

GEOMETRY

Public Release 2005

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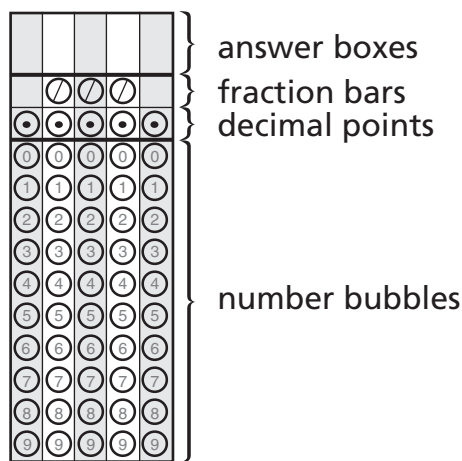
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Session 1

Response Grid Items

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



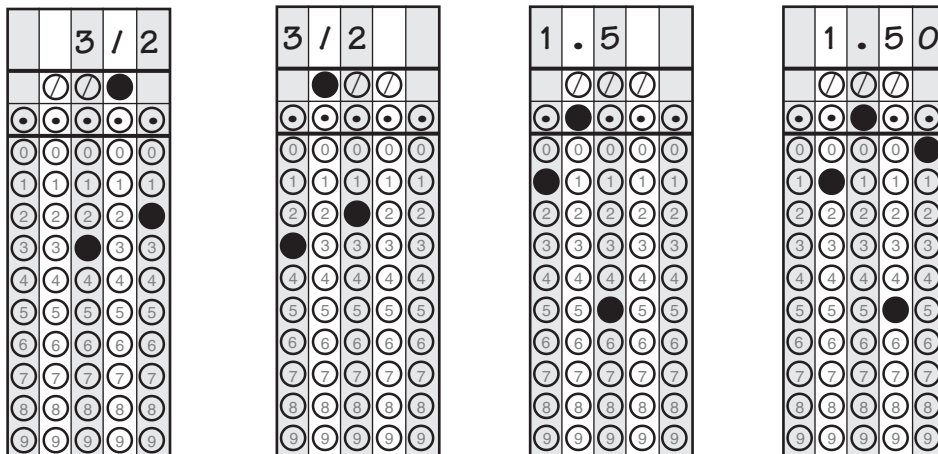
Directions for Completing the Response Grids

- Find the answer to the problem.
- Write your answer in the boxes at the top of the grid.
 - 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 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.
- 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.



Examples of Valid Responses

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



Special Directions for Mixed Numbers, Decimals, Negative Numbers, and Percents

- 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. Some answers may need to be rounded in order to fit in the Response Grid space.
- No Response Grid items have negative answers.
- Percents must be entered as decimals or fractions. For example, an answer of 50% should be entered as .5 or $\frac{1}{2}$.

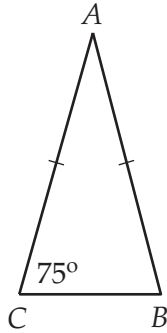


Directions

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

Sample A

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

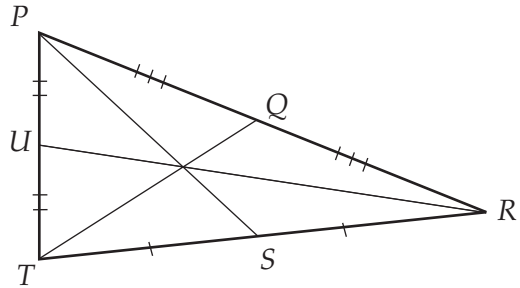


Note: The figure is not drawn to scale.

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

Sample B

Triangle PRT is shown below.

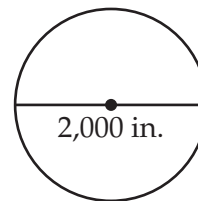


Which of these statements must be true about triangle PRT ?

- 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 circle shown below.



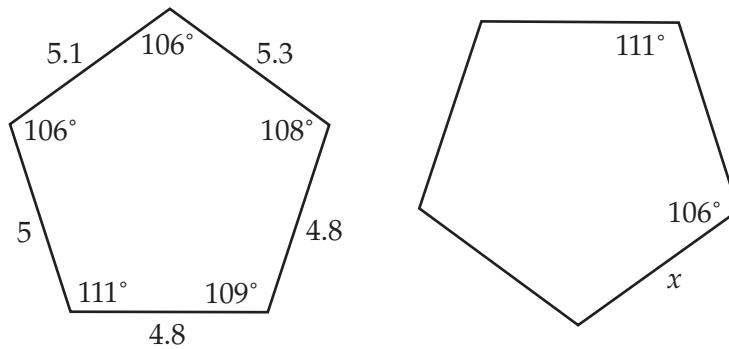
What is the circumference of the circle? Round the answer to the nearest inch.

