

# KEY POINTS

## Section 5.1

### Linear Functions

- Definition of a linear function
- Interpreting linear functions
- Initial value and rate of change
- Slope and vertical intercept
- Units

# Warm-Up

Section 5.1

Linear  
Functions

Write down everything you know about linear functions.

Straight line

increase or decrease

y-intercept

x-intercept

rate of change is constant

# Background

## Section 5.1 Linear Functions

$(0, y)$

Linear functions describe quantities that grow at a constant rate, either increasing or decreasing.

This means that the slopes of the graphs are constant.

Linear functions are expressed in two different forms:

$$y = mx + b \quad \text{or} \quad y = b + mx$$

When dealing with linear functions, they will have a **y-intercept**, and **slope**.

**y-intercept**- represented by **b** in the general function. It is the point where the linear function crosses the y-axis, this means the x-value of the point will be 0. It is a constant value.

**slope**- represented by **m** in the general function, either positive or negative, known as the rate of change or steepness of the line. It is a constant value.

**b** & **m** are also known as the parameters for the family.

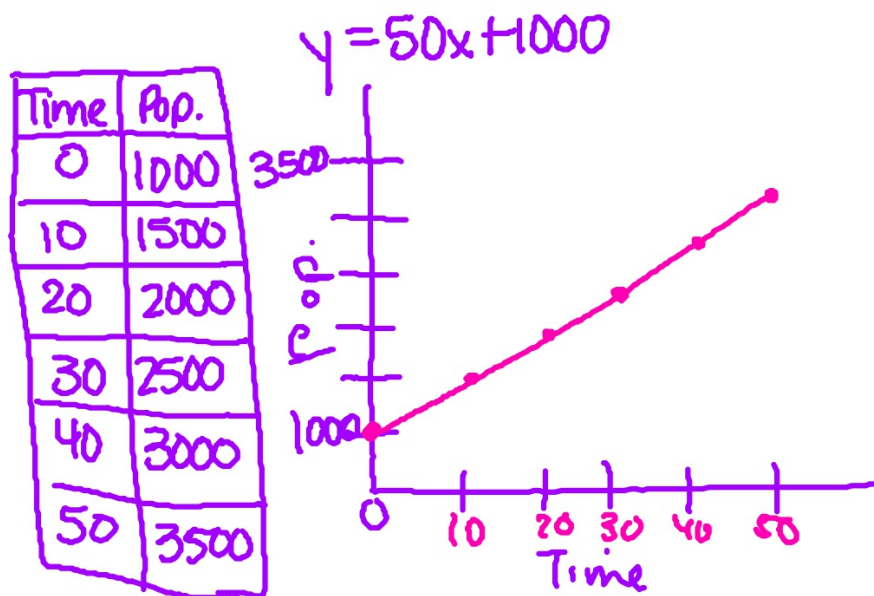
The function  $f(t) = 2.50 + 2.99t$  has  $b = 2.50$  and  $m = 2.99$ . So, 2.50 and 2.99 are the parameters.

# Example

## Section 5.1

### Linear Functions

The school-age population  $P$  of a school district begins at 1000 children and increases at a constant rate of 50 students per year. Create a table, a graph, and an equation that gives the size of the population over a 50-year period,



# Examples

## Section 5.1

### Linear Functions

The school-age population of another school district is given by  $P = 10,000 - 75t$ .

- a.) Create a table of values for this function over a 50-year time period.
- b.) Create a graph of the function.
- c.) Explain in words what this formula tells you about the population.

The school districts population is 10,000 students and decreases by 75 students each year.

# Examples

## Section 5.1 Linear Functions

For the following situations, state the values of  $m$  and  $b$ , and their units. What do they tell you about each situation?

a.) The population of a small island in year  $t$  is  $200,000 + 4000t$ .

$m = 4000$  new people

$b = 200,000$  current residents

The pop. is 200,000 and increases by 4000 each year.

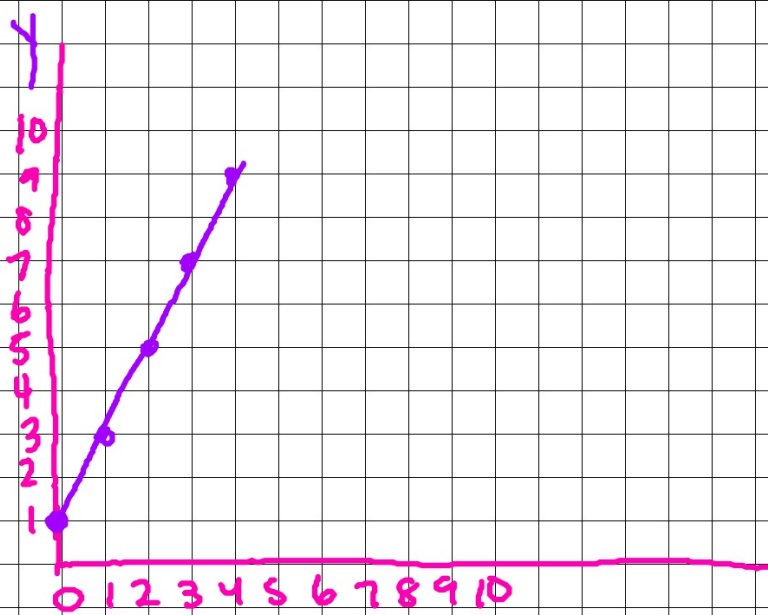
b.) The cost (in dollars) of a long-distance phone call lasting  $n$  minutes is  $1.50 + 0.7n$

$m = \$0.7$

$b = \$1.50$

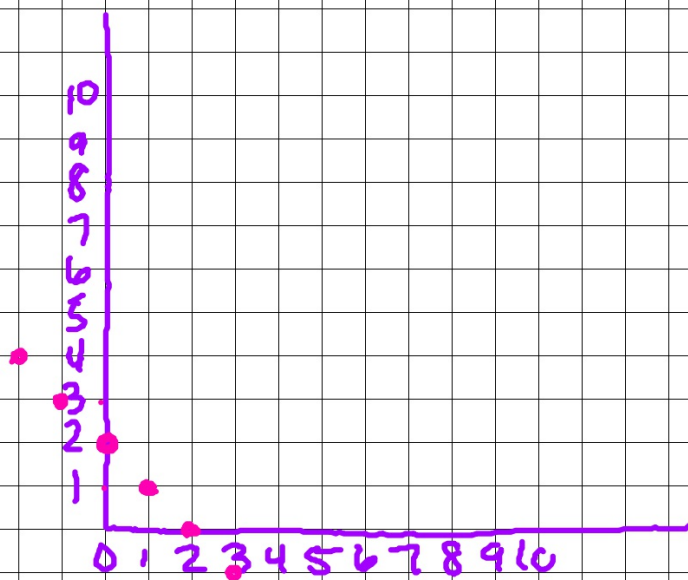
To make a long distance call you pay \$1.50 flat fee and \$0.70 each minute talked.

Graph  $y = 1 + 2x$



Slope:  $2 = \frac{2}{1} \frac{\text{rise}}{\text{run}}$

Graph  $y = 2 - x$



Slope:  $-\frac{1}{1} = -1$



Graph  $y = 3 + \frac{1}{2}x$

# Homework

Section 5.1  
Linear  
Functions

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