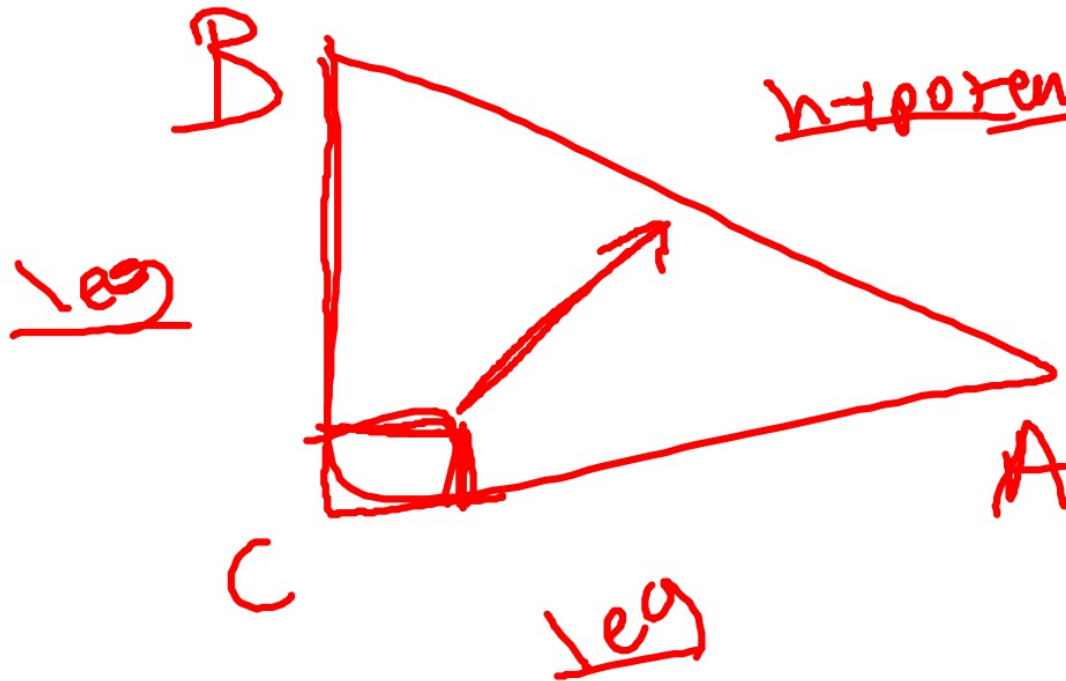


Q.411

Lesson 5  
Pythagorean Theorem

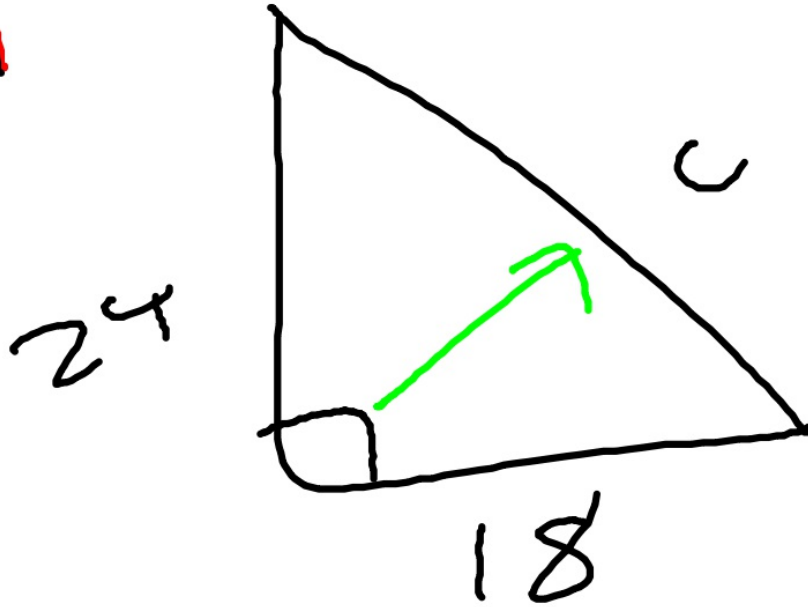


$$\overline{BC} = \underline{6 \text{ cm}}$$

$$\overline{CA} = \underline{8 \text{ cm}}$$

$$\overline{AB} = \underline{10 \text{ cm}}$$

9

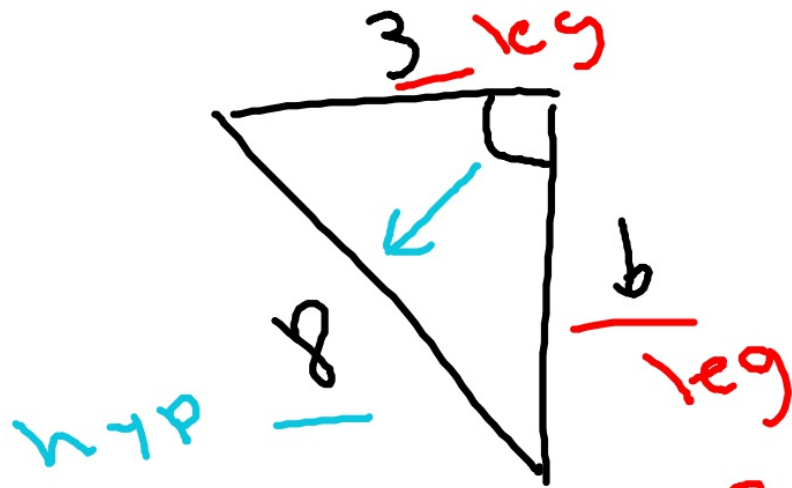


$$24^2 + 18^2 = c^2$$

$$c \quad 576 + 324 = c^2$$

$$\sqrt{900} = \sqrt{c^2}$$

$$30 = c$$



$$3^2 + b^2 = 8^2$$

$$9 + b^2 = 64$$

$$\begin{array}{r} - 9 \\ \hline b^2 = 55 \end{array}$$

$$b = \sqrt{55}$$

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Converse

\* Assume the longest length  
is the hypotenuse.

