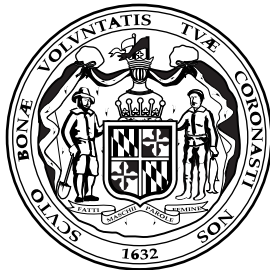


Mathematics

Goal 2: Geometry, Measurement, and Reasoning



Maryland High School Assessment

Public Release, Fall 2000

CTB/McGraw-Hill

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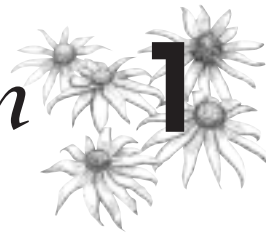


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Session

1



Response Grid Questions

Several questions in this test require you to enter your answer on a special grid like the one shown below.

/	/	/		
.
0	0	0	0	0
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9

answer boxes
fraction bars
decimal points
number bubbles

Directions for Completing the Response Grids

1. Find the answer to the problem.
2. Write your answer in the boxes at the top of the grid using the directions below.
 - You may start your answer at either end of the answer box. Print your answer with the first digit (or symbol) in the left answer box, or print your answer with the last digit in the right answer box.
 - Print no more than one digit or symbol in each answer box. Do not leave a blank answer box in the middle of an answer.
 - Be sure to write a decimal point or fraction bar in the answer box if it is part of the answer.
3. Fill in the appropriate bubble under each box in which you wrote your answer.
 - Fill in only one bubble for each answer box used in your answer. Do not fill in a bubble under an unused answer box.
 - You must fill in the bubbles accurately to receive credit for your answer.



Special Directions for Mixed Numbers, Decimals, and Negative Numbers

- Mixed numbers must be entered as decimals or improper fractions. For example, an answer of $1\frac{1}{2}$ should be entered as 1.5 or $\frac{3}{2}$.
- Decimal answers should be entered as accurately as possible unless otherwise indicated in the problem.
- No Response Grid questions have negative answers.

Examples of Valid Responses

The Response Grids below show valid ways to enter an answer of $\frac{3}{2}$.

		3	/	2	
	○	○	○	○	○
○	○	○	○	○	○
1	1	1	1	1	1
2	2	2	2	2	●
3	3	●	3	3	
4	4	4	4	4	
5	5	5	5	5	
6	6	6	6	6	
7	7	7	7	7	
8	8	8	8	8	
9	9	9	9	9	

3	/	2			
	○	○	○	○	○
○	○	○	○	○	○
1	1	1	1	1	1
2	2	●	2	2	
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

1	.	5			
	○	○	○	○	○
○	○	○	○	○	○
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	○	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

1	.	5	0		
	○	○	○	○	○
○	○	○	○	○	○
0	0	0	0	○	○
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	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

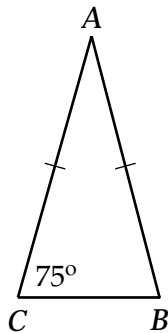


Directions

Use the Response Grid in the Answer Book to complete Sample A.

Sample A

Triangle ABC is isosceles with $m\angle C = 75^\circ$.

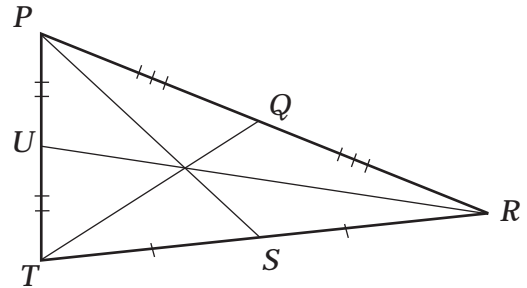


Note: The figure is not drawn to scale.

What is the measure, in degrees, of $\angle B$?

Sample B

Triangle PRT is shown below.

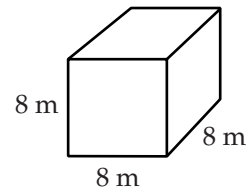


Which of these statements must be true about triangle PRT ?

- A $\overline{PQ} \cong \overline{QR}$
- B $\overline{PS} \cong \overline{TQ}$
- C $\angle PTQ \cong \angle RTQ$
- D $\angle TPR \cong \angle PTR$

Sample C

Look at the rectangular solid shown below.



Note: The figure is not drawn to scale.

What is the volume of the rectangular solid?

- F 24 cubic meters
- G 64 cubic meters
- H 128 cubic meters
- J 512 cubic meters

Notice that the answer choices for Sample C are FGHJ. Selected response answer choices will alternate ABCD and FGHJ.

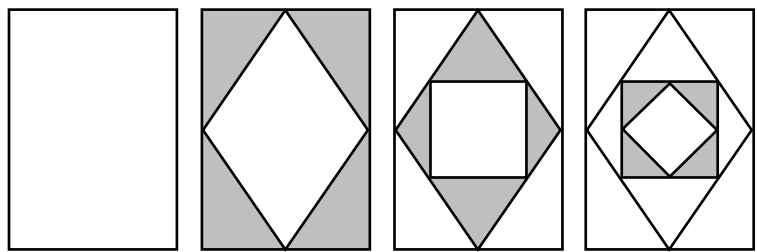
In addition to response grid questions such as Sample A and selected response questions such as Sample B and Sample C, there will be constructed response questions that require a written answer. Brief constructed response items, which require a short written answer, are labeled "BCR" below the question number in the Student Test Book. Extended constructed response questions, which require a longer written answer, are labeled "ECR" below the question number in the Student Test Book. The Rubric Sheet provides information about how constructed response questions will be scored. You may refer to the Rubric Sheet during the test. You will also be provided with "Cues for Students," which further clarifies how to respond to the constructed response questions. For students taking the geometry assessment, the difference between a construction and drawing is clarified under "Representation" on the "Cues for Students" sheet.

Remember, read all directions and questions very carefully and choose the best answer for each question. If you are not sure about an answer, do the best you can, but don't spend too much time on any one question.

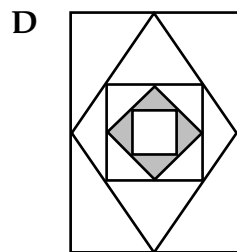
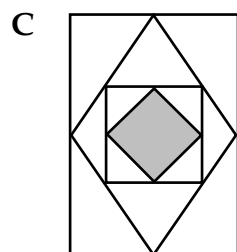
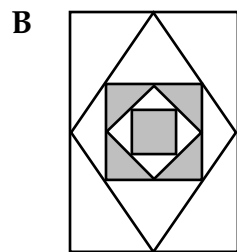
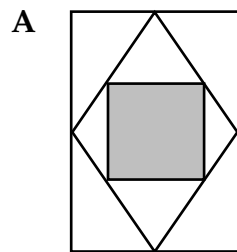
Answer all questions until you come to the end of Session 1, where you will see a stop sign. If you finish early, you may check your answers in Session 1, but do not go on to Session 2. You have 65 minutes to complete Session 1.



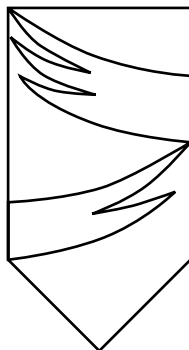
1 Look at the pattern below.



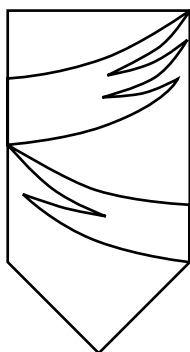
If the pattern continues, which of these would be next in the pattern?



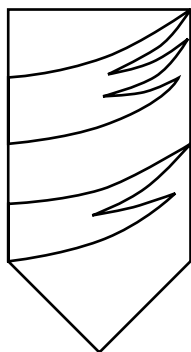
- 2 A meeting room has the picture shown below on one of the walls. A mirror on the opposite wall shows a reflection of the picture.



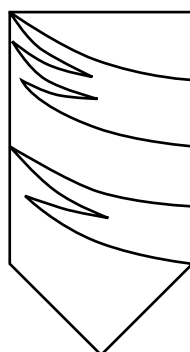
What is the appearance of the picture in the mirror?



F



G

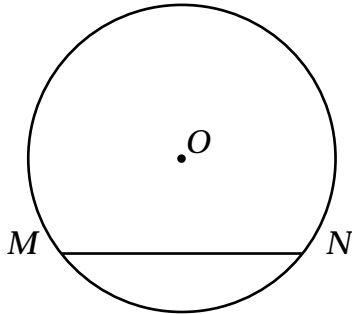


H



J

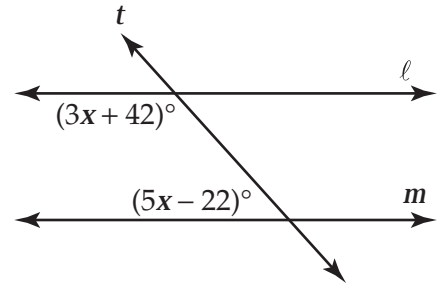
- 3 Circle O is shown below.



Which of these terms best describes \overline{MN} ?

- A diameter
- B radius
- C tangent
- D chord

- 4 Line ℓ is parallel to line m . Line t is a transversal with angle measures as indicated below.

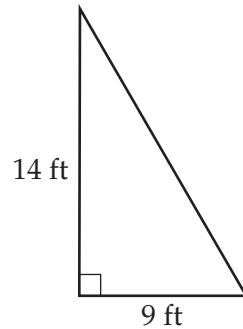


Note: The figure is not drawn to scale.

What is the value of x ?

- F 16
- G 20
- H 25
- J 32

- 5** Ricardo makes sails for sailboats. A customer places an order for a right triangle sail, as shown below.

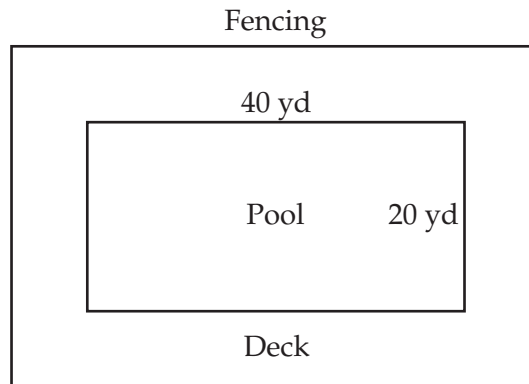


Note: The figure is not drawn to scale.

Which theorem guarantees that all triangles with the measurements shown above will be congruent?

- A Angle-Angle-Side (AAS)
- B Side-Angle-Side (SAS)
- C Angle-Side-Angle (ASA)
- D Side-Side-Side (SSS)

- 6** The dimensions of the rectangular pool shown below are 40 yards by 20 yards.
BCR Fencing was ordered to enclose the deck. The ratio of the dimensions of the region that is fenced in to the dimensions of the pool is $\frac{3}{2}$.



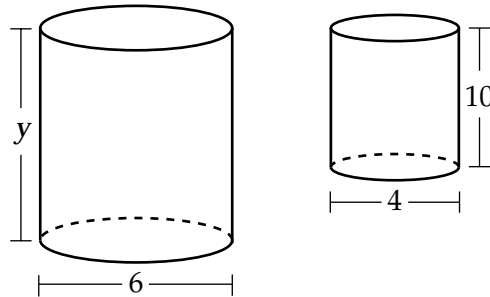
Note: The figure is not drawn to scale.

Complete the following in the Answer Book:

- What are the dimensions, in yards, of the region that is fenced in? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.
- How many yards of fence were purchased to enclose the deck?
- Fencing costs \$7.50 per yard. How much did it cost to purchase fencing to enclose the deck?

- 7** Look at the two cylinders shown below. The ratio of corresponding diameters is equal to the ratio of corresponding heights.

BCR



Note: The figures are not drawn to scale.

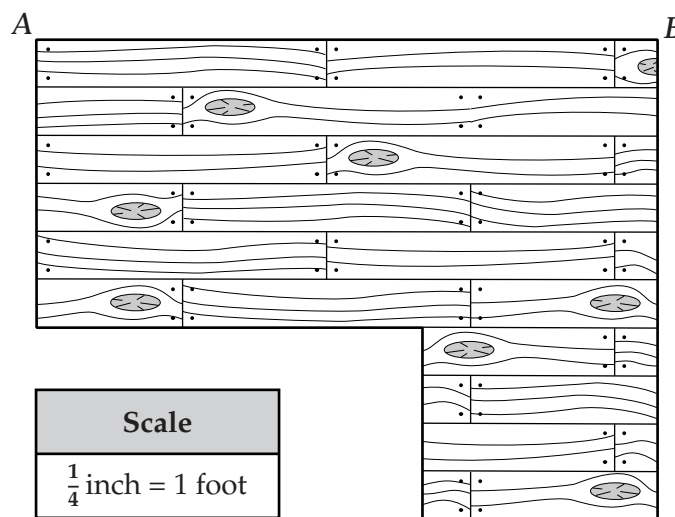
Complete the following in the Answer Book:

- What is the height of the large cylinder? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.
- Find the ratio of the volumes of the cylinders. Use mathematics to justify your answer.

Directions

Use the Response Grids in the Answer Book to complete Numbers 8 through 11.

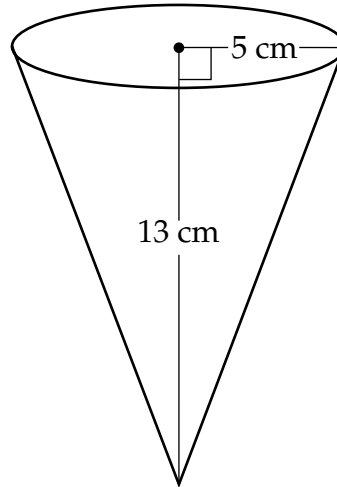
- 8** A scale drawing of a deck is shown below.



On the actual deck, what is the length, in feet, of \overline{AB} ?

9 What is the circumference, in centimeters, of the largest circle that can be drawn on a piece of paper 16 centimeters by 16 centimeters in size?

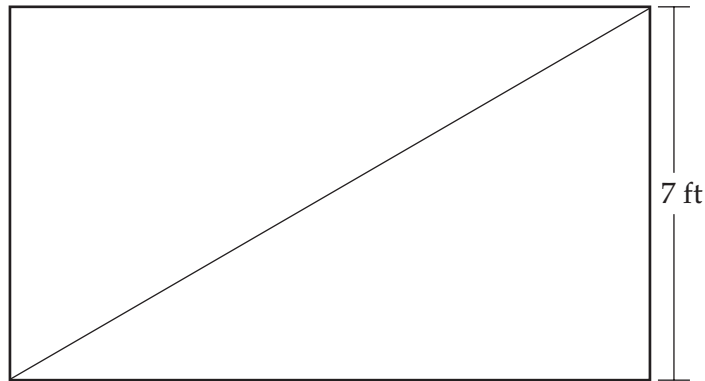
10 A cone is shown below.



Note: The figure is not drawn to scale.

What is the volume, in cubic centimeters, of the cone?

- 11** The area of the rectangle shown below is 168 square feet.

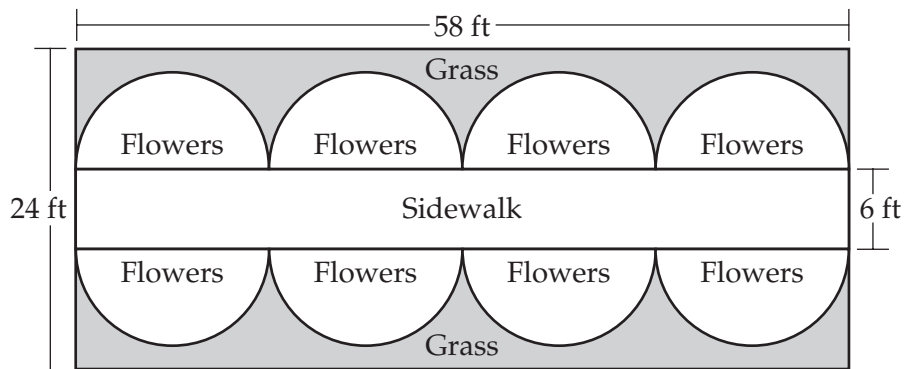


Note: The figure is not drawn to scale.

What is the length, in feet, of the diagonal?

- 12** To plant a lawn, Kristin needs 4 pounds of grass seed per 1,000 square feet. A diagram of her lawn is shown below. Kristin wants to plant the flowers in congruent semicircles.

ECR

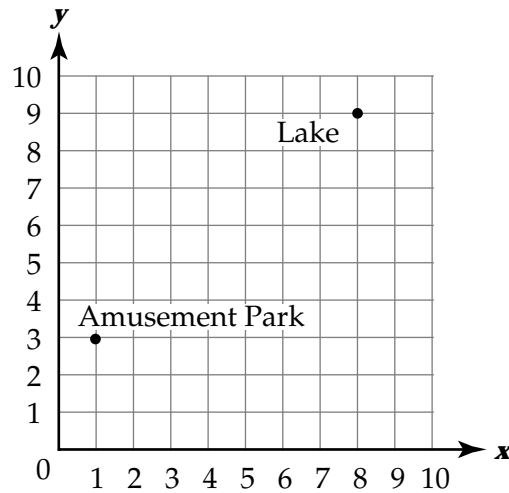


Note: The figure is not drawn to scale.

Complete the following in the Answer Book:

- How many pounds of seed does Kristin need for her lawn? Use mathematics to explain how you determined your answer. Use words, symbols, or both in your explanation.

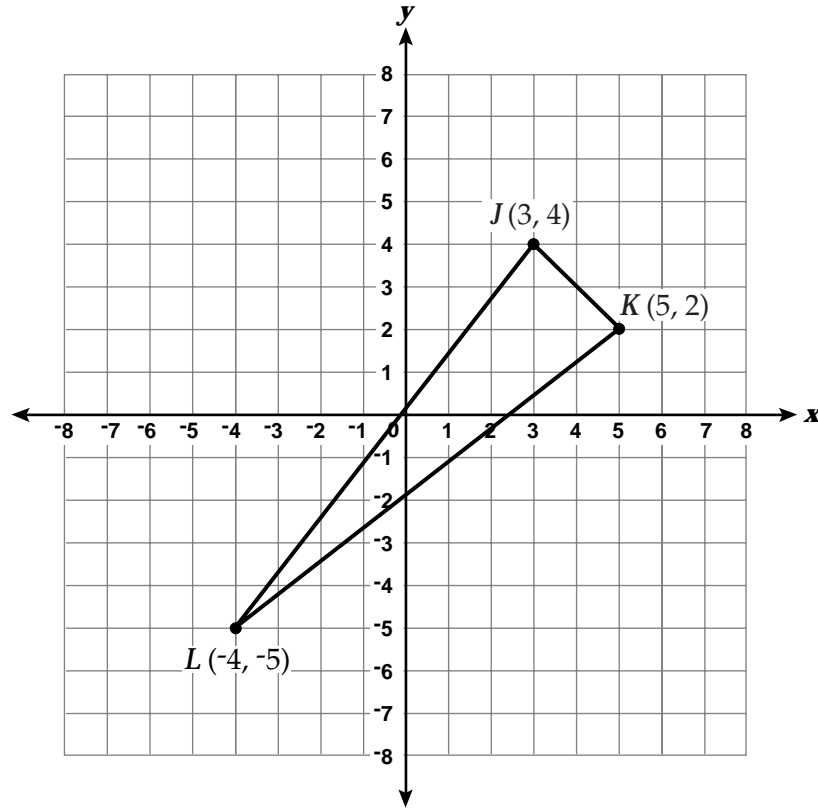
- 13** The two most popular tourist attractions in a city are shown on the grid below. A hotel advertises that it is located at the midpoint between the tourist attractions.



What are the coordinates of the hotel?

- A $(3\frac{1}{2}, 6)$
- B $(4\frac{1}{2}, 5\frac{1}{2})$
- C $(4\frac{1}{2}, 6)$
- D $(6, 4\frac{1}{2})$

14 Triangle JKL is shown on the grid below.

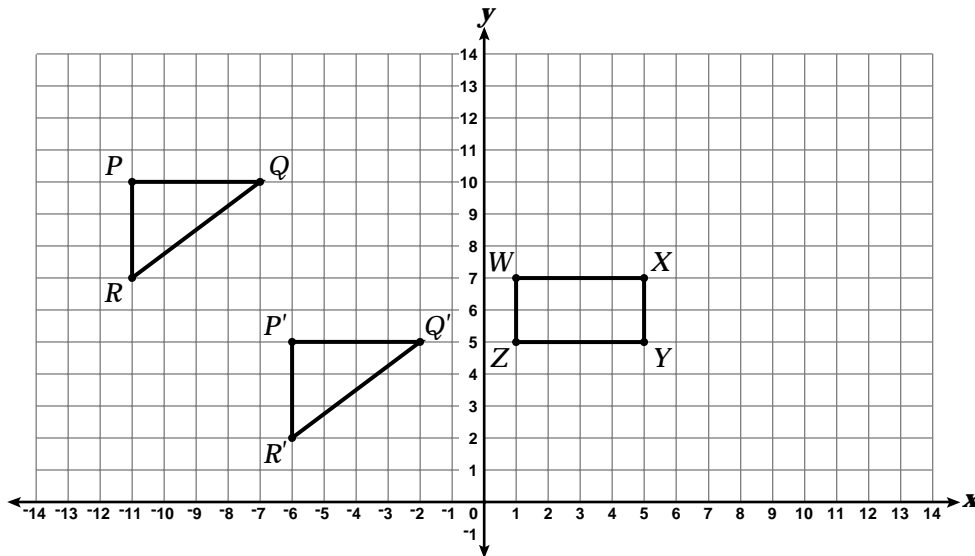


What is the length of \overline{KL} ? Round the answer to the nearest tenth of a unit.

- F 3.2 units
- G 4.0 units
- H 11.4 units
- J 11.7 units



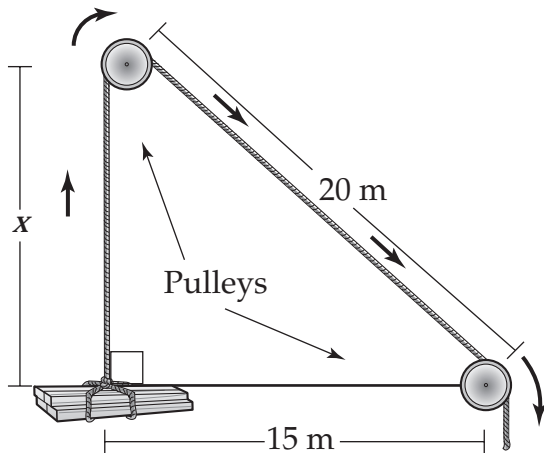
- 15 $\triangle PQR$ has been translated to the position of $\triangle P'Q'R'$. Rectangle $WXYZ$ will be translated to a corresponding position using the same transformation.



What is the location of X' in the new rectangle?

- A (0, 2)
- B (10, 2)
- C (0, 12)
- D (10, 12)

- 16** John designed a system of pulleys to lift wooden boards, as shown below.

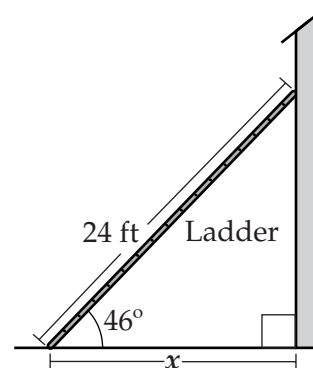


Note: The figure is not drawn to scale.

To what maximum height (x) will his system of pulleys lift the boards? Round the answer to the nearest meter.

- F 13 meters
- G 15 meters
- H 17 meters
- J 25 meters

- 17** A ladder leaning against a house is shown below.

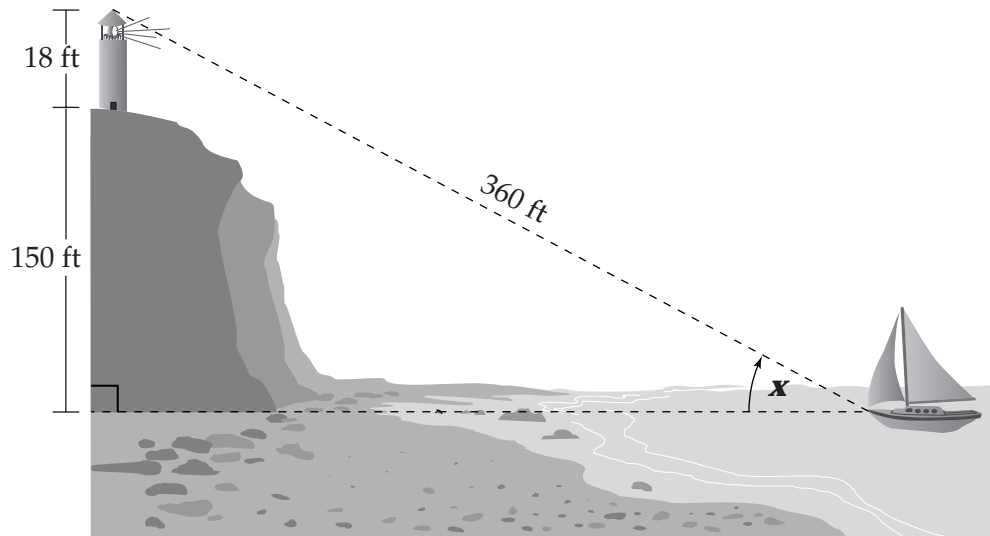


Note: The figure is not drawn to scale.

What is the distance (x) from the base of the ladder to the house? Round the answer to the nearest foot.

- A 13 feet
- B 17 feet
- C 21 feet
- D 36 feet

- 18** A lighthouse, which is 18 feet high, stands on a cliff that is 150 feet above sea level. The distance from the top of the lighthouse to a sailboat on the ocean is 360 feet.

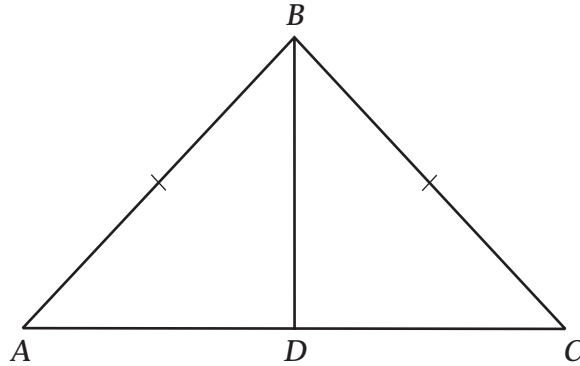


Note: The figure is not drawn to scale.

What is the angle of elevation (x) from the sailboat to the top of the lighthouse? Round the answer to the nearest degree.

- F 25°
- G 28°
- H 62°
- J 65°

- 19** Isosceles triangle ABC is shown below. \overline{BD} is the angle bisector of $\angle ABC$.
ECR

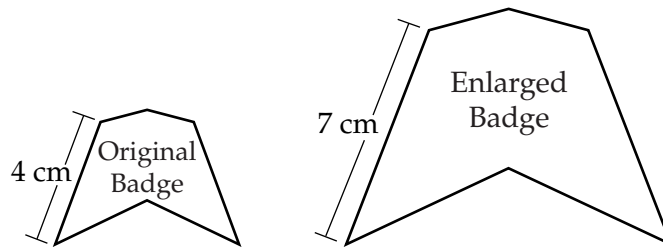


Note: The figure is not drawn to scale.

Complete the following in the Answer Book:

- Prove that \overline{BD} bisects \overline{AC} .

- 20** An artist designed a badge in the shape of a hexagon for a school club. The artist wants to enlarge the badge as shown below.



Note: These figures are not drawn to scale.

If the perimeter of the original badge is 18 centimeters, what is the perimeter of the enlarged badge? Round the answer to the nearest centimeter.

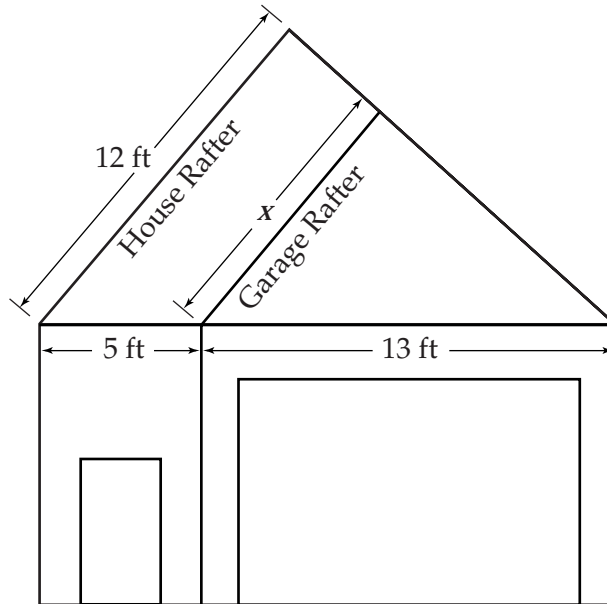
- F 10 centimeters
- G 21 centimeters
- H 32 centimeters
- J 42 centimeters



Session **2**

Answer all questions until you come to the end of Session 2, where you will see a stop sign. If you finish early, you may check your answers in Session 2, but do not go back to Session 1. You have 60 minutes to complete Session 2.

- 21** The diagram below shows the rafters for a house and garage. The house rafter is parallel to the garage rafter.

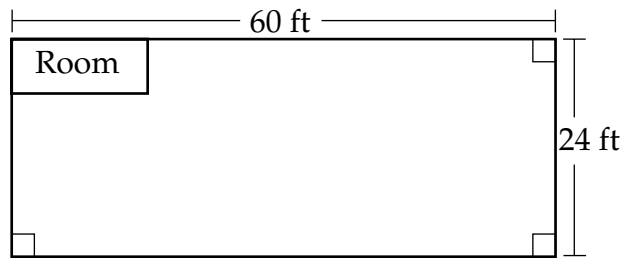


Note: The figure is not drawn to scale.

What is the length (x) of the garage rafter? Round the answer to the nearest foot.

- A 5 feet
- B 7 feet
- C 9 feet
- D 11 feet

- 22** A house measuring 24 feet by 60 feet contains a room that is similar in shape to the house. The ratio of the dimensions of the room to those of the house is 1:6.

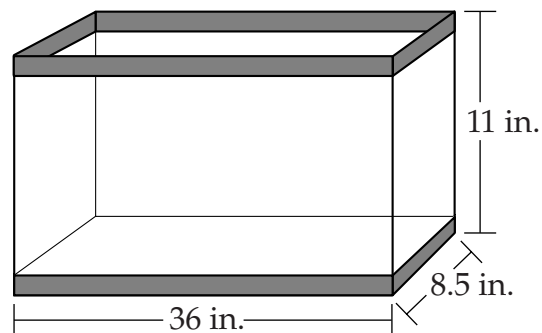


Note: The figure is not drawn to scale.

What are the dimensions of the room?

- F 2 feet by 5 feet
- G 4 feet by 10 feet
- H 6 feet by 15 feet
- J 12 feet by 30 feet

- 23** To properly fill the aquarium shown below, the water level should be 1.5 inches from the top of the aquarium.

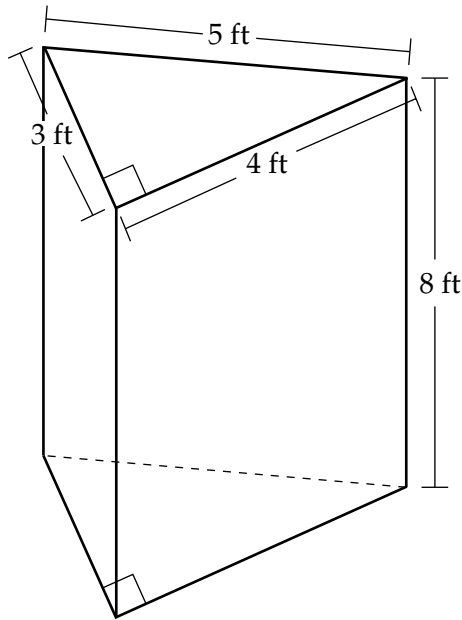


Note: The figure is not drawn to scale.

If the aquarium is filled properly, how many cubic inches of water will it contain?

- A 1,285 cubic inches
- B 2,772 cubic inches
- C 2,907 cubic inches
- D 3,366 cubic inches

- 24** Monique plans to cover the three rectangular faces of the right triangular prism shown below with fabric.

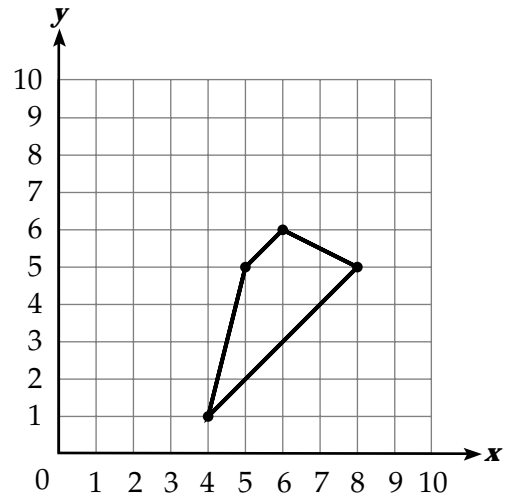


Note: The figure is not drawn to scale.

How many square feet of fabric will Monique need to cover the rectangular faces of the prism?

- F 56 square feet
- G 72 square feet
- H 96 square feet
- J 108 square feet

- 25** A trapezoid is shown on the grid below.

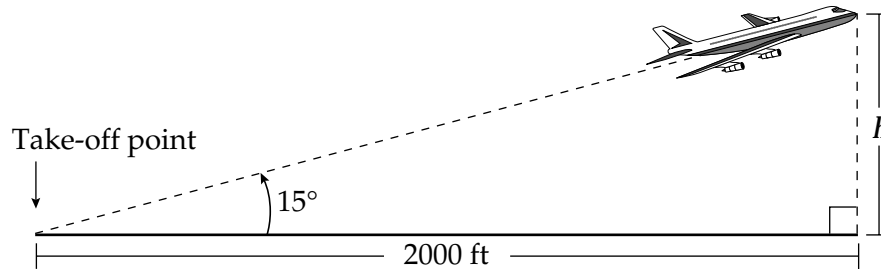


What is the slope of each base of the trapezoid?

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

- 26** A line segment on the coordinate plane joins $(0, 5)$ to the origin. After a rotation the slope of this segment is 0. Which of these could be the angle of rotation?
- F 45° clockwise
 - G 90° clockwise
 - H 180° clockwise
 - J 360° clockwise
- 27** A regular polygon has 20 sides. What is the measure of each interior angle?
- A 18°
 - B 20°
 - C 162°
 - D 180°
- 28** One line divides a plane into two parts. Two distinct parallel lines divide a plane into three parts. Into how many parts will n distinct parallel lines divide the plane?
- F n
 - G $n+1$
 - H $n-1$
 - J $2n-1$

- 29** An airplane makes a 15° angle of elevation from the runway when it takes off. The airplane pictured below is 2,000 feet along the ground from its take-off point.

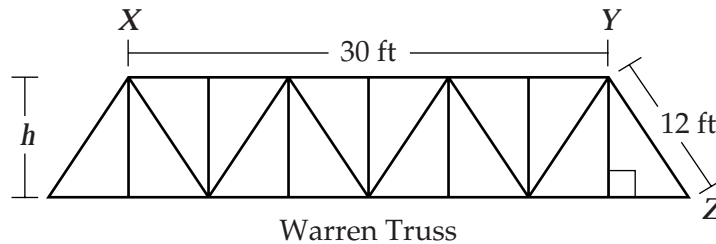


Note: The figure is not drawn to scale.

At what height (h) is the airplane? Round the answer to the nearest foot.

- A 500 feet
- B 518 feet
- C 536 feet
- D 550 feet

- 30** The Warren Truss shown below consists of 14 congruent right triangles. The distance from point X to point Y is 30 feet and the distance from point Y to point Z is 12 feet.



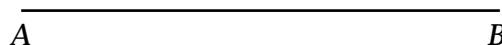
Note: The figure is not drawn to scale.

What is the height (h) of the truss? Round the answer to the nearest foot.

- F 7 feet
- G 10 feet
- H 11 feet
- J 13 feet

- 31** Use the segment below to complete each of the following constructions.

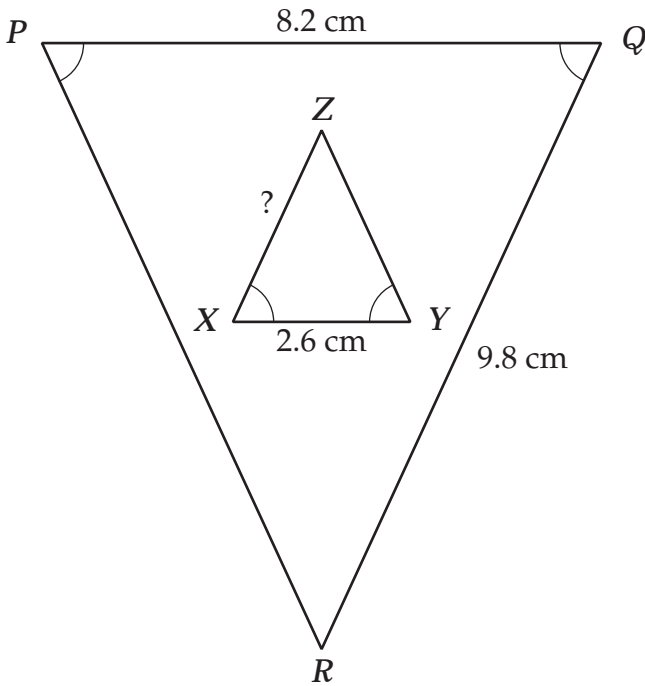
ECR



Complete the following in the Answer Book:

- Using segment \overline{AB} , construct equilateral triangle ABC . Use mathematics to explain the process you used to construct the triangle. Use words, symbols, or both in your explanation.
- Construct circle O so that $\triangle ABC$ is inscribed in circle O . Use mathematics to explain your process. Use words, symbols, or both in your explanation.

- 32** The design for a company's logo is shown below. $\angle P \cong \angle Q \cong \angle X \cong \angle Y$.

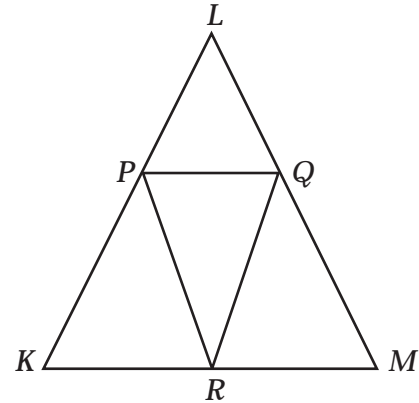


Note: The figure is not drawn to scale.

What is the length of \overline{XZ} ? Round the answer to the nearest tenth of a centimeter.

- F 2.2 centimeters
- G 2.6 centimeters
- H 3.1 centimeters
- J 4.2 centimeters

- 33** In the figure below, \overline{PQ} is parallel to \overline{KM} .

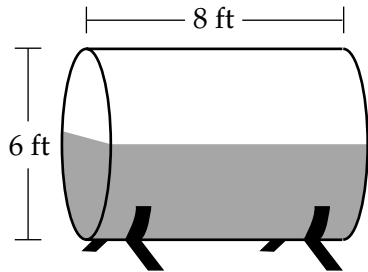


Note: The figure is not drawn to scale.

Which statement must be true about the figure?

- A $\triangle LPQ \cong \triangle PKR$
- B $\triangle LPQ \sim \triangle LKM$
- C $\triangle PKR \cong \triangle QRM$
- D $\triangle PKR \sim \triangle QRM$

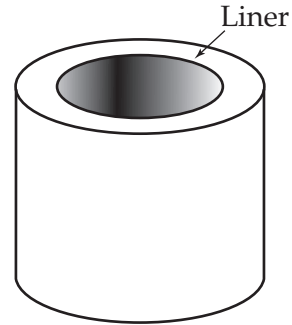
- 34** The cylindrical oil tank shown below is half full.



How much oil is in the tank?
Round the answer to the nearest cubic foot.

- F 113 cubic feet
- G 151 cubic feet
- H 226 cubic feet
- J 452 cubic feet

- 35** An insulated bottle with a circumference of 26 inches needs a liner with a radius two-thirds the radius of the bottle.

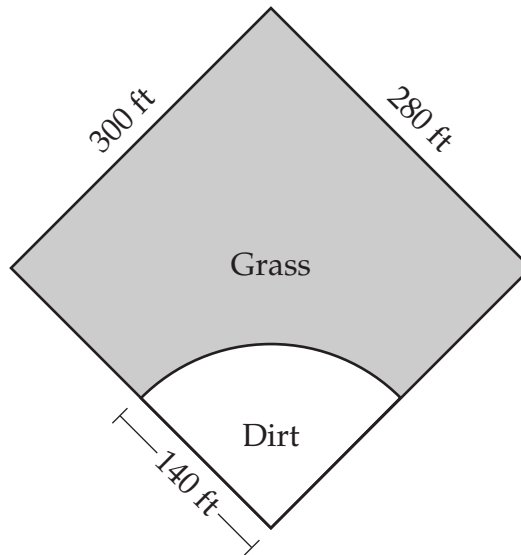


Insulated bottle

What is the radius of the liner?
Round the answer to the nearest inch.

- A 1 inch
- B 2 inches
- C 3 inches
- D 4 inches

- 36** A worker at a new baseball park is mowing the shaded region of the rectangular field shown below. The dirt region is a quarter circle with a radius of 140 feet.



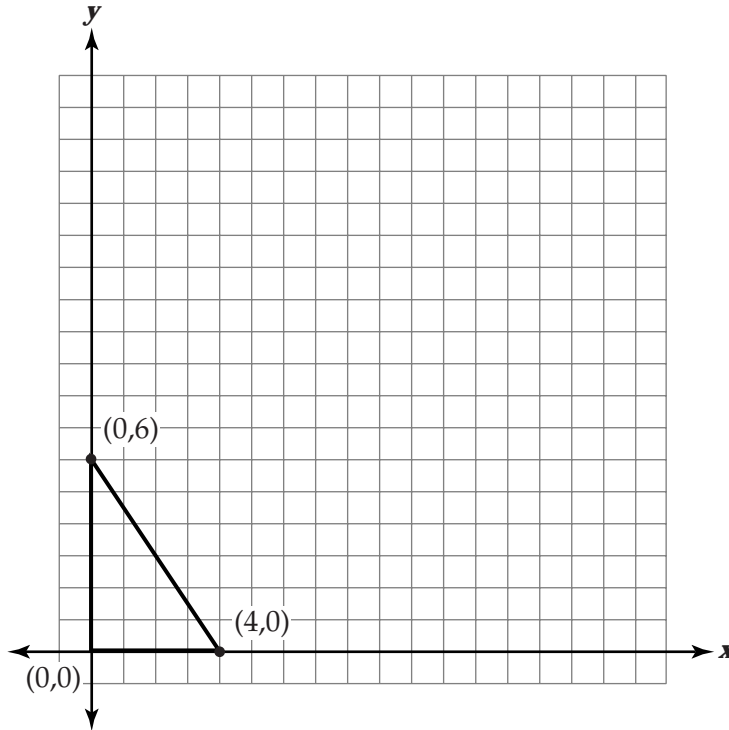
Note: The figure is not drawn to scale.

How many square feet of grass will the worker mow? Round the answer to the nearest square foot.

- F 15,394 square feet
- G 22,425 square feet
- H 68,606 square feet
- J 84,000 square feet

37 A triangle with vertices at $(0, 0)$, $(0, 6)$, and $(4, 0)$ is shown on the grid below.

BCR



Complete the following in the Answer Book:

- Draw the dilation image of the triangle using a scale factor of 3 and using $(0, 0)$ as the center of the dilation on the grid provided in the Answer Book.
- What is the difference between a dilation using a scale factor greater than 1 and a dilation using a scale factor between 0 and 1? Use examples to justify your answer.

38 Elizabeth draws a right triangle with angles of 52° and 38° .

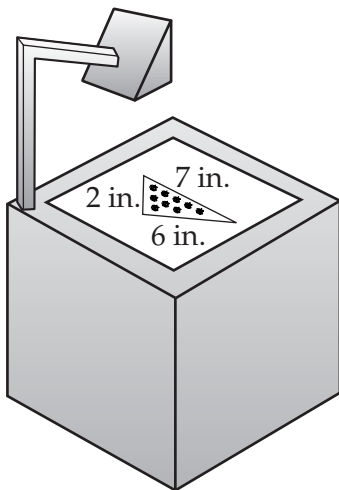
BCR Complete the following in the Answer Book:

- Draw a right triangle using these angle measurements. Label the measure of each angle.
- Will any right triangle with angles of 52° and 38° be congruent to Elizabeth's triangle? Use mathematics to justify your answer.

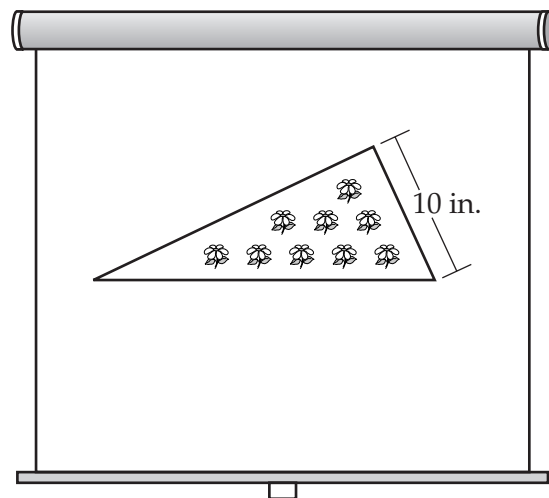
Directions

Use the Response Grids in the Answer Book to complete Numbers 39 through 43.

39 A blueprint of a triangular garden with sides measuring 2, 6, and 7 inches is placed on an overhead projector and projected onto a screen, as shown below. The shortest side of the triangle on the screen is 10 inches.



Overhead
Projector

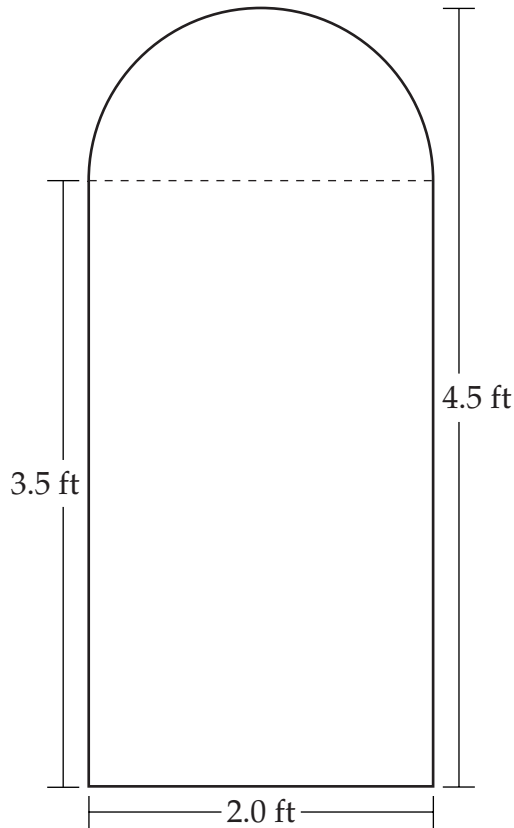


Movie Screen

Note: The figures are not drawn to scale.

How many inches is the longest side of the triangle on the screen?

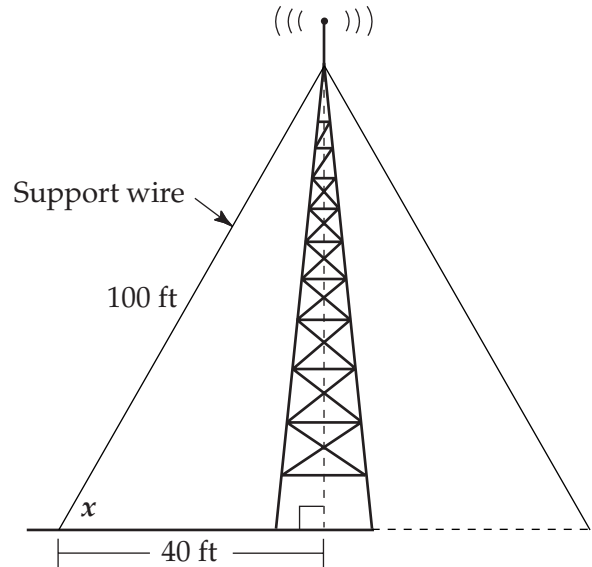
- 40** The window shown below is in the shape of a rectangle with a semicircular top.



