26^\circ$ .

Which expression models the total distance, in feet, the bird flew?

**A**  $\frac{40}{\cos 26^\circ}$

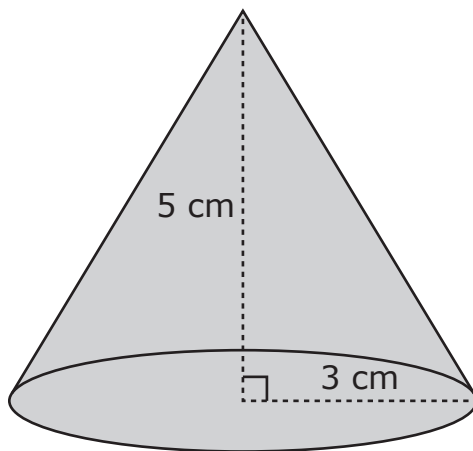
**B**  $\frac{40}{\sin 26^\circ}$

**C**  $\frac{\cos 26^\circ}{40}$

**D**  $\frac{\sin 26^\circ}{40}$



- 6** A cone has a base radius of 3 centimeters and a height of 5 centimeters. A student correctly calculates its volume to be  $15\pi$  cubic centimeters.



The student thinks that a simpler formula for the volume of a cone is  $V = \pi rh$  because  $\pi(3)(5) = 15\pi$ .

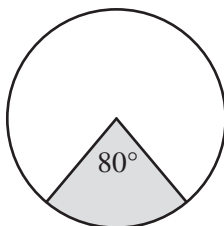
Which statement explains the conditions for which the student's claim would be true?

- A** The claim is true only when the height is 5.
- B** The claim is true only when the radius of the cone is 3.
- C** The claim is true regardless of the dimensions of the cone.
- D** The claim is true whenever the product of the base and height is 15.





- 7** In the following figure, a sector of a circle has a central angle of  $80^\circ$ . The area of the circle is  $9\pi$  square units.



If the sector has an area of  $k\pi$  square units, what is the value of  $k$ ?

Enter your answer in the space provided.

- 8** A company is designing a soup can that is in the shape of a right circular cylinder. The height of the can will be 3 times the radius of the can. The volume of the can will be 350 cubic centimeters.

Which measurement, in centimeters, is closest to the radius of the soup can?

- A** 2.3
- B** 3.3
- C** 6.9
- D** 9.9





# Section 3

## (Calculator)

### Directions:

Today, you will take Section 3 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 entered within the space provided 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 section ONLY. Do not go past the stop sign.



## Directions for Completing the Answer Grids

1. Work the problem and find an answer.
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3. Print only one number or symbol in each box. Do not leave a blank box in the middle of an answer.
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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.

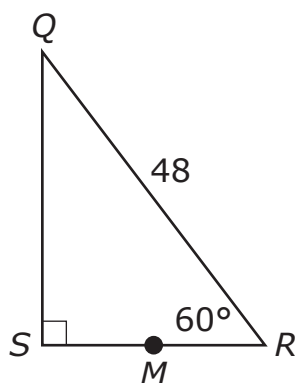
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To answer  $.75$  in a question, fill in the answer grid as shown below.

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- 1 In the figure shown, point  $M$  is the midpoint of  $\overline{RS}$ .

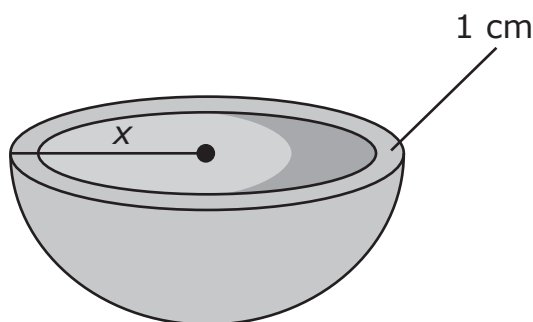


Which value **best** represents the length of  $\overline{RM}$ ?

- A 41.6
- B 24.0
- C 20.8
- D 12.0



- 2 Using a three-dimensional printer, an artist will produce several models of hemispheres. The material used to make each model is 1 centimeter thick, as shown in the diagram.



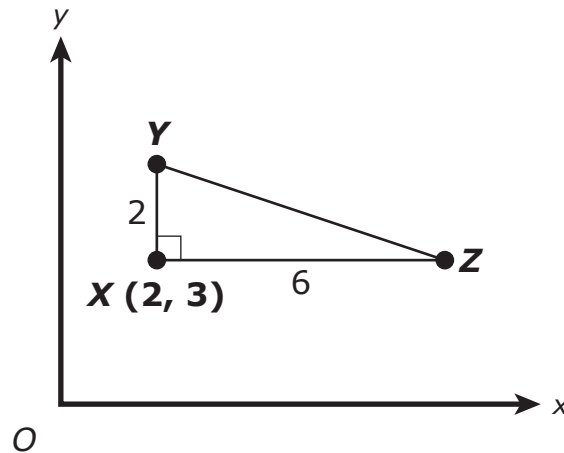
The artist will fill each model with colored paint to its maximum capacity. The colored paint costs \$0.01 per cubic centimeter.

Which expression represents the cost, in dollars, of the colored paint needed to fill any model based on  $x$ , the outer radius, in centimeters, of the model?

- A**  $0.01 \cdot \frac{2}{3}\pi x^3$
- B**  $0.01 \cdot \frac{4}{3}\pi x^3$
- C**  $0.01 \cdot \frac{2}{3}\pi(x - 1)^3$
- D**  $0.01 \cdot \frac{4}{3}\pi(x - 1)^3$



- 3** Right triangle  $XYZ$  is shown in the  $xy$ -plane. Vertex  $X$  has coordinates  $(2, 3)$ . The length of  $\overline{XY}$  is 2 units, and the length of  $\overline{XZ}$  is 6 units.



A student's work for finding the slope of the perpendicular bisector of  $\overline{YZ}$  is shown.

The slope of  $\overline{YZ}$  is  $\frac{2}{6}$ , or  $\frac{1}{3}$ . The opposite of the reciprocal of  $\frac{1}{3}$  is  $-3$ . So, the perpendicular bisector of  $\overline{YZ}$  has a slope of  $-3$ .

- Describe the student's mistake.
- Find the equation of the line that represents the perpendicular bisector of  $\overline{YZ}$ . Show your work or explain how you found the equation.

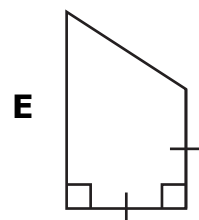
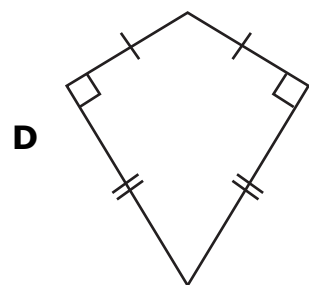
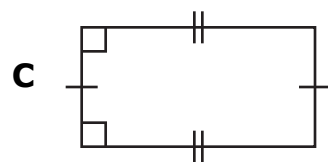
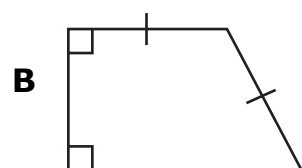
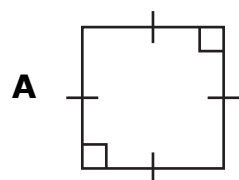
Enter your answer and your work or explanation in the space provided.



- 4 A student claims that any quadrilateral with two right angles must be a rectangle.

Which figures can be used to show the student is incorrect?

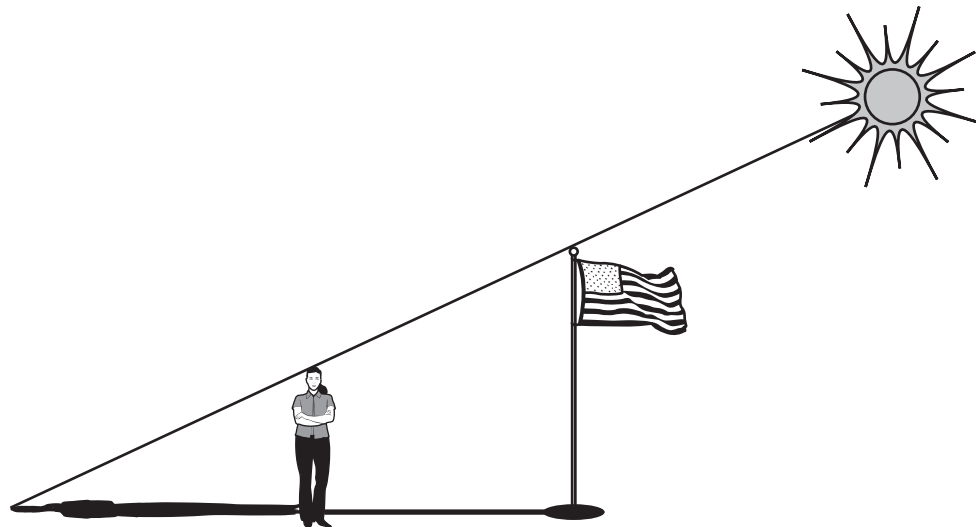
Select **all** that apply.





## Mathematics

- 5 A student is standing next to a vertical flagpole. The top of the student's shadow coincides with the top of the flagpole's shadow as shown.



not to scale

The student is 62 inches tall. The student estimates that the distance from the flagpole to the point where the student is standing is between 21 and 22 feet.

The student also estimates that the length of the student's shadow is between 7 and  $7\frac{1}{2}$  feet.

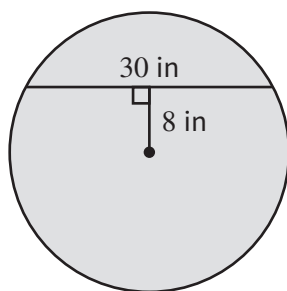
Based on the given information, what are the **least** and **greatest** possible heights, in **feet**, of the flagpole? Explain how you arrived at your answers.

Enter your answers and explanations in the space provided.





- 6 A 30-inch chord in a circle is 8 inches from the center of the circle, as shown in the following figure.



What is the length, in inches, of the radius of the circle?

Enter your answer in the space provided.





# Section 4

## (Calculator)

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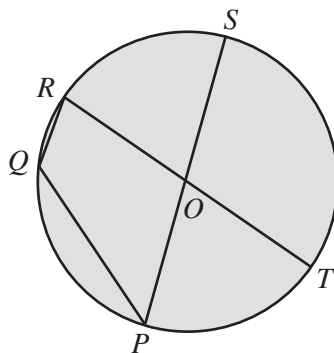
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- 1 The following figure shows a circle that has center  $O$ , diameters  $\overline{PS}$  and  $\overline{RT}$ , and chords  $\overline{PQ}$  and  $\overline{QR}$ .



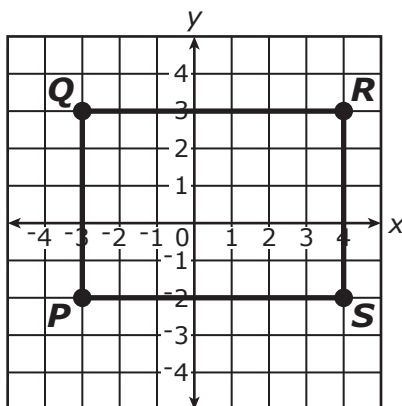
If  $m\widehat{RS} = 74^\circ$  and  $m\widehat{ST} = 106^\circ$ , what is  $m\angle PQR$ ?

Select one answer.

- A  $106^\circ$
- B  $127^\circ$
- C  $138^\circ$
- D  $143^\circ$



- 2 The vertices of rectangle  $PQRS$  are graphed in the  $xy$ -plane with coordinates  $P(-3, -2)$ ,  $Q(-3, 3)$ ,  $R(4, 3)$ , and  $S(4, -2)$ .



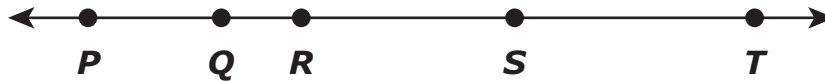
The rectangle  $PQRS$  is reflected across the  $y$ -axis and rotated  $90^\circ$  counterclockwise about the origin to form rectangle  $P'Q'R'S'$ .

What are the coordinates of point  $P'$ ?

- A  $(-2, -3)$
- B  $(-2, 3)$
- C  $(2, -3)$
- D  $(2, 3)$



**3** Five points are shown on a number line.



Information about some of the lengths of different segments is given.

- The length of  $\overline{PQ}$  is 5 units.
- The length of  $\overline{RS}$  is equal to the length of  $\overline{PR}$ .
- The length of  $\overline{ST}$  is 3 times the length of  $\overline{QR}$ .
- The length of  $\overline{PT}$  is 25 units.

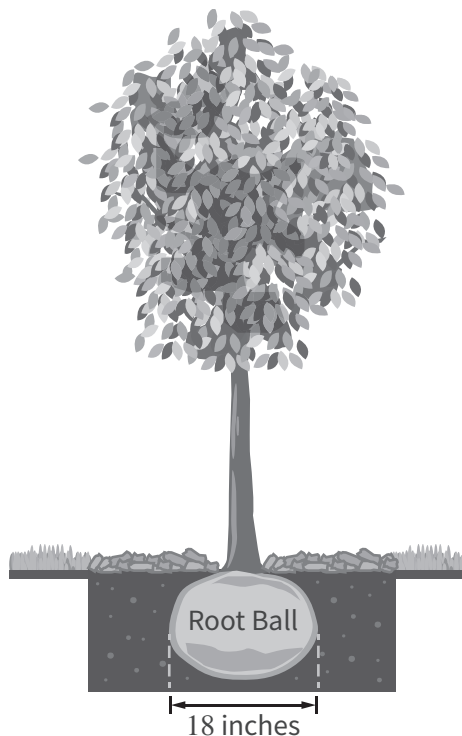
Which statements are correct?

Select **all** that apply.

- A** The length of  $\overline{QR}$  is 3 units.
- B** The length of  $\overline{RS}$  is 8 units.
- C** The length of  $\overline{QS}$  is 19 units.
- D** The length of  $\overline{RT}$  is 13 units.
- E** The length of  $\overline{ST}$  is 9 units.



- 4 Mahari will dig a hole in which to plant a new tree. The root ball of the tree has a diameter of 18 inches and will be placed in the hole, as shown in the following figure.

**Part A**

The hole needs to be twice as wide as the diameter of the root ball and deep enough for the entire root ball to fit inside. After placing the tree in the hole, Mahari will fill the rest of the hole with soil.

Approximate the amount of soil, **in cubic feet**, that Mahari needs to fill the hole. Show how you arrived at your answer.

Enter your answer and work in the space provided.

**Part B**

After filling the hole with soil, Mahari will place mulch within a circle around the tree. The diameter of the circle is the diameter of the hole. The diameter of the base of the tree trunk is 6 inches.

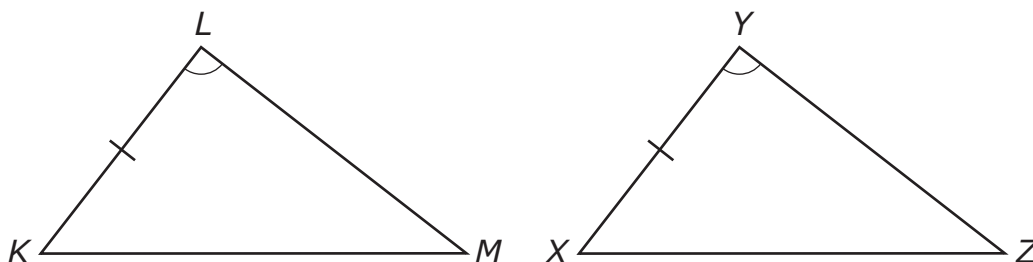
What is the area, **in square feet**, that the mulch will cover? Show how you arrived at your answer.

Enter your answer and your work in the space provided.





**5** In  $\triangle KLM$  and  $\triangle XYZ$  shown,  $\overline{KL} \cong \overline{XY}$  and  $\angle L \cong \angle Y$ .



Which statement correctly proves the two triangles are congruent?

- A** If  $\overline{LM} \cong \overline{YZ}$ , then  $\triangle KLM \cong \triangle XYZ$  by AAS postulate.
- B** If  $\overline{LM} \cong \overline{YZ}$ , then  $\triangle KLM \cong \triangle XYZ$  by SSS postulate.
- C** If  $\angle M \cong \angle Z$ , then  $\triangle KLM \cong \triangle XYZ$  by AAS postulate.
- D** If  $\angle M \cong \angle Z$ , then  $\triangle KLM \cong \triangle XYZ$  by SSS postulate.



- 6** A farmer wants to build a garden using fence. A total of 60 feet of fence will be used to enclose the garden. The farmer calculates that the area of the garden will be 225 square feet if a square-shaped garden is built using the fence. The farmer also considers building the garden in different shapes to increase the area enclosed by the fence.

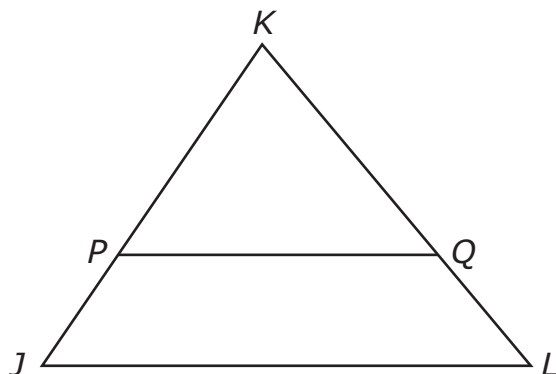
Building the garden in which shape will increase the area of the garden enclosed by the fence?

- A** circle
- B** equilateral triangle
- C** rhombus that is not a square
- D** rectangle that is not a square



7 Given:  $\overline{PQ} \parallel \overline{JL}$

Prove:  $\frac{JP}{PK} = \frac{LQ}{QK}$



An incomplete proof is shown in the table.

Step	Statement	Reason
1	$\overline{PQ} \parallel \overline{JL}$	Given
2	$\angle KPQ \cong \angle KJL, \angle KQP \cong \angle KLJ$	?
3	$\triangle PKQ \sim \triangle JKL$	AA criterion
4	$\frac{JK}{PK} = \frac{LK}{QK}$	?
5	$\frac{JP + PK}{PK} = \frac{LQ + QK}{QK}$	Segment addition postulate
6	$\frac{JP}{PK} + \frac{PK}{PK} = \frac{LQ}{QK} + \frac{QK}{QK}$	Distributive property
7	$\frac{JP}{PK} = \frac{LQ}{QK}$	Addition property of equality



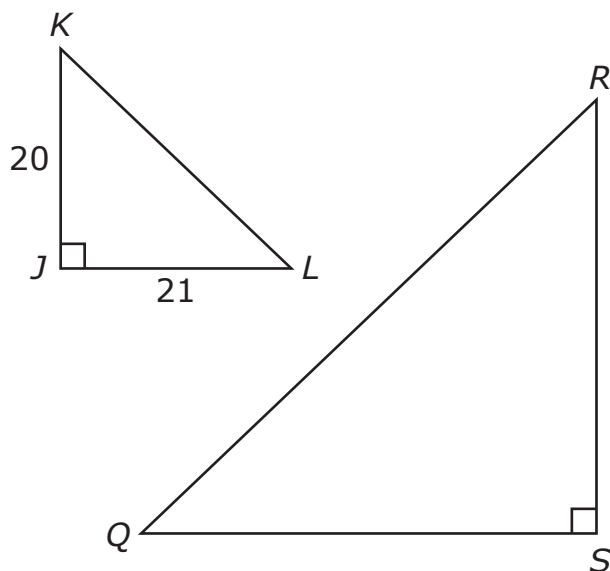
Which reasons for Step 2 and Step 4 complete the proof?

Select **all** that apply.

