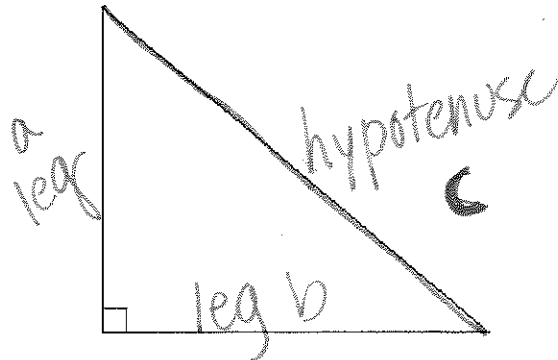


Name: \_\_\_\_\_ Date: \_\_\_\_\_ Hour: \_\_\_\_\_

## Guided Notes: Pythagorean Theorem

The Pythagorean Theorem is useful when you need to find the length of a side of a right triangle.



A right triangle is a triangle with a 90° angle (right angle)

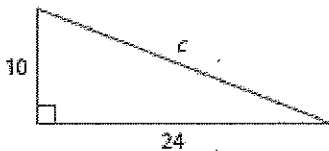
In a right triangle, the side opposite the right angle is called the hypotenuse.

The other two sides are called the legs

PYTHAGOREAN THEOREM:  $a^2 + b^2 = c^2$

**Example:** Find the missing length. If necessary, round to the nearest tenth.

1)



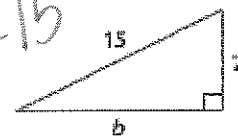
$$10^2 + 24^2 = c^2$$

$$100 + 576 = c^2$$

$$\sqrt{676} = \sqrt{c^2}$$

$$26 = c$$

2)



$$7^2 + b^2 = 15^2$$

$$49 + b^2 = 225$$

$$b^2 = 176$$

$$b = 13.3$$

Determine whether or not 9, 12, and 16 can be the lengths of the sides of a right triangle.

$$9^2 + 12^2 = 16^2$$

$$81 + 144 = 256$$

$$225 \neq 256$$

No!

Determine whether or not 30, 40, and 50 can be the lengths of the sides of a right triangle.

$$30^2 + 40^2 = 50^2$$

$$900 + 1600 = 2500$$

$$2500 = 2500$$

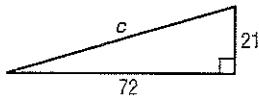
Yes!

# 10-5 Skills Practice

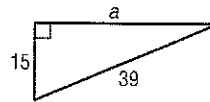
## The Pythagorean Theorem

Find each missing length. If necessary, round to the nearest hundredth.

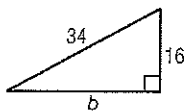
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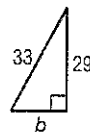
2.



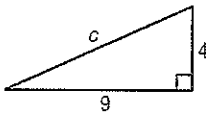
3.



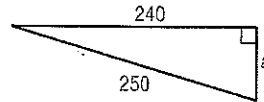
4.



5.



6.



Determine whether each set of measures can be sides of a right triangle. Then determine whether they form a Pythagorean triple.

7. 7, 24, 25

8. 15, 30, 34

9. 16, 28, 32

10. 18, 24, 30

11. 15, 36, 39

12. 5, 7,  $\sqrt{74}$

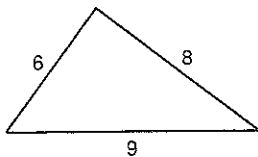
13. 4, 5, 6

14. 10, 11,  $\sqrt{221}$

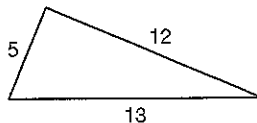
### The Pythagorean Theorem

Do the following lengths form a right triangle?

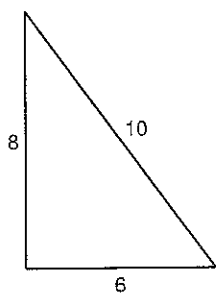
1)



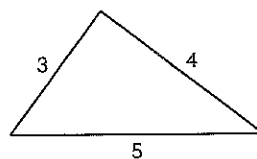
2)



3)



4)

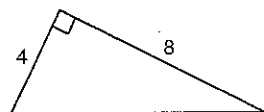


5)  $a = 6.4, b = 12, c = 12.2$

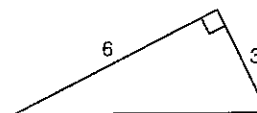
6)  $a = 2.1, b = 7.2, c = 7.5$

Find each missing length to the nearest tenth.

