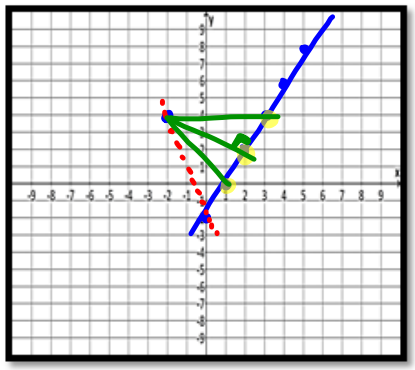
Warm-up

1. Find the distance from the point (-2, 4) to the line $y = 2x - 2$. Round to the nearest tenth.



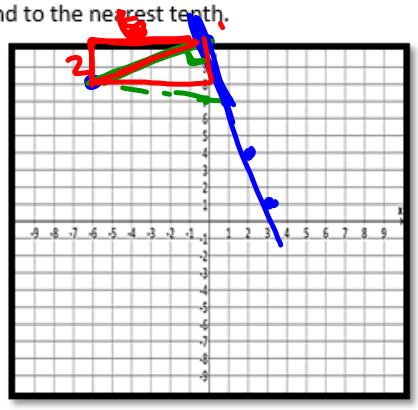
Distance

(-2, 4) (2, 2)

$d = \sqrt{(2 - -2)^2 + (2 - 4)^2}$

$d = \sqrt{16 + 4}$ $d = \sqrt{20} \approx 4.5$

2. Find the distance from the point (-6, 8) to the line $y = -3x + 10$. Round to the nearest tenth.



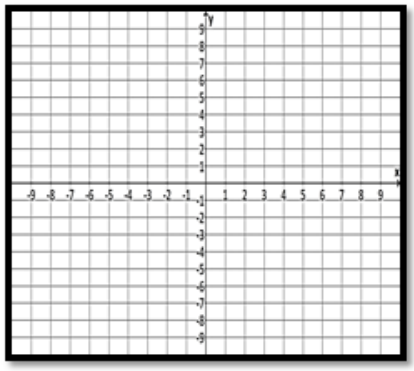
Distance

(-6, 8) (0, 10)

$d = \sqrt{(0 - -6)^2 + (10 - 8)^2}$

$d = \sqrt{36 + 4}$ $d = \sqrt{40}$ $d \approx 6.3$

3. Find the distance from the point (3, 8) to the line $y = \frac{1}{5}x - 3$. Round to the nearest tenth.



Homework Answers

Parallel and Perpendicular lines

2) $y = -\frac{8}{3}x - 5$

4) $y = -\frac{6}{7}x - \frac{5}{7}$

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

8) $y = 3x - 5$

10) $x = -4$

Distance

2) (h, –3), (1, 9), distance = 13 units

h = –4

$h = 6$

4) (0, p), (–8, 5), distance = 8 units

p = 5

$8 = \sqrt{(6-8)^2 + (p-5)^2}$

$64 = 64 + (p-5)^2$

$0 = (p-5)^2$

$\pm 0 = p - 5$

6) (g, 9), (8, 9), distance = 9 units

g = –1

8) The endpoints of the diagonal of a parallelogram are (–4, 2) and (–7, z) and the length is 3 units. Find the value of z.

z = 2

$13 = \sqrt{(h-1)^2 + (-3-9)^2}$

$169 = (h-1)^2 + 144$

$25 = (h-1)^2$

$\pm 5 = h - 1$

$+1 \quad +1$

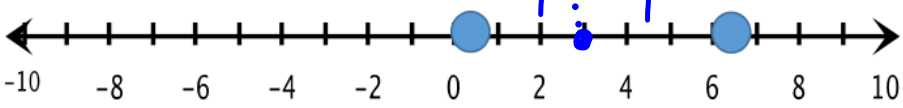
$1 \pm 5 = h$

Partitioning a Segment in 1 & 2 Dimensions

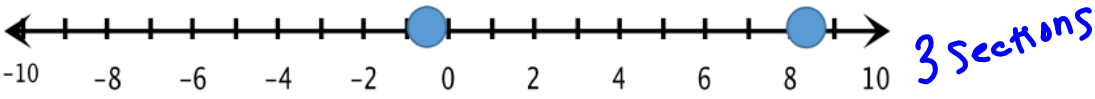
You have already learned how to calculate the midpoint of a line segment. Think back...

