Topic 1-3 Partition a Segment
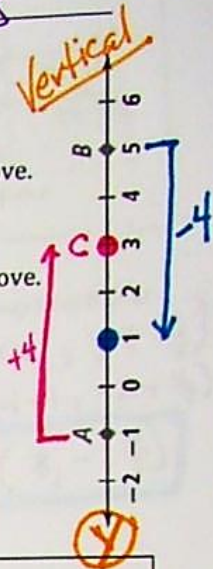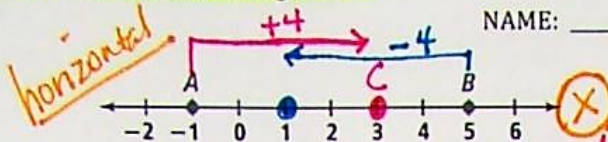
(also see examples in <mark>GREEN</mark> Text Book)

Topic 1-3 | TARGETED Skill: "Partition a Segment"
[TB Pp 22 – 23]

NAME: _Key 2017-18_

horizontal *vertical*

+4   −4
A   C   B

−2 −1 0 1 2 3 4 5 6   (X)

Getting Started!

A→B

A) Find the coordinate value of a point C that is $\frac{2}{3}$ of the way from point A to B on the number line above.

$5-(-1)=6$ $\frac{2}{3}(6)=4$ $-1(+4)=3$ $\boxed{C(3)}$

B) Find the coordinate value of a point D that is $\frac{2}{3}$ of the way from point B to A on the number line above.

$5-(-1)=6$ $\frac{2}{3}(6)=4$ $5(-4)=1$ $\boxed{C(1)}$

C) How was finding the coordinate's distance from A or B the same?

You have to find the same fraction of the total distance

D) How was finding the coordinate value for point C from A and D from B different?

A → C add 4   B → C subtract 4

B
C   +4
A

When you "partition" a segment, you are being asked to find the _coordinates_ of an endpoint that is a certain distance away from another (given) endpoint. The distance traveled from one of the points already at one end of the segment to the location part of the distance away is only a fraction of a given segment's entire length.
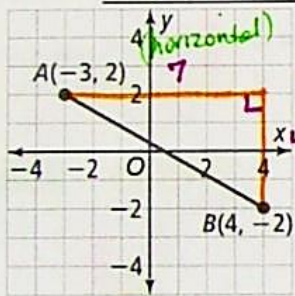
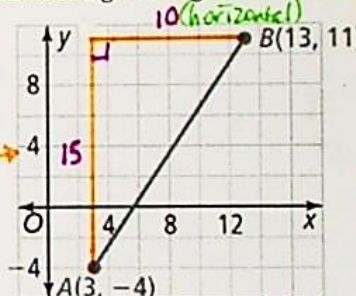A(−3, 2) 4 (horizontal) 7
−4 −2 O 2 4
x 4
−2
B(4, −2)
−4

Figure 1

10 (horizontal)
B(13, 11)
8
(vertical) → 4 15
O 4 8 12 x
−4
A(3, −4)

Figure 2

1) Previously you were finding the midpoint of a segment, which is <u>what fraction</u> away from an endpoint of a given segment? __$\frac{1}{2}$__

2) Does it matter which endpoint you travel from when finding the coordinates of a segment's midpoint using the Midpoint Formula? __no__

3) Think about how number lines are related to the x and y axes. How can you relate partitioning on a number line to partitioning on a coordinate plane? You have to find a fraction (part) of the horizontal distance AND a part of the vertical distance.

4) Explain how you could partition a segment to find the midpoint of it from A to B, <u>*instead of using*</u> the Midpoint Formula.
(Hint: Use Figure 1 <u>and</u> Figure 2 above to help you reason through your explanation)
You must find half of the horizontal & vertical distance, then add or subtract from the starting point depending on which direction you must move.

STEPS AND CHECKLIST FOR PARTITIONING A SEGMENT:

☐ **Plan first!** Determine which direction you will go <mark>horizontally</mark> and vertically from the given endpoint!
Look at the graphed line, find the point (x, y) that you are moving away from and ...
Think!