- A** Step 2 : When two parallel lines are cut by a transversal, corresponding angles are congruent.
- B** Step 2 : When two parallel lines are cut by a transversal, alternate interior angles are congruent.
- C** Step 4 : Corresponding sides of similar triangles are congruent.
- D** Step 4 : Corresponding sides of similar triangles are proportional.
- E** Step 4 : Corresponding sides of congruent triangles are congruent.
- F** Step 4 : Corresponding sides of congruent triangles are proportional.



8 In the figure,  $m\angle K + m\angle Q = 90^\circ$ .



Which trigonometric ratios are equivalent?

Select **all** that apply.

- A**  $\sin(L)$  and  $\sin(Q)$
- B**  $\sin(L)$  and  $\cos(Q)$
- C**  $\sin(L)$  and  $\sin(R)$
- D**  $\cos(L)$  and  $\sin(Q)$
- E**  $\cos(L)$  and  $\cos(Q)$
- F**  $\cos(L)$  and  $\sin(R)$



## Practice Test Answer and Alignment Document

### Mathematics: Geometry

The following pages include the answer keys for all machine-scored items. A sample student response for the top score is included for all hand-scored constructed response items.

- Some answer keys include one possible sample student response. Other valid methods for solving the problem can earn full credit unless a specific method is required by the item.
- In items where the scores are awarded for full and partial credit, the definition of partial credit will be confirmed during range-finding (reviewing sets of real student work).
- If students make a computation error, they can still earn points for reasoning or modeling.

## Section 1

Item Number	Answer Key	Evidence Statement Key/ Content Scope
1.	C	G-GPE.A.1
2.	D	G-CO.C.11
3.	B, E	G-SRT.C.7
4.	B, E	G-CO.B.6
5.	A	G-SRT.B.5
6.	40	G-CO.C.10
7.	D	G-SRT.B.5
8.	C, D, E	G-CO.D.13
9.	1.25	G-SRT.A.1.b
10.	A, B, D	G-GMD.B.4-1
11.	A	G-CO.C.10
12.	56	G-GPE.B.7

Item Number	Answer Key	Evidence Statement Key/ Content Scope
13.	C	G-CO.C.9

## Section 2

Item Number	Answer Key	Evidence Statement Key/ Content Scope
1.	A	G-GPE.B.5
2.	51	G-SRT.C.8
3.	9.9 – 10 inclusive	G-M.6-1 G-GMD.A.3
4.	<p><b><u>Sample Top Score Response</u></b></p> <p><b>Part A:</b></p> <p>Calculating the slopes:</p> <p>The slope of side <math>PQ</math>: <math>\frac{10-7}{4-10} = \frac{3}{-6} = -\frac{1}{2}</math></p> <p>The slope of side <math>RS</math>: <math>\frac{5-4}{4-6} = \frac{1}{-2}</math></p> <p>The slope of side <math>PS</math>: <math>\frac{10-5}{4-4} = \frac{5}{0}</math> which is undefined</p> <p>The slope of side <math>QR</math>: <math>\frac{7-4}{10-6} = \frac{3}{4}</math></p> <p><math>PQRS</math> is a trapezoid because sides <math>PQ</math> and <math>RS</math> are parallel and sides <math>PS</math> and <math>QR</math> are not parallel.</p> <p><b>Part B:</b></p> <p>Calculating the side lengths:</p> $PS = \sqrt{(10-5)^2 + (4-4)^2} = 5$ $QR = \sqrt{(7-4)^2 + (10-6)^2} = 5$ <p>Since the side lengths are equal, <math>PQRS</math> is an isosceles trapezoid.</p> <p><b>Refer to the Holistic Rubric for 4-Point Reasoning Constructed Response Items for score point information.</b></p>	G-R.6 G-GPE.B.7
5.	B	G-M.1 G-SRT.C.8
6.	B	G-R.3 G-GMD.A.3



Item Number	Answer Key	Evidence Statement Key/ Content Scope
7.	2	G-C.B.5
8.	B	G-MG.A.3

