Distance and Midpoint

Distance

☆ Distance Formula:

1D: $x_2 - x_1$

Ex: Find the distance between the points -5 and 14 on a number line.

$14 - (-5)$

$d = 19$

Distance

☆ Distance Formula:

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

Ex: Find the distance between A (2, 5) and D (-3, -4)

$x_1 y_1 \quad x_2 y_2$

$\sqrt{(-3-2)^2 + (-4-5)^2}$

$\sqrt{25 + 81} = \sqrt{106}$

Midpoint

☆ Midpoint Formula:

1D $\frac{x_1 + x_2}{2}$

Ex: Find the midpoint between the points -5 and 14 on a number line.

$\frac{-5+14}{2} = \frac{9}{2}$

Midpoint

☆ Midpoint Formula:

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

Ex: Find the midpoint between A (2, 5) and D (-3, -4)

$x_1 y_1 \quad x_2 y_2$

$\frac{2+(-3)}{2}, \frac{5+(-4)}{2}$

$\left(\frac{-1}{2}, \frac{1}{2}\right) = M$

Example when midpoint is given...

The midpoint M of $\overline{AB}$ is (3, 4)
If A is (-3, -2), find the other endpoint.

$\frac{-3+x_2}{2} = 3 \cdot 2 \qquad \frac{-2+y_2}{2} = 4 \cdot 2$

$\frac{2}{1}$

$-3 + x_2 = 6 \qquad -2 + y_2 = 8$

$+3 \quad +3 \qquad +2 \quad +2$

$x_2 = 9 \qquad y_2 = 10$

$B = (9, 10)$

Day 5 Segments

Warm Up: Have HW out!

Solve for the missing variable.

1) $2(x + 3) - 4 = 5x + 6$

2) $4x - 1 + 3x + 6 = 2(x + 4)$

3) $4x - 3 + 2x - 7 = 9x + 6$

4) $3(x + 6) = 4(x - 2)$

$3x + 18 = 4x - 8$

$-3x \qquad -3x$

$18 = x - 8$

$+8 \qquad +8$

$26 = x$

1) $2(x + 3) - 4 = 5x + 6$

$2x + 6 - 4 = 5x + 6$

$2x + 2 = 5x + 6$

$-2 \qquad -2$

$2x = 5x + 4$

$-5x \quad -5x$

$\frac{-3x}{-3} = \frac{4}{-3}$

$x = -4/3$

2) $4x - 1 + 3x + 6 = 2(x + 4)$

$7x + 5 = 2x + 8$

$-5 \qquad -5$

$7x = 2x + 3$

$-2x \quad -2x$

$\frac{5x}{5} = \frac{3}{5}$

$x = 3/5$

3) $4x - 3 + 2x - 7 = 9x + 6$

$6x - 10 = 9x + 6$

$+10 \qquad +10$

$6x = 9x + 16$

$-9x \quad -9x$

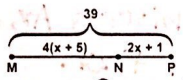
$\frac{-3x}{-3} = \frac{16}{-3}$

$x = -16/3$

Segment Addition:

If A, B, + C are collinear with B between A + C, then AB + BC = AC.

Using the diagram shown, find the value of x.



MN + NP = MP

$4(x+5) + 2x + 1 = 39$

$4x + 20 + 2x + 1 = 39$

$6x + 21 = 39$

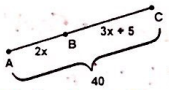
$-21 \quad -21$

$\frac{6x}{6} = \frac{18}{6}$

$x = 3$

Day 5 Segments

Using the diagram shown, find AB and BC.



$2x + 3x + 5 = 40$

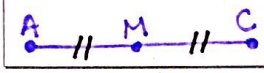
$5x + 5 = 40$

$\frac{5x}{5} = \frac{35}{5}$

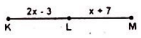
$x = 7$ $AB = 14$ $BC = 26$

Midpoint of a Segment:

If M is the midpoint of $\overline{AC}$, then $\overline{AM} \cong \overline{MC}$



In the given diagram, L is the midpoint of $\overline{KM}$. Find the value of x



$KL = LM$

$2x - 3 = x + 7$

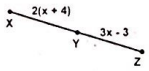
$+3 \quad +3$

$2x = x + 10$

$-x \quad -x$

$x = 10$

In the given diagram, Y is the midpoint of $\overline{XZ}$. Find XZ



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

$2x + 8 = 3x - 3$

$+3 \quad +3$

$11 + 2x = 3x$

$-2x \quad -2x$

$11 = x$

$3(11) - 3$

$33 - 3$

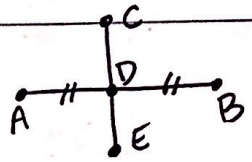
$YZ = 30$

$XY = 30$

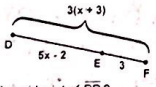
$XZ = 60$

Segment Bisector:

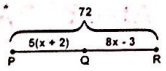
If CE bisects AB at D, then $AD \cong DB$.



1.) Using the diagram shown, find DE and DF.



2.) Is Q the midpoint of $\overline{PR}$?



① $5x - 2 + 3 = 3(x+3)$

$5x + 1 = 3x + 9$

$-1 \quad -1$

$5x = 3x + 8$

$-3x \quad -3x$

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

$x = 4$

$DE = 18$ $DF = 21$

② $5(x+2) + 8x - 3 = 72$

$5x + 10 + 8x - 3 = 72$

$13x + 7 = 72$

$-7 \quad -7$

$\frac{13x}{13} = \frac{65}{13}$

$x = 5$

$QR = 37$

$PQ = 35$

$PQ \neq QR$

NO!