③

5, 10, 12

$$5^2 + 10^2 = 12^2 \text{ false}$$

$$25 + 100 \neq 144$$

NOT a right  
triangle

④

9, 40, 41

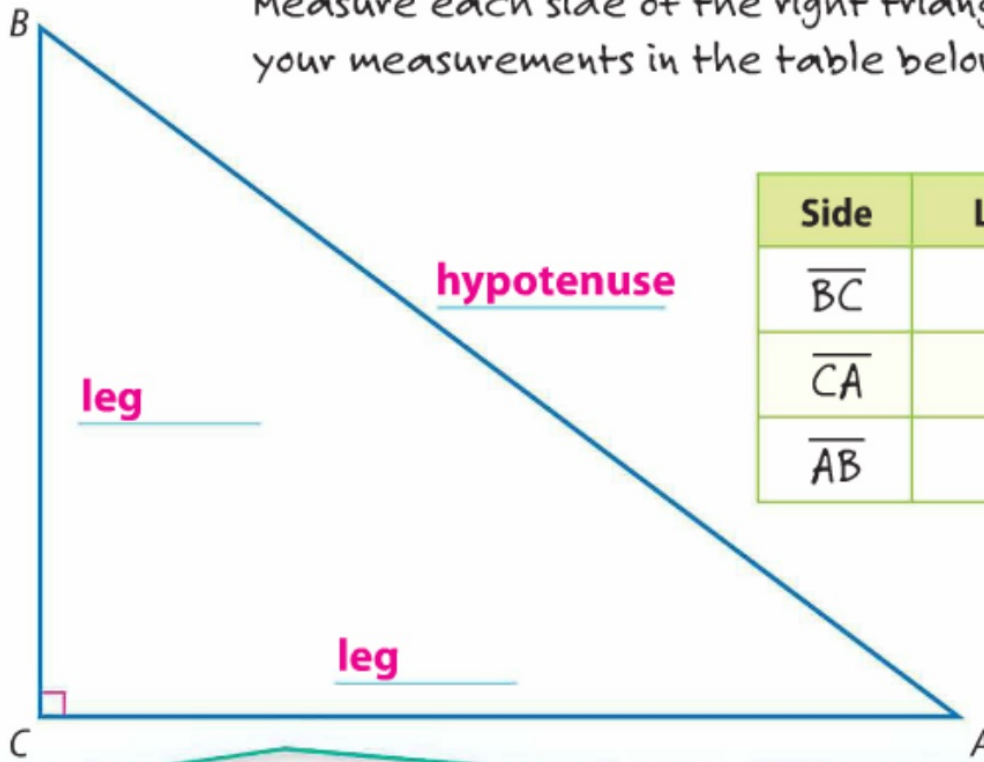
$$9^2 + 40^2 = 41^2 \text{ true}$$

$$81 + 1600 = 1681$$

~~It is~~  
a right triangle

Complete the graphic organizer. Label the legs and the hypotenuse.

Draw a right angle symbol on the right angle.  
Measure each side of the right triangle and write  
your measurements in the table below.



Side	Length (cm)
$\overline{BC}$	6 cm
$\overline{CA}$	8 cm
$\overline{AB}$	10 cm

Show your work.

d.  $36^2 + 48^2 = 60^2$

e.  $4^2 + 5^2 \neq 7^2$

### Got It? Do these problems to find out.

Determine whether each triangle with sides of given lengths is a right triangle. Justify your answer.

d. 36 mi, 48 mi, 60 mi

e. 4 ft, 7 ft, 5 ft

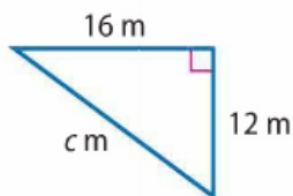
## Guided Practice



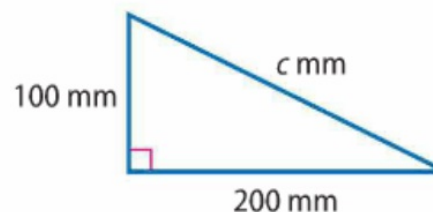
Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary. (Examples 1 and 2)

1.  $12^2 + 16^2 = c^2$ ; 20 m

Show your work.




2.  $100^2 + 200^2 = c^2$ ; 223.6 mm



Determine whether each triangle with sides of given lengths is a right triangle. Justify your answer. (Example 3)

3. 5 in., 10 in., 12 in. no;  $5^2 + 10^2 \neq 12^2$

4. 9 m, 40 m, 41 m yes;  $9^2 + 40^2 = 41^2$