- F 3,142 inches
- G 6,283 inches
- H 3,141,593 inches
- J 12,566,371 inches



- 1** A toy duck is $\frac{3}{4}$ the size of an actual duck. If the actual length of a duck is 24 inches, what is the length of the toy?
- A 16 inches
 - B 18 inches
 - C 32 inches
 - D 42 inches

- 2** The two pentagons shown below are congruent.



What is the value of x ?

- F 4.8
- G 5.0
- H 5.1
- J 5.3



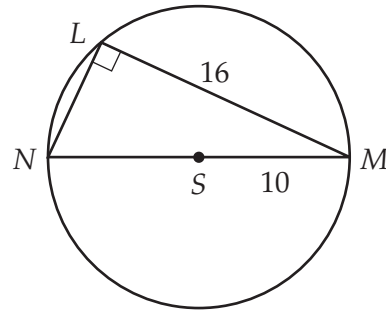
3 Look at the statements shown below:

- If the pencil is red, then the pen is white.
- If the protractor is not blue, then the compass is green.
- If the protractor is blue, then the pen is not white.

If the pencil is red, which of these conclusions can be drawn from the statements given?

- A The pen is not white.
- B The compass is green.
- C The protractor is blue.
- D The protractor is not green.

4 In the diagram below, the radius of circle S is 10 units.



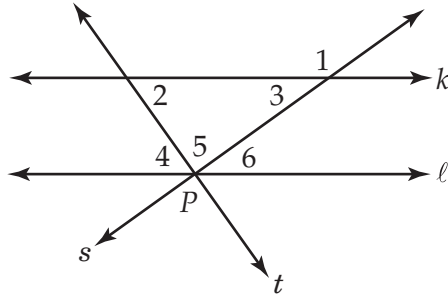
Note: The figure is not drawn to scale.

What is the length of \overline{LN} ?

- F 4 units
- G 6 units
- H 10 units
- J 12 units



- 5 Look at the figure below. Line k is parallel to line ℓ . Line s and line t are transversals that intersect line ℓ at point P .

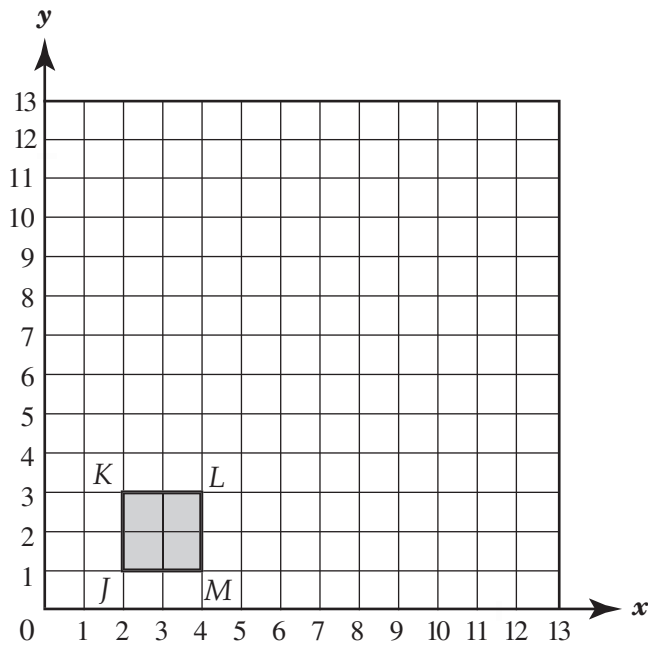


Note: The figure is not drawn to scale.

Which of these statements must be true?

- A $m\angle 4 = m\angle 6$
- B $m\angle 2 = m\angle 6$
- C $m\angle 3 = m\angle 4 + m\angle 5$
- D $m\angle 1 = m\angle 4 + m\angle 5$

6 Square $JKLM$ is shown on the coordinate plane below.
BCR

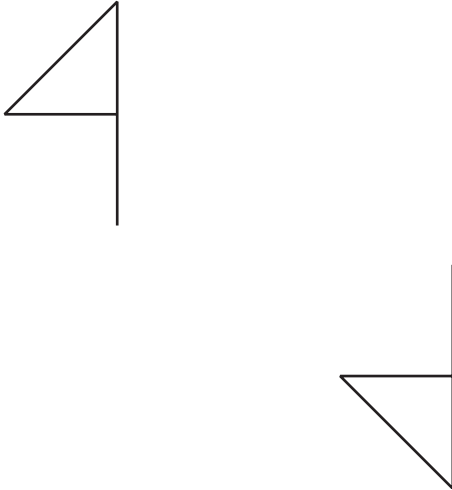


Complete the following in the Answer Book:

- Draw the dilation image of $JKLM$ using a scale factor of 3 and the origin as the center of dilation. Label the vertices of the image J' , K' , L' , and M' . Use mathematics to explain how you drew $J'K'L'M'$. Use words, symbols, or both in your explanation.
- What is the effect of the dilation on the area of the square? Use mathematics to justify your answer.



