**6.1 – The slope of a line**

The slope of a line is defined by:

The slope is used to describe the “steepness” of the line.

Examples:



When a line is vertical, the horizontal change will be 0. As a consequence, the slope will be undefined.

Note: If the line has an undefined slope, it is not representing a function.

Applications: Draw a line that passes through the point A(-2;1) and has a slope of:

 a) b) c)



Notice: A slope of 3 can be seen as or or… When determining the slope of a graph, no matter what points you chose, the result will be the same. We will always use 2 points whose coordinates are exact.

If we do not have a graph, we can directly get the slope of the graph by using the coordinates of 2 points.

 If and , then

Example: Determine the slope of the line that passes through:

1. A(3;-3) and B(4;1)

 or

1. C(45;-64) and D(495;236)

Note: The slope of a line is the same as the rate of change of the linear function that it represents.

Hwk: p.339 # 4-18, 20-27

**6.2 – Slope of parallel and perpendicular lines**

Property 1: Two parallel line have the same slope.

Therefore, to identify if two lines are parallel, you just need to compare their slopes.

Example: If A(-4;2) , B(2;-1) , C(-4;5) and D(5;1)
 Is (AB) parallel to (CD)?

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 No!

Property 2: Two lines are perpendicular if their slopes are opposite and reciprocal.

Vocabulary: Opposite ex. 3 and -3

 5 and -5

 Reciprocal ex. 3 and

 and

 and

Therefore, to know if a shape has a right angle. You must compare their slopes.

Example: If A(-2,7), B(2,-5) and C(-5,6)
 Show that the triangle ABC is a right triangle.

 Yes!

Reminder on geometric figures:

Parallelogram:

Trapezoid:

Rectangle:

Other applications: E(2,3) and F(-4,-1)

Determine the coordinates of a possible point G such that (EG) is perpendicular to (EF)

 so we must have

For example: G(4,0) or (6,-3) or…

Note: other method:



Hwk: p.348 #3-20

**6.3 – Explore the graphs of linear equations**

Develop your understanding p. 255

Where *m* is the slope and *b* is the y-intercept.

Hwk: Evaluate your comprehension p.356 #1-7

**6.4 – Linear equation in slope-intercept form**

All linear functions can be written in the form:

When the equation is in this form, *m* is the slope of the line and *b* is the y-intercept.

This form is called the slope-intercept form.

Examples:

1)

 and y-intercept = 3

2)

y-intercept = -5 and

3)

y-intercept = 5 and m = 0

Note: Vertical lines don’t represent functions. Their slopes are undefined. Their equation is in the form of *x* = *k*

ex: *x =* 3



Applications:

1. Determine the equation of a line with a slope of and a y-intercept of 5

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1. What is the equation of the following line?

 *y*-intercept : 1

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m = 2

1. To get a gym membership, Kevin pays $99 to register and $29 for every month.
2. What is the total cost, *C*, in function to the number of months, *n.*
3. What is the cost of the gym membership for 23 months?
4. Over how many months did Kevin stay if he paid $505 in total.
5. Same question but $600.

Hwk: p.362 # 4-9, 12-14, 16, 18, 19, 21, 22, 24

**6.5 - Equation of a linear function in slope-point form**

We use this form when we do not know the y-intercept….

Example 1:



Example 2: Determine the equation of a line that passes through the points A(500,57) and B(780,71)

Slope-point form:

Where *m* is the slope and ( are the coordinates of a point on the line.

Example 1:

Lets use the point P(3,1)

Note: We can change it from slope-point form to slope-intercept form.

Example 2:

Example 3: Graph the following function

1. 🡪 slope: 2 passes through A(1,3)
2. 🡪 slope: passes though B(-2,5)
3. 🡪 slope: -4 passes though C(1,-3)



Example 4: The relationship between the temperature in degrees Celsius ( and Fahrenheit ( is linear. We know that is equivalent to and is equivalent to .

1. Express *C* in function to *F*.
2. What is equivalent to ?
3. From the question, we can tell that C is the dependant variable and F is the independent variable.

Consider the points: (212,100) and (32,0)

Hwk: p.372 # 5-12, 16-19, 21-23, 25

**6.6 – Equation of a linear function in general form**

A linear equation is in general form if it is in the form:

Where *a, b* and *c* are integers and *a* is positive or 0.

Examples:



Transform the linear equation in general form:

1. 🡪
2. 🡪
3. 🡪

The general form is ‘nice to look at’ and commonly given, but it is not very useful.

We can easily determine the x and y intercepts when the equation is in general form.

*y*-intercept: the value of y when x = 0

*x*-intercept: the value of x when y = 0

Example:

If x = 0 : so

If y = 0 : so

Note: To know the slope or when using a graphing calculator, you must transform the graph from general form to explicit form.

Transform an equation in general from to slope-intercept form:

Example:

Note: We will also use standard form:

Where *a, b* and *c* are integers and *a* is positive or 0.

Example:

Hwk: p.384 # 4-9, 11-14, 16, 18, 21-24