5.  **Building on the Essential Question** What is the relationship among the legs and the hypotenuse of a right triangle?

The sum of the squares of the lengths of the legs is equal to the square of the length of the hypotenuse.

### Rate Yourself!

How confident are you about using the Pythagorean Theorem? Check the box that applies.



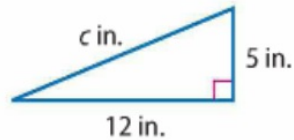
For more help, go online to access a Personal Tutor.



**FOLDABLES** Time to update your Foldable!

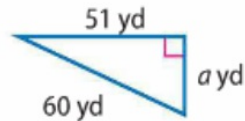
Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary. (Examples 1 and 2)

1.  $5^2 + 12^2 = c^2$ ; 13 in.

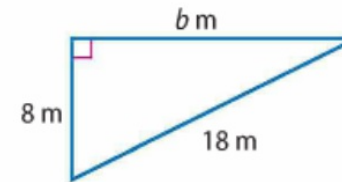


Show your work. →

2.  $a^2 + 51^2 = 60^2$ ; 31.6 yd



3.  $8^2 + b^2 = 18^2$ ; 16.1 m



Determine whether each triangle with sides of given lengths is a right triangle. Justify your answer. (Example 3)

4. 28 yd, 195 yd, 197 yd

yes;  $28^2 + 195^2 = 197^2$

5. 30 cm, 122 cm, 125 cm

no;  $30^2 + 122^2 \neq 125^2$



6. Calculate the length of the diagonal of the state of Wyoming.

about 457 mi



Write an equation you could use to find the length of the missing side of each right triangle. Then find the missing length. Round to the nearest tenth if necessary.

