

**2014 Oak Park Back to School Packet for incoming 11th graders.**  
**Please show all work in the space provided for each question.**

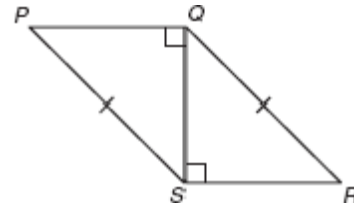
**NOTE: All lines should be straight lines even though they may not appear straight.**

**Multiple Choice**

*Identify the choice that best completes the statement or answers the question.*

\_\_\_\_\_ 1.

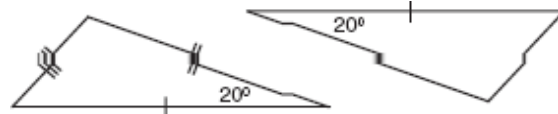
In the figure shown,  $\overline{PS} \cong \overline{RQ}$ . Which theorem can be used to prove  $\triangle SQR \cong \triangle QSP$ ?



- a. SSS
- b. SAS
- c. AAS
- d. HL

\_\_\_\_\_ 2.

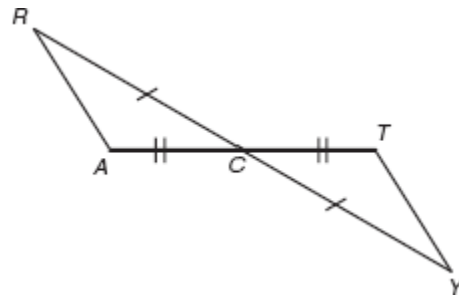
Using the diagram shown, choose the correct conclusion.



- a. The triangles are congruent by SSS.
- b. The triangles are congruent by ASA.
- c. The triangles are congruent by SAS.
- d. Not enough information to determine if the triangles are congruent.

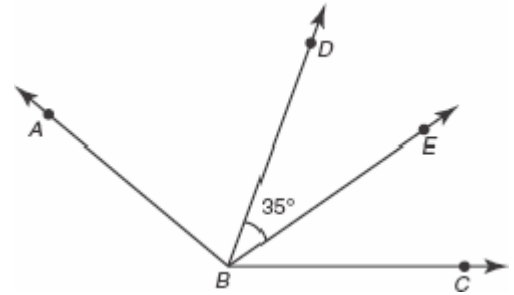
\_\_\_\_\_ 3.

Using the diagram shown, choose the correct conclusion.



- a. The triangles are congruent by SSS.
- b. The triangles are congruent by ASA.
- c. The triangles are congruent by SAS.
- d. Not enough information to determine if the triangles are congruent.

- \_\_\_\_\_ 4. In the figure shown,  $\overrightarrow{BD}$  bisects  $\angle ABC$ , and  $\overrightarrow{BE}$  bisects  $\angle DBC$ . The measure of  $\angle EBD$  is  $35^\circ$ . What is the measure of  $\angle ABC$ ?



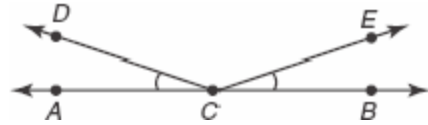
- a.  $35^\circ$
  - b.  $70^\circ$
  - c.  $90^\circ$
  - d.  $140^\circ$
- \_\_\_\_\_ 5. The following two statements are true.  
 Tom is older than David.  
 David is older than Aaron.  
 Which conclusion can be reached by deductive reasoning?
- a. Tom and Aaron are the same age.
  - b. Tom is older than Aaron.
  - c. Tom is older than David.
  - d. Aaron is older than Tom.

- \_\_\_\_\_ 6. In the figure shown,  $\overline{AC} \cong \overline{CE}$ ,  $D$  is the midpoint of  $\overline{CE}$ ,  $DE = 5$ , and  $BC = 2$ . What is the measure of  $\overline{AB}$ ?

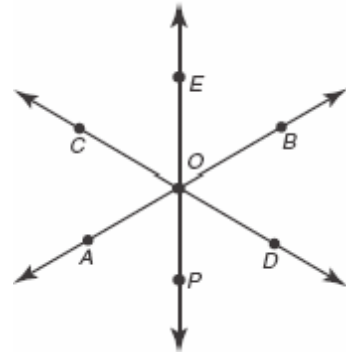


- a. 5
  - b. 7
  - c. 8
  - d. 10
- \_\_\_\_\_ 7. Two angles are supplementary. The larger angle is twice as large as the smaller angle. What is the measure of the smaller angle?
- a.  $30^\circ$
  - b.  $60^\circ$
  - c.  $90^\circ$
  - d.  $120^\circ$

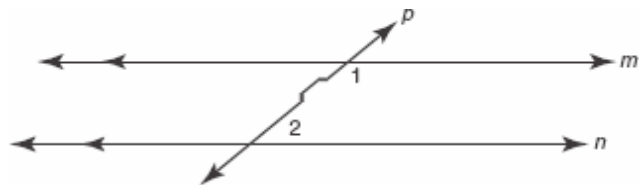
- \_\_\_\_\_ 8. What conclusion can you make based on the figure shown?



- \_\_\_\_\_ 9. The figure shows intersecting lines. Which angle pairs are vertical angles?



