**Pre-calculus 10**

**Chapter 5**

**Linear Equation**

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**5.1 Different Forms of Linear Equations**

Standard Form 🡺 Ax + By = C

 A, B and C are integers, and A 0.

Examples:

 3x + 2y = 5 2x – 7y = 5

What if: -4x + 5y = 10

2

3

 x + 2y = 4

Slope-Intercept Form 🡺 y = mx + b

(The y-intercept of the line is (0 , b)and the slope of the line is (m)

Standard form of an equation of a line can be written in slope intercept form as follows:

 Ax + By = C 🡺

A

B

The slope of Ax + By = C is –

C

B

The y-intercept of Ax + By = C is

Examples

 2x – 3y = 12

Graphing a Line Using the Slope and Y-intercept

Example

Graph 3x + 2y = 12

Step 1: Write the equation in : y = mx + b

 Step 2: Identify the y-intercept and graph this point

 Step 3: Graph another point using the slope

 Counting from the y-intercept

 Step 4: Draw the line connecting the two points

to obtain the graph

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_



\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Graphing a Line Using the Slope and a Point

Graph the line through (-2 , -4) with slope 3.



Graph the line through (\_\_\_\_\_\_\_\_) with slope \_\_\_\_.



Graph the line through (\_\_\_\_\_\_\_\_) with slope \_\_\_\_.

Writing an Equation of a Line Using a Slope and a Point

Write the equation of the line with slope of 2 that runs through (-4 , 1) in slope intercept-form.

Write the equation of the line with slope of \_\_\_ that runs through (\_\_\_\_) in slope intercept-form.

Write the equation of the line with slope of \_\_\_ that runs through (\_\_\_\_) in slope intercept-form.

Write the equation of the line with slope of \_\_\_ that runs through (\_\_\_\_) in slope intercept-form.

Point-Slope Form of a Linear Equation

Point-slope form 🡺 y – y1 = m(x – x1)

Write the equation of the line with slope of 2 that runs through (-4 , 1) in slope intercept-form.

Write the equation of the line with slope of \_\_\_ that runs through (\_\_\_\_) in slope intercept-form.

Write the equation of the line with slope of \_\_\_ that runs through (\_\_\_\_) in slope intercept-form.

Write the equation of the line with slope of \_\_\_ that runs through (\_\_\_\_) in slope intercept-form.

**5.2 Special Cases of Linear Equations**

A horizontal line can be thought of as all points on a graph where y has the same value

 (y = k)

Examples:



A vertical line can be thought of as all points on a graph where x has the same value

 (x = k)

Examples:



Writing the equation of a Line Through Two Points

Examples

 Write the equation of the line passing through A (5 , 2) and B (1 , - 4) in slope-intercept

form.

 Solution 1: Solution 2:

 Write the equation of the line passing through A (5 , 2) and B (1 , - 4) in slope-intercept

form.

 Solution 1: Solution 2:

 Write the equation of the line passing through A (5 , 2) and B (1 , - 4) in slope-intercept

form.

 Solution 1: Solution 2:

Parallel and Perpendicular Lines

Examples

 x + 2y = 6

-2x + y = 3

In the system of equations , determine if the lines are parallel, perpendicular, or neither.

Solution 1: Solution 2:

A

B

The slope of Ax + By = C is –

Examples

3x – y = 5

-6x + 2y = 12

In the system of equations , determine if the lines are parallel, perpendicular, or neither.

Solution 1: Solution 2:

Solution:

Examples

4x + 3y = 7

2x – y - 4

In the system of equations , determine if the lines are parallel, perpendicular, or neither.

Solution 1: Solution 2:

**5.3 Equations of Parallel and Perpendicular Lines**

Examples

Write the equation of a line parallel to 3x – 2y = 6, and which goes through the point A (4 , -2).

A

B

Solution: 3x – 2y = 6 🡺 m = - = 🡺 y – y1 = m(x – x1)

Write the equation of a line parallel to \_\_\_\_\_\_\_\_\_\_, and which goes through the point A (\_\_\_\_\_).

Write the equation of a line parallel to \_\_\_\_\_\_\_\_\_\_, and which goes through the point A (\_\_\_\_\_).

Write the equation of a line parallel to \_\_\_\_\_\_\_\_\_\_, and which goes through the point A (\_\_\_\_\_).

Write the equation of a line perpendicular to 4x + 2y = 7, and which goes through the point

B (-2 , 5).

Write the equation of a line perpendicular to \_\_\_\_\_\_\_\_\_\_\_\_\_, and which goes through the point

B (\_\_\_\_\_\_).

