

Useful Guidelines:

- * Linear Function: $f(x) = ax + b$ [If $f(x) = b$ (constant function) and if $f(x) = x$ (Identity Function)]
Its graph is a straight line. For each unit increase in x , $f(x)$ changes by an amount equal to a .
- * Rate of Change for a Linear Function (slope of the graph): The output of a linear function changes by a constant amount for each unit increase in the input.
- * When data have a constant rate of change, they can be modeled by $f(x) = ax + b$. The constant a represents the rate of change, and the constant b represents the initial amount or the value when $x = 0$.
- * The slope of a line through the points (x_1, y_1) and (x_2, y_2) is
 $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\text{rise}}{\text{run}}$ ($x_1 \neq x_2$). "Slope Formula"
 $f(x) = ax + b$ (slope, y intercept)

1. Determine whether f is a linear function. If f is linear, give values for a and b so that f may be expressed as $f(x) = ax + b$.

a) $f(x) = -3x - 2$

$a = -3$ $b = -2$

b) $f(x) = x^2 - 2$

non-linear function
 $\nabla (0, -2)$

non-linear function

$f(x) = \frac{8}{3} - \frac{4x+2}{3x}$
 $\frac{8}{3} - \frac{4x+2}{3x} = \frac{8x - (4x+2)}{3x} = \frac{8x - 4x - 2}{3x} = \frac{4x - 2}{3x}$

d) $f(x) = \sqrt{x} + 4 = x^{\frac{1}{2}} + 4$

non-linear function

2. a) Find the slope, if it exists, of the line passing through the points $(1, 9)$ and $(8, 18)$.

slope $\frac{y_2 - y_1}{x_2 - x_1} = \frac{18 - 9}{8 - 1} = \frac{9}{7}$

b) If a linear function has the points $(1, 9)$ and $(8, 18)$ on its graph, what is the rate of change of the function?

rate of change $\frac{18 - 9}{8 - 1} = \frac{9}{7}$

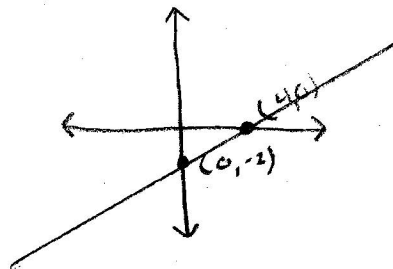
x	y
0	3
9	0

3. Use the intercepts to graph the following equations.

a) $2y - x = -4$

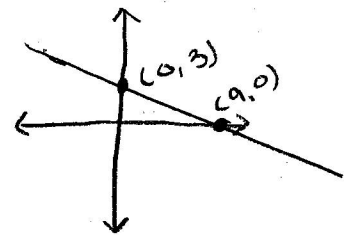
y
-2
0

$2y = x - 4$
 $\frac{2y}{2} = \frac{x-4}{2}$
 $y = \frac{1}{2}x - 2$



b) $x + 3y = 9$

$-x -x$
 $\frac{3y}{3} = \frac{-x+9}{3}$
 $y = -\frac{1}{3}x + 3$



4. Suppose the monthly cost for the manufacture of tennis balls is $C(x) = 1220 + 0.21x$, where x is the number of tennis balls produced each month.

a) What is the slope of the graph of the total cost function?

\$0.21 per tennis ball

b) What is the marginal cost (rate of change of the cost function) for the product?

\$0.21

c) What is the cost of each additional ball that is produced in a month?

\$0.21