- How many segments does the midpoint split a segment into?
- Are these segments equal in length?

This is called a 1 to 1 ratio (1:1), which means the length of the first segment is one times as big (or equal to) as the second segment. Since the ratio is 1:1, you can also think of it as dividing a segment into two equal parts.



A 2:1 ratio would be interpreted as a segment being divided into three equal parts (2 + 1) with two equal parts representing the "2" in the ratio and the other remaining equal part representing the "1".



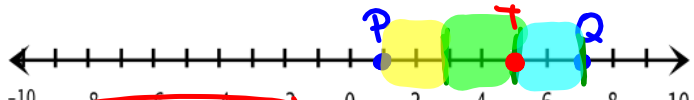
When we divide or separate a line segment, we are **partitioning the segment**. Today, we are going to learn how to partition a segment using a given ratio, other than 1:1 (midpoint). When partitioning a segment, it is necessary to determine the total number of parts that the line segment must be divided into. In the following ratios below, determining the total number of parts:

a. 2:5 b. 3:5 c. 1:2 d. 3:8

7 sections 8 3 11

Partitioning a Line Segment on a Number Line

1. Given: P is at 1 and Q is at 7. Find the point T, so that T partitions P to Q in a 2:1 ratio.

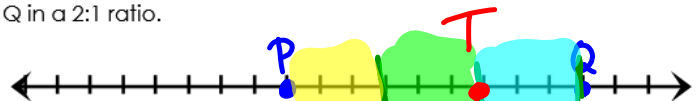


3 sections
T is at 5
6 spaces
$\frac{6}{3} = 2 \frac{\text{spaces}}{\text{section}}$

Partitioning in One Dimension:

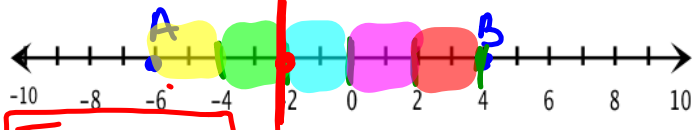
1. Plot endpoints (x_1 & x_2)
2. Determine number of equal parts.
3. Determine length of segment.
4. Count the number of equal parts in the 1st part of the ratio and plot the point.

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



T is at 4
9 spaces
3 sections
$\frac{9}{3} = 3 \frac{\text{spaces}}{\text{section}}$

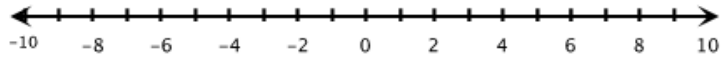
3. Given: A is at -6 and B is at 4. Find the point T, so that T partitions A to B in a 2:3 ratio.



T is at -2
5 Sections
10 Spaces
$\frac{10}{5} = 2 \frac{\text{spaces}}{\text{section}}$

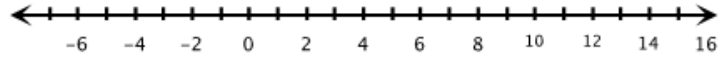
Partitioning Segments by a Ratio

1) A is at 1, and B is at 10. Find the point, T, so that T partitions A to B in a 2:1 ratio.



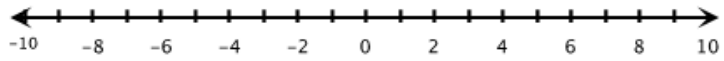
7

2) A is at -2 and B is at 14. Find the point, T, so that T partitions A to B in a 3:1 ratio.



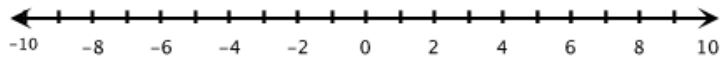
10

3) 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.



