Level 2

Determine the slope of a line that passes through A(3, -5) and B(-2, -1).

Step 1: **Remember that ordered pairs are in the form (x, y). Label the points so you can substitute into the formula:** **A(3, -5), so $x_1 = 3$ and $y_1 = -5$.** **B(-2, -1) so $x_2 = -2$ and $y_2 = -1$**

Step 2: **Substitute the values into the slope formula**

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \frac{-1 - (-5)}{-2 - 3}$$ ***Recall that -1 – (-5) means -1 + 5**

$$m = \frac{4}{-5} = -\frac{4}{5}$$

1. Determine the slope of a line that passes through:
   a) A(5, 2) and B(3, 8)   b)   A(-1, 4) and B(2, -7)

   c) A(-4, -1) and B(-2, 3)   d)   A(-7, -2) and B(-1, -3)

Determine the slope of a line with equation y = -2x + 1
- **This equation is written in slope-intercept form (y = mx + b) where m is the slope and b is the y-intercept.**
- **The slope is the number that is multiplied (attached) to the 'x' value**
- **The slope in this particular equation is -2.**

2. Determine the slope of the line with the following equation:
   a) Y = 4x + 5   b)   y = -2x – 4   c) $y = \frac{2}{3}x + 4$

   d) $y = -\frac{4}{5}x - 8$ e)   y = x + 5   f)   y = -x + 2

Determine the slope of a line with equation (y – 4) = -5(x + 1)

- **This equation is written in point-slope form, $(y - y_1) = m(x - x_1)$ where m is the slope and (x_1, y_1) is a point on the line.**
- **The slope is the number that is multiplied (attached) to the bracket containing 'x'**
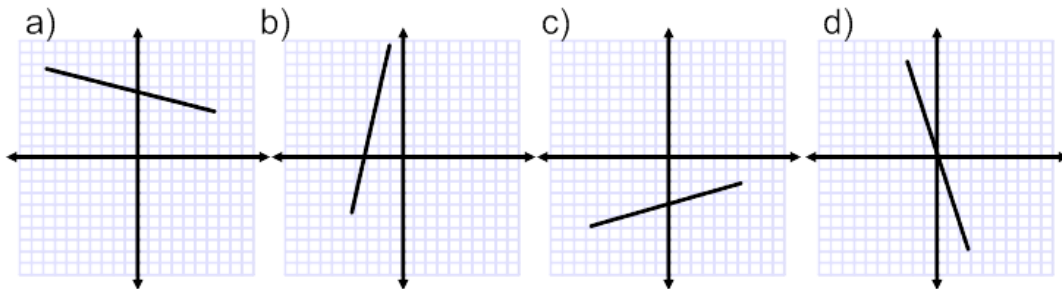- **The slope in this particular equation is -5.**

3. Determine the slope of the line with the following equation:

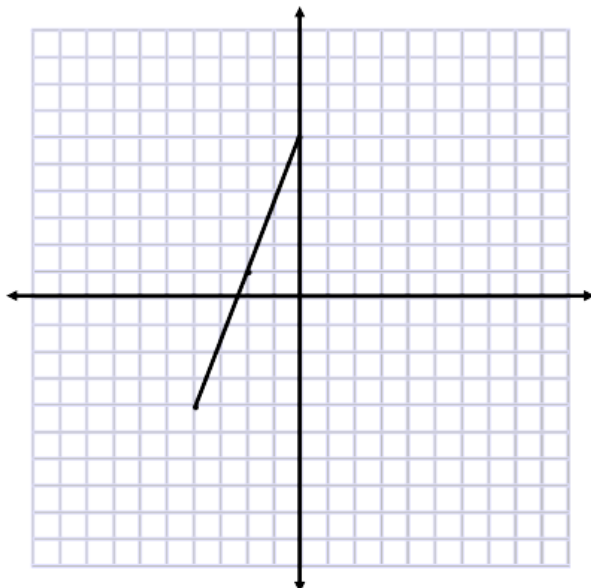a) $(y - 3) = -2(x + 5)$ b) $(y + 2) = 6(x - 3)$ c) $(y + 2) = \frac{1}{5}(x + 2)$

Positive vs Negative Slopes
- **A line that rises (goes up) from left to right has a positive slope**
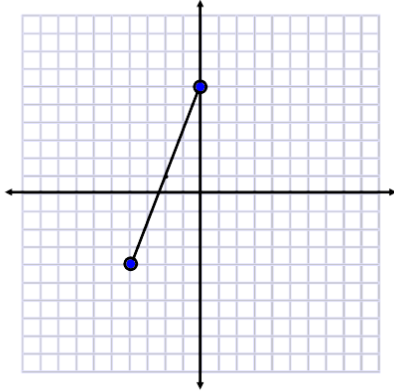- **A line that falls/drops (goes down) from left to right has a negative slope**

