

# INTERMEDIATE ALGEBRA

GPS #7

2.2 LINEAR FUNCTIONS

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## Useful Guidelines:

\* Linear Function:  $f(x) = ax + b$  [Example:  $f(x) = 4x - 3$ ,  $a = 4$  and  $b = -3$ ]

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: 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  $f(x) = ax + b$ .

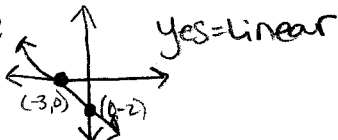
The constant  $a$  represents the rate of change, and the constant  $b$  represents the initial amount or the value when  $x = 0$ .

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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)  $f(x) = x^2 - 2$  not linear

c)  $f(x) = 50$

$a = 0$   
 $b = 50$  yes = linear

d)  $f(x) = \sqrt{x} + 4$   
 $f(x) = x^{\frac{1}{2}} + 4$  not linear

2. Use the table to determine whether  $f(x)$  could represent a linear function. If it could, write the formula for  $f$  in the form  $f(x) = ax + b$ .

a)

$x$	0	1	2	3
$f(x)$	5	7	9	11

yes = linear

$f(x) = ax + b$

$5 = 0 + b$

$b = 5$

$f(x) = ax + 5$

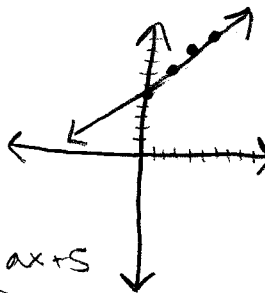
$f(x) = ax + 5$

$7 = a(1) + 5$

$7 = a + 5$

$a = 2$

$f(x) = 2x + 5$



b)

$x$	-2	-1	0	1
$f(x)$	-20	-11	-2	7

$f(x) = ax + b$

$-20 = 0 + b$

$b = -20$

$f(x) = ax - 20$

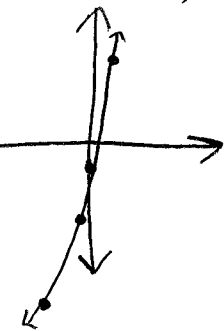
$f(x) = ax + b$

$7 = a(1) - 20$

$7 = a - 20$

$a = 27$

$f(x) = 27x - 20$

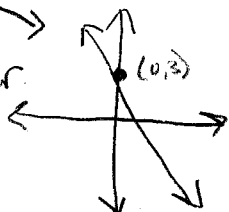


3. