Name _____ Date _____

Day 5 – Midpoint and Partitioning a Line Segment

Midpoint Formula:

When given (x_1, y_1) and (x_2, y_2) the midpoint $= \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

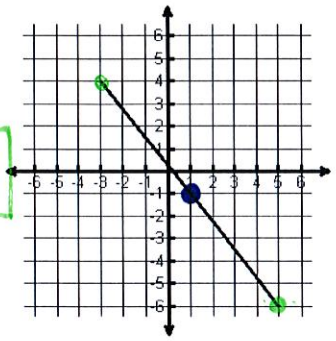
Find the midpoint of each segment.

1. (-3, 4) and (5, -6)

$\left(\frac{-3+5}{2}, \frac{4+(-6)}{2}\right)$

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

Mdpt = (1, -1)

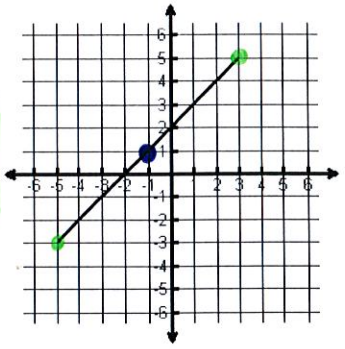


2. (-5, -3) and (3, 5)

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

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

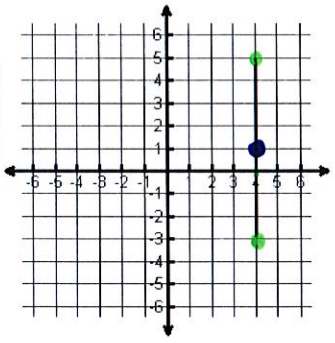
Mdpt = (-1, 1)



3. (4, 5) and (4, -3)

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

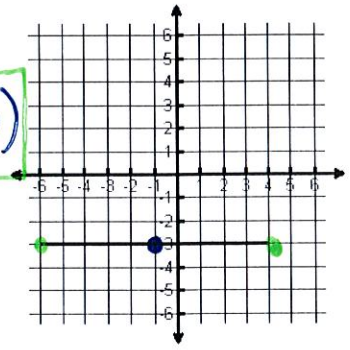
Mdpt = (4, 1)



4. (-6, -3) and (4, -3)

$\left(\frac{-6+4}{2}, \frac{-3+(-3)}{2}\right)$

Mdpt = (-1, -3)



Find the midpoint of the segment with the following endpoints.

5. (9,8) and (-7,16)

$\left(\frac{9+(-7)}{2}, \frac{8+16}{2}\right)$

$\left(\frac{2}{2}, \frac{24}{2}\right)$

(1, 12)

6. (11,-3) and (-15,17)

$\left(\frac{11+(-15)}{2}, \frac{-3+17}{2}\right)$

$\left(\frac{-4}{2}, \frac{14}{2}\right)$

(-2, 7)

7. $\left(\frac{1}{2}, -2\right)$ and $\left(\frac{5}{2}, 0\right)$

$\left(\frac{\frac{1}{2}+\frac{5}{2}}{2}, \frac{-2+0}{2}\right)$

$\left(\frac{3}{2}, -1\right)$

Given the midpoint and one endpoint, find the other endpoint of the line segment.

8. Midpoint : (-4,6) ENDPOINT : (2,1) (-10, 11)

$\frac{2+x_2}{2} = -4$ $\frac{1+y_2}{2} = 6$

$x_2 = -10$ $y_2 = 11$

9. Midpoint : (-3,3) ENDPOINT : (-4,-2) (-2, 8)

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

$x_2 = -2$ $y_2 = 8$

10. Midpoint : $\left(\frac{3}{2}, 1\right)$ ENDPOINT : (5,-7) (-2, 9)

$\frac{5+x_2}{2} = \frac{3}{2}$ $\frac{-7+y_2}{2} = 1$

$x_2 = -2$ $y_2 = 9$

Partitioning Line Segments

$$x \rightarrow \quad x_1 + \left(\frac{a}{a+b}\right)(x_2 - x_1)$$

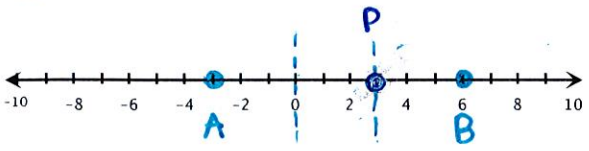
$$y \rightarrow \quad y_1 + \left(\frac{a}{a+b}\right)(y_2 - y_1)$$

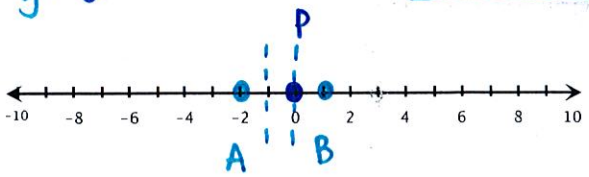
1. Given the points A(–3, -2) and B(6, 1), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 2:1. a:b equal parts = 3

x: 3

y: 0

P(3, 0)



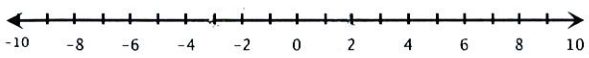


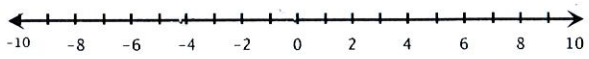
2. Given the points A(-3, -4) and B(2, 0), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 2:3. a:b

$x \rightarrow -3 + \left(\frac{2}{5}\right)(2 - (-3)) = -1$

$y \rightarrow -4 + \left(\frac{2}{5}\right)(0 - (-4)) = \frac{-12}{5}$

$P\left(-1, \frac{-12}{5}\right)$

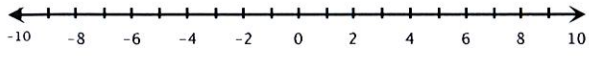


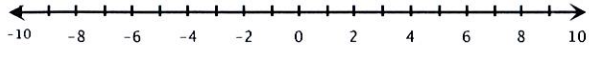


3. Given the points A(-4, 4) and B(0, -4), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 1:3.

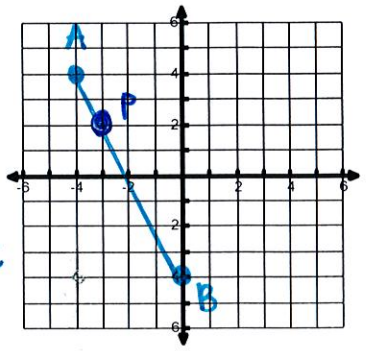
ratio fraction: $\frac{1}{4}$

Slope: $\frac{-8\,(1/4)}{4\,(1/4)} = \frac{-2}{1}$ ← new slope





P(-3, 2)

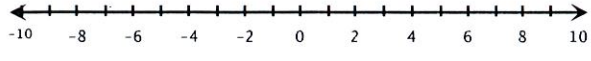


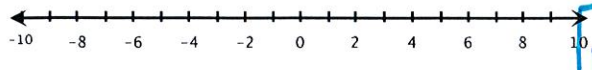
4. Given the points A(-2,1) and B(4, -4), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 2:4.

ratio fraction: $\frac{2}{6}$

$x \rightarrow -2 + \left(\frac{2}{6}\right)(4 - (-2)) = 0$

$y \rightarrow 1 + \left(\frac{2}{6}\right)(-4 - 1) = \frac{-2}{3}$





$P\left(0, -\frac{2}{3}\right)$