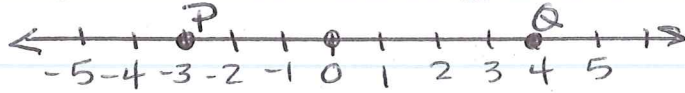


9/13/11

## 1-3 Distance and Midpoints

Distance on a number line:

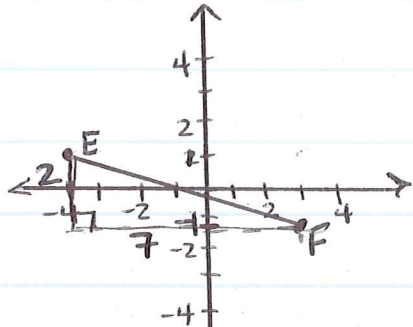


$$PQ = |a - b| \quad \text{ex: } PQ = |-3 - 4|$$

$$PQ = |-7|$$

$$PQ = 7$$

Distance on a coordinate plane:



Find the distance between  
 $E(-4, 1)$  and  $F(3, -1)$ .  
 $x_1, y_1$                        $x_2, y_2$

TWO WAYS TO SOLVE

(1) Pythagorean Theorem

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

$$2^2 + 7^2 = (EF)^2$$

$$4 + 49 = (EF)^2$$

$$\sqrt{53} = \sqrt{(EF)^2}$$

$$EF = \sqrt{53} \approx 7.28$$

(2) Distance Formula

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

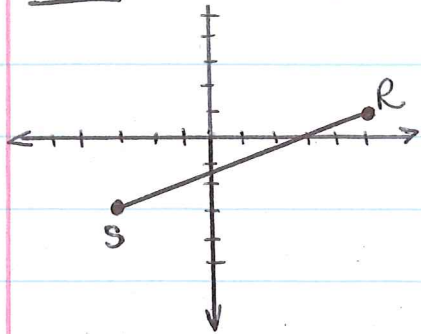
$$d = \sqrt{(3 - (-4))^2 + (-1 - 1)^2}$$

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

$$d = \sqrt{49 + 4}$$


$$d = \sqrt{53} \approx 7.28$$

ex: Find the distance between  $R(5,1)$  &  $S(-3,-3)$ .

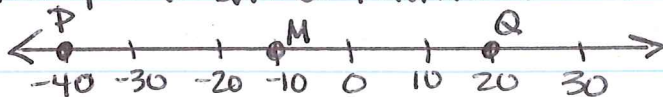


Try it on your own!

Midpoint = the point on the segment that divides the segment into two congruent segments.

ex:   $\overline{AX} \cong \overline{XB}$   
X is the midpoint of  $\overline{AB}$ .  $AX = XB$

Midpoint <sup>on</sup> a numberline:



$$M = \frac{a+b}{2}$$

ex: Find the midpoint of  $\overline{PQ}$ .

$$M = \frac{-40+20}{2}$$

$$M = \frac{-20}{2} = -10$$

The midpoint is at -10.

Midpoint on a coordinate plane:

For a segment with endpoints  $(x_1, y_1)$  and  $(x_2, y_2)$ , the coordinates for the midpoint are  $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$ .

ex: Find the midpoint for  $\overline{JK}$ ,  $J(-1, 2)$  &  $K(6, 1)$ .

$$\left(\frac{-1+6}{2}, \frac{2+1}{2}\right)$$

$$(x, y) = \left(\frac{5}{2}, \frac{3}{2}\right)$$

$$= (2.5, 1.5)$$