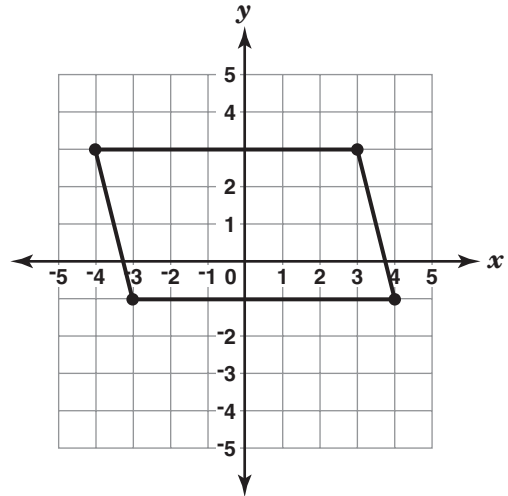
7 Look at the figure on the left and its image on the right.



Which of these describes the transformation of the original figure onto its image?

- A translation and dilation
- B translation and reflection
- C translation
- D reflection

8 The floor plan of a room is shown on the grid below. Connie will put a light where the diagonals of the room intersect.

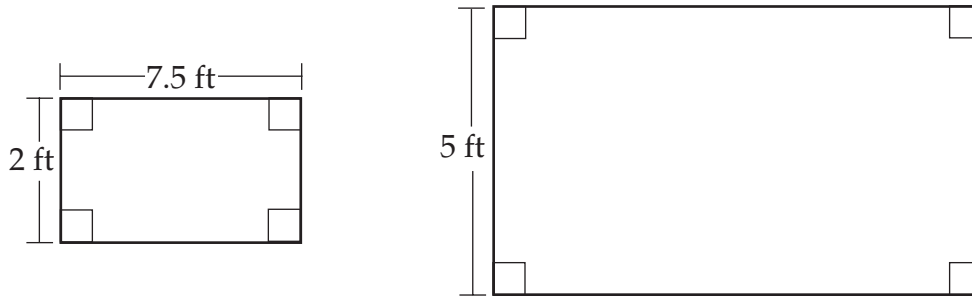


What are the coordinates of the point where Connie will put the light?

- F (0, 1)
- G (0, 2)
- H (1, 0)
- J (2, 0)



9 In the pictures below, the larger bulletin board is similar to the smaller one.

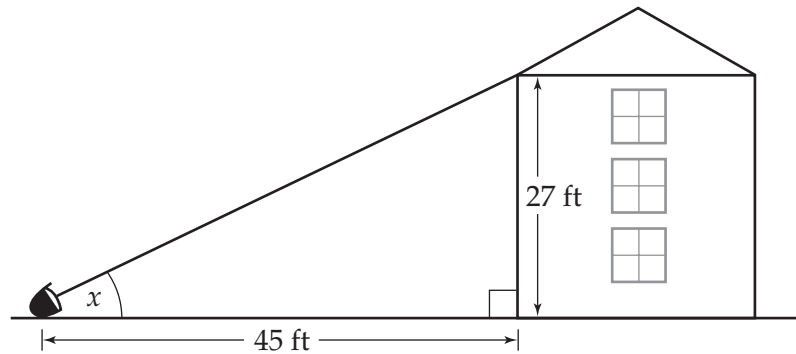


Note: These figures are not drawn to scale.

What is the perimeter of the larger bulletin board? Round the answer to the nearest foot.

- A 19 feet
- B 29 feet
- C 31 feet
- D 48 feet

- 10** A spotlight shines on the front of a building. The spotlight is 45 feet from the front of the building and shines on a point 27 feet above the ground.

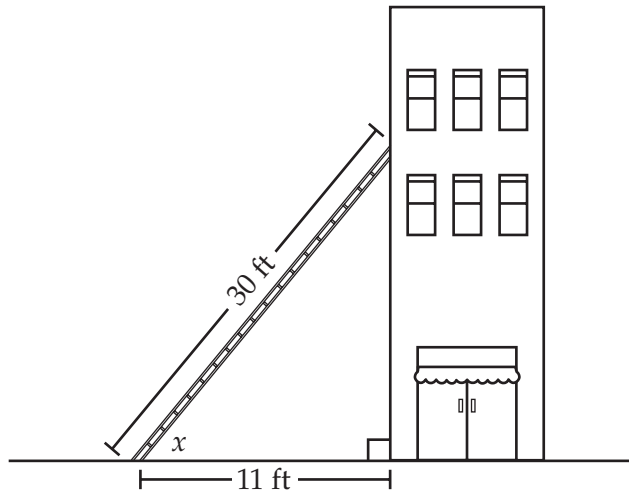


Note: The figure is not drawn to scale.