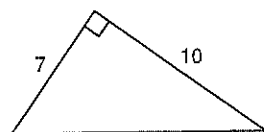
7)



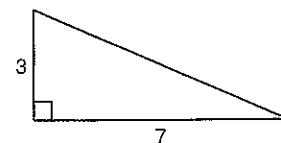
8)



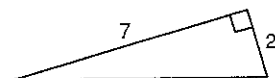
9)



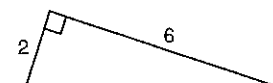
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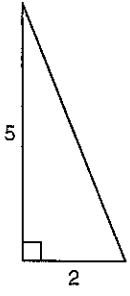
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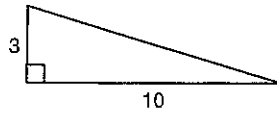
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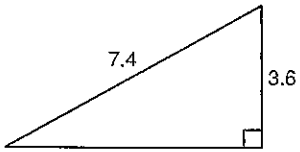
13)



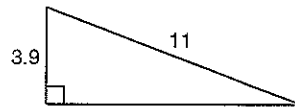
14)



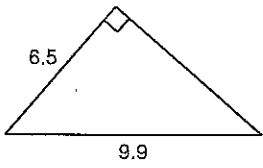
15)



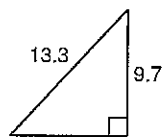
16)



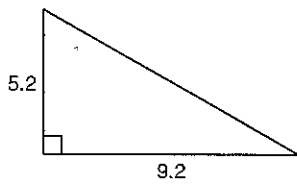
17)



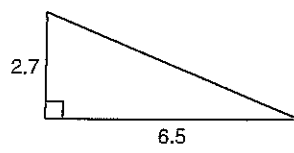
18)



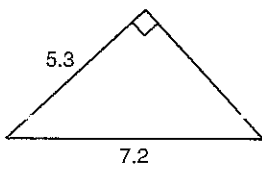
19)



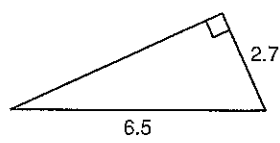
20)



21)



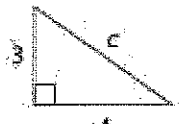
22)



## Error Analysis: Pythagorean Theorem

**Directions:** Below are completed problems that have been done incorrectly. Circle the error(s), and explain what they did wrong on the lines given. Then, solve the problem correctly.

For the following problems, find the missing side length.

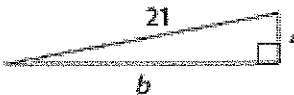
1. 

$3 + 4 = c$   
 $7 = c$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

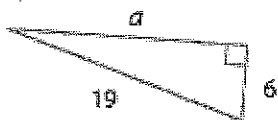
2. 

$4^2 + b^2 = 21$   
 $16 + b^2 = 21$   
 $b^2 = 5$   
 $b = \sqrt{5}$   
 $b = 2.2$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

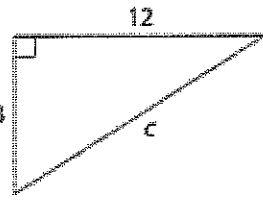
3. 

$19^2 + 6^2 = a^2$   
 $361 + 36 = a^2$   
 $397 = a^2$   
 $a = 19.9$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

4. 

$8^2 + 12^2 = c^2$   
 $64 + 144 = c^2$   
 $208 = c^2$

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Determine whether each set of measures can be the lengths of the sides of a right triangle.

