

Chapter 1	Linear Functions
Section 2	Linear Functions and Applications

Replace the  $y$  with  $f(x)$ :

$y = mx + b$  becomes  $f(x) = mx + b$  (read this as: "f of x equals" or "the function of x is")

$f$  is the name of the function.

Other common names:  $g(x)$ ;  $h(x)$ ; etc.

### Definition of a Function

A particular value of  $x$  always results in only one value of  $y$ .  
Two or more values of  $x$  may result in the same value of  $y$ .

### Evaluating a Function

Substitute (replace) the variable with the value

### Applications

Supply and demand are common functions studied in any business that has a product to sell.

If the price of an item is increased, then the demand decreases. Therefore, the supply remains high.

If the price of an item is decreases, then the demand increases. Therefore, the supply drops.

If the demand of an item increases, then the price will be increases and the supply drops.

If the demand of an item decreases, then the prices will be decreased and the supply remains high.

Supply	$p = S(q) = mq + b$	$p = \text{price}$
Demand	$p = D(q) = mq + b$	$q = \text{quantity}$

Equilibrium is reached when the graphs of the supply and demand functions intersect. This represents equilibrium in both price and quantity.

To find equilibrium, solve the two functions simultaneously.

## Applications (cont.)

### Cost Analysis

Here, we are interested in the cost of producing an item.

There are two types of cost:

1. marginal (variable, direct): these are the costs associated directly with a single item being produced – materials, direct labor, distribution.
2. fixed (indirect) – these are the costs associated with overall production of all items – building, electricity, indirect labor (administration).

### Break-Even Analysis

Here, we are interested in when we are going to start making money.

We already know about the cost of producing items.

The money made from selling the items is called revenue.

The difference between revenue and cost is our profit (if positive) or loss (if negative).

Cost	$C(x) = mx + b$	x=units m=variable (marginal) cost b=fixed cost
Revenue	$R(x) = px$	p=price x=units
Profit/Loss	$P(x) = R(x) - C(x)$	