

Name:

Date:

Period:

Partitioning a Directed Line Segment

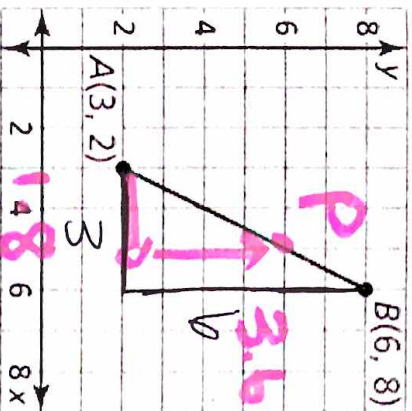
Learning Objective WBAT ~~find~~ find the point that will divide a segment into a given ratio.

Directed Line Segment: A segment that represents moving from point A to point B.

→ We can use slopes to find a point on a line segment that partitions (or divides) the segment into a given ratio.

Example:

1. Find the coordinates of P along the directed line segment so that the ratio of AP:PB is 3:2.



* AB has $3+2=5$ parts

↳ AP is $\frac{3}{5}$ of AB.

① take $\frac{3}{5}$ of Δx and Δy of AB

$$\Delta x : 3 \dots \frac{3}{5} \Delta x = \frac{3}{5} \cdot 3 = \frac{9}{5} = 1.8$$

$$\Delta y : 6 \dots \frac{3}{5} \Delta y = \frac{3}{5} \cdot 6 = \frac{18}{5} = 3.6$$

② add these to A

$$P(3+1.8, 2+3.6) = \boxed{P(4.8, 5.6)}$$

2. Find the coordinates of P along the directed line segment so that the ratio of AP:PB is 4:1

A(1, 3) and B(8, 4) AB has $4+1=5$ parts $\Rightarrow AP = \frac{4}{5} AB$

$$\Delta x : 7 \dots \frac{4}{5} (7) = \frac{28}{5} = 5.6$$

$$\Delta y : 1 \dots \frac{4}{5} (1) = 0.8$$

$$P(1+5.6, 3+0.8) = \boxed{P(6.6, 3.8)}$$

3. Find the coordinates of P along the directed line segment so that the ratio of AP:PB is 3:7
A(-2, 1) and B(4, 5)

10 parts

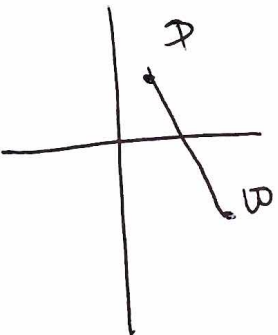
$$AP = \frac{3}{10} AB$$

$$\Delta x = 6$$

$$\Delta y = 4$$

$$\frac{3}{10}(6) = 1.8$$

$$\frac{3}{10}(4) = 1.2$$

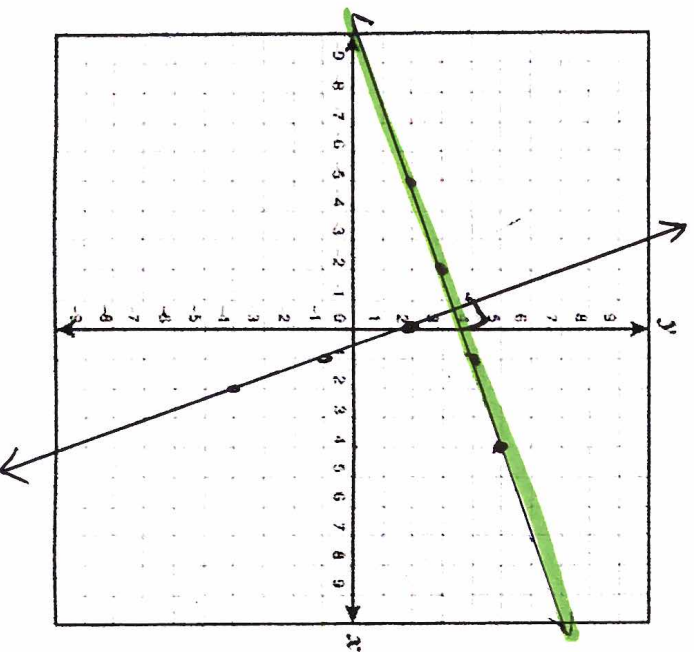


$$P(-2 + 1.8, 1 + 1.2)$$

$$P(-0.2, 2.2)$$

Extra Example: Perpendicular Lines

4. Write the equation of the line perpendicular to $y = -3x + 2$ through the point (4, 5).



⊥ slope: $\frac{1}{3}$

$$\left(\frac{-3}{1}\right)\left(\frac{m}{1}\right) = -1$$

$$m = \frac{1}{3}$$

$$y - y_1 = m(x - x_1)$$

$$y - 5 = \frac{1}{3}(x - 4)$$

$$y - 5 = \frac{1}{3}x - \frac{4}{3}$$

$$y = \frac{1}{3}x - \frac{4}{3} + 5$$

$$y = \frac{1}{3}x - \frac{4}{3} + \frac{15}{3}$$

$$y = \frac{1}{3}x + \frac{11}{3}$$