What is the measure of the angle (x) that the spotlight forms with the ground?
Round the answer to the nearest degree.

- F 31°
- G 37°
- H 53°
- J 59°

- 11** A 30-foot ladder is placed so that the base of the ladder is 11 feet from the side of the building.

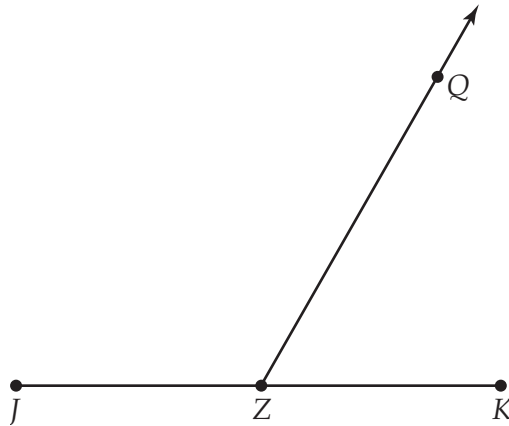


Note: The figure is not drawn to scale.

What is the measure of the angle (x) where the ladder meets with the ground?
Round the answer to the nearest degree.

- A 20°
- B 22°
- C 68°
- D 77°

12 In the figure below, Z is the midpoint of \overline{JK} .
ECR



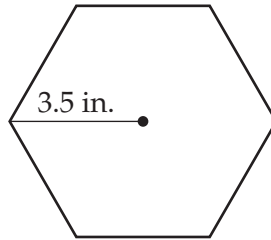
Complete the following in the Answer Book:

- Locate point L on \overrightarrow{ZQ} so that $ZL = ZK$.
- Draw \overline{LK} and \overline{JL} .
- Find and label the measure of all interior angles.
- Classify $\triangle JKL$ by its angles. Use mathematics to justify your answer.

Directions

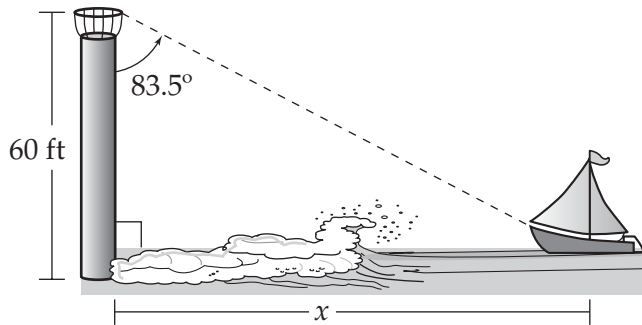
Use the Response Grids in the Answer Book to complete Numbers 13 through 15.

- 13** A regular hexagon is shown below. The distance from the center of the hexagon to one of the vertices is 3.5 inches.



What is the perimeter, in inches, of the hexagon?

- 14** From a tower 60 feet above the water's edge, the line of sight to a sailboat makes an 83.5° angle with the tower.

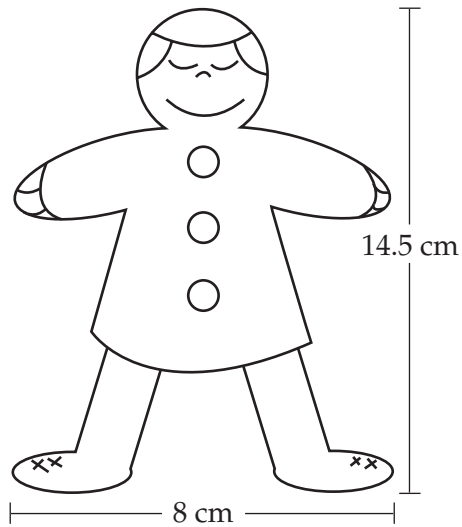


Note: The figure is not drawn to scale.

What is the distance (x) from the base of the tower to the sailboat?

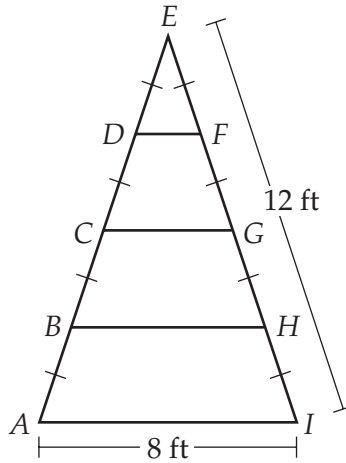


- 15 Terry is enlarging the doll cutout below so it will have a height of 42 centimeters. She wants to make sure that she has a piece of fabric that is wide enough.



