

1.2: SEGMENTS AND DISTANCE

Objective: I can find distance between 2 points and use the segment addition post.

To measure the **LENGTH** of a segment, you can use a number line to find the **DISTANCE** between the two endpoints, or you can use the formula:

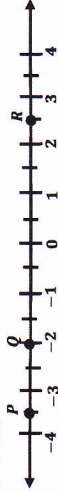
$$d = |a - b|$$

(Where a & b are endpoints of the segment.)

EXAMPLE 1: Find the distance between -2 and 6 on a number line.

$$d = |-2 - 6| = |-8| = 8$$

EXAMPLE 2: Find PQ , QR and PR on the number line shown below.



$PQ = 1.5$	$QR = 4.5$	$PR = 6$
$P = -3.5$	$Q = -2$	$P = -3.5$
$Q = -2$	$R = 2.5$	$R = 2.5$
$d = -3.5 - (-2) $	$d = -2 - 2.5 $	$d = -3.5 - 2.5 $
$= -1.5 $	$= -4.5 $	$= -6 $
$= 1.5$	$= 4.5$	$= 6$

Segment Addition Postulate:

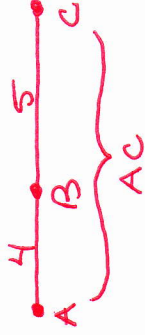
If Q is between P and R , then $PQ + QR = PR$.

If $PQ + QR = PR$, then Q is between P and R .



Little Part + Little Part = Whole

EXAMPLE 1: If B is between A and C and $AB = 4$ and $BC = 5$, then $AC = 9$.



$$AC = 4 + 5 = 9$$

EXAMPLE 2: If $AB = x$, $BC = x + 6$ and $AC = 24$, then find AB and BC .

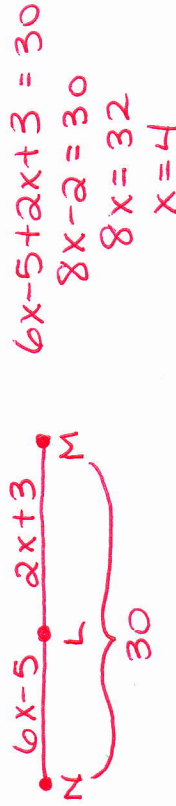
$$AB = 9; BC = 15$$



$$\begin{aligned} x + x + 6 &= 24 \\ 2x + 6 &= 24 \\ 2x &= 18 \\ x &= 9 \end{aligned}$$

EXAMPLE 3: Find LM if L is between N and M , $NL = 6x - 5$, $LM = 2x + 3$ and $NM = 30$.

$$LM = 2(4) + 3 = 11$$



$$\begin{aligned} 6x - 5 + 2x + 3 &= 30 \\ 8x - 2 &= 30 \\ 8x &= 32 \\ x &= 4 \end{aligned}$$

When a segment is drawn on a coordinate plane, you can find its **LENGTH** by using the **DISTANCE** formula:

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

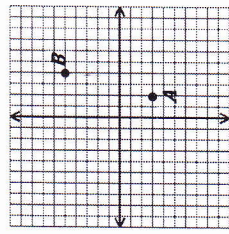
EXAMPLE 5: Find the distance between $(2, -1)$ and $(-2, -1)$.

$$\begin{aligned} d &= \sqrt{(-2 - 2)^2 + (-1 - (-1))^2} \\ &= \sqrt{(-4)^2 + (0)^2} \\ &= \sqrt{16} \\ &= 4 \end{aligned}$$

EXAMPLE 6: Find the distance between $(5, -2)$ and $(-2, -3)$.

$$\begin{aligned} d &= \sqrt{(-2 - 5)^2 + (-3 - (-2))^2} \\ &= \sqrt{(-7)^2 + (-1)^2} \\ &= \sqrt{49 + 1} \\ &= \sqrt{50} = \sqrt{25 \cdot 2} = 5\sqrt{2} \end{aligned}$$

EXAMPLE 7: Find AB.



A $(2, -3)$
 x_1, y_1
 B $(4, 5)$
 x_2, y_2

$$\begin{aligned} d &= \sqrt{(4 - 2)^2 + (5 - (-3))^2} \\ &= \sqrt{(2)^2 + (8)^2} \\ &= \sqrt{4 + 64} \\ &= \sqrt{68} \\ &= \sqrt{4 \cdot 17} \\ &= 2\sqrt{17} \end{aligned}$$