

Lesson 7: Point of Division of a Segment

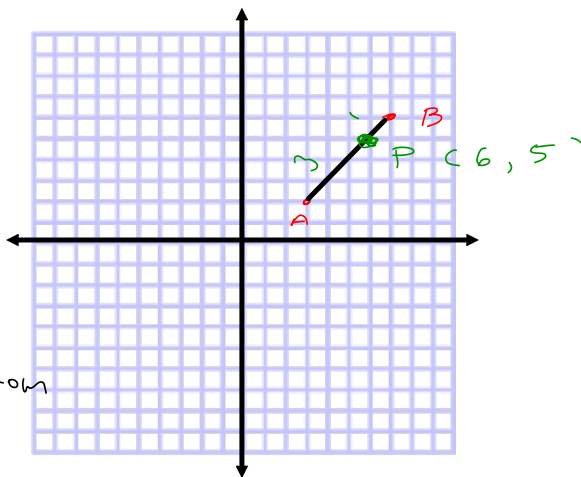
Recall : Segment : a line formed by two points.

$A (3 , 2)$

$B (7 , 6)$

Draw \overline{AB}

Plot P that is located $\frac{3}{4}$ \overline{AB} , from A.



Point of Division Coordinate Formula:
If P is located $\frac{m}{n}$ of the way along \overline{AB}

$$x = x_1 + \frac{m}{n} (x_2 - x_1)$$

$$y = y_1 + \frac{m}{n} (y_2 - y_1)$$

$x = 3 + \frac{3}{4} (7 - 3)$

$x = 3 + \frac{3}{4} (4)$

$x = 6$

$y = 2 + \frac{3}{4} (6 - 2)$

$y = 2 + \frac{3}{4} (4)$

$y = 5$

$P (6 , 5)$

(x_1, y_1) \overline{AB} (x_2, y_2)

$A (3 , 2)$
 $B (7 , 6)$
P at $\frac{3}{4}$ $\frac{m}{n}$ (along \overline{AB})

Find:
E located at $\frac{3}{4}$ along \overline{BA} from B.

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#8 P located at $\frac{3}{5}$ from point B along \overline{AB}

x_2 y_2
A (-4, -6)

B (11, -7)
 x_1 y_1

$$x = x_1 + \frac{m}{n} (x_2 - x_1)$$

$$y = y_1 + \frac{m}{n} (y_2 - y_1)$$

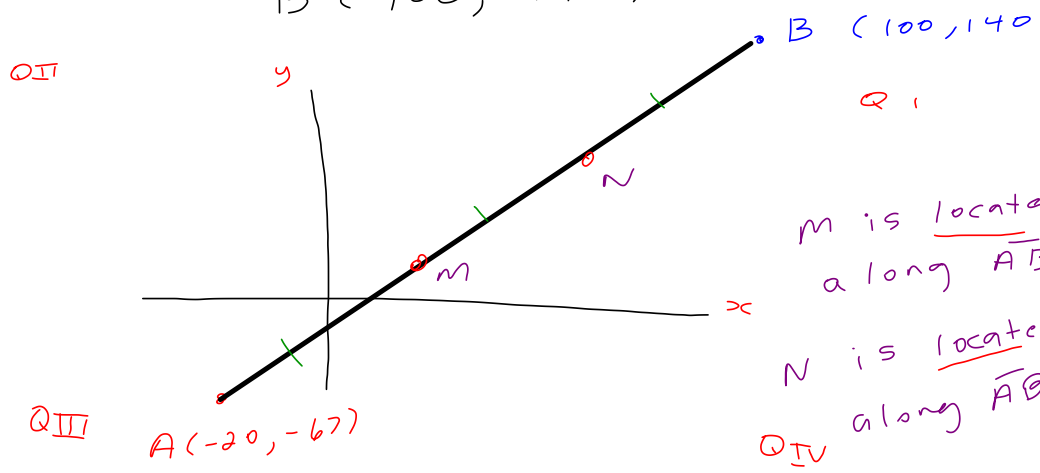
$$x = 11 + \left(\frac{3}{5}\right)(-4 - 11)$$

$$x = 2$$

$$y = -7 + \left(\frac{3}{5}\right)(-6 - -7)$$

$$y = -6.4$$

#9 $A(-20, -67)$
 $B(100, 140)$



m is located $\frac{1}{3}$ m
 along \overline{AB} n

N is located $\frac{2}{3}$ m
 along \overline{AB} n

Location Fraction vs Division Ratio
 used in formula vs sometimes given.

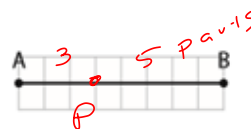
PS

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$D \neq B$ a) 1-8) b)

8 a) For each of the following statements, place point P on segment AB.

