Good morning!

1. "Here"

2. Notes on Midpoint and Partitioning

3. Practice

4. DeltaMath Quiz opens at 3:30 PM today! Try the DeltaMath Review first!!!

Warm up

Write the equation of the line:

SAME

1. <u>Parallel</u> to 8x – 2y = 6 and goes through (5, -2)

$-8x \qquad -8x$

$x \quad y$

$\dfrac{-2y}{-2} = \dfrac{-8x}{-2} + \dfrac{6}{-2}$

$y = 4x - 3$ orriginal $m = 4$

$\parallel m = 4$

$b = -22$

$y = mx + b$
$-2 = 4(5) + b$
$-2 = 20 + b$
$\underline{-20 \quad -20}$

$\boxed{y = 4x - 22}$

Midpoint

Given 2 ordered pairs, it's the

AVG of the x's and

AVG of the y's.

Midpoint Formula

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

Find the midpoint.

1. (3, 7) and (-2, 4)

(-2,4)   (3,7)

(.5, 5.5)

$$\left(\frac{3+(-2)}{2} = \frac{1}{2} \text{ or } .5, \quad \frac{7+4}{2} = \frac{11}{2} = 5.5 \right)$$

2. (5, -2) and (6, 14)

(5.5, 6)

$$\left(\frac{5+6}{2} = 5.5, \quad \frac{-2+14}{2} = 6 \right)$$

Find the midpoint.

3. **(3, -9) and (14, 16)**

(8.5, 3.5)

4. **(12, 17) and (-7, 9)**

(2.5, 13)

Find the midpoint.

5.

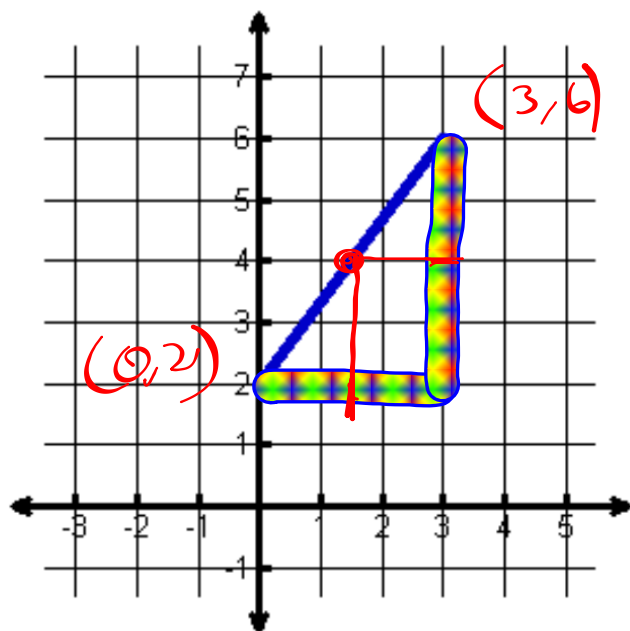(-1,6)

-6

(2, 3)

(5,0)

6

(2, 3)
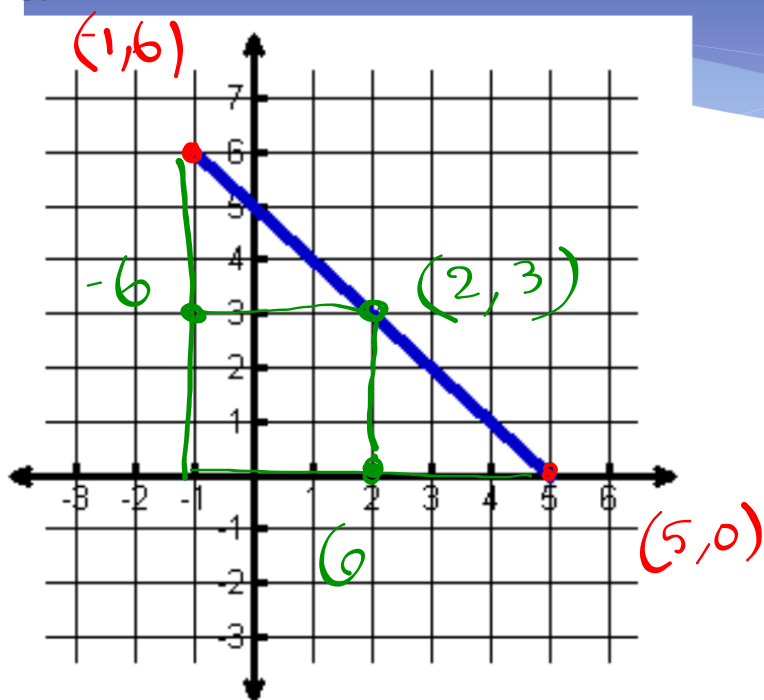
Find the midpoint.

6.

(3, 6)

(0, 2)

(1.5, 4)

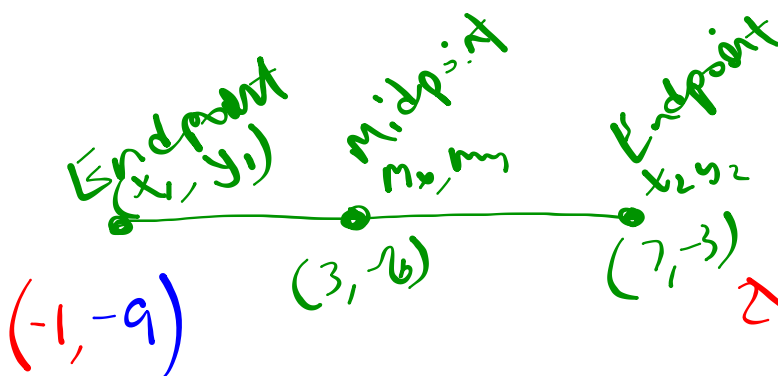$$\left(\frac{0+3}{2} = \frac{3}{2} = 1.5, \quad \frac{2+6}{2} = \frac{8}{2} = 4 \right)$$

Given the midpt and one endpt,
find the other endpt.

7.

Midpt (3, -6)

Endpt (7, -3)

(-1, -9)

$2 \cdot \dfrac{y_1+3}{2} = -6 \cdot 2$

$y_1 - 3 = -12$

$\dfrac{x_1+x_2}{2} = m_x$ $\begin{matrix}+3 & +3\end{matrix}$

$y_1 = -9$

Endpoint (x_1, y_1) Midpoint m_x, m_y Endpoint $x_2 y_2$

(3, -6)   (7, -3)

(-1, -9)

$2 \cdot \dfrac{x_1+7}{2} = 3 \cdot 2$

$\begin{matrix}x_1 + 7 = 6 \\ -7 \quad -7\end{matrix}$

$x_1 = -1$

Given the midpt and one endpt, find the other endpt.

8.

Midpt (-1, 2)

Endpt (3, 0)

$-4 \ (\overset{-5}{M_x} \ \overset{4}{M_y} \ \overset{1}{2}+2$

$\overset{4}{\to}(\overset{x_2}{x_2} \ \overset{y_2}{y_2} \ \overset{1}{2}+2$

(-5, 4)

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

$\frac{x_1 + 3}{2} = -1 \quad \frac{y_1 + 0}{2} = 2$

$x_1 + 3 = -2 \quad \quad y_1 + 0 = 4$
$\underline{\quad -3 \ -3} \quad \quad \underline{\quad -0 \ -0}$
$\left(x_1 = -5 \quad \quad y_1 = 4 \right)$

Given the midpt and one endpt, find the other endpt.

9.

Midpt (-4, 6)

Endpt (2, 1)

x_2 y_2

$-6 \nearrow -10$, $11 \nwarrow +5$

$-6 \nearrow$ m_x m_y $+5$

(-10, 11)

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

$2 \cdot \dfrac{x_1 + 2}{2} = -4 \cdot 2$ $2 \cdot \dfrac{y_1 + 1}{2} = 6 \cdot 2$

$x_1 + 2 = -8$ $y_1 + 1 = 12$
  $-2 \ -2$ $-1 \ -1$

$x_1 = -10$ $y_1 = 11$

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

midpoint

(x_1, y_1) $1 = a$ $\downarrow$ $1 = b$ (x_2, y_2)

In the middle

$a + b = 2$
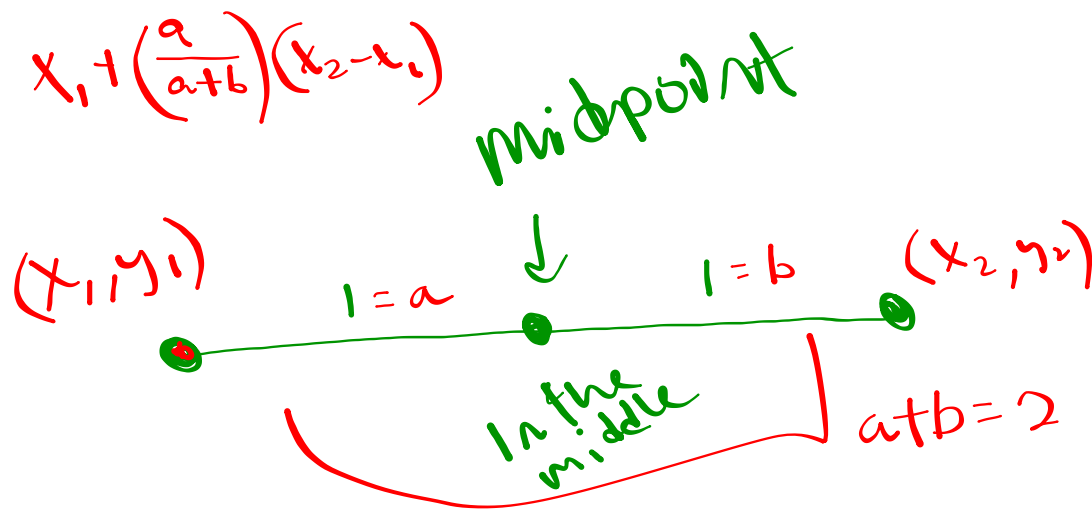
Partitions line segment
into $1:1$ ratio.

Partition Line Segments (1 Dimension)

total distance → fraction → Started

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

R

L

B 1:3   4 sections

$$X_2 - X_1 \left(\frac{a}{a+b} \right) + X_1$$

■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■

this also works!

$$\frac{b \cdot X_1 + a \cdot X_2}{b + a}$$

■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■ ■
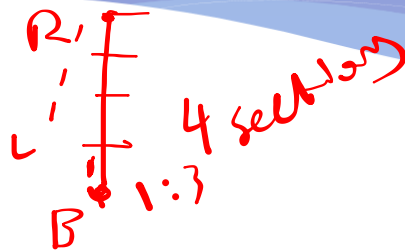
Partition – 1 Dimension
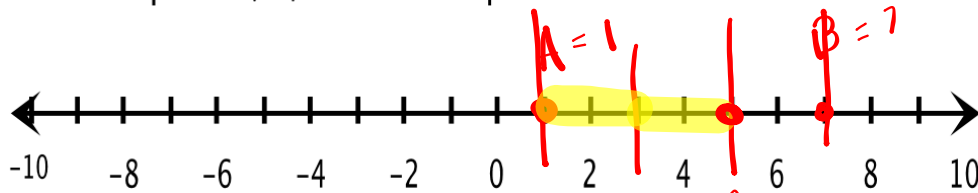
$$(x_2 - x_1)\left(\frac{a}{a+b}\right) + x_1$$

total distance   portion started

A is at 1, and B is at 7.
Find the point, T, so that T partitions A to B in a 2:1 ratio.

a:b

A = 1   B = 7

-10   -8   -6   -4   -2   0   2   4   6   8   10

$$(7-1)\left(\frac{2}{3}\right) + 1$$

6

$$6\left(\frac{2}{3}\right) + 1 = 4 + 1 = 5$$

T = 5

Partition – 1 Dimension
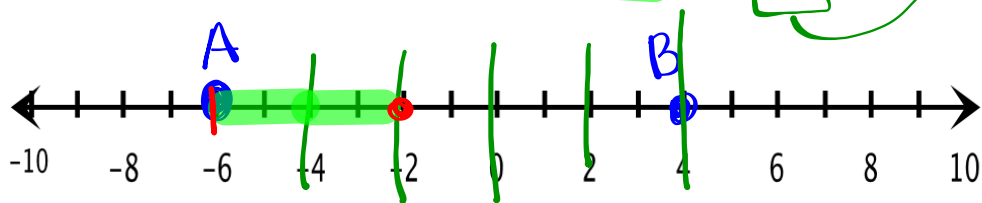
$$(x_2 - x_1)\left(\frac{a}{a+b}\right) + x_1$$

