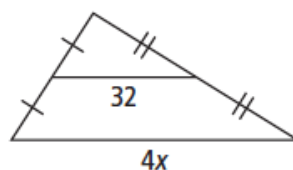


Do Now

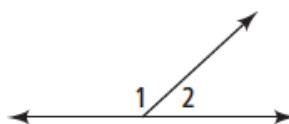
67

1. What is the value of x in the diagram at the right?

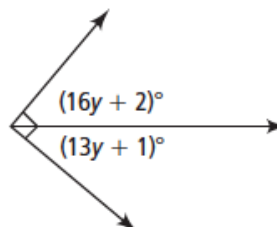


2. Which best describes $\angle 1$ and $\angle 2$?

- ☐ F vertical angles
☐ G corresponding angles
☐ H alternate exterior angles
☐ I linear pair



3. What is the value of y in the diagram at the right?



4. Which is not a point of concurrency in a triangle?

- ☐ F incenter ☐ G orthocenter ☐ H altitude ☐ I centroid

Special Right Triangles

Objective To use the properties of 45° - 45° - 90° and 30° - 60° - 90° triangles

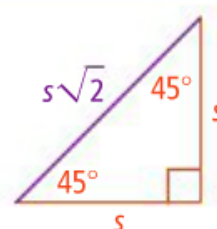
Essential Understanding Certain right triangles have properties that allow you to use shortcuts to determine side lengths without using the Pythagorean Theorem.

take note

Theorem 8-5 45°-45°-90° Triangle Theorem

In a 45°-45°-90° triangle, both legs are congruent and the length of the hypotenuse is $\sqrt{2}$ times the length of a leg.

$$\text{hypotenuse} = \sqrt{2} \cdot \text{leg}$$



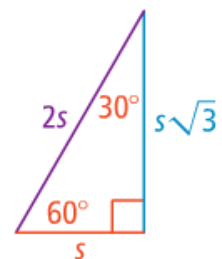
take note

Theorem 8-6 30°-60°-90° Triangle Theorem

In a 30°-60°-90° triangle, the length of the hypotenuse is twice the length of the shorter leg. The length of the longer leg is $\sqrt{3}$ times the length of the shorter leg.

$$\text{hypotenuse} = 2 \cdot \text{shorter leg}$$

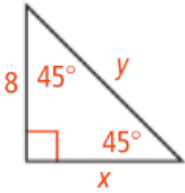
$$\text{longer leg} = \sqrt{3} \cdot \text{shorter leg}$$

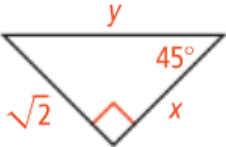


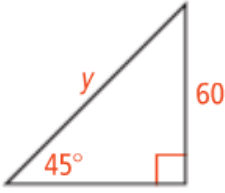
homework

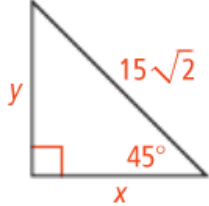
Find the value of each variable. If your answer is not an integer, express it in simplest radical form. [See Prob](#)

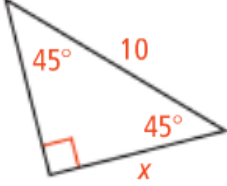
7.

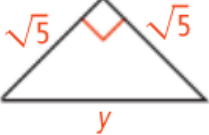

8.


9.


10.

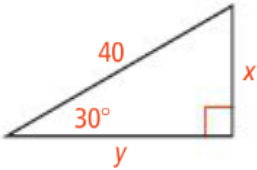

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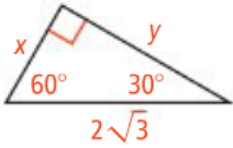

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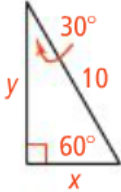


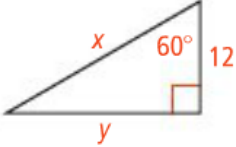
Algebra Find the value of each variable. If your answer is not an integer, express it in simplest radical form. [See Problems](#)

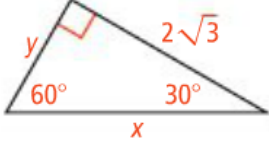
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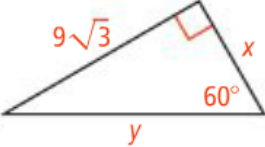

16.