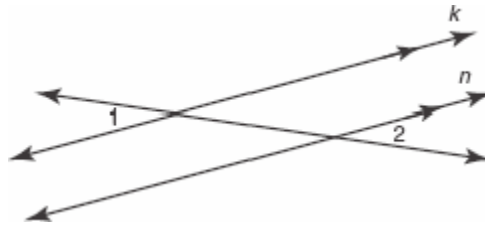
- \_\_\_\_\_ 10. In the diagram shown, parallel lines  $m$  and  $n$  are cut by transversal  $p$ . Which statement about  $\angle 1$  and  $\angle 2$  must be true?



- a.  $\angle 1 \cong \angle 2$
- b.  $\angle 1$  is the complement of  $\angle 2$ .
- c.  $\angle 1$  is the supplement of  $\angle 2$ .
- d. Angle 1 and  $\angle 2$  are vertical angles.

\_\_\_\_\_ 11.

In the figure shown, line  $k$  is parallel to line  $n$ .  
Given that  $m\angle 1 = 3x + 6^\circ$  and  $m\angle 2 = 9x - 24^\circ$ ,  
what is the measure of  $\angle 1$ ?



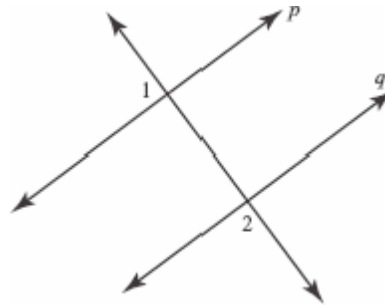
- a.  $5^\circ$
- b.  $16^\circ$
- c.  $21^\circ$
- d.  $54^\circ$

\_\_\_\_\_ 12.  $PARO$  is a parallelogram. Which angles are opposite angles of  $PARO$ ?

- a.  $\angle P$  and  $\angle O$   
 $\angle A$  and  $\angle R$
- b.  $\angle P$  and  $\angle R$   
 $\angle A$  and  $\angle O$
- c.  $\angle P$  and  $\angle A$   
 $\angle O$  and  $\angle R$
- d.  $\angle P$  and  $\angle R$   
 $\angle R$  and  $\angle A$

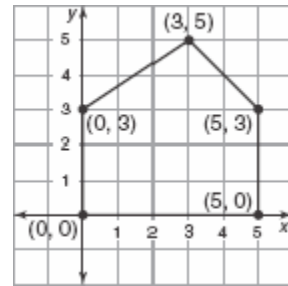
\_\_\_\_\_ 13.

In the figure,  $m\angle 1 = 95^\circ$  and  $m\angle 2 = 2x - 5^\circ$ .  
For what value of  $x$  will lines  $p$  and  $q$  be parallel?

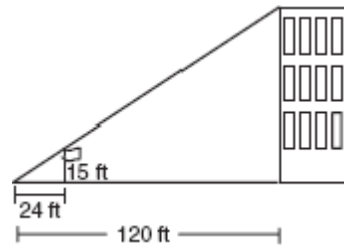


- a. 95
- b. 85
- c. 45
- d. 40

- \_\_\_\_\_ 14. What is the area of the region bounded by the five line segments?



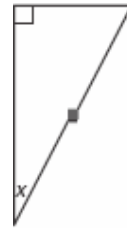
- a. 25 square units
  - b. 12.5 square units
  - c. 20 square units
  - d. 15 square units
- \_\_\_\_\_ 15. Calculate the height of the building.



- a. 60 feet
- b. 75 feet
- c. 80 feet
- d. 96 feet

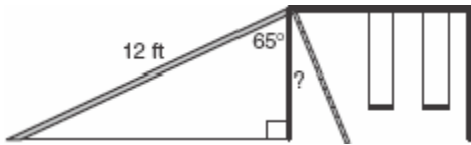
\_\_\_\_\_ 16.

In the figure shown, if  $\tan x = \frac{8}{15}$ , what are  $\sin x$  and  $\cos x$ ?



- a.  $\sin x = \frac{17}{8}$  and  $\cos x = \frac{17}{15}$
- b.  $\sin x = \frac{8}{17}$  and  $\cos x = \frac{15}{17}$
- c.  $\sin x = \frac{15}{17}$  and  $\cos x = \frac{8}{17}$
- d.  $\sin x = \frac{8}{15}$  and  $\cos x = \frac{17}{8}$

\_\_\_\_\_ 17. In the diagram shown, a 12-foot slide is attached to a swing set. The slide makes a  $65^\circ$  angle with the swing set. Which answer most closely represents the height of the top of the slide?



$$\sin 65^\circ \approx 0.91$$

$$\cos 65^\circ \approx 0.42$$

$$\tan 65^\circ \approx 2.14$$

- a. 5.0 feet
- b. 5.6 feet
- c. 10.9 feet
- d. 25.7 feet

\_\_\_\_\_ 18. Which of the following cannot be the lengths of the three sides of a triangle?

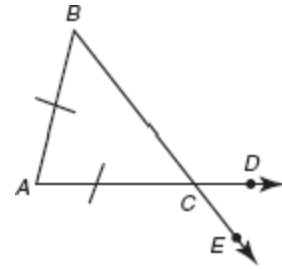
- a. 3 in., 4 in., 5 in.
- b. 5 cm, 12 cm, 13 cm
- c. 4 yd, 6 yd, 8 yd
- d. 3 mm, 6 mm, 9 mm

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\_\_\_\_\_ 19.