7.  $a = 48$  yd;  $b = 55$  yd

$48^2 + 55^2 = c^2$ ; 73 yd

8.  $a = 23$  in.;  $b = 18$  in.

$23^2 + 18^2 = c^2$ ; 29.2 in.

9.  $b = 5.1$  m;  $c = 12.3$  m

$a^2 + 5.1^2 = 12.3^2$ ; 11.2 m

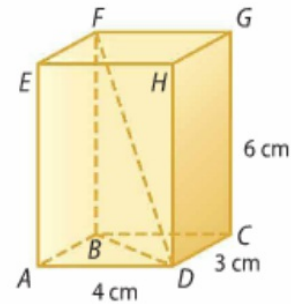
10. **CCSS Use Math Tools** The whole numbers 3, 4, and 5 are called Pythagorean triples because they satisfy the Pythagorean Theorem. Complete the graphic organizer shown to list 4 additional sets of Pythagorean triples.

Pythagorean Triples		
3	4	5
6	8	10
9	12	15
5	12	13
8	15	17

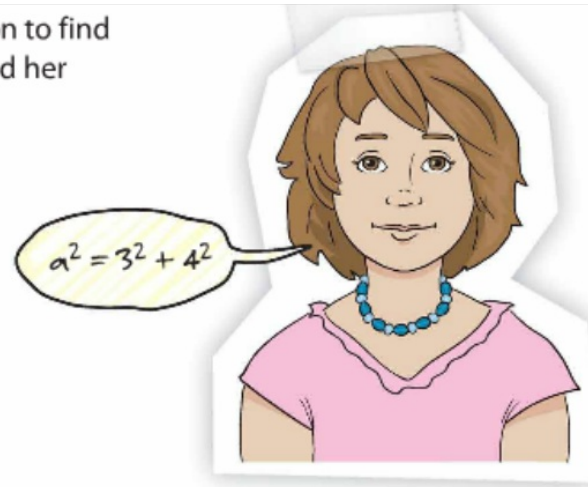
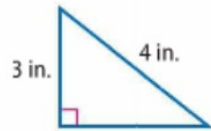
### H.O.T. Problems Higher Order Thinking

11. **CCSS Persevere with Problems** In the figure,  $\overline{BD}$  is the diagonal of the base and  $\overline{FD}$  is the diagonal of the figure. Find  $\overline{FD}$  to the nearest tenth.

**7.8 cm**



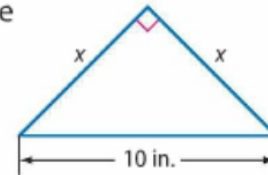
12. **CCSS Find the Error** Danielle is writing an equation to find the length of the third side of the right triangle. Find her mistake and correct it.



She used the sides given as legs, when  
one is a hypotenuse;  $a^2 + 3^2 = 4^2$ .

13. **CCSS Justify Conclusions** What does the value of  $x$  have to be for the figure to be classified as a right isosceles triangle? Justify your reasoning.

about 7.1 in; Sample answer: The Pythagorean Theorem states that  $c^2 = a^2 + b^2$ . Since both legs are  $x$  inches,  $c^2 = 2x^2$ . When you replace  $c$  with 10 and simplify,  $x \approx 7.1$ .



14. **CCSS Justify Conclusions** The hypotenuse of a right triangle is 23 centimeters long. Find possible measures for the legs of the triangle. Round to the nearest hundredth. Justify your answer.

Sample answer: 15 cm and 17.44 cm;  $23^2 = 529$  and  $15^2 + 17.44^2 = 529.1536$ . So,  $23^2 \approx 15^2 + 17.44^2$ .