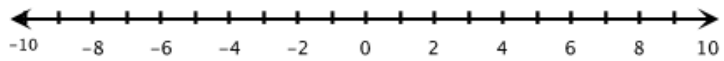
1

4) A is at -5 and B is at 5. Find the point, T, so that T partitions A to B in a 2:3 ratio.



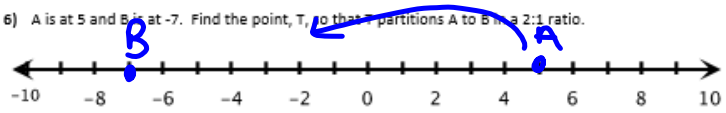
-1

5) A is at -6 and B is at 9. Find the point, T, so that T partitions A to B in a 3:2 ratio.



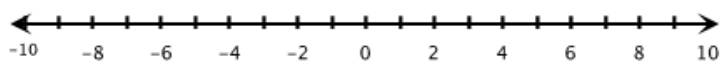
3

6) A is at 5 and B is at -7. Find the point, T, so that T partitions A to B in a 2:1 ratio.



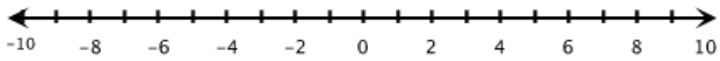
-3

7) A is at 2 and B is at 7. Find the point, T, so that T partitions A to B in a 2:3 ratio.



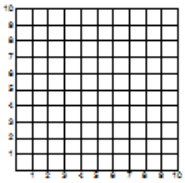
4

8) A is at -4 and B is at 10. Find the point, T, so that T partitions A to B in a 3:4 ratio.

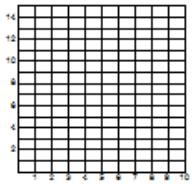


Challenge: Plot points A and B and then find the coordinates of point T.

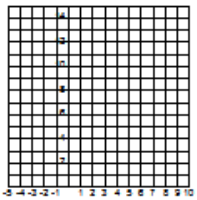
9) Find the coordinates of T that partitions A(2, 3) to B(5, 9) in a 1:2 ratio.



10) Find the coordinates of T that partitions A(1, 4) to B(7, 13) in a 1:2 ratio.



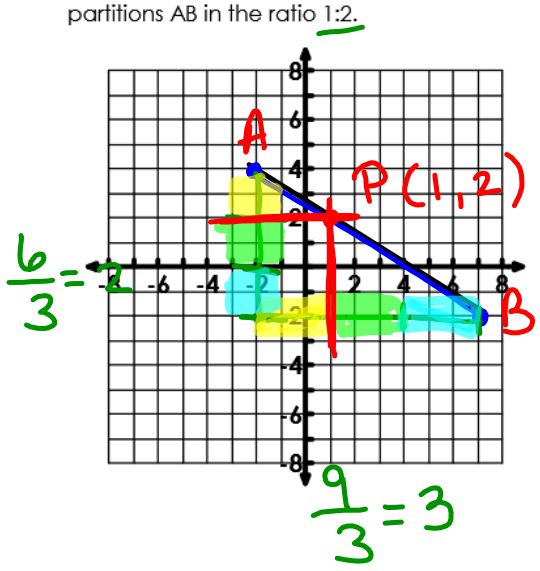
11) Find the coordinates of T that partitions A(-2, 1) to B(8, 11) in a 2:3 ratio.



Partitioning a Segment in Two Dimensions

Partitioning a segment in two dimensions means you are partitioning a line segment in a coordinate plane. It is very similar to partitioning a segment in one dimension except instead of multiplying your fraction by the length; you will be multiplying by the rise (y-coordinate) and run (x-coordinate) of the segment.