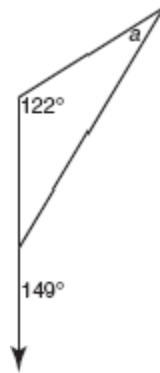
In the isosceles triangle shown, the measure of the base angle  $\angle B$  is  $52^\circ$ . What is the measure of  $\angle BCD$ ?



- a.  $52^\circ$
- b.  $64^\circ$
- c.  $116^\circ$
- d.  $128^\circ$

\_\_\_\_\_ 20.

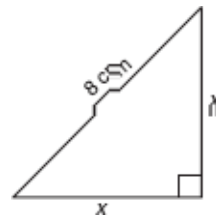
Solve for  $a$  in the diagram shown.



- a.  $58^\circ$
- b.  $31^\circ$
- c.  $29^\circ$
- d.  $27^\circ$

\_\_\_\_\_ 21.

In the triangle shown, what is the value of  $x$ ?

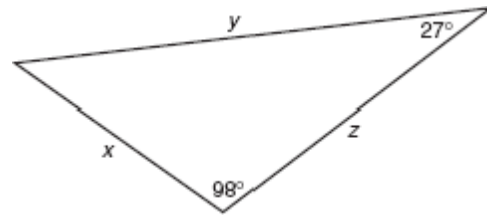


- a. 4
- b.  $4\sqrt{2}$
- c. 8
- d.  $8\sqrt{2}$

\_\_\_\_\_ 22. Which expression shows  $\sqrt{180}$  written in simplest form?

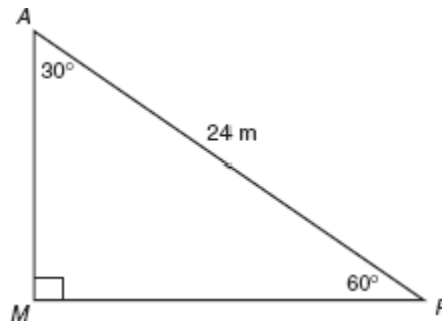
- a.  $2\sqrt{45}$
- b.  $3\sqrt{20}$
- c.  $6\sqrt{5}$
- d. none of the above

\_\_\_\_\_ 23. What is the order from least to greatest of the lengths of the sides of the triangle shown?



- a.  $z, y, x$
- b.  $x, z, y$
- c.  $x, y, z$
- d. Cannot be determined.

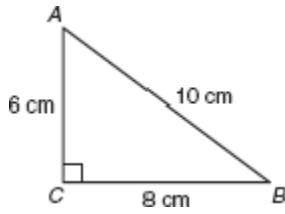
\_\_\_\_\_ 24. What is the length of  $\overline{AM}$  in triangle MAP?



- a.  $6\sqrt{3}$  m
- b. 12 m
- c.  $12\sqrt{2}$  m
- d.  $12\sqrt{3}$  m



\_\_\_\_\_ 25. Determine the three trigonometric ratios for  $\angle A$ . Write your answers as simplified fractions.



a.  $\sin A = \frac{4}{3}$ ,  $\cos A = \frac{3}{5}$ ,  $\tan A = \frac{4}{5}$

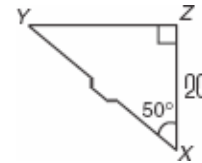
c.  $\sin A = \frac{4}{3}$ ,  $\cos A = \frac{4}{5}$ ,  $\tan A = \frac{3}{5}$

b.  $\sin A = \frac{4}{5}$ ,  $\cos A = \frac{3}{5}$ ,  $\tan A = \frac{4}{3}$

d.  $\sin A = \frac{4}{5}$ ,  $\cos A = \frac{5}{3}$ ,  $\tan A = \frac{4}{3}$

\_\_\_\_\_ 26.

Which equation can be used to calculate the length of  $\overline{XY}$  in the triangle shown?



a.  $\sin 50^\circ = \frac{XY}{20}$

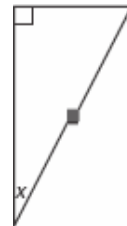
c.  $\sin 50^\circ = \frac{20}{XY}$

b.  $\cos 50^\circ = \frac{20}{XY}$

d.  $\cos 50^\circ = \frac{XY}{20}$

\_\_\_\_\_ 27.

In the figure shown, if  $\tan x = \frac{8}{15}$ , what is the  $\cos x$ ?



a.  $\cos x = \frac{17}{15}$

c.  $\cos x = \frac{15}{17}$

b.  $\cos x = \frac{15}{8}$

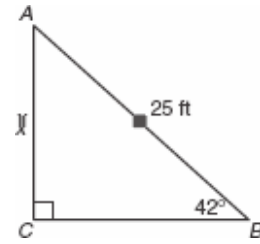
d.  $\cos x = \frac{8}{17}$

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\_\_\_\_\_ 28.

