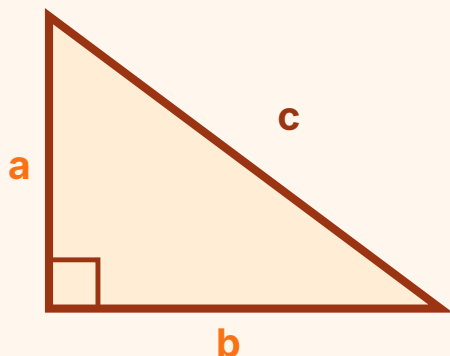


Pythagoras & Transformations

8th Grade

The theorem, its converse, the distance formula and four transformations.

THE PYTHAGOREAN THEOREM



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

c is the hypotenuse — opposite the right angle.

Find the hypotenuse: $c = \sqrt{a^2 + b^2}$

Find a leg: $a = \sqrt{c^2 - b^2}$

Triples worth knowing: 3-4-5 · 5-12-13 · 8-15-17 · 7-24-25

THE CONVERSE & THE DISTANCE FORMULA

If $a^2 + b^2 = c^2$, the triangle is right-angled. If $a^2 + b^2 > c^2$ it is acute; if less, obtuse.

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

— Pythagoras on the grid

TRANSFORMATIONS

Translation

slide

$$(x, y) \rightarrow (x + a, y + b)$$

same size, same shape

Reflection

flip

$$\text{over x-axis: } (x, -y) \cdot \text{over y-axis: } (-x, y)$$

same size, mirrored

Rotation

turn

$$90^\circ \text{ about origin: } (x, y) \rightarrow (-y, x)$$

same size, turned

Dilation

resize

$$(x, y) \rightarrow (kx, ky)$$

similar, not congruent

The first three keep congruence. Only dilation changes size.