5. 8, 12, 16

$$12^2 + 16^2 = 8^2$$

$$144 + 256 = 64$$

$$400 \neq 64 \quad \underline{\text{No!}}$$

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6. 28, 45, 53

$$28 + 45 = 53$$

$$73 \neq 53 \quad \underline{\text{No!}}$$

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7. 7, 24, 25

$$7^2 + 24^2 = 25^2$$

$$49 + 567 = 625$$

$$616 \neq 625 \quad \underline{\text{No!}}$$

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8. 15, 25, 45

$$15^2 - 25^2 = 45^2$$

$$225 - 625 = 2025$$

$$-400 \neq 2025 \quad \underline{\text{No!}}$$

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## 10-5 Study Guide and Intervention *(continued)*

### The Pythagorean Theorem

**Right Triangles** If  $a$  and  $b$  are the measures of the shorter sides of a triangle,  $c$  is the measure of the longest side, and  $c^2 = a^2 + b^2$ , then the triangle is a right triangle.

**Example** Determine whether each set of measures can be sides of a right triangle.

a. 10, 12, 14

Since the greatest measure is 14, let  $c = 14$ ,  $a = 10$ , and  $b = 12$ .

$$c^2 = a^2 + b^2 \quad \text{Pythagorean Theorem}$$

$$14^2 \stackrel{?}{=} 10^2 + 12^2 \quad a = 10, b = 12, c = 14$$

$$196 \stackrel{?}{=} 100 + 144 \quad \text{Multiply.}$$

$$196 \neq 244 \quad \text{Add.}$$

Since  $c^2 \neq a^2 + b^2$ , segments with these measures cannot form a right triangle.

b. 7, 24, 25

Since the greatest measure is 25, let  $c = 25$ ,  $a = 7$ , and  $b = 24$ .

$$c^2 = a^2 + b^2 \quad \text{Pythagorean Theorem}$$

$$25^2 \stackrel{?}{=} 7^2 + 24^2 \quad a = 7, b = 24, c = 25$$

$$625 \stackrel{?}{=} 49 + 576 \quad \text{Multiply.}$$

$$625 = 625 \quad \text{Add.}$$

Since  $c^2 = a^2 + b^2$ , segments with these measures can form a right triangle.

### Exercises

Determine whether each set of measures can be sides of a right triangle. Then determine whether they form a Pythagorean triple.

1. 14, 48, 50

2. 6, 8, 10

3. 8, 8, 10

4. 90, 120, 150

5. 15, 20, 25

6. 4, 8,  $4\sqrt{5}$

7. 2, 2,  $\sqrt{8}$

8. 4, 4,  $\sqrt{20}$

9. 25, 30, 35

10. 24, 36, 48

11. 18, 80, 82

12. 150, 200, 250

13. 100, 200, 300

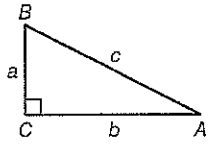
14. 500, 1200, 1300

15. 700, 1000, 1300

# 10-5 Study Guide and Intervention

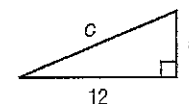
## The Pythagorean Theorem

**The Pythagorean Theorem** The side opposite the right angle in a right triangle is called the **hypotenuse**. This side is always the longest side of a right triangle. The other two sides are called the **legs** of the triangle. To find the length of any side of a right triangle, given the lengths of the other two sides, you can use the **Pythagorean Theorem**.

<p><b>Pythagorean Theorem</b></p>	<p>If <math>a</math> and <math>b</math> are the measures of the legs of a right triangle and <math>c</math> is the measure of the hypotenuse, then <math>c^2 = a^2 + b^2</math>.</p>	
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**Example** Find the missing length.

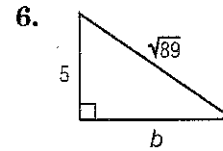
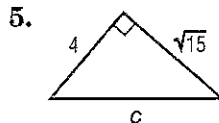
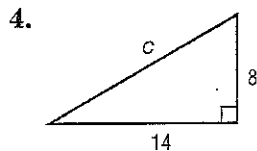
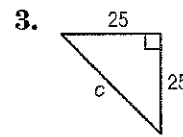
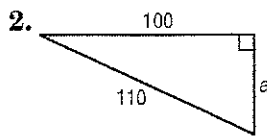
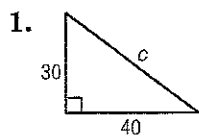
$c^2 = a^2 + b^2$       Pythagorean Theorem  
 $c^2 = 5^2 + 12^2$        $a = 5$  and  $b = 12$   
 $c^2 = 169$       Simplify.  
 $c = \sqrt{169}$       Take the square root of each side.  
 $c = 13$       Simplify.



