Lesson 8

**RF3** Demonstrate an understanding of slope with respect to rise and run, line segments and lines, rate of change, parallel lines, perpendicular lines.

The slope of a line is a measure of the steepness of a line.

Slope of a line on a grid can be found using

 Slope = $\frac{Rise}{Run}$

The rise of a line is the change in the dependent (y) variable.

The run of a line is the change in the independent (x) variable.

Slope can also be called rate of change. The letter m is used to represent slope.



Examples:

Find the slope of each of the following:

1.



Answer:

Find the rise and run of the line

To get from A to B ( always move from the leftmost point to the rightmost point to avoid mixing up signs) we start with A which has a y co-ordinate of -4. B has a y co-ordinate of 6. To get from -4 to 6 we go up 10 units. The rise of the line is therefore 10.

To get from A to B we move from -5 on the x axis to 1 on the x axis, This is 6 units. The run of the line is 6.

Slope = $\frac{Rise}{\begin{array}{c}Run\\\end{array}}$

 = $\frac{10}{6}$

 = $\frac{5}{3}$ \*\*\* Always reduce fractions\*\*\*

(b)

 

To go from C to D we have to go down 2 units. The rise is -2.

We have to go over 10 units so the run is 10.

Slope = $\frac{rise}{run}$

 = $\frac{-2}{10}$

 =$\frac{-1}{5}$

(c)

 

To get from E to F we don’t need to move up or down so the rise is 0. To get from E to F we go over 7 units.

 Slope = $\frac{Rise}{Run}$

 = $\frac{0}{7}$

 = 0

EF is a horizontal line. It is a flat line, rise is 0, so slope 0. This is true of all horizontal lines.

(d)

 

To get from G to H we go down 10 units. The rise is -10. GH is a vertical line so we don’t move along the x-axis to get from one point to another. The run is 0.

 Slope = $\frac{rise}{run}$

 = $\frac{10}{0}$

 It is not possible to divide by zero so the slope here is called **undefined**.

Slopes of all vertical lines are undefined, because the run will always be zero.

Recap:

When a line segment goes up to the right, both y and x increase; both the rise and run are positive, so the slope of the line segment is positive.

Looks like

When a line segment goes down to the right, y decreases and x increases; the rise is negative and the run is positive, so the slope of the line segment is negative.

Looks like

For a horizontal line segment, the change in y is 0 and x increases. The rise is 0 and the run is positive.

Looks like

For a vertical line segment , y increases and the change in x is 0. The rise is positive and the run is 0.

Looks like

**Using the slope formula to find slope.**

We know slope is $\frac{rise}{run}$ . Rise is the change in the y values and run is the change in the x values. From this the slope formula is developed.

**Slope Formula**

 **Slope =** $\frac{y2-y1}{x2-x1}$

When a line passes through A(x1,y1) and B(x2,y2)

Ex: Find the slope of the line passing through A(1,2) and B( -2, 0)

We could draw the graph

Slope = $\frac{Rise}{Run}$

 = $\frac{2}{3}$

Or using the slope formula

 Slope = y2 -y2

 x2 -x1

= $\frac{0-2}{\begin{array}{c}-2-1\\\end{array}}$

= $\frac{-2}{-3}$

= $\frac{2}{3}$

 Ex: Find the slope of the line connecting P(-2,-4) to Q (6, -2)

Using the formula Slope = y2 -y2

 x2 -x1

 = $\frac{-2-(-4)}{\begin{array}{c}6-\left(-2\right)\\\end{array}}$

 = $\frac{2}{8}$

 =$\frac{1}{4}$

Practice questions from the textbook p. 339-341 #5-27