What is the minimum width, in centimeters, that Terry needs for the enlarged doll cutout?

- 16** The frame shown below is an isosceles triangle with legs that measure 12 feet and a base that measures 8 feet. Each of the horizontal supports is equally spaced.
BCR

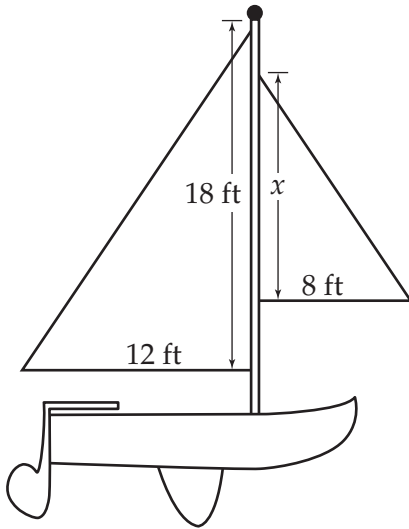


Note: The figure is not drawn to scale.

Complete the following in the Answer Book:

- How long are the horizontal supports \overline{DF} , \overline{CG} , and \overline{BH} ?
- Use mathematics to explain how you found your answers. Use words, symbols, or both in your explanation.

- 17** The sails of the boat shown below are similar triangles.



Note: The figure is not drawn to scale.

Which of these is the height (x) of the smaller sail?

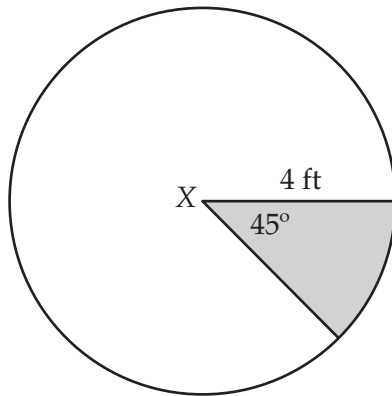
- A 8 feet
- B 12 feet
- C 14 feet
- D 18 feet

- 18** Point $P(1, 9)$, point $Q(9, 9)$, and point $R(11, 3)$ are vertices of parallelogram $PQRS$. What are the coordinates of point S ?

- F (1, 3)
- G (3, 3)
- H (3, 9)
- J (11, 9)



19 Circle X has a radius of 4 feet.



What is the area of the shaded region? Round the answer to the nearest square foot.

- A 3 square feet
- B 6 square feet
- C 13 square feet
- D 44 square feet



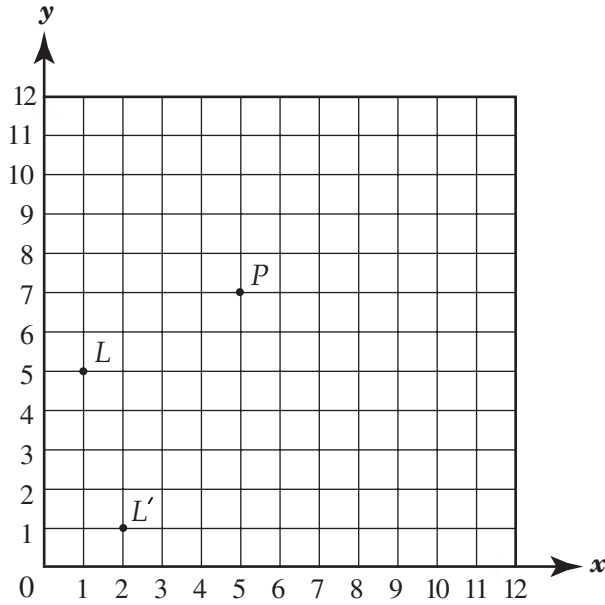
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Session **2**



- 20** A translation maps L to L' as shown below. Using the same translation, P is mapped to P' .

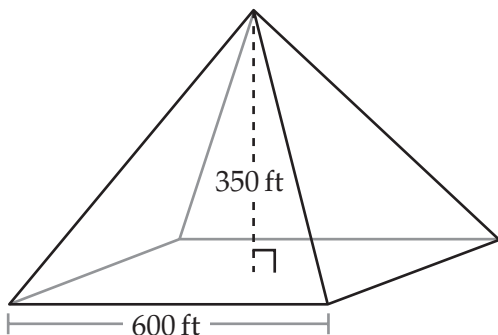


What are the coordinates of P' ?

- F (2, 1)
- G (4, 11)
- H (6, 3)
- J (9, 9)



- 21** **ECR** A hotel will be built in the shape of a giant glass pyramid, as shown below. The pyramid will have a height of 350 feet and a square base with edges 600 feet long.



Note: The figure is not drawn to scale.