17.


18.

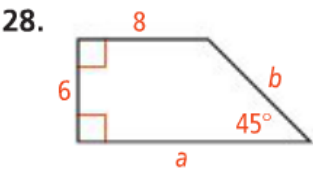
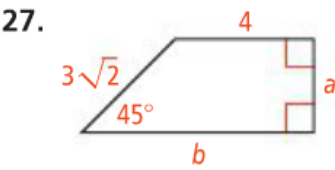
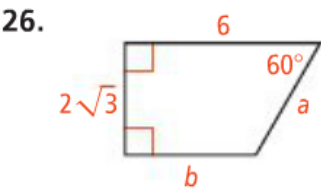
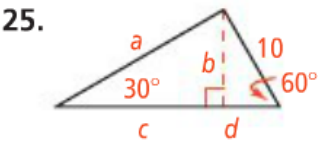
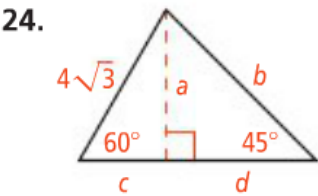
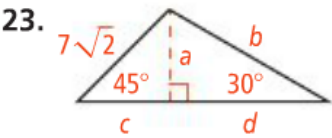

19.


20.



homework

Algebra Find the value of each variable. If your answer is not an integer, express it in simplest radical form.



7. $x = 8, y = 8\sqrt{2}$

8. $x = \sqrt{2}, y = 2$

9. $60\sqrt{2}$

10. $x = 15, y = 15$

11. $5\sqrt{2}$

12. $\sqrt{10}$

15. $x = 20, y = 20\sqrt{3}$

16. $x = \sqrt{3}, y = 3$

17. $x = 5, y = 5\sqrt{3}$

18. $x = 24, y = 12\sqrt{3}$

19. $x = 4, y = 2$

20. $x = 9, y = 18$

23. $a = 7, b = 14, c = 7, d = 7\sqrt{3}$

24. $a = 6, b = 6\sqrt{2}, c = 2\sqrt{3}, d = 6$

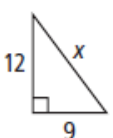
25. $a = 10\sqrt{3}, b = 5\sqrt{3}, c = 15,$
 $d = 5$

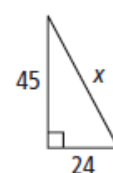
26. $a = 4, b = 4$

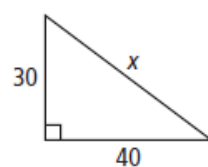
27. $a = 3, b = 7$

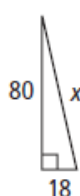
28. $a = 14, b = 6\sqrt{2}$

Algebra Find the value of x .

1.  To start, use the Pythagorean Theorem. Then substitute 9 for a , 12 for b , and x for c .
 $\square^2 + \square^2 = \square^2$ 9; 12; x ; 15

2.  51

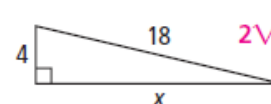
3.  50

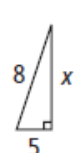
4.  82

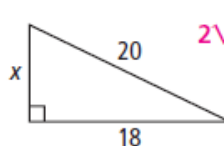
Does each set of numbers form a Pythagorean triple? Explain.

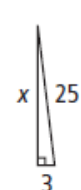
5. 6, 8, 10 yes; $6^2 + 8^2 = 36 + 64 = 100 = 10^2$
 6. 7, 16, 18 no; $7^2 + 16^2 = 49 + 256 = 305 \neq 18^2$
 7. 16, 30, 34 yes; $16^2 + 30^2 = 256 + 900 = 1156 = 34^2$

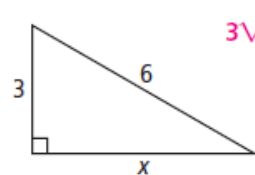
Algebra Find the value of x . Express your answer in simplest radical form.