In the diagram shown,  $m\angle B = 42^\circ$  and  $AB = 25$  feet. Which equation can be used to calculate the value of  $x$ ?



a.  $\sin 42^\circ = \frac{x}{25}$

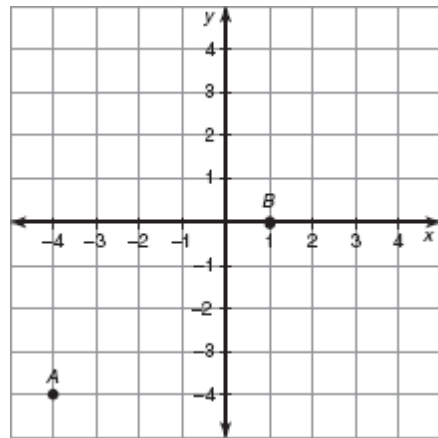
c.  $\tan 42^\circ = \frac{x}{25}$

b.  $\cos 42^\circ = \frac{x}{25}$

d.  $\sin \frac{42^\circ}{25} = x$

\_\_\_\_\_ 29.

What is the distance between point A and point B on the grid?



a.  $\sqrt{41}$

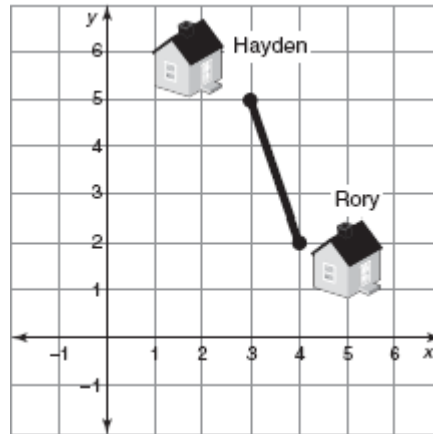
b. 5

c. 3

d.  $4\sqrt{2}$

\_\_\_\_\_ 30.

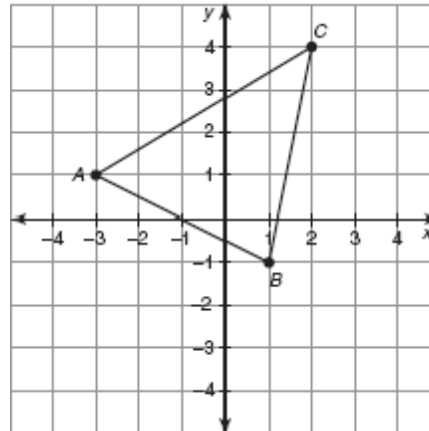
How far is the walk along the path from Rory's house to Hayden's house? (Note: Each grid square represents one city block.)



- a.  $\sqrt{10}$  blocks
- b. 3 blocks
- c.  $\sqrt{2}$  blocks
- d. 4.2 blocks

\_\_\_\_\_ 31.

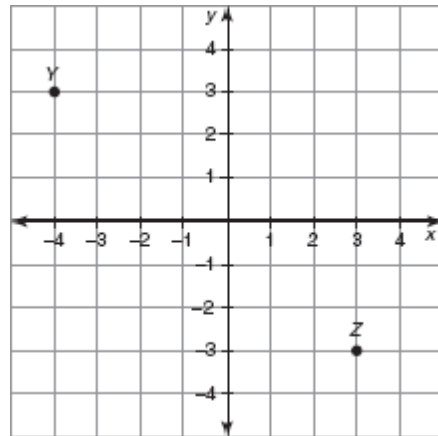
What is the midpoint of side  $\overline{AB}$  of the triangle?



- a.  $(-1, 0)$
- b.  $(0, -1)$
- c.  $(1, 0)$
- d.  $(0, 1)$

\_\_\_\_\_ 32.

Suppose that point  $X$  lies halfway between points  $Y$  and  $Z$  on the grid. What are the coordinates of point  $X$ ?



- a. (0, 0)
- b. (-0.5, 0)
- c. (-1, 0)
- d. (0, -0.5)

\_\_\_\_\_ 33. The midpoint of a line segment is  $(-1, -3)$ . One endpoint is  $(7, 3)$ . What is the other endpoint?

- a. (3, 0)
- b. (-13, -1)
- c. (15, 9)
- d. (-9, -9)

### Matching

Match each term with its description.

- a. two angles whose measures add up to  $90^\circ$
- b. two nonadjacent angles that are formed by two intersecting lines
- c. two angles whose measures add up to  $180^\circ$
- d. an angle whose measure is greater than  $90^\circ$  but less than  $180^\circ$
- e. two angles that share a common vertex and a common side

\_\_\_\_\_ 34. obtuse angle

\_\_\_\_\_ 35. complementary angles

\_\_\_\_\_ 36. adjacent angles

\_\_\_\_\_ 37. vertical angles

\_\_\_\_\_ 38. supplementary angles

Match each property with the figure it best describes.

- a. a quadrilateral with both pairs of opposite sides parallel
- b. a quadrilateral with all sides congruent
- c. a quadrilateral with exactly one pair of parallel sides
- d. a quadrilateral with opposite sides congruent and four right angles
- e. a quadrilateral with two pairs of consecutive congruent sides with opposite sides not congruent
- f. a quadrilateral with four right angles and all sides congruent

- \_\_\_\_\_ 39. rectangle
- \_\_\_\_\_ 40. kite
- \_\_\_\_\_ 41. parallelogram
- \_\_\_\_\_ 42. square
- \_\_\_\_\_ 43. trapezoid
- \_\_\_\_\_ 44. rhombus

### Short Answer

Each answer is graded on the following rubric.