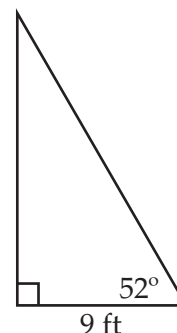
Complete the following in the Answer Book:

- What is the slant height of one of the triangular walls? Round your answer to the nearest foot. Use mathematics to explain how you determined the slant height. Use words, symbols, or both in your explanation.
- What is the amount of glass that is needed to construct the walls of the building? Use mathematics to justify your answer.

- 22** Which of these types of quadrilaterals will always be similar to other quadrilaterals of the same type?

- F parallelograms
- G rectangles
- H rhombuses
- J squares

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

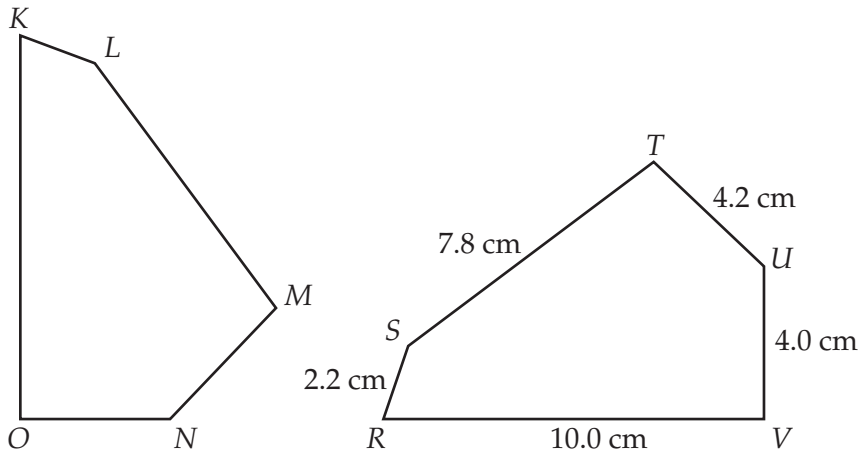


Note: The figure is not drawn to scale.

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

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

24 In the figures below, pentagon $KLMNO$ is congruent to pentagon $RSTUV$.



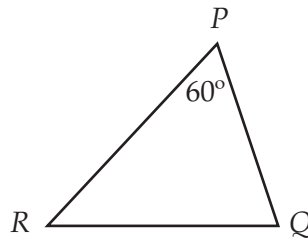
Note: The figures are not drawn to scale.

What is the length of \overline{MN} ?

- F 2.2 centimeters
- G 4.0 centimeters
- H 4.2 centimeters
- J 7.8 centimeters



- 25** $\triangle PQR$ is shown below. $m\angle Q > m\angle R$.



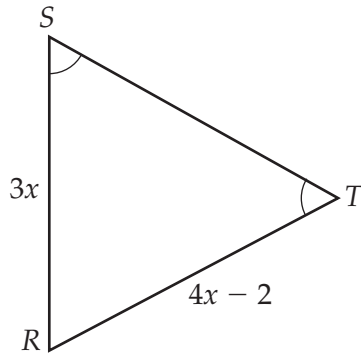
Note: The figure is not drawn to scale.

Which of these statements is true?

- A $PQ > PR > QR$
- B $PQ > QR > PR$
- C $PR > PQ > QR$
- D $PR > QR > PQ$

26 In the figure below,

- $\angle S \cong \angle T$;
- $RS = 3x$; and
- $RT = 4x - 2$.



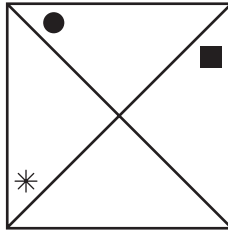
Note: The figure is not drawn to scale.

What is the value of x ?

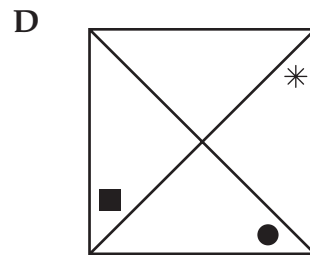
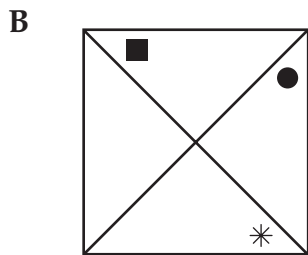
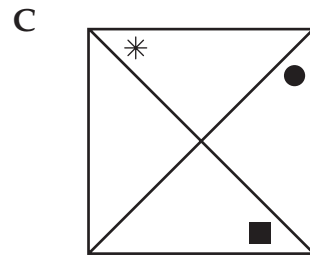
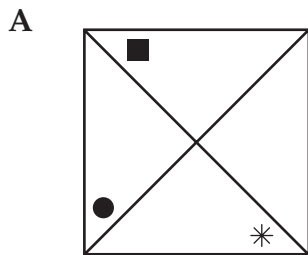
- F 2
- G 5
- H 6
- J 10



