Section 2.2: The Distance and Midpoint Formula

For any two points **A** (x_1, y_1) and **B** (x_2, y_2), the distance between them is given by

$$d(A, B) = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Example 1: Find the distance between the following pair of points.

a) $(-3, 1) \& (1, 3)$

b) $(-2, 5) \& \left(\frac{1}{2}, -1\right)$

c) $(4, -6) \& \left(\frac{3}{2}, -2\right)$

Midpoint Formula

The midpoint of the line segment joining the two points **A** (x_1, y_1) and **B** (x_2, y_2) is given by

$$M = \left(\frac{x_2 + x_1}{2}, \frac{y_2 + y_1}{2}\right)$$

Example 2: Find the midpoint between the following pair of points.

a) $(-3,1)$ & $(1,3)$
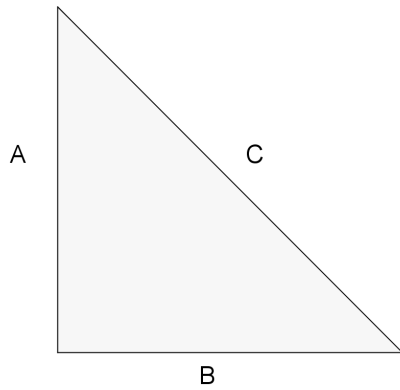
b) $(-2,-3)$ & $(4,6)$

c) $\left(-\frac{1}{2}, 2\right)$ & $\left(\frac{5}{2}, -6\right)$
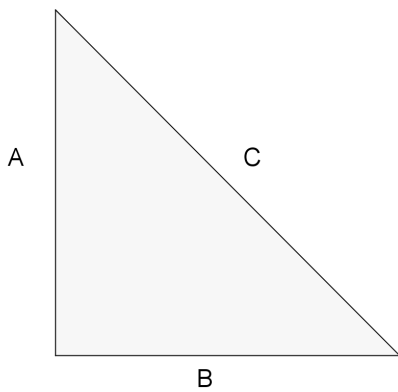
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The **Pythagorean Theorem** states that in a right triangle, if a and b are the lengths of the legs, and c is the length of the hypotenuse, then $a^2 + b^2 = c^2$

Note: To use the Pythagorean Theorem, you **must** have a right triangle

Example 3: Find the missing side, if $a = 6$ and $b = 8$.

Example 4: Find the missing side, if $a = 3$ and $c = 5$.

Example 5: Find the missing side, if $a = 5$ and $c = 13$.