



# Concepts

## Linear and Constant Functions

Based on power point presentations by Pearson Education, Inc.  
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# Learning Objectives

1. Define linear functions.
2. Graph linear functions by hand.
3. Define and graph constant functions by hand.

NOTE: This lesson contains some examples. You can find more examples in the “Examples” document also located in the appropriate MOM Learning Materials folder.

# 1. Linear Functions (1 of 2)

When we discussed the *Vertical Line Test* earlier, we determined that linear equations in two variables are functions! Specifically, we can call them *linear functions*.

The linear function is defined in  $x$  as  $f(x) = mx + b$ , where  $m \neq 0$  is the slope of the graph of the function and  $b$  is the  $y$ -intercept.

Please note that the definition of a linear function is nothing but the *slope-intercept form* of a linear equation in two variables, which is  $y = mx + b$ .

Domain: *All Real Numbers* or  $(-\infty, \infty)$  in *Interval Notation*.

# Linear Functions (2 of 2)

Examples of linear functions:

$$g(x) = 3x + 5 \text{ (} m = 2 \text{ and } b = 5\text{)}$$

$$h(x) = -6x + (-1) \text{ (} m = -6 \text{ and } b = -1\text{)}$$

Please note that this linear function is usually written as  $h(x) = -6x - 1$ .  
We eliminate the double signs!

$$k(x) = \frac{1}{2}x \text{ (} m = \frac{1}{2} \text{ and } b = 0\text{)}$$

$$p(x) = x \text{ (} m = 1 \text{ and } b = 0\text{)}$$

Special case of the linear function. It is often called the *Identity Function*.

## 2. Graphs of Linear Functions

Since linear functions are just linear equations in two variables, the graphs of linear functions are also lines.

We graph linear functions by hand just like we did linear equations in two variables. That is, we use either the *Intercept Method* or the *Point-by-Point Plotting Method* or a combination of both.

### 3. Constant Functions and their Graphs

The *Constant Function* is defined as  $f(x) = b$ , where  $m = 0$  is the slope of the graph of the function and  $b$  is the  $y$ -intercept.

Note that the definition of a constant function is that of a horizontal line. It is nothing but  $y = b$ .

Domain: *All Real Numbers* or  $(-\infty, \infty)$  in *Interval Notation*.

**Please note that a vertical line is not a function. Do the *Vertical Line Test* to convince yourself!!!**