**4 pts - completely correct**

**3 pts - minor error(s)**

**2 pts - little understanding but work shown**

**1 pt - attempted problem with minimal understanding 0 pts - no response**

- 45. The measure of angle  $T$  is  $70^\circ$ .
  - a. What is the measure of an angle that is complementary to  $\angle T$ ?
  - b. What is the measure of an angle that is supplementary to  $\angle T$ ?
- 46. Line segment  $AB$  has midpoint  $M$ . If the measure of line segment  $AB$  is equal to 4 inches, what is the measure of line segment  $AM$ ?
- 47. The first four numbers in a sequence are 5, 17, 29, and 41.
  - a. What is the next number in the sequence? How did you calculate the next number?
  - b. What types of reasoning did you use and in what order to make the conclusion?

48. Sketch and label an example of each statement.

a.  $\overleftrightarrow{HI} \perp \overleftrightarrow{JK}$

b. Angle  $R$  is acute.

c.  $\angle D \cong \angle E$

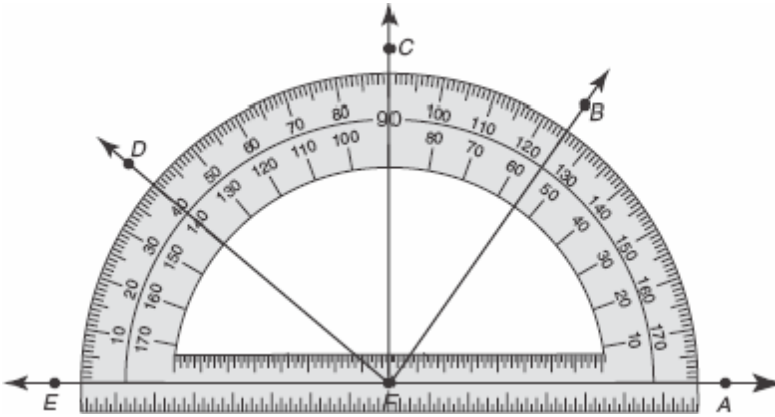
d. Angle 4 and  $\angle 5$  are vertical angles.

e.  $W$  is the midpoint of  $\overline{VX}$ .

f.  $\overline{FG}$

49. What does it mean when a line segment is bisected?

50. Use the diagram shown to determine the measure of each angle. Then classify each angle.



a.  $\angle AFD$

b.  $\angle AFB$

c.  $\angle EFD$

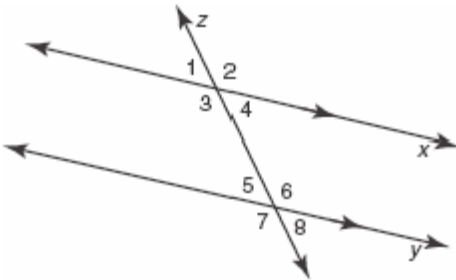
d.  $\angle EFB$

e.  $\angle DFB$

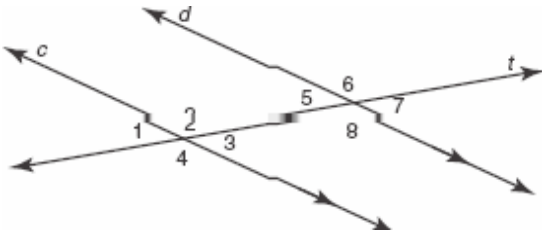
f.  $\angle CFA$

51. A complement of an angle measures 10 degrees more than the measure of the angle. What is the measure of the angle and its complement? Explain.

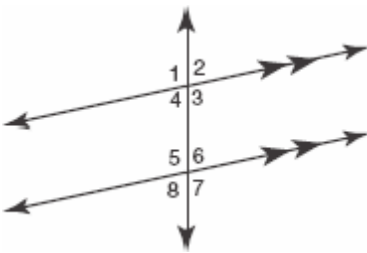
52. In the figure, line  $x$  is parallel to line  $y$  and  $m\angle 1 = 64^\circ$ . Determine the measure of  $\angle 8$  using the Corresponding Angle Postulate and any other theorems, postulates, or properties.



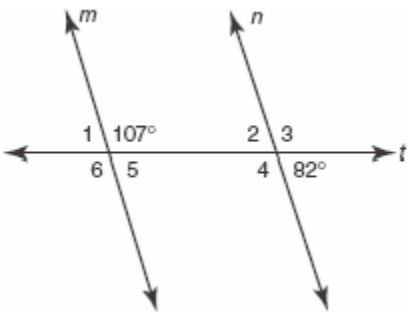
53. In the figure, line  $c$  is parallel to line  $d$  and  $m\angle 3 = 26^\circ$ . Determine the measure of  $\angle 6$  using the Corresponding Angle Postulate and any other theorems, postulates, or properties.



54. The lines shown in the figure are parallel, and  $m\angle 1 = 102^\circ$ . Determine the missing angle measures without using a protractor. Explain how you calculated your answers.



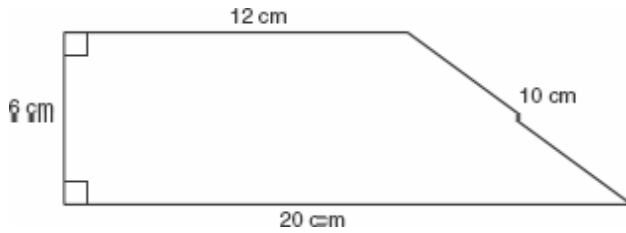
55. The measures of two angles are given in the figure. Are lines  $m$  and  $n$  parallel? Explain.