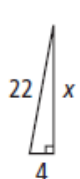
8.  $2\sqrt{77}$

9.  $\sqrt{39}$

10.  $2\sqrt{19}$

11.  $2\sqrt{154}$

12.  $3\sqrt{3}$

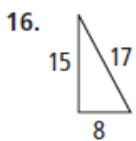
13.  $6\sqrt{13}$

14. A window washer has an 18-ft ladder. He needs to reach the bottom of a window 16 feet off the ground. How far out from the building should the base of the ladder be? Round to the nearest tenth of a foot. **8.2 ft**

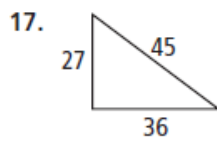
To start, use the Pythagorean Theorem. Then substitute 16 for a and 18 for c .

15. **Reasoning** A square has a diagonal of 12 cm. What is the perimeter of the square? Express in simplest radical form. **$24\sqrt{2}$**

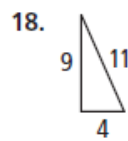
Is each triangle a right triangle? Explain.



yes; $8^2 + 15^2 = 17^2$



yes; $27^2 + 36^2 = 45^2$



no; $4^2 + 9^2 < 11^2$

The lengths of the sides of a triangle are given. Classify each triangle as *acute*, *right*, or *obtuse*.

19. 3, 4, 6 **obtuse**

To start, compare c^2 to $a^2 + b^2$. Substitute the greatest length for c .

20. 9, 11, 16 **obtuse**

21. 4, 6, 7 **acute**

22. 6, 8, 12 **obtuse**

23. 24, 70, 74 **right**

24. 10, 12, 14 **acute**

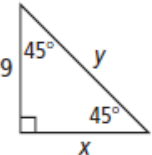
25. 20, 25, 31 **acute**

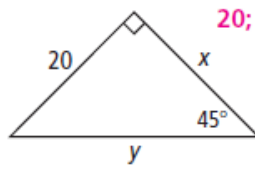
26. **Reasoning** In parallelogram $ABCD$, $AB = 20$, $BC = 15$, and $AC = 22$. Is $ABCD$ a rectangle? Explain.
It is not a rectangle. If $ABCD$ were a rectangle, then $\triangle ABC$ would be a right \triangle , then $AB^2 + BC^2 = AC^2$, but $15^2 + 20^2 > 22^2$.
27. **Open-Ended** Write a set of three numbers to represent the sides of each type of triangle listed below. Then draw each triangle.
- a. acute Check students' work. The square of the greatest number must be less than the sum of the squares of the other two numbers.
 - b. obtuse Check students' work. The square of the greatest number must be greater than the sum of the squares of the other two numbers.
 - c. right Check students' work. The square of the greatest number must be equal to the sum of the squares of the other two numbers.

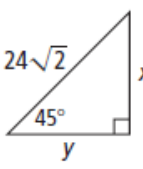
Open-Ended Find integers j and k such that (a) the two given integers and j represent the side lengths of an acute triangle, and (b) the two given integers and k represent the side lengths of an obtuse triangle.

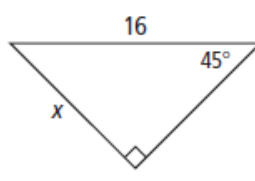
28. 33, 55 Answers may vary. $45 \leq j \leq 64$; $23 \leq k \leq 43$ or $65 \leq k \leq 87$
29. 60, 65 Answers may vary. $26 \leq j \leq 88$; $6 \leq k \leq 24$ or $89 \leq k \leq 124$
30. **Reasoning** A classmate drew an acute triangle with sides 9 in. and 12 in. What is the greatest possible whole number that can be the length of the longest side of the triangle in inches? 14

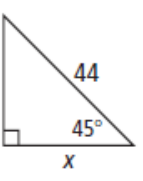
Find the value of each variable. If your answer is not an integer, express it in simplest radical form.

