Distance Between Two Points

Key idea

The horizontal change Δx and vertical change Δy are the two shorter sides of a right-angled triangle:

$d = \sqrt{(\Delta x)^2 + (\Delta y)^2}$.

Method

Δx = gap in the x-values.
Δy = gap in the y-values.
Then $d = \sqrt{(\Delta x)^2 + (\Delta y)^2}$.

Example

From $(0, 0)$ to $(3, 4)$:

$\Delta x = 3,\ \Delta y = 4$
$d^2 = 3^2 + 4^2 = 25$
$d = 5$

Common mistake

Do not use the coordinates as the side lengths.
Use the **changes** between them: Δx and Δy.

Harder Cases - Notes and Steps

Negative coordinates

From $(-2, -3)$ to $(3, 9)$:

$\Delta x = 3 - (-2) = 5$

$\Delta y = 9 - (-3) = 12$

$d^2 = 5^2 + 12^2 = 169$, so $d = 13$.

Not always a whole number

From $(1, 1)$ to $(5, 5)$:

$\Delta x = 4,\ \Delta y = 4$

$d = \sqrt{32} = 4\sqrt{2}$

Common mistake

With negatives, subtract carefully.

Δx is how far apart the x-values are, so d is always positive.

= copy this into your book. Boxes without a pencil are just to read.