4. Determine if the following have a positive or negative slope

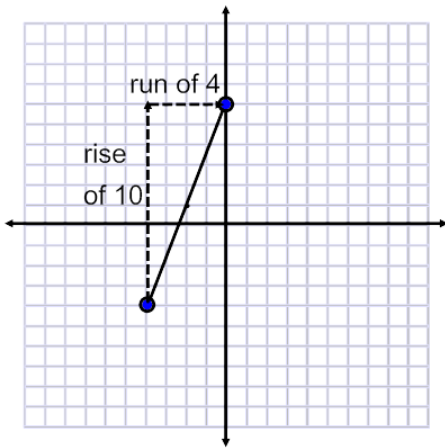a)   b)   c)   d)

Determining the slope of the following line

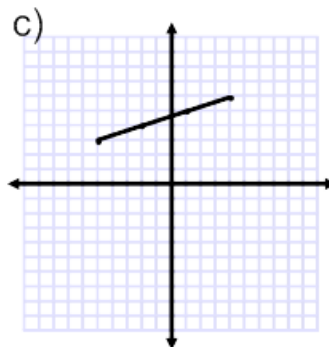**First find two points that are on the intersection of the grid lines.**

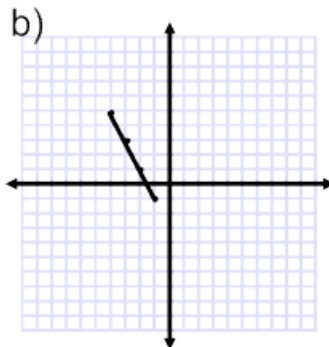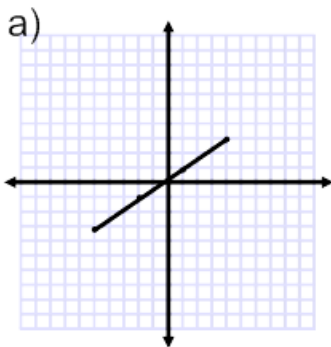**Now determine the rise and run between these two points. You can form a right triangle between them to assist you.**

Slope is $\frac{rise}{run}$ **and we know this is a positive slope as the line rises from left to right.**

Therefore the slope is $\frac{10}{4}$ or $\frac{5}{2}$

5. Determine the slope of the following lines.

a)

b)

c)

Recall – the slope of parallel lines are equal. This means they are exactly the same!

Ie.   **If a slope of a line is $-\frac{2}{3}$, then the slope of a line that is parallel to this one will also be $-\frac{2}{3}$**

6. A line has slope $\frac{4}{5}$. What would the slope of a line that is parallel to this one be?
7. A line has slope -2. What would the slope of a line that is parallel to this one be?
8. A line has slope $\frac{-1}{3}$. What would the slope of a line that is parallel to this one be?

Recall - the slope of perpendicular lines are negative reciprocals. This means that you change the sign and flip the fraction.

Ie.   If a slope of a line is $-\frac{3}{4}$, then the slope of a line that is perpendicular to this one would be $\frac{4}{3}$. (we went from a negative to a positive slope, and flipped the fraction around)

Ie.   If a slope of a line is 5, then the slope of a line that is perpendicular to this one would be $\frac{-1}{5}$. (a slope of 5 can be written as $\frac{5}{1}$, so you just change from a positive to a negative and then flip the fraction.

9. A line has slope $\frac{4}{5}$. What would the slope of a line that is perpendicular to this one be?
10. A line has slope -2. What would the slope of a line that is perpendicular to this one be?
11. A line has slope $\frac{-1}{3}$. What would the slope of a line that is perpendicular to this one be?

To determine if two lines are parallel, perpendicular, or neither, given two equations, compare their slopes.
**Ie.   y = -5x + 3 and y = -5x + 7**
The slope of the first equation is -5 (number attached to 'x') and the slope of the second equation is -5 (number attached to 'x'). Therefore, since the slopes are equal, these lines are parallel.

Ie.   y = 4x – 1 and y = -4x + 2
The slope of the first equation is 4 and the slope of the second equation is -4. These slopes are NOT Equal (they have opposite signs) and they are NOT negative reciprocals (the fractions haven't been Flipped), so they aren't parallel or perpendicular

Ie. $y = \frac{3}{4}x - 1$ and $y = \frac{-4}{3}x + 5$
The slope of the first equation is $\frac{3}{4}$ and the slope of the second equation is $-\frac{4}{3}$. Since these slopes Have opposite signs and the fractions are flipped, they are called negative reciprocals of each other And therefore are perpendicular lines.