Write the equation of a line perpendicular to \_\_\_\_\_\_\_\_\_\_\_\_\_, and which goes through the point

B (\_\_\_\_\_\_).

Write the equation of a line perpendicular to \_\_\_\_\_\_\_\_\_\_\_\_\_, and which goes through the point

B (\_\_\_\_\_\_).

**5.4 Linear Applications and Modelling**

Example 1

Water freezes 320 F, or 00 C. Water boils at 2120 F, or 1000 C. Graph the linear relation between 0C and 0F, and find the formula that converts Celsius to Fahrenheit.



Solution:

Example 2

It costs a popcorn vendor $490 to make 150 bags of popcorn and $610 to make 350 bags.

a. Graph the linear relation between

cost and number of bags.



 b. Find the cost equation

 c. Find the fixed cost

 d. Find the cost of 250 bags of popcorn

 e. How many bags of popcorn can be bought for $724?

Example 2b

It costs a popcorn vendor $\_\_\_\_\_\_ to make \_\_\_\_ bags of popcorn and $\_\_\_\_ to make \_\_\_\_ bags.

a. Graph the linear relation between

cost and number of bags.

 b. Find the cost equation

 c. Find the fixed cost

 d. Find the cost of \_\_\_\_ bags of popcorn

 e. How many bags of popcorn can be bought for $\_\_\_\_\_?

Example 3

A family has a medical plan that pays 70% of all prescription costs, less a $200 deductible each year.

a. Write a function that models the family’s d. Graph this function and label the answers

 responsibility for prescription costs. from b and c



b. Determine the amount the medical plan

 will pay on $1250 in prescription costs.

c. Determine the amount spent on

 prescription purchases if the amount

 the plan paid was $1250.

Example 3b

A family has a medical plan that pays \_\_\_% of all prescription costs, less a $\_\_\_\_\_ deductible each year.

a. Write a function that models the family’s d. Graph this function and label the answers

 responsibility for prescription costs. from b and c



b. Determine the amount the medical plan

 will pay on $\_\_\_\_\_\_ in prescription costs.

c. Determine the amount spent on

 prescription purchases if the amount

 the plan paid was $\_\_\_\_\_\_\_\_\_.

**5.5 Function Notation**

Example 1

 Given f(x) = 3x + 5, determine the coordinates of one point on the line for f(2).

 Solution:

 Therefore:

Given f(x) = 3x + 5, determine the coordinates of one point on the line for f(\_\_).

 Solution:

 Therefore:

Given f(x) = 3x + 5, determine the coordinates of one point on the line for f(\_\_).

 Solution:

 Therefore:

Example 2

 Given f(x) = \_\_\_\_\_\_\_\_\_\_\_\_, determine the coordinates of one point on the line for f(\_\_).

 Solution:

 Therefore:

 Given f(x) = \_\_\_\_\_\_\_\_\_\_\_\_, determine the coordinates of one point on the line for f(\_\_).

 Solution:

 Therefore:

 Given f(x) = \_\_\_\_\_\_\_\_\_\_\_\_, determine the coordinates of one point on the line for f(\_\_).

 Solution:

 Therefore:

Example 3

 Complete the table for f(x) = 3x + 5

|  |  |  |  |
| --- | --- | --- | --- |
| x | 3x + 5 | f(x) | (x , y) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

 Complete the table for f(x) = \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| x | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | f(x) | (x , y) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

 Complete the table for f(x) = \_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| x | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ | f(x) | (x , y) |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Example 4

 Determine the slope-intercept function f(x) = mx + b if f(1) = 4 and f(3) = -2.

Solution: f(1) = 4 🡺 (1 , 4)

f(3) = -2. 🡺 (3 , -2)

m =

f(x) = mx + b

Therefore

Example 4b

 Determine the slope-intercept function f(x) = mx + b if f(\_\_) = \_\_ and f(\_\_) = \_\_\_.

Solution: 🡺

 🡺

m =

f(x) = mx + b

Therefore

Example 4b

 Determine the slope-intercept function f(x) = mx + b if f(\_\_) = \_\_ and f(\_\_) = \_\_\_.

Solution: 🡺

 🡺

m =

f(x) = mx + b

Therefore

Example 5

 If f(x) = 2x + 1

 a. What is f(3x)? b. What is f(x + 3)?

Example 5b

 If f(x) = \_\_\_\_\_\_\_\_\_\_\_

 a. What is f(\_\_\_\_)? b. What is f(\_\_\_\_\_\_\_\_)?

Example 5b

 If f(x) = \_\_\_\_\_\_\_\_\_\_\_

 a. What is f(\_\_\_\_)? b. What is f(\_\_\_\_\_\_\_\_)?