$4 \cdot (-6)$

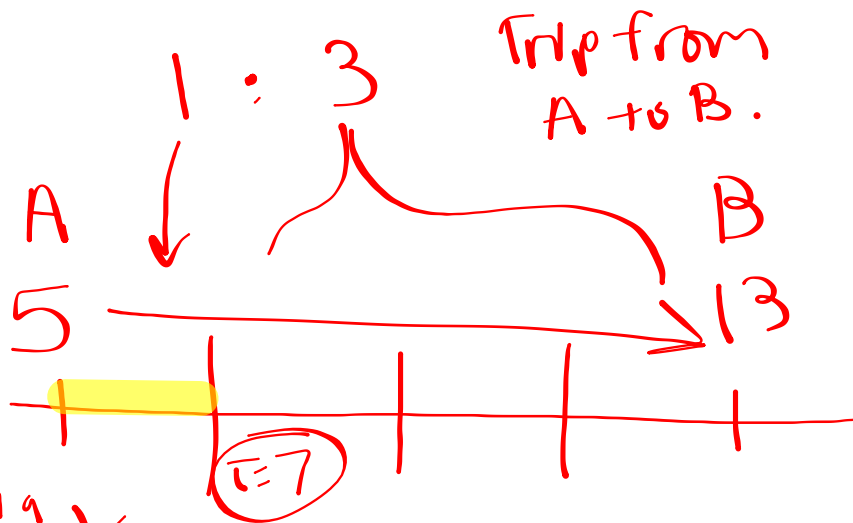$(10)\left(\frac{2}{5}\right) + -6 \overset{-6}{=} 4-6 = -2$

A is at -6 and B is at 4.

Find the point, T, so that T is A to B in a 2:3 ratio.
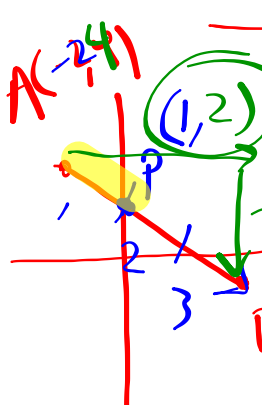
$a:b$

total subpart)
2+3
=5

$T = -2$

$1 : 3$

Trip from
A to B.

A   B

5   13

$\boxed{\overline{t=7}}$

$x_1 + \left(\dfrac{1}{4}\,\text{or}\,\dfrac{1a}{b}\right)(x_2 - x_1)$ Find $\overline{t}$ so that it has

$5 + \left(\dfrac{1}{4}\right)\underset{8}{(13-5)}$ a ratio $1:3$.

$5 + \left(\dfrac{1}{4}\right)(8)$

$5 + 2\left(\dfrac{1}{4}\right)(8) = 7$

Partition – 2 Dimension

$$(x_2 - x_1)\left(\frac{a}{a+b}\right) + x_1 \qquad (y_2 - y_1)\left(\frac{a}{a+b}\right) + y_1$$

x_1, y_1

$A(-2,4)$

$(1,2)$

x_2, y_2

Given the points A(-2,4) and B(7,-2), find the coordinates of the point P on the directed line segment AB that partitions AB in the ratio 1:2.

$B(7,-2)$

$-2 + \left(\frac{1}{3}\right)\left(\overset{7-(-2)}{9}\right)$

$-2 + 3 = 1$

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

$4 - 2 = 2$

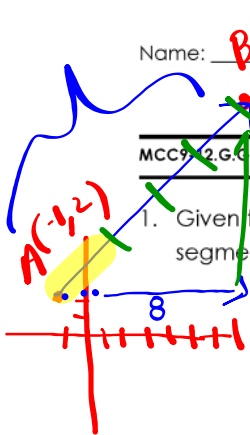$\boxed{P(1,2)}$

$7 - (-1) = 8$

$14 - 2 = 12$

Name: _____ $B(7,14)$ _____   Date: _____

## Partitioning Line Segments in 2 Dimensions Homework

MCC9-12.G.GPE.6 Find the point on a directed line segment between two given points that partitions the segment in a given ratio.

