

Distance:

- * How far apart two points are.
- * On a number line use $|a-b|$.
- * On a coordinate plane use:

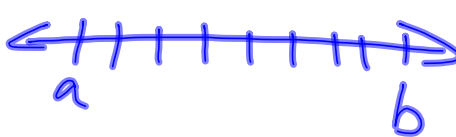
$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

(x_1, y_1)
 (x_2, y_2)

Midpoint:

- * Half way between the two endpoints.

* On a number line use: $\frac{a+b}{2}$

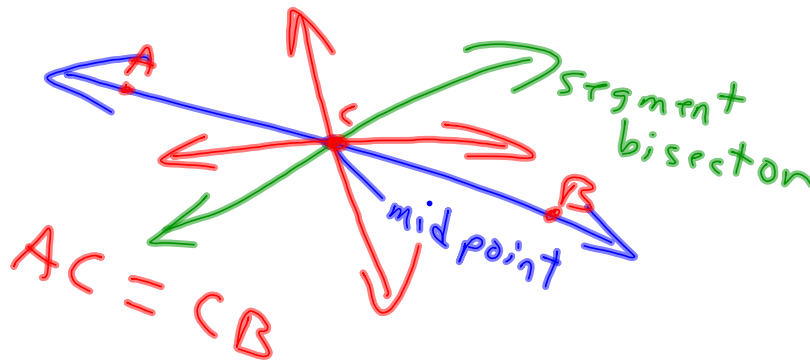


- * On the coordinate plane use:

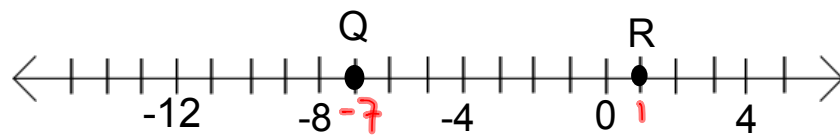
$$\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

Segment Bisector:

* Any segment, line, or plane that intersects a segment at the midpoint.



1. Use the number line to find QR .



$$QR = |-7 - 1| = |-8| = \boxed{8}$$

2. Find the distance between $E(-4, 1)$ and

$F(3, -1)$.

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


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

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

$$EF = \sqrt{49 + 4} = \boxed{\sqrt{53}}$$

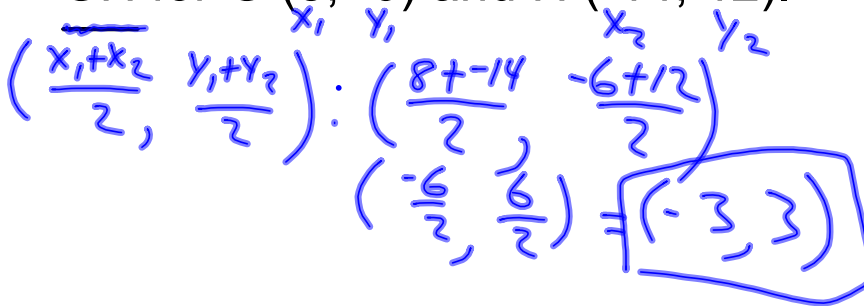
$$\begin{array}{c} (-2)^2 \\ (-2)^2 \end{array}$$

3. The coordinates on a number line for J and K are -12 and 16, respectively. Find the coordinates of the midpoint for \overline{JK} .



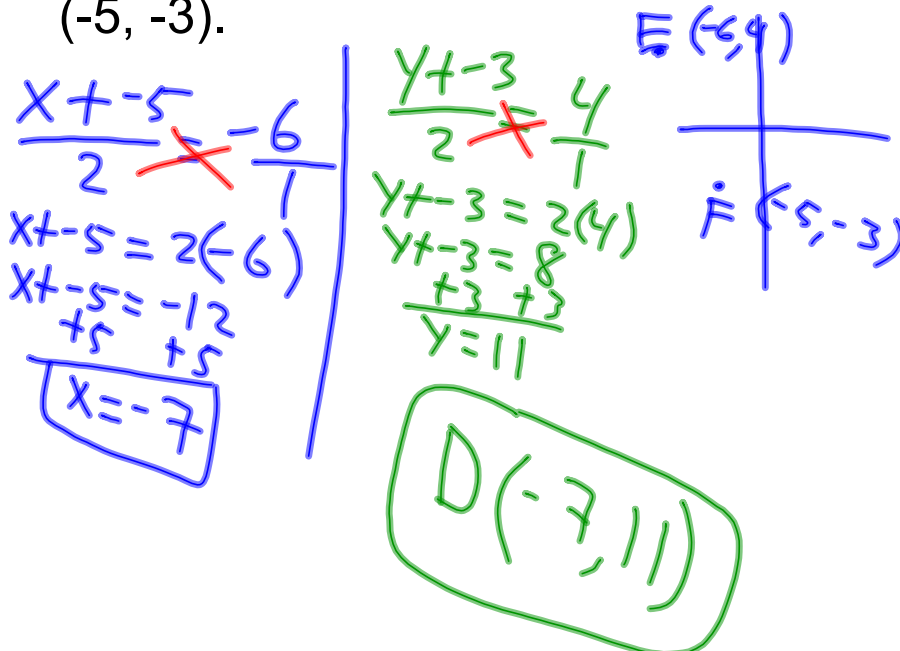
midpt = $\frac{-12+16}{2} = \frac{4}{2} = 2$

4. Find the coordinates of the midpoint of \overline{GH} for G (8, -6) and H (-14, 12).



$\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{8+(-14)}{2}, \frac{-6+12}{2}\right) = \left(\frac{-6}{2}, \frac{6}{2}\right) = (-3, 3)$

5. Find the coordinates of D if E (-6, 4) is the midpoint of \overline{DF} and F has coordinates (-5, -3).



$$\frac{x+(-5)}{2} = -6$$

$$x+(-5) = 2(-6)$$

$$x+(-5) = -12$$

$$+5 \quad +5$$

$$x = -7$$

$$\frac{y+(-3)}{2} = 4$$

$$y+(-3) = 2(4)$$

$$y+(-3) = 8$$

$$+3 \quad +3$$

$$y = 11$$

$E(-6, 4)$
 $F(-5, -3)$
 $D(-7, 11)$

6. What is the measure of \overline{PR} if Q is the midpoint of \overline{PR} ?

$$\begin{aligned}
 6 - 3x + 6 - 3x &= 14x + 2 \\
 -6x + 12 &= 14x + 2 \\
 \begin{array}{r}
 +6x \qquad +6x \\
 \hline
 12 = 20x + 2 \\
 -2 \qquad -2 \\
 \hline
 10 = 20x \\
 \frac{10}{20} = \frac{20x}{20} \\
 \frac{1}{2} = x
 \end{array}
 \end{aligned}$$

