

Name:

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4

Partitioning a Directed Line Segment

Learning Objective

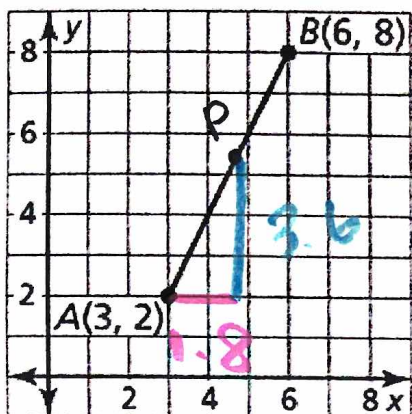
INBAT find the point that partitions a line segment into a given ratio.

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.



\* divide into  $3+2$  or  $5 \approx$  pieces  
 ↳ P is  $\frac{3}{5}$  of the way from A to B

① total  $\Delta y$  and  $\Delta x$  from A to B  
 $\Delta y: 6$   
 $\Delta x: 3$

② Find P  
 \* add  $\frac{3}{5}$  of  $\Delta y$  to y-coord of A  
 $6 \cdot \frac{3}{5} = \frac{18}{5} = 3.6$

\* add  $\frac{3}{5}$  of  $\Delta x$  to x-coord of A  
 $3 \cdot \frac{3}{5} = \frac{9}{5} = 1.8$

$$P(3 + 1.8, 2 + 3.6)$$

$$\boxed{P(4.8, 5.6)}$$

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

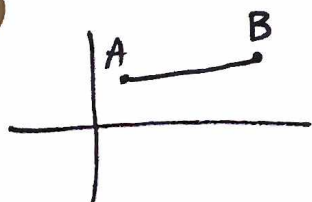
A(1, 3) and B(8, 4)

①  $\Delta y: 1$       ② \*  $\Delta y: \frac{4}{5} \cdot 1 = 0.8$

$\Delta x: 7$

$$\Delta x: \frac{4}{5} \cdot 7 = \frac{28}{5} = 5.6$$

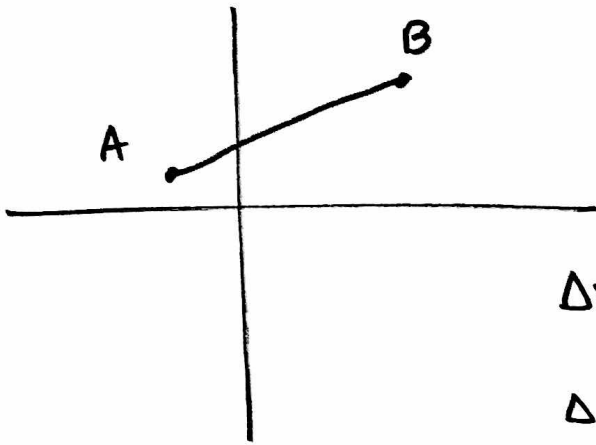
5 pieces  
 AP is  $\frac{4}{5}$  of AB



$$P(1 + 5.6, 3 + 0.8)$$

$$\boxed{P(6.6, 3.8)}$$

3. Find the coordinates of P along the directed line segment so that the ratio of AP:PB is  $\frac{3}{7}$  10 pieces  
A(-2, 1) and B(4, 5)



$$\Delta y: 4$$

$$\Delta x: 6$$

$$\Delta y: \frac{3}{10} \cdot 4 = \frac{12}{10} = 1.2$$

$$\Delta x: \frac{3}{10} \cdot 6 = \frac{18}{10} = 1.8$$

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

$$P(-0.2, 2.2)$$

