

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.

$$y = mx + b$$

Straight line, up or down

every x only has one y

Continuous line

+ slope, - slope, 0 slope, undefined slope
constant rate of change.

isn't a
function

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.

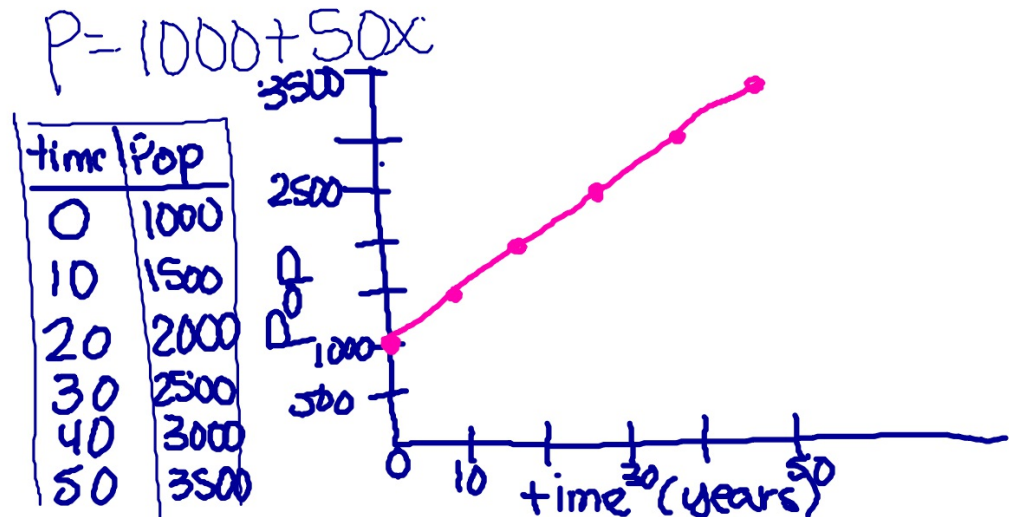
The function $f(t) = 2.50 + 2.99t$ has $b = 2.50$ and $m = 2.99$. So, 2.50 and 2.99 are the parameters.

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 district had a population of 10,000 and it decreased at a constant rate of 75 students per 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 $200,000 + 4000t$.

$$m = 4000 \text{ people/yr}$$

$$b = 200,000 \text{ population}$$

The pop. begins with 200,000 people and increases by 4000 each year.

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

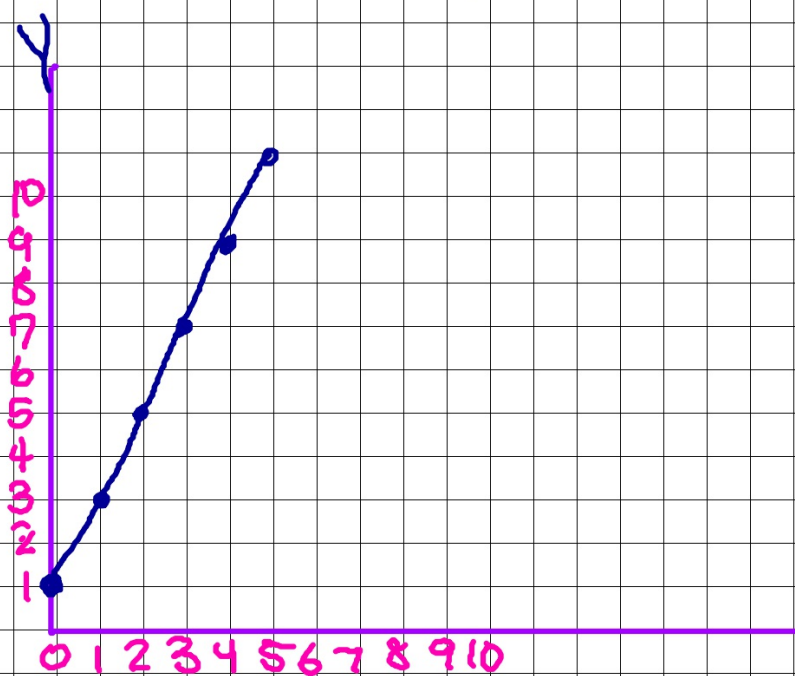
$$m = 0.7 \text{ \$/min}$$

$$b = 1.50 \text{ \$}$$

A long dist. phone call is 1.50 flat fee and cost .70 each minute you talk.

Graph $y = 1 + 2x$

slope = $2 = \frac{2}{1}$



Graph $y = 2 - x$

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



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

Homework

Section 5.1
Linear
Functions

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