1) Point P divides segment AB with a ratio of 3:5 from point A.



$\frac{3}{8}$

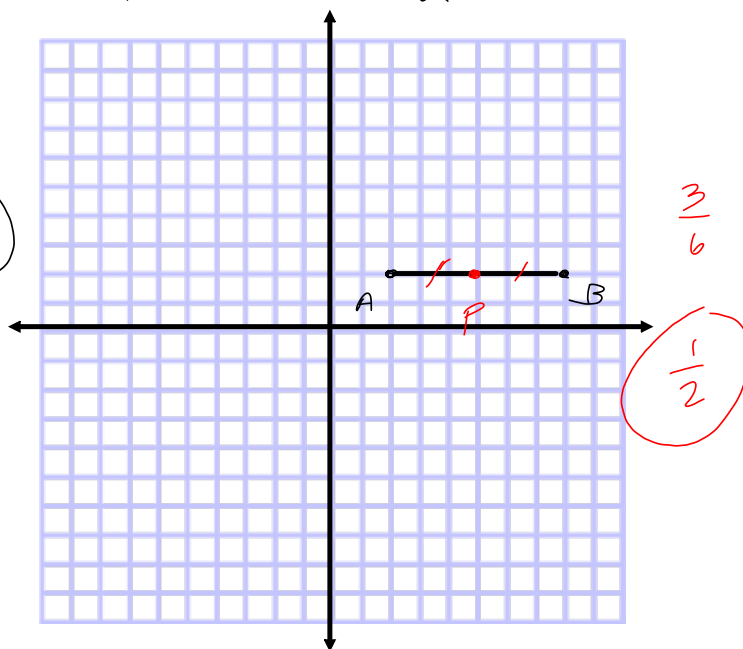
nota bene: always convert a division ratio to a located fraction → formula.

DR	LF	DR	LF
3 : 5 $\frac{3}{3+5}$	$\frac{3}{8}$	4 : 1	$\frac{4}{5}$
3 : 1 $\frac{3}{3+1}$	$\frac{3}{4}$	2 : 1	$\frac{2}{3}$
2 : 3 $\frac{2}{2+3}$	$\frac{2}{5}$	4 : 6	$\frac{4}{10}$
1 : 1	$\frac{1}{2}$	1 : 3	$\frac{1}{4}$
		<u>1 : 1</u>	<u>$\frac{1}{2}$</u>
		2 : 4	$\frac{2}{6}$

midpoint \rightarrow a Special Point
of Division

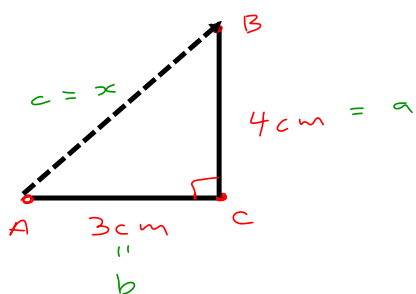
Located Midpoint

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



Calculating the distance/length
Between Two Points

Calculate distance between A and B.



$$c^2 = a^2 + b^2$$

$$c = \sqrt{16 + 9}$$

$$c = 5 \text{ cm}$$

Plot points

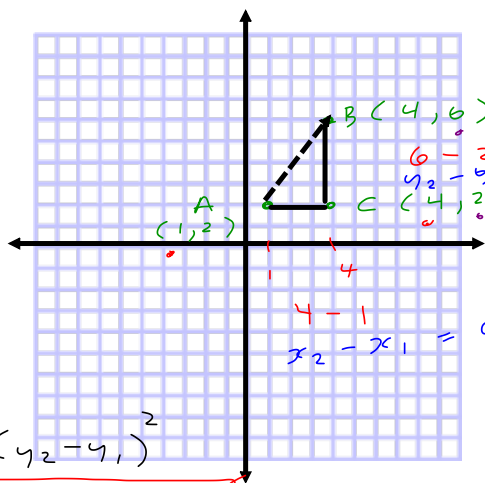
A (1, 2)

C (4, 2)

Find distance between A and C.

$$c^2 = a^2 + b^2$$

$$c^2 = (x_2 - x_1)^2 + (y_2 - y_1)^2$$



B (4, 6)
C (4, 2)

$$6 - 2 = 4 = b$$

$$4 - 1 = 3 = a$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

distance formula.

P 75 Calculate ^(length) distance from point A to B

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

A ^{x₁} ^{y₁} (-2, 1)

$$d = \sqrt{(5 - (-2))^2 + (6 - 1)^2}$$

B ^{x₂} ^{y₂} (5, 6)

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 show