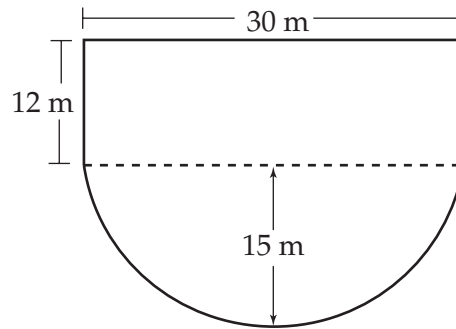
27 Look at the figure below.



Which of these shows a 270° clockwise rotation of the figure?



- 28** Bill wants to build a fence around the lot shown below. The lot is in the shape of a rectangle and semicircle.

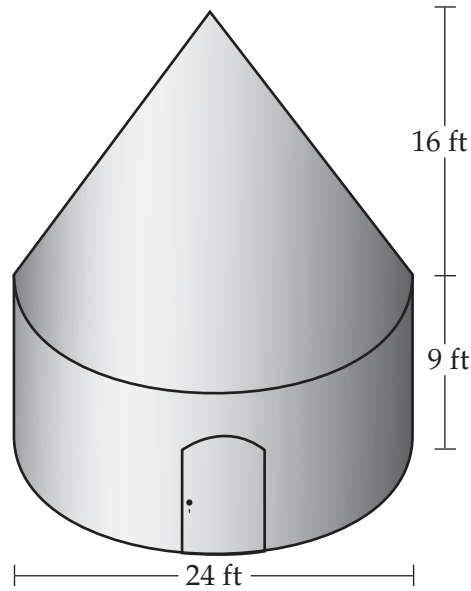


Note: The figure is not drawn to scale.

How much fencing will Bill need to complete the job? Round the answer to the nearest tenth of a meter.

- F 101.1 meters
- G 131.1 meters
- H 148.2 meters
- J 178.2 meters

- 29** A building is shaped like a cylinder with a cone on top. The diameter of the building is 24 feet, as shown below.

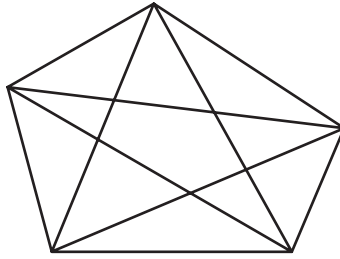


Note: The figure is not drawn to scale.

What is the volume of the entire building? Round the answer to the nearest cubic foot.

- A 2,413 cubic feet
- B 4,072 cubic feet
- C 6,484 cubic feet
- D 7,691 cubic feet

30 A pentagon has five diagonals, as shown below.



The chart below shows the relationship between the number of sides of a polygon and the number of diagonals in a polygon.

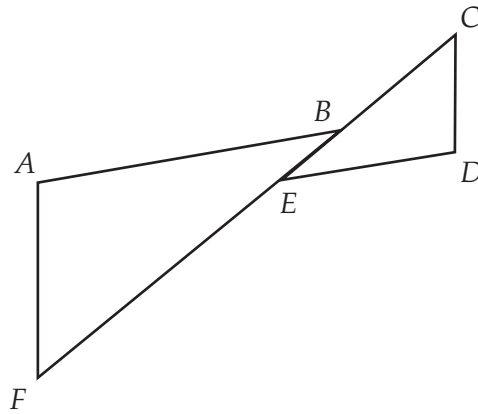
POLYGON DIAGONALS CHART

Number of Sides	3	4	5	6	7	8	9	10
Number of Diagonals	0	2	5	9	14	20	?	?

Based on this pattern, how many diagonals can be drawn in a 10-sided polygon?

- F 25
- G 27
- H 30
- J 35

- 31** \overline{AB} and \overline{ED} shown in the figure below are parallel. \overline{AF} and \overline{CD} are also parallel.
ECR



Note: The figure is not drawn to scale.

Complete the following in the Answer Book:

- Prove that $\triangle ABF$ is similar to $\triangle DEC$.

32 The perimeter of a square is 52 feet. What is the length of the diagonal of the square? Round the answer to the nearest foot.

