

Sections 1.3 & 1.4 – Linear Functions and Their Formulas

Preliminary Example. The cost, C , of your monthly phone bill consists of a \$30 basic charge, plus \$0.10 for each minute of long distance calls.

(a) Complete the table below, and sketch a graph.

t	0	30	60	90	120	150
C						

(b) Compute the average rate of change of C over any time interval.

(c) Find a formula for C in terms of t .

(d) If your bill is \$135, how long did you talk long distance?

Notes on Linear Functions:

1. If $y = f(x)$ is a linear function, then $y = mx + b$, where

2. If $y = f(x)$ is linear, then _____ input values produce output values.

Different forms for equations of lines:

Example 2. Find the slope and the y -intercept for each of the following linear functions.

(a) $3x + 5y = 20$

(b) $\frac{x - y}{5} = 2$

Examples and Exercises

1. Let $C = 20 - 0.35t$, where C is the cost of a case of apples (in dollars) t days after they were picked.

(a) Complete the table below:

t (days)	0	5	10	15
C (dollars)				

(b) What was the initial cost of the case of apples?

(c) Find the average rate of change of C with respect to t . Explain in practical terms (i.e., in terms of cost and apples) what this average rate of change means.

2. In parts (a) and (b) below, two different linear functions are described. Find a formula for each linear function, and write it in slope intercept form.

(a) The line passing through the points $(1, 2)$ and $(-1, 5)$.

(b)

C	10	15	20	25
F	50	59	68	77

3. According to one economic model, the demand for gasoline is a linear function of price. If the price of gasoline is $p = \$3.10$ per gallon, the quantity demanded in a fixed period of time is $q = 65$ gallons. If the price is $\$3.50$ per gallon, the quantity of gasoline demanded is 45 gallons for that period.
- (a) Find a formula for q (demand) in terms of p (price).

 - (b) Explain the economic significance of the slope in the above formula. In other words, give a practical interpretation of the slope.

 - (c) According to this model, at what price is the gas so expensive that there is no demand?

 - (d) Explain the economic significance of the vertical intercept of your formula from part (a).
4. Look back at your answer to problem 2(b). You might recognize this answer as the formula for converting Celsius temperatures to Fahrenheit temperatures. Use your formula to answer the following questions.
- (a) Find C as a function of F .

 - (b) What Celsius temperature corresponds to 90°F ?

 - (c) Is there a number at which the two temperature scales agree?