

4.4 Pythagorean Theorem

Name:

Day 7 Notes

What can the Pythagorean theorem help me to determine?

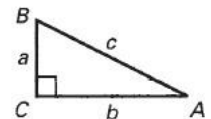
Leg of a right triangle

Hypotenuse of a right triangle

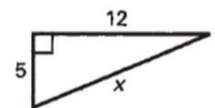
THEOREM 4.7: THE PYTHAGOREAN THEOREM

Words In a right triangle, the square of the length of the _____ is equal to the sum of the squares of the lengths of the legs.

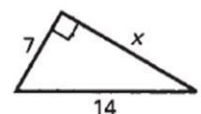
Symbols If $m\angle C = 90^\circ$, then $c^2 = \underline{\quad} + \underline{\quad}$.

**Example 1** Find the Length of the Hypotenuse

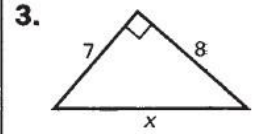
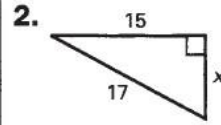
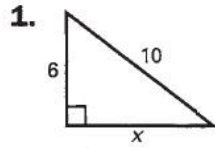
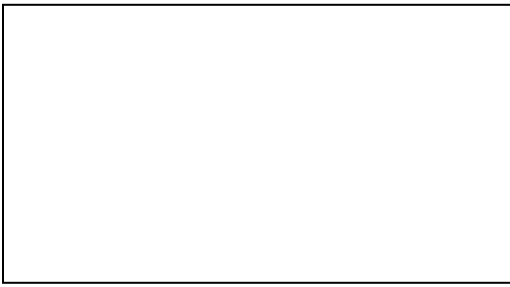
Find the length of the hypotenuse.

Solution**Example 2** Find the Length of a Leg

Find the unknown side length.

Solution

✔ **Checkpoint** Find the unknown side length.



Summary:

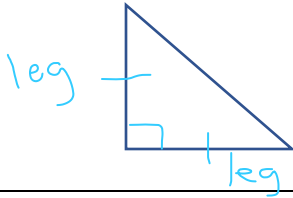
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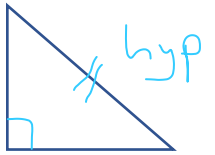
What can the Pythagorean theorem help me to determine?

Leg of a right triangle



- 2 sides that form the right angle
- 2 sides that are perpendicular
- Can also be called base and height

Hypotenuse of a right triangle



- Side opposite the right angle
- The longest side of a triangle; side C.

Can I identify the hypotenuse?

$$\text{Hyp}^2 = \text{leg}^2 + \text{leg}^2$$

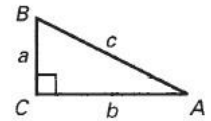
$$a^2 + b^2 = c^2$$

$$\text{base}^2 + \text{height}^2 = \text{hyp}^2$$

THEOREM 4.7: THE PYTHAGOREAN THEOREM

Words In a right triangle, the square of the length of the hyp is equal to the sum of the squares of the lengths of the legs.

Symbols If $m\angle C = 90^\circ$, then $c^2 = a^2 + b^2$.



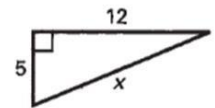
$$5^2 + 12^2 = x^2$$

$$25 + 144 = 169$$

$$x = 13 \text{ units}$$

Example 1 Find the Length of the Hypotenuse

Find the length of the hypotenuse.

Solution

$$7^2 + x^2 = 14^2$$

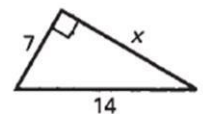
$$49 + x^2 = 196$$

$$x^2 = 147$$

$$x = 12.124$$

Example 2 Find the Length of a Leg

Find the unknown side length.

Solution

$$a^2 + b^2 = c^2$$

✔ **Checkpoint** Find the unknown side length.

1) $x^2 + 6^2 = 10^2$

$x^2 = 64$

$x = 8$

2) $x^2 + 15^2 = 17^2$

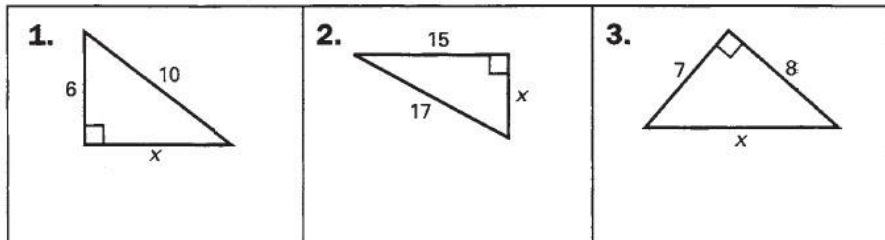
$x^2 = 289 - 225$

$x = 8$

3) $7^2 + 8^2 = x^2$

$x^2 = 113$

$x = 10.630$



Summary:

- $a^2 + b^2 = c^2$
- Use with right triangles
- Hypotenuse is the side opposite the right angle

