Key Ideas	Notes	1.7 Midpoint & Distance

Distance Formula

Used to find the distance between two points (x_1, y_1) *and* (x_2, y_2)

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

Examples:

1. Find the distance between the two points on the graph.

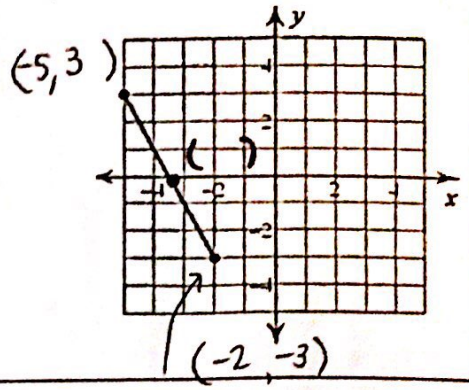
1. $(-5, 3)$ $(-2, -3)$
x_1, y_1 x_2 y_2

$\sqrt{(-2 + 5)^2 + (-3 - 3)^2}$

$\sqrt{(3)^2 + (-6)^2}$

$\sqrt{9 + 36}$

$\sqrt{45} = 6.7$



2. Find AB when $A(-4, 1)$ and $B(3, -1)$
x_1, y_1
x_2, y_2

2.

$\sqrt{(3 + 4)^2 + (-1 - 1)^2}$

$\sqrt{7^2 + (-2)^2}$

$\sqrt{49 + 4}$

$\sqrt{53} = 7.3$

Midpoint Formula

Used to find the midpoint between two points (x_1, y_1) *and* (x_2, y_2)

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

1. $\overline{AB}$ has endpoints -4 and 9. What is the coordinate of its midpoint?

1. -4 9
A B
2.5

$\frac{(-4 + 9)}{2} = \frac{5}{2} = 2.5$

2. Find the midpoint of $\overline{GH}$ given :
$G(7, -5)$ *and* $H(9, -1)$
x_1, y_1 x_2 y_2

2.

$\left(\frac{7 + 9}{2}, \frac{-5 + (-1)}{2}\right)$

$\frac{16}{2}$, $\frac{-6}{2}$

$(8, -3)$ → $(8, -3)$

3. Find the midpoint of $\overline{AB}$ given :
$A(-7, 4)$ *and* $B(3, -4)$
x_1, y_1 x_2 y_2

3.

$\left(\frac{-7 + 3}{2}, \frac{4 + (-4)}{2}\right)$

$\frac{-4}{2}$, $\frac{0}{2}$

$(-2, 0)$ → $(-2, 0)$

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