Note: The figure is not drawn to scale.

What is the area, in square feet, of the window?

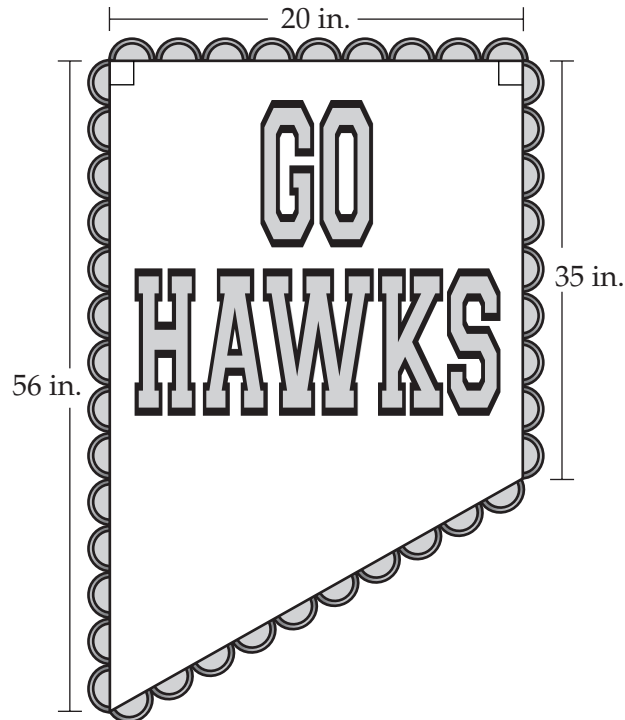
- 41** One of the support wires for a radio tower is 100 feet long. One end of the wire is 40 feet from the base of the tower, as shown in the diagram below.



Note: The figure is not drawn to scale.

What angle (x), in degrees, does the support wire make with the ground?

- 42** A school is purchasing trim to go around all four edges of the banner shown below.

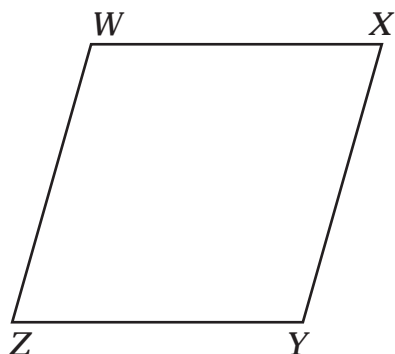


Note: The figure is not drawn to scale.

How many inches of trim should be purchased?

- 43** A streetlight casts a 10-foot shadow, while a 6-foot person casts a 4-foot shadow. What is the height, in feet, of the streetlight?

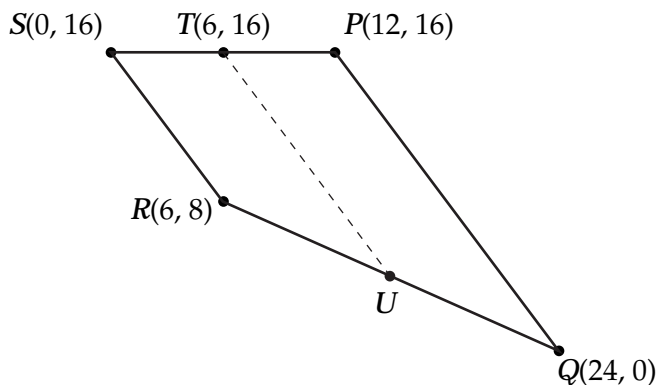
- 44** Quadrilateral $WXYZ$ is a rhombus, but it is not a square.



Which of these statements is not true?

- F \overline{WY} is congruent to \overline{XZ} .
- G $\angle X$ is congruent to $\angle Z$.
- H \overline{WX} is parallel to \overline{YZ} .
- J \overline{WY} is perpendicular to \overline{XZ} .

- 45** Trapezoid $PQRS$ is shown below. \overline{TU} is parallel to \overline{PQ} .



What are the coordinates of point U ?

- A (15, 4)
 - B (12, 8)
 - C (9, 4)
 - D (7, 12)
- 46** Triangle JKL has vertices at $(0, 0)$, $(2, 0)$, and $(0, 1)$. How can triangle JKL be classified?
- F right scalene triangle
 - G right isosceles triangle
 - H scalene triangle, but not a right triangle
 - J isosceles triangle, but not a right triangle

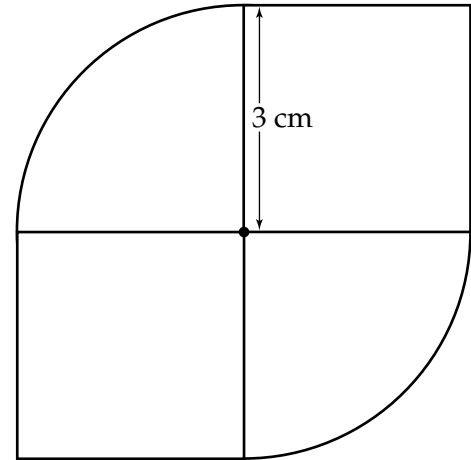
47 Consider these statements:

- Every square is a rhombus.
- Quadrilateral $ABCD$ is not a rhombus.

Which of these conclusions can be made using both statements?

- A $ABCD$ is not a parallelogram.
B $ABCD$ is a rectangle.
C $ABCD$ is not a square.
D $ABCD$ is a trapezoid.

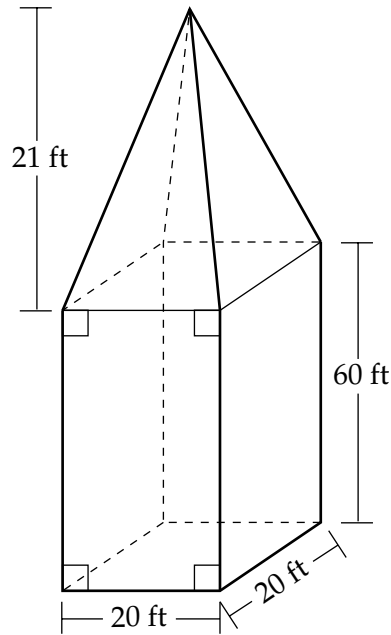
48 A company's logo is formed by drawing a circle and then replacing two opposite quarters of the circle with squares, as shown below.



What is the area of the logo? Round the answer to the nearest square centimeter.

- F 32 square centimeters
G 46 square centimeters
H 71 square centimeters
J 85 square centimeters

- 49** The heating system for the building shown below can raise the temperature 10°F at a rate of 150 cubic feet per minute.



Note: The figure is not drawn to scale.

How many minutes will it take to raise the temperature of the building 10°F ?
Round the answer to the nearest minute.

- A 72 minutes
- B 160 minutes
- C 179 minutes
- D 216 minutes