12. The equations of two lines are given. Are the two lines parallel, perpendicular, or neither?

a) Y = 5x – 1   b)   y = -2x + 3   c) $y = \frac{2}{5}x - 1$

   Y = -5x – 1 $y = \frac{1}{2}x - 2$ $y = \frac{5}{2}x + 1$

**Draw a line segment with a slope of $\frac{2}{5}$**

Step 1: Since this doesn't give you a point to start at, you can pick any point on your grid that you want. Since this is a positive slope, it will rise from left to right, so a point in the bottom left corner makes more sense to use. Be sure to put your point on an intersection of the grid lines.
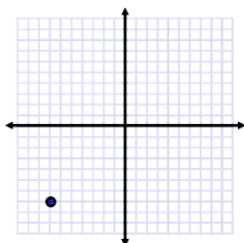
Step 2: Slope is $\frac{rise}{run}$, so rise is 2 and the run is 5. Since the rise is 2, it means FROM THE POINT, count two grid lines up and then 5 grid lines right and put another point.

5 right

2 up
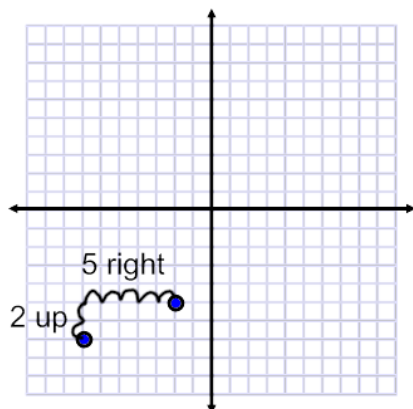
Step 3: You can either draw a line through these two points, or continue the pattern again and then draw the line.

5 right

2 up
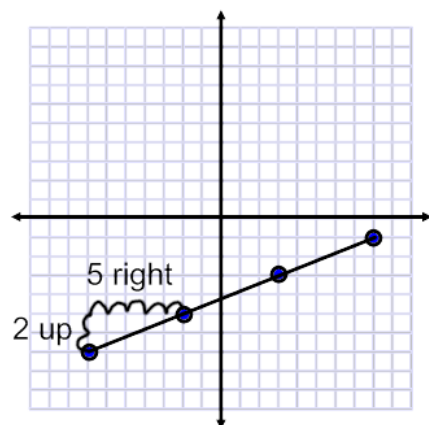
***If the slope is an integer (not a fraction), then you can make it a fraction by placing the number over 1. For example if the slope is 2, it can be written as $\frac{2}{1}$ so you have a rise and run.
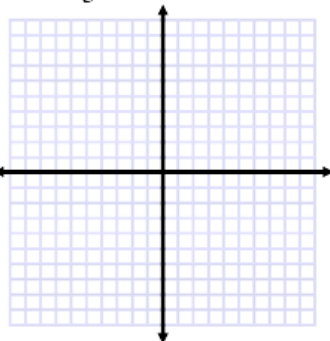
*** If the slope is negative, then your rise is negative, which means instead of counting UP from the point, you count DOWN from the point. You still count RIGHT for the run.

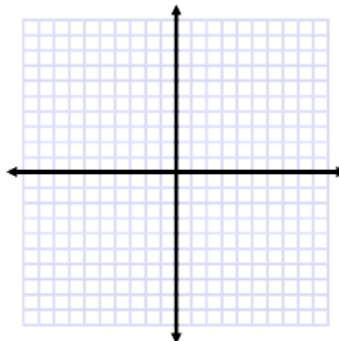13. Draw a line segment that has slope:
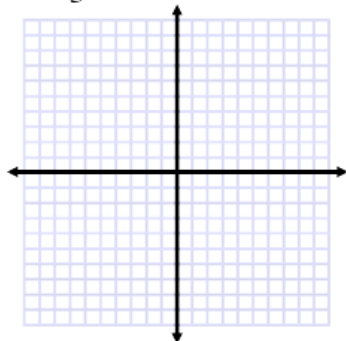
a) $\frac{4}{3}$ b) $\frac{-3}{5}$ c) 4

Level 4
Look through your previous assessments and assignments. Rate of change is a common level 4 question. You are calculating the slope from a graph, but you can't necessarily just count grid markings, you need to check what your scale of the graph is to determine your rise and run.