1.  To start, use the 45° - 45° - 90° Triangle Theorem to find x .
Because the legs are ?, $x =$ 9.
9; $9\sqrt{2}$ congruent

2.  20; $20\sqrt{2}$

3.  24; 24

4.  8\sqrt{2}

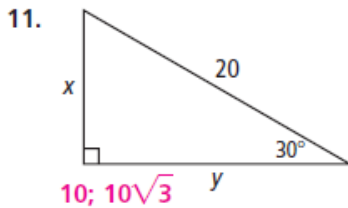
5.  22\sqrt{2}

6. An architect is planning a new town square. The square has sides that are 20 ft long. A walkway will also cut diagonally through the square. How long will the walkway be? Round to the nearest tenth of a foot. 28.3 ft
7. Charlene made a square quilt block by piecing together four congruent isosceles right triangles. The diagonal of the square is 6 in. What is the perimeter of the square in simplest radical form? 12\sqrt{2} in.
8. A square has a side length of $11\sqrt{2}$ meters. What is the length of the diagonal of the square? 22 m
9. A square has a diagonal of 15 cm. What is the length of a side? Express in simplest radical form. $\frac{15\sqrt{2}}{2}$

10. **Reasoning** A classmate said that the perimeter of an isosceles right triangle can never be a whole number. Is this true? Explain.

No; there is always an isosceles triangle that can be made with a given perimeter. To show this, make an isosceles triangle from a piece of string with a whole number length.

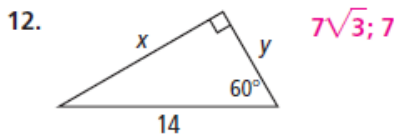
Find the value of each variable. If your answer is not an integer, express it in simplest radical form.



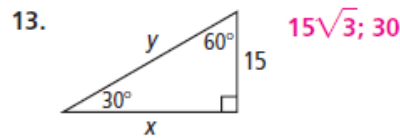
To start, find the length of the leg.
Use the 30° - 60° - 90° Triangle Theorem to write an equation in terms of x .

$$\boxed{20} = 2 \cdot \boxed{x}$$

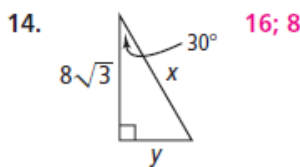
10; $10\sqrt{3}$



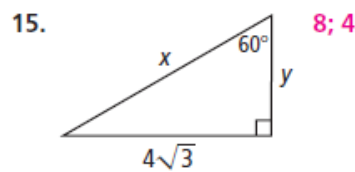
$7\sqrt{3}$; 7



$15\sqrt{3}$; 30



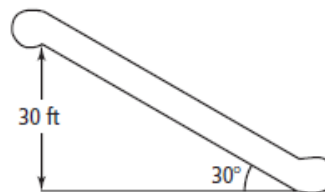
16; 8



8; 4

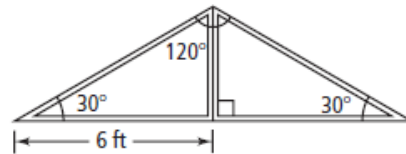
16. The top of a giant slide is 30 ft off the ground. The slide rises at a 30° angle. To the nearest whole foot, what is the distance down the slide?

60 ft

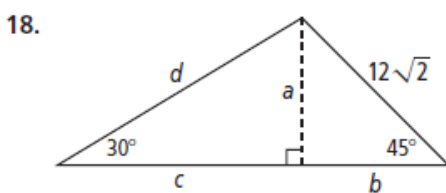


17. The frame for a garage roof is shown at the right. How long is each of the top pieces? Round to the nearest tenth of a foot.

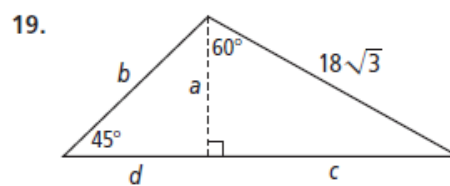
6.9



Algebra Find the value of each variable. If your answer is not an integer, express it in simplest radical form.



$a = 12$; $b = 12$; $c = 12\sqrt{3}$; $d = 24$



$a = 9\sqrt{3}$; $b = 9\sqrt{6}$; $c = 27$; $d = 9\sqrt{3}$