

Geometry

Partitioning Segments (Divide a set into sections)

Name: _____

Date: _____ Period: _____

WARM-UP: Find the missing point of the segment.

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

1. Endpoint: $(-12, 8)$ and Endpoint: $(-2, -2)$
Find the midpoint.

$$\left(\frac{-12 + (-2)}{2}, \frac{8 + (-2)}{2} \right) = \boxed{(-7, 3)}$$

2. Endpoint: $(18, 0)$ and Endpoint: $(30, -6)$

Find the midpoint.

$$\left(\frac{18 + 30}{2}, \frac{0 + (-6)}{2} \right) = \boxed{(24, -3)}$$

3. Endpoint: $(5, -10)$ and Midpoint: $(8, -8)$

Find the other endpoint.

$$\begin{array}{l} E(5, -10) \\ M(8, -8) \\ E(11, -6) \end{array} \begin{array}{l} > +2 \\ > +2 \\ > +2 \end{array}$$

4. Endpoint: $(5, -13)$ and Midpoint: $(1, -7)$

Find the other endpoint.

$$\begin{array}{l} E(5, -13) \\ M(1, -7) \\ E(-3, -1) \end{array} \begin{array}{l} > +6 \\ > +6 \\ > +6 \end{array}$$

1. The Atlanta Zoo has a 100ft piece of bamboo to feed their pandas. The pandas are in 2 different areas. Area A has a total of 14 pandas, and area B has a total of 11 pandas. How much bamboo should each area get so that each panda has the same amount of bamboo?

total of 25 pandas

Area A

$$\frac{14}{25} (100) = \boxed{56 \text{ ft}}$$

Area B

$$\frac{11}{25} (100) = \boxed{44 \text{ ft}}$$

2. The Columbia Zoo has a 40 feet piece of bamboo to feed their pandas. They need to feed a group of 3 pandas and a group of 5 pandas. How much does each group get?

total of 8 pandas

Group 1

$$\frac{3}{8} (40) = \boxed{15 \text{ ft}}$$

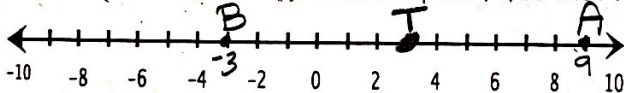
Group 2

$$\frac{5}{8} (40) = \boxed{25 \text{ ft}}$$

Partitioning a segment (one variable): $x_1 + \frac{a}{a+b}(x_2 - x_1)$

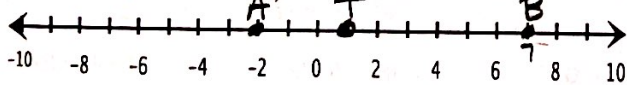
(a:b) is the given ratio

1. A is at 9 and B is at -3. Find the point, T, so that T partitions A to B in a 1:1 ratio.



$$9 + \frac{1}{1+1} (-3 - 9) = 9 + \frac{1}{2} (-12) = 9 - 6 = \boxed{3}$$

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



$$-2 + \frac{1}{1+2} (7 - (-2)) = -2 + \frac{1}{3} (9) = -2 + 3 = \boxed{1}$$

Mile Markers are what the Department of Transportation uses to identify where you are on a highway. Generally mile markers start with the number 1 on the south end of the state and go up as you go north. Same thing from west to east.

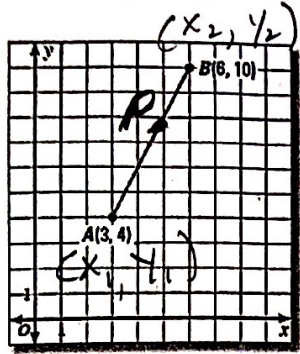
3. If you start at mile marker 12 and end up at mile marker 48, which mile marker is $\frac{2}{3}$ of the way?

$$12 + \frac{2}{3} (48 - 12) = 12 + \frac{2}{3} (36) = 12 + 24 = \boxed{36}$$

4. If you start at mile marker 28 and end up at mile marker 108 which mile marker is $\frac{5}{8}$ of the way?

$$28 + \frac{5}{8} (108 - 28) = 28 + \frac{5}{8} (80) = 28 + 50 = \boxed{78}$$

Partitioning a Segment (two variables): $(x_1 + \frac{a}{a+b}(x_2 - x_1), y_1 + \frac{a}{a+b}(y_2 - y_1))$



1. Find the coordinates of P along the directed line segment AB so that the ratio of AP to PB is 3 to 2. $\rightarrow 3:2 \rightarrow \frac{3}{3+2} = \frac{3}{5}$

$$P: \left(3 + \frac{3}{5}(6-3), 4 + \frac{3}{5}(10-4) \right)$$

$$P: (4.8, 7.6)$$

2. Find the coordinates of point P along the directed line segment AB so that AP to PB is the given ratio.

$A(1, 3), B(8, -4); 4 \text{ to } 1.$ $\frac{4}{4+1} = \frac{4}{5}$

$$P: \left(1 + \frac{4}{5}(8-1), 3 + \frac{4}{5}(-4-3) \right)$$

$$P: (6.6, -2.6)$$

3. Find the coordinates of point P along the directed line segment AB so that AP to PB is the given ratio.

$A(-3, -8), B(4, 6); 2 \text{ to } 2.$ $\frac{2}{2+2} = \frac{2}{4} = \frac{1}{2}$

$$P: \left(-3 + \frac{1}{2}(4-(-3)), -8 + \frac{1}{2}(6-(-8)) \right)$$

$$P: (.5, -1)$$

CAREFUL! Sometimes the ratio is already written as $\frac{a}{a+b}$.

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. A market is $\frac{2}{3}$ the distance from Malik's apartment to Brad's apartment. Where is the market?

Malik $(3, 1)$ Brad $(3, 19)$
 x_1, y_1 x_2, y_2

$$\left(3 + \frac{2}{3}(3-3), 1 + \frac{2}{3}(19-1) \right)$$

$$\text{Market } (3, 13)$$

5. Kaleb's lost control of his model plane $\frac{1}{4}$ the way to the theater on 8th Avenue and 20th Street. Kaleb lives at the corner of 18th Avenue and 4th Street. What are the possible coordinates for the plane?

Kaleb $(18, 4)$ Theatre $(8, 20)$
 x_1, y_1 x_2, y_2

$$\left(18 + \frac{1}{4}(8-18), 4 + \frac{1}{4}(20-4) \right)$$

$$\text{Plane } (15.5, 8)$$

