Introduction to the Pythagorean Theorem

Holden Mui

Name: _____

Date: _____

Example 1. Define the following terms and draw a picture of each one.

- Leg

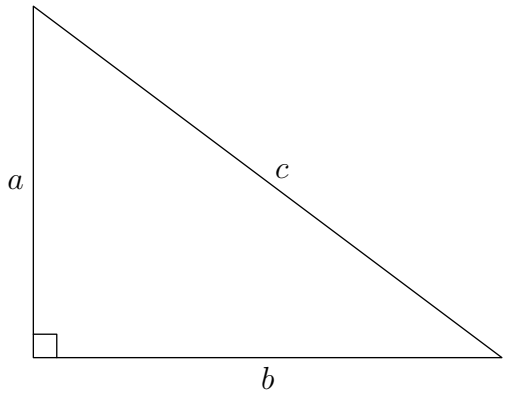
- Hypotenuse

- Pythagorean triple

Pythagorean Theorem. The Pythagorean Theorem states that the sum of the squares of the legs of a right triangle equals the square of its hypotenuse. In other words,

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

where a and b are the lengths of the two legs and c is the length of the hypotenuse.



Example 2. A 13-foot ladder is propped up against a wall such that its base is 5 feet away from the corner of a wall. How high does the ladder reach?

Example 3. A triangle has side of lengths 16, 17, and 17. Find its area.

Example 4. You are located at $(0, 10)$ on the coordinate plane, and you want to get to the point $(20, 11)$. If you must touch the x-axis, what is the length of the shortest possible path you can take?

Example 5. Complete the missing number in each Pythagorean triple.

- 3, 4, ?
- 6, 8, ?
- 5, 12, ?
- 9, 12, ?
- 8, 15, ?
- 12, 16, ?
- 7, 24, ?

- 15, 20, ?
- 10, 24, ?
- 20, 21, ?
- 18, 24, ?
- 16, 32, ?
- 21, 28, ?
- 12, 35, ?
- 15, 36, ?
- 24, 32, ?
- 9, 40, ?
- 27, 36, ?
- 14, 48, ?
- 30, 40, ?

Problems

Problem 1. The two legs of a triangles measure 150 cm and 200 cm. What is the length of its hypotenuse, in centimeters?

Problem 2. A TV has a 65 inch diagonal and a width of 56 inches. What is its height?

Problem 3. What is the distance between the points $(0.1, 4.5)$ and $(4.9, 10)$? Express your answer as a decimal.

Problem 4. A trapezoid has parallel sides of lengths 9 and 17, one of its sides is perpendicular to both parallel sides, and the remaining side has length 17. Find its perimeter.

Problem 5. A 5 by 6 rectangle is rotated about its center and sweeps out a circular region. What is the area of the region? Leave π in your answer.

Problem 6. In quadrilateral $ABCD$, diagonal AC is perpendicular to CD, $AB = 9$, $BC = 3$, and $CD = 7$. Find the perimeter of $ABCD$.

Problem 7. Explain why the following diagrams show the Pythagorean Theorem is true.