The length of the hypotenuse is 13.

### Exercises

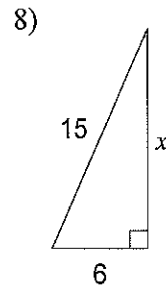
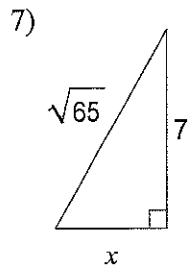
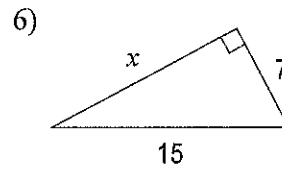
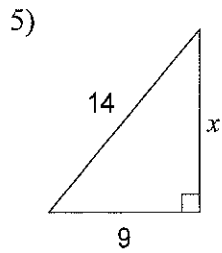
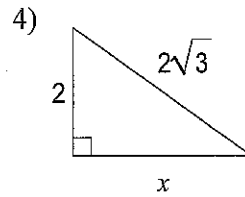
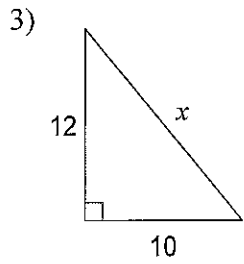
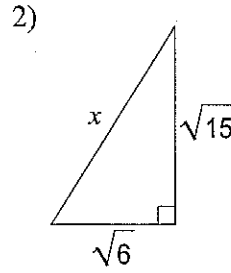
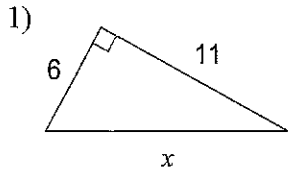
Find the length of each missing side. If necessary, round to the nearest hundredth.

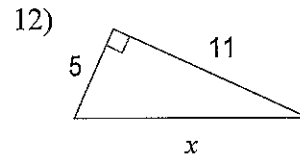
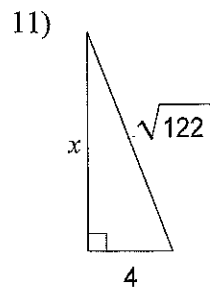
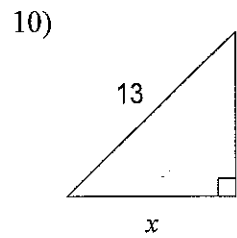
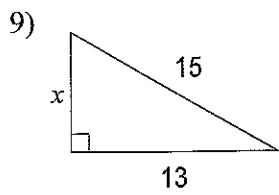




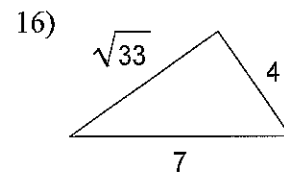
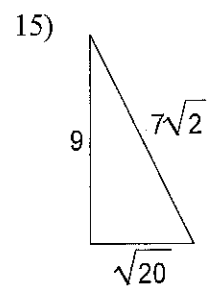
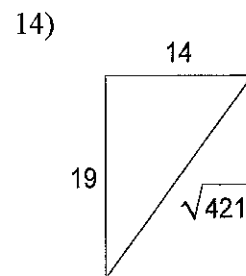
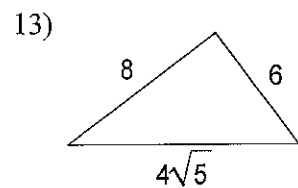
# Pythagorean Theorem

Find the missing side of each triangle. Leave your answers in simplest radical form.





State if each triangle is a right triangle.



State if the three sides lengths form a right triangle.

17)  $13, 3\sqrt{3}, 14$

18)  $15, 5, 5\sqrt{10}$

19)  $\sqrt{2}, \sqrt{7}, 3$

20)  $4, \sqrt{65}, 9$