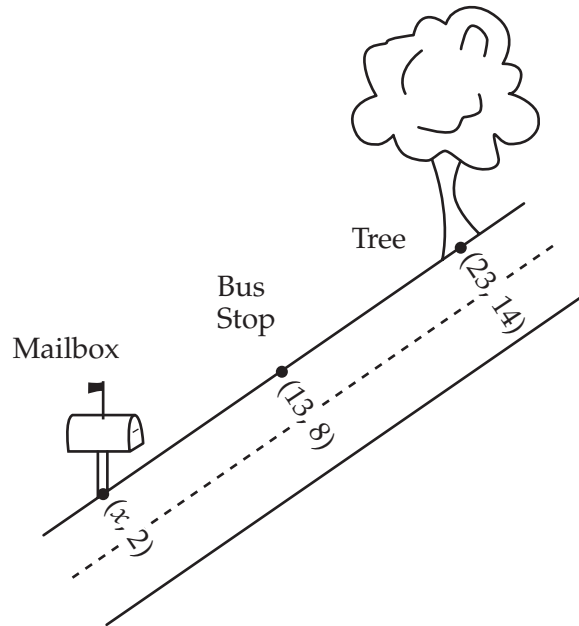
- F 13 feet
- G 18 feet
- H 23 feet
- J 37 feet

33 A cylinder has a circumference of 24π meters and a height that is 3 times its radius. What is the volume of the cylinder? Round the answer to the nearest cubic meter.

- A 1,357 cubic meters
- B 16,286 cubic meters
- C 48,858 cubic meters
- D 65,144 cubic meters



34 The bus stop is halfway between the tree and the mailbox.

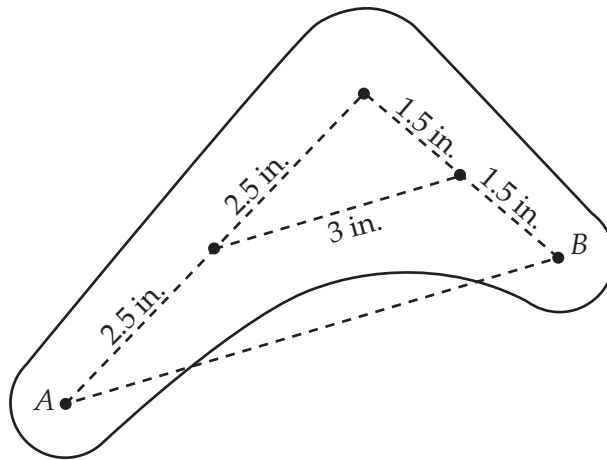


Note: The figure is not drawn to scale.

What is the value of x ?

- F 2
- G 3
- H 5
- J 10

35 Look at the figure below.



Note: The figure is not drawn to scale.

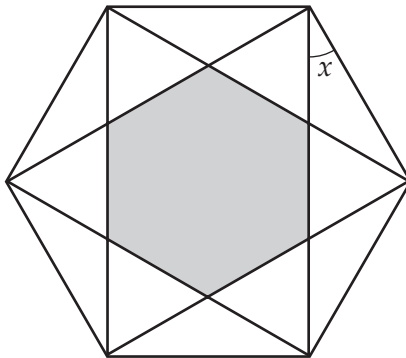
What is the distance, in inches, between A and B?



Directions

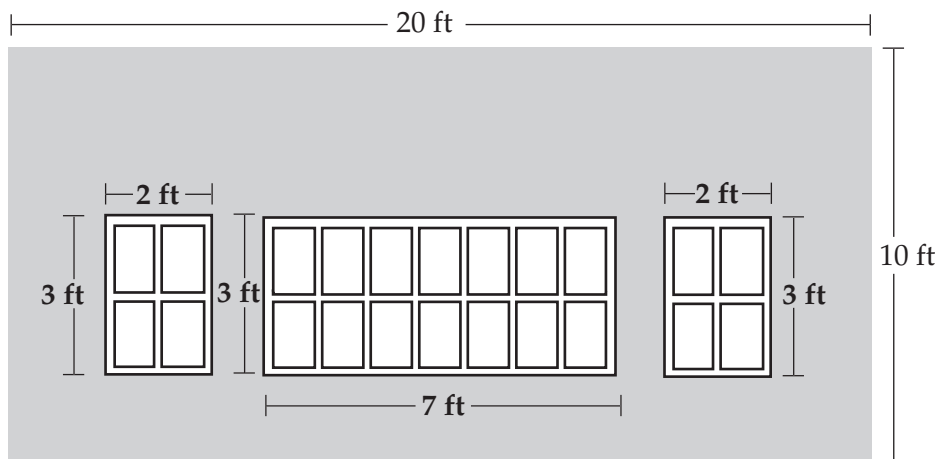
Use the Response Grids in the Answer Book to complete Numbers 36 and 37.

- 36** Diagonals of a regular hexagon were drawn to form equilateral triangles, isosceles triangles, and a smaller regular hexagon.



What is the measure, in degrees, of angle x ?

- 37** The dimensions of a rectangular wall and its rectangular windows are shown below. The shaded region will be covered by wallpaper.



Note: The figure is not drawn to scale.

What is the area, in square feet, that will be covered by wallpaper?





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