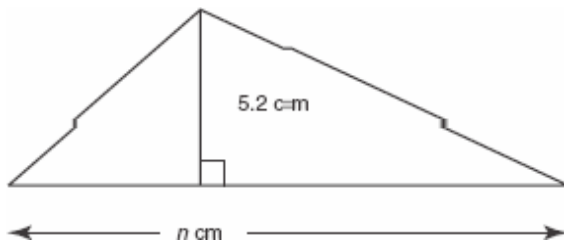
**Write the area formula for each shape.**

- 56. triangle
- 57. rectangle
- 58. parallelogram

59. Calculate the area of the trapezoid shown.



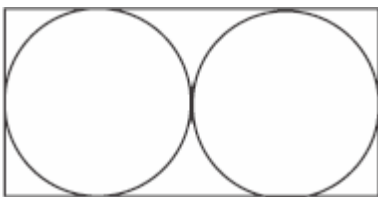
60. The area of the triangle shown is 38.48 square centimeters. What is the value of  $n$ ?



61. A side length of the square is 14 inches. The diameter of the circle is 8 inches. Calculate the area of the shaded portion. Use 3.14 for  $\pi$ .



62. The figure shown consists of a rectangle and two congruent circles. If the area of the rectangle is 1250 square feet, what is the radius of one of the circles?



**Write the area formula for each shape.**

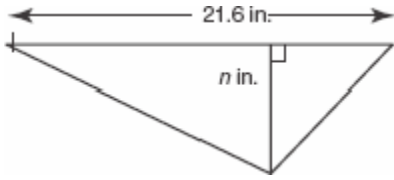
63. The area of a rectangular room is 144 square feet. If the length of the room is 16 feet, what is the perimeter of the room? Draw a diagram and show all your work.



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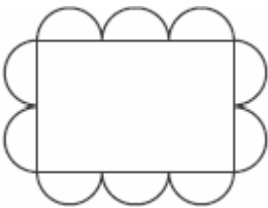
64. The area of the triangle shown is 72.36 square inches. What is the value of  $n$ ?



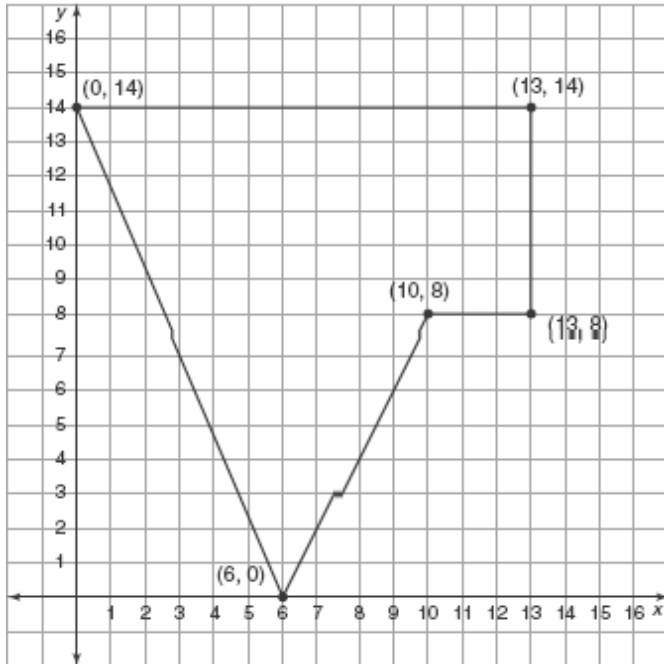
65. The diameter of the large circle is 6 feet. The diameter of the small circle is 2 feet. Calculate the area of the shaded portion. Leave your answer in terms of  $\pi$ .



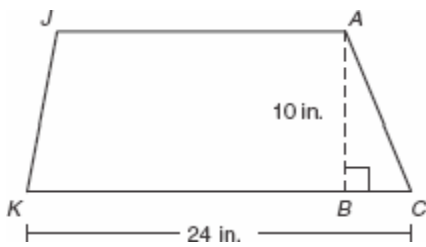
66. The figure shown consists of a rectangle and 10 congruent semicircles. If the perimeter of the rectangle is 88 centimeters, what is the radius of one of the semicircles?



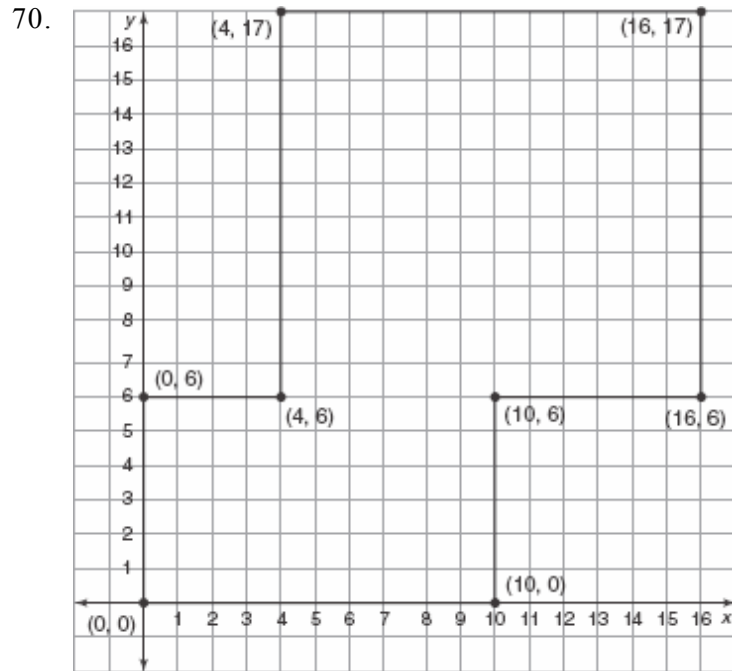
67. Calculate the area of the region bound by the given coordinates on the graph. Show all your work.