## Section 3

Item Number	Answer Key	Evidence Statement Key/ Content Scope
1.	D	G-SRT.C.6
2.	C	G-M.6. G-GMD.A.3 G-MG.A.2
3.	<p><b><u>Sample Top Score Response</u></b></p> <p>The student's mistake was using a slope of <math>\frac{1}{3}</math> instead of <math>-\frac{1}{3}</math> since side YZ points down and to the right. The opposite of the reciprocal of <math>-\frac{1}{3}</math> is 3.</p> <p>The perpendicular bisector of side YZ passes through the midpoint of side YZ. The coordinates of the midpoint are</p> $x = 2 + \frac{6}{2} = 5$ $y = 3 + \frac{2}{2} = 4$ <p>The equation of the perpendicular bisector is</p> $x - 4 = 3(x - 5)$ $y = 3x - 15 + 4$ $y = 3x - 11$ <p><b>Refer to the Holistic Rubric for 4-Point Reasoning Constructed Response Items for score point information.</b></p>	G-R.7 G-CO.C.9 G-GPE.B.5
4.	B, D, E	G-R.1 G-CO.C.11

Item Number	Answer Key	Evidence Statement Key/ Content Scope
5.	<p><b><u>Sample Top Score Response</u></b></p> <p>The least height for the flagpole will be when the shadow is longest (7.5 feet or 90 inches) and the distance between Isabella and the flag is shortest (21 feet or 252 inches). The following proportion can be solved to arrive at the least height of the flagpole, in inches.</p> $\frac{62}{90} = \frac{x}{90 + 252}$ $62(342) = 90x$ $x = 235.6 \text{ inches or } 19.63 \text{ feet.}$ <p>The greatest height for the flagpole will be when the shadow is shortest (7 feet or 84 inches) and the distance between Isabella and the flag is longest (22 feet or 264 inches). The following proportion can be solved to arrive at the greatest height of the flagpole, in inches.</p> $\frac{62}{84} = \frac{x}{84 + 264}$ $62(348) = 84x$ $x = 256.9 \text{ inches or } 21.4 \text{ feet}$ <p><b>Refer to the Holistic Rubric for 4-Point Modeling Constructed Response Items for score point information.</b></p>	G-M.6-2 G-SRT.B.5
6.	17	G-C.A.2

**Section 4**

Item Number	Answer Key	Evidence Statement Key/ Content Scope
1.	B	G-C.A.2
2.	D	G-CO.A.5
3.	A, B, E	G-R.8. G-GPE.B.6

Item Number	Answer Key	Evidence Statement Key/ Content Scope
4.	<p><b><u>Sample Top Score Response</u></b></p> <p><b>Part A:</b></p> <p>The hole must have a diameter that measures approximately 36 inches and a height that measures approximately 18 inches. Thus the volume of the hole is approximately</p> $V = \pi \left( \frac{36}{2} \right)^2 (18) = 5,832\pi \text{ cubic inches.}$ <p>The root ball has an approximate volume of <math>V = \frac{4}{3} \pi \left( \frac{18}{2} \right)^3 = 972\pi</math> cubic inches. So approximately</p> $(5,832 - 972)\pi \approx 15,268 \text{ cubic inches of soil will be needed.}$ <p>Since 12 inches = 1 foot, 1,728 cubic inches = 1 cubic foot, and 15,268 cubic inches = <math>\frac{15,268}{1,728}</math> cubic feet <math>\approx</math> 8.8 cubic feet.</p> <p><b>Part B:</b></p> <p>The part that will be covered by mulch has the form of a circle of radius 18 inches. And the area occupied by the tree trunk has radius of 3 inches. So the total area to be covered by mulch is</p> $(18^2 - 3^2)\pi \approx 989.6 \text{ square inches.}$ <p>Since 12 inches = 1 foot, 144 square inches = 1 square foot,</p> <p>and <math>989.6 \text{ square inches} = \frac{989.6}{144}</math> square feet <math>\approx</math> 6.9 square feet.</p> <p><b>Refer to the Holistic Rubric for 4-Point Modeling Constructed Response Items for score point information.</b></p>	<p>G-M.6-1 G-GMD.A.3 G-MG.A.1</p>
5.	C	<p>G-R.5 G-CO.B.8</p>

Item Number	Answer Key	Evidence Statement Key/ Content Scope
6.	A	G-M.3 G-MG.A.3
7.	A, D	G-SRT.B.4
8.	A, E, F	G-SRT.C.7