# 1 - 3
# Distance and Midpoints

# Finding distance on a number line

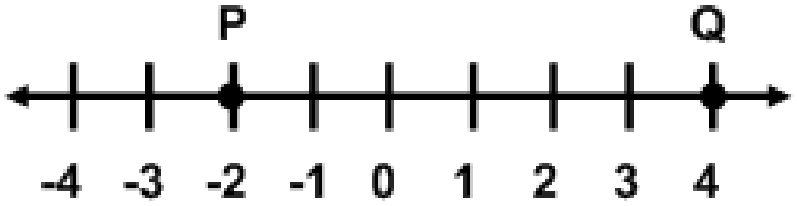
**Ex:**


6

$3-9=-6$

$9-3=6$

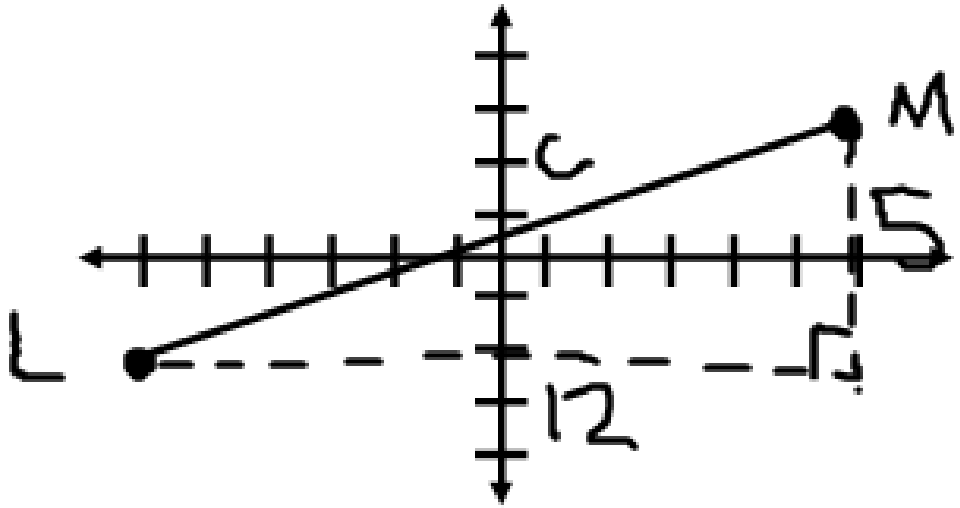
**Ex:**




$4+2=6$

# Find distance on a coordinate plane

**Ex: L(-6, -2) and M(6, 3)**




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

$12^2 + 5^2 = c^2$

$144 + 25 = c^2$

$\sqrt{169} = \sqrt{c^2}$

$13 = c$

## Represented by the distance formula

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

**Ex: Find the distance between B(-7, 0) and C(5, 9).**

$$d = \sqrt{(-7-5)^2 + (0-9)^2}$$

$$= \sqrt{(-12)^2 + (-9)^2}$$

$$= \sqrt{144 + 81}$$

$$= \sqrt{225}$$

$$= 15$$

**Ex: Find the distance between (2, 5) and (4, -7).**

$$d = \sqrt{(4-2)^2 + (-7-5)^2}$$

$$= \sqrt{2^2 + (-12)^2}$$

$$= \sqrt{4+144}$$

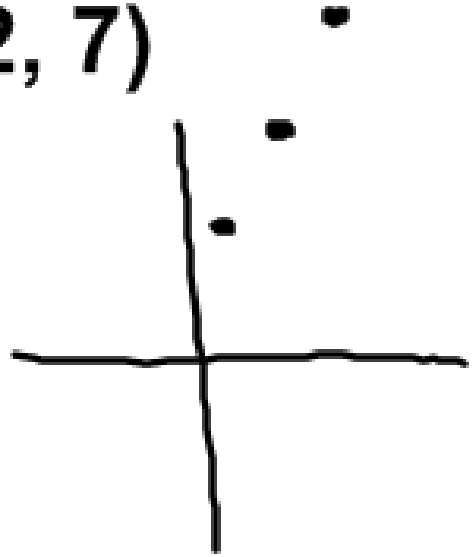
$$= \sqrt{148} \approx 12.2$$

## Midpoint Formula

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

**Ex: Find the midpoint of A(2, 7) and B(6, 13).**

$$\left(\frac{2+6}{2}, \frac{7+13}{2}\right) = (4, 10)$$

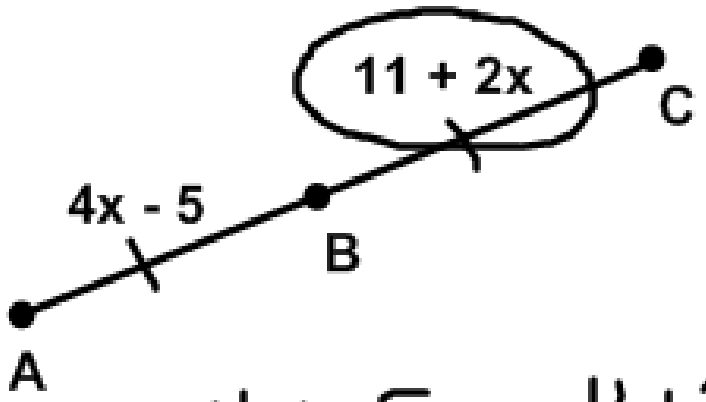


**Ex: Find the midpoint of (-4, 2) and (5, -2).**

$$\left(\frac{-4+5}{2}, \frac{2+-2}{2}\right)$$

$$\boxed{\left(\frac{1}{2}, 0\right)}$$

# Ex: What is the length of $\overline{BC}$ if B is the midpoint of $\overline{AC}$?




$11+2(8)$

27

$4x-5 = 11+2x$

$-2x \quad -2x$

$2x-5 = 11$

$+5 \quad +5$

$\frac{2x}{2} = \frac{16}{2}$ $\quad x=8$