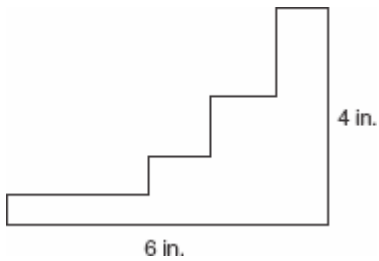
68. The area of a parallelogram is 85 square meters and its base is 17 meters long. What is the height of the parallelogram?
69. The area of trapezoid  $JACK$  is 210 square inches. The length of  $\overline{AB}$  is 10 inches and the length of  $\overline{KC}$  is 24 inches. What is the length of  $\overline{JA}$ ?



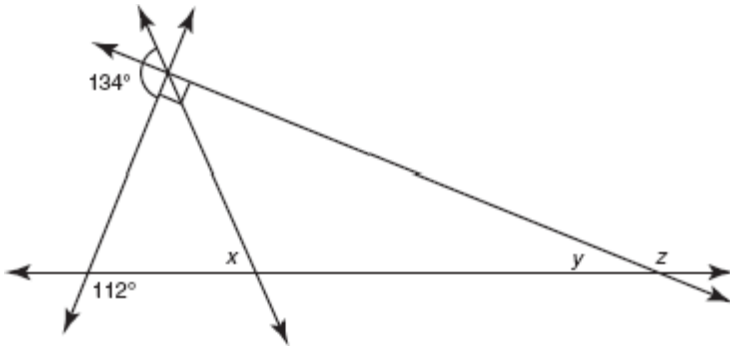
Determine the area of the region bounded by the line segments.



71. The area of a parallelogram is 322 square meters and the base is 14 meters long. What is the height of the parallelogram?
72. All of the line segments in the figure shown are either vertical or horizontal. What is the perimeter of the figure?



Determine the measure of each lettered angle.



73.  $x =$  \_\_\_\_\_

74.  $y =$  \_\_\_\_\_

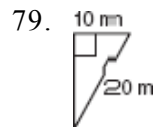
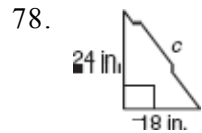
75.  $z =$  \_\_\_\_\_

Simplify each expression. Write each answer in radical form. Show all your work.

76.  $\sqrt{98}$

77.  $\frac{3}{\sqrt{5}}$

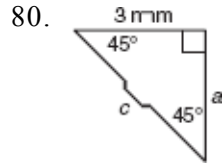
Calculate the missing side lengths of each triangle. Round your answers to the nearest tenth. Show all your work and use a complete sentence in your answer.



Name: \_\_\_\_\_

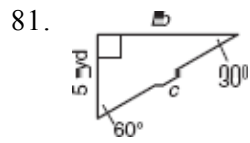
ID: A

Calculate the unknown side lengths in each triangle. Show all your work and use a complete sentence in your answer. Do not evaluate the radicals.



$a =$  \_\_\_\_\_

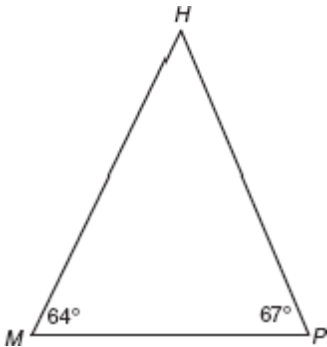
$c =$  \_\_\_\_\_



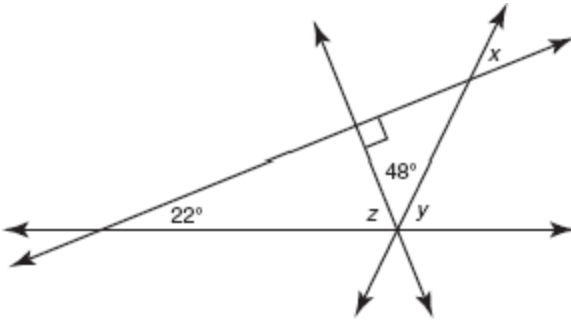
$b =$  \_\_\_\_\_

$c =$  \_\_\_\_\_

82. List the sides of the triangle shown in order from least to greatest length.



Determine the measure of each lettered angle.



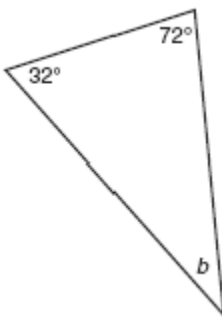
83.  $x =$  \_\_\_\_\_

84.  $y =$  \_\_\_\_\_

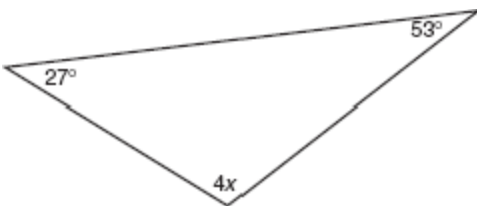
85.  $z =$  \_\_\_\_\_

Determine the value of each variable. Show all your work.