$A(-1,2)$

1. Given the points A(−1, 2) and B(7, 14), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 1:3.

12

8

$x: -1 + \left(\frac{1}{4}\right)(8)$
$-1 + 2$
1

$y: 2 + \left(\frac{1}{4}\right)(12)$ $(1,5)$
$2 + 3$
5 $\boxed{P(1,5)}$

$A(-2,4)$

2. Given the points A(-2, 4) and B(7, -2), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 1:2.

$P(1,2)$ -6

$B(7,-2)$

$\boxed{P(1,2)}$

$a:b$ $7 - (-2)$
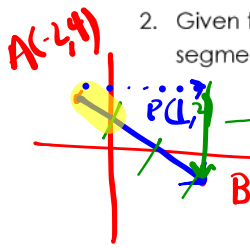
$x: -2 + \left(\frac{1}{3}\right)(9)$
$-2 + 3$
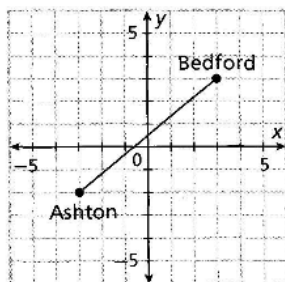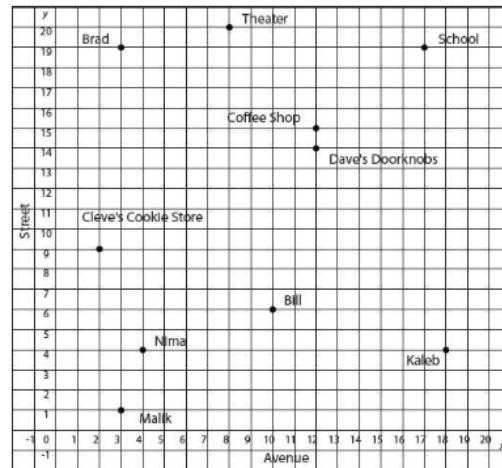1

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

3. Given the points A(-3, -4) and B(5, 0), find the coordinates of the point P on directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 2:3.

4. The map shows a straight highway between two towns. Highway planners want to build two new rest stops between the towns so that the two rest stops divided the highway into three equal parts. Find the coordinates of the points at which the rest stops should be built.

Problems #5-9 Adapted from: Walch Education Resources: CCGPS Coordinate Algebra Teacher Resource Binder

Use the map and the information given to solve each problem that follows.

5. Luis works at a theater on 8th Avenue and 20th Street. Kaleb lives at the corner of 18th Avenue and 4th Street. What is a possible location that is midway between them?

6. Nima lives at the corner of 4th Avenue and 4th Street. Bill lives at the corner of 10th Avenue and 6th Street. Their favorite bakery is located midway between them. What is one possible of the bakery?

7. Cleve's Cookie Store is located at the corner of 2nd Avenue and 9th Street. Dave's Doorknobs is located at the corner of 12th Avenue and 14th Street. Located 1/5 of the distance from Cleve's Cookie Store is the post office. Where is the post office?

8. Malik and Brad both live on 3rd Avenue. Malik lives at the corner of 1st Street, and Brad lives at the corner of 19th Street. 2/3 the distance from Malik's apartment to Brad's apartment is a market. Where is the market?

9. The main entrance to the high school is located at the corner of 17th Avenue and 19th Street. On his way from school to the bank, Luis stops at the coffee shop located at 12th Avenue and 15th Street. The coffee shop is the midpoint of this trip. What is the location of the bank?

Problems #5-9Adapted from: Walch Education Resources: CCGPS Coordinate Algebra Teacher Resource Binder

Geometry   Name_____

                                                                                Date_____ Period____

Answer the following questions and show all work!

1. Given the points A(-1, 2) and B(7, 8), find the coordinates of the point P on the directed line segment $\overline{AB}$ that partitions $\overline{AB}$ in the ratio 1:3. Plot P along with segment AB.

$X: -1 + \left(\frac{1}{4}\right)(8)$ $a:b$

$-1 + 2$

_____

1

$(1, 3.5)$
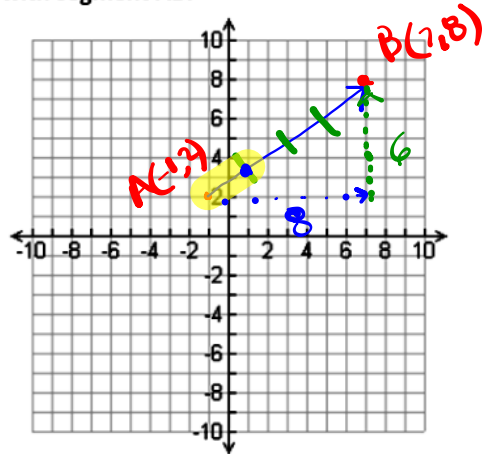
$Y: 2 + \left(\frac{1}{4}\right)(6)$

$2 + \frac{3}{2}$

3.5

2. Find the coordinates of P so that P partitions $\overline{AB}$ in the ratio 5:1 with A(2, 4) and B(8, 10).

3. Find the coordinates of P so that P partitions $\overline{AB}$ in the ratio 1 to 3 with A(-5, 4) and B(7, -4).

4. Find the coordinates of P so that P partitions $\overline{AB}$ in the ratio 3:4 with A(-9, -9) and B(5, -2).

5. Find the coordinates of P so that P partitions $\overline{AB}$ in the ratio $\frac{2}{5}$ if A(-8, -2) and B(6, 19).