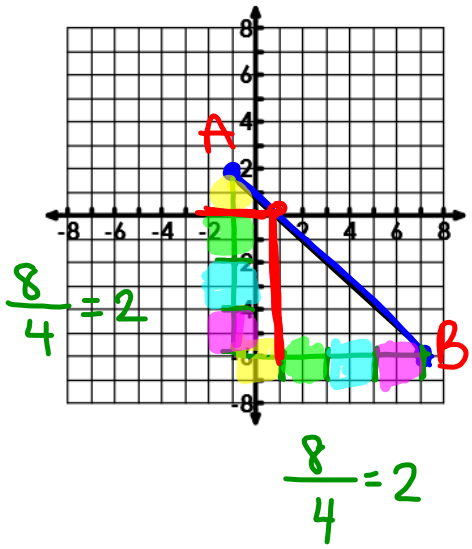
Example 1: Given the points A(-2, 4) and B(7, -2), find the coordinates of the point P on the line segment AB that partitions AB in the ratio 1:2.



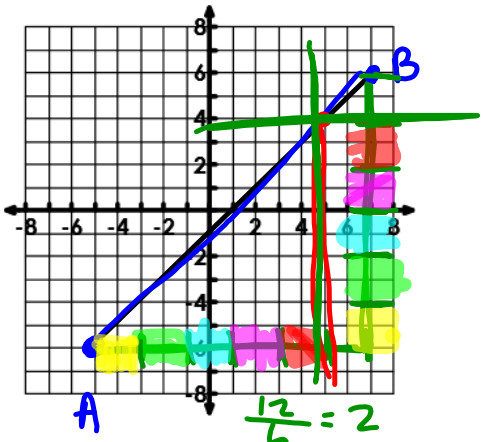
Partitioning in Two Dimensions:

1. Plot points (x_1, y_1) & (x_2, y_2).
2. Determine your slope $(\frac{rise}{run})$.
3. Multiply the **rise** by the fraction that represents the first part of the ratio $(\frac{a}{a+b})$.
4. Multiply the **run** by the fraction that represents the first part of the ratio $(\frac{a}{a+b})$.
5. Go back to point A and plot a point using your new rise over run value.
6. The plotted point represents the given ratio.

Example 2: Given the points A(-1, 2) and B (7, -6), find the coordinates of the point P on the line segment AB that partitions AB in the ratio 1:3.



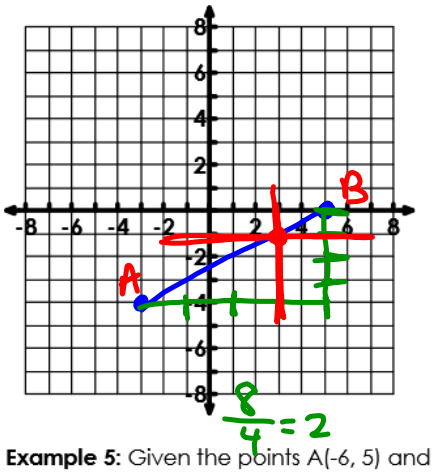
Example 3: Given the points A(-5, -6) and B (7, 6), find the coordinates of the point P on the line segment AB that partitions AB in the ratio 5:1.



$\frac{12}{6} = 2$

P(5,4)

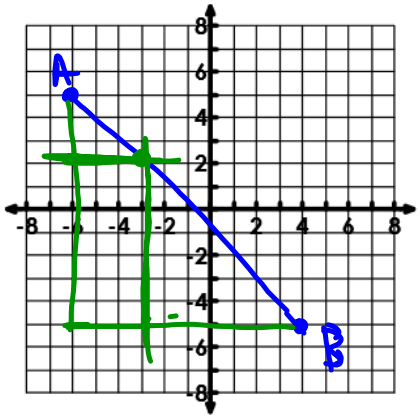
Example 4: Given the points A(-3, -4) and B(5, 0), find the coordinates of the point P on the line segment AB that partitions AB in the ratio 3 to 1.



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

P(3,-1)

Example 5: Given the points A(-6, 5) and B(4, -5), find the coordinates of the point P on the line segment AB that partitions AB in the ratio 3:7.



P(-3,2)