If RIGHT, then $(x+\square)$ If UP, then $(y+\square)$

If LEFT, then $(x-\square)$ If DOWN, then $y-\square)$

☐ Find the horizontal distance between the endpoints, then take "the part" of it represented by the given fraction.
☐ Find the vertical distance between the endpoints, then take "the part" of it represented by the given fraction.
☐ Add (or subtract) the results you got from the previous steps to (from) the x and y coordinates of your starting point.

Topic 1-3 | TARGETED Skill: "Partition a Segment"

Use the STEPS AND CHECKLIST FOR PARTITIONING A SEGMENT:

☐ Plan first! Determine which direction you will go horizontally and vertically from the given endpoint! Look at the graphed line, find the point (x, y) that you are moving away from and ...
Think!

If RIGHT, then $(x + \square)$ If UP, then $(y + \square)$

If LEFT, then $(x - \square)$ If DOWN, then $(y - \square)$

☐ Find the horizontal distance between the endpoints, then take "the part" of it represented by the given fraction.
☐ Find the vertical distance between the endpoints, then take "the part" of it represented by the given fraction.
☐ Add (or subtract) the results you got from the previous steps to (from) the x and y coordinates of your starting point.
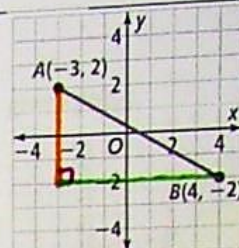
Figure 1

(Use figure 1 for the questions 1 and 2)

1) What are the coordinates of the point $\frac{1}{4}$ of the way from A to B?

A(-3, 2) A$(x + \square, y - \square) \rightarrow (x + 1\frac{3}{4}, y - 1)$

right   down $(-3 + 1\frac{3}{4}, 2 - 1)$

horizontal | vertical $\boxed{C(-1.25, 1)}$

$|4 - (-3)|$ | $|2 - (-2)|$

$|7|$ | $|4|$

$\frac{1}{4}(7) = \frac{7}{4} = \boxed{1\frac{3}{4}}$, $\frac{1}{4}(4) = \boxed{1}$

2) What are the coordinates of the point $\frac{1}{7}$ of the way from B to A?

B(4, -2) B$(x - \square, y + \square) = (x - 1, y + \frac{4}{7})$

left   up $(4 - 1, -2 + \frac{4}{7})$

$\frac{1}{7}(7)$ $\frac{1}{7}(4)$ $\boxed{C(3, -1\frac{3}{7})}$

$= 1$ $= \frac{4}{7}$

(Use figure 2 for questions 3 and 4)

Figure 2

3) What are the coordinates of the point $\frac{2}{5}$ of the way from A to B?

A$(3, -4)$ A$(x + \square, y + \square) = (x + 4, y + 6)$

up   right $(3 + 4, -4 + 6)$

horizontal | vertical $\boxed{C(7, 2)}$

$|3 - 3|$ | $|11 - (-4)|$
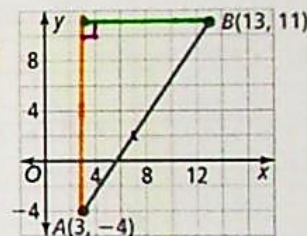
$\frac{2}{5}(10)$ | $\frac{2}{5}(15)$

$\boxed{4}$ | $\boxed{6}$

4) What are the coordinates of the point $\frac{3}{5}$ of the way from B to A?

B$(13, 11)$ B$(x - \square, y - \square) = (13 - 6, 11 - 9)$

left   down $\boxed{C(7, 2)}$

$\frac{3}{5}(10)$ $\frac{3}{5}(15)$

$\boxed{6}$ $\boxed{9}$

What do you do in the event that you are not given a graph, but only a set of points?

5) Find the coordinates of the point $\frac{3}{4}$ of the way from B (12, 5) to A (-4, -7).

B(12, 5) $(x - \square, y - \square)$ $(x - 12, y - 9)$

left   down $(12 - 12, 5 - 9)$

$(B \rightarrow A)$ $\boxed{M(0, -4)}$

horizontal | vertical

$|12 - (-4)|$ | $|5 - (-7)|$

16 | 12

$\frac{3}{4}(16)$ | $\frac{3}{4}(12)$

$\boxed{12}$ | $\boxed{9}$

rough sketch (left) B(12,5)

(down)

A
(-4,-7)

Okay, so my coordinate plane (rough sketch) was a bit off...