86.



87.



Simplify each expression below. Show all your work.

88.  $\sqrt{54}$

89.  $\frac{16}{\sqrt{5}}$

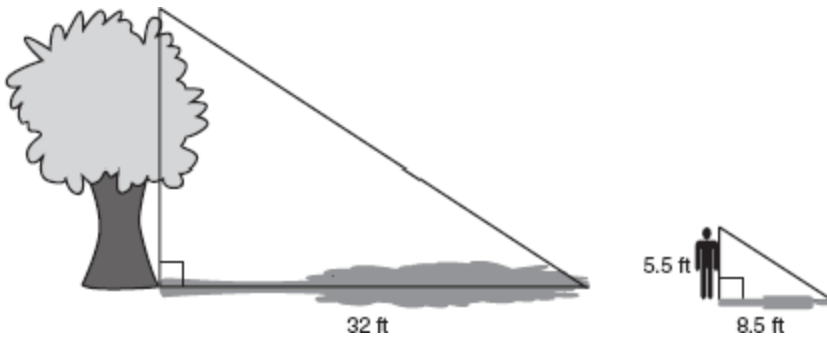
**Simplify each expression. Show all your work.**

90.  $\sqrt{72}$

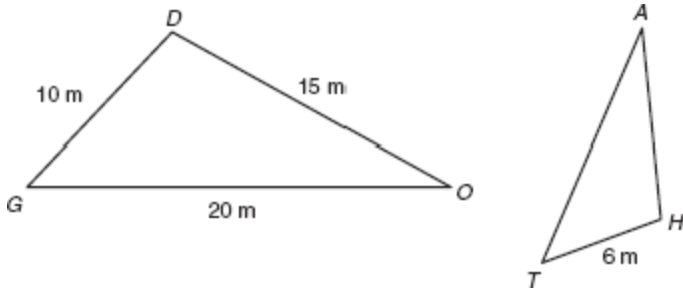
**Use the scenario to answer the following question.**

**The cost of 15 gallons of gas is \$45.**

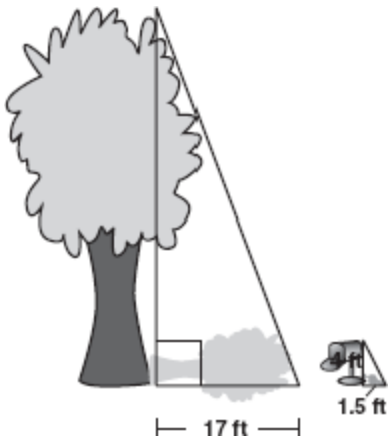
91. Calculate the number of gallons of gas you could buy with \$9. Show all your work.
92. Determine the height of the tree. Round your answer to the nearest hundredth, if necessary.



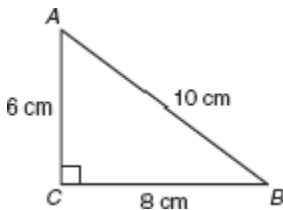
93. In the figure shown,  $\triangle HAT \sim \triangle DOG$ . Determine the length of  $\overline{HA}$ .



94. Determine the height of the tree. Round your answer to the nearest hundredth, if necessary.

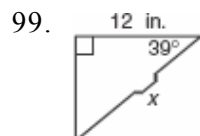
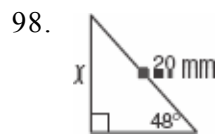


95. The average female giraffe is 15 feet tall and has a neck approximately 7 feet long. You are building a 2-foot scale model of the giraffe. Calculate the length of the model's neck.
96. Write the six trigonometric ratios for  $\angle A$ . Write your answers as simplified fractions.



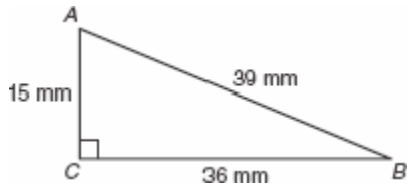
97. Josh is using a clinometer to determine the height of a building. He places the clinometer 50 feet from the base of the building and measures the angle of elevation to be  $72^\circ$ . Draw a diagram that models the situation. Then determine the height of the building. Round your answer to the nearest foot. Show all your work.

**Use trigonometric ratios to determine the value of  $x$ . Show all your work and round your answer to the nearest tenth.**





100. Write the six trigonometric ratios for  $\angle A$ . Write your answers as simplified fractions.



**Calculate the distance between each pair of points. Round your answer to the nearest tenth, if necessary.**

101.  $(-3, -1)$  and  $(9, -6)$

102.  $(2, 0)$  and  $(-3, 1)$

**Calculate the midpoint of the line segment with the given endpoints.**

103.  $(2, 9)$  and  $(-2, 5)$

104.  $(-4, 8)$  and  $(-5, -2)$

**Calculate the distance between each pair of points. Round your answer to the nearest tenth, if necessary.**

105.  $(4, 10)$  and  $(-3, -1)$

106.  $(-3, 8)$  and  $(9, 2)$

**Calculate the midpoint of the line segment with the given endpoints.**

107.  $(-1, 3)$  and  $(-4, -4)$

108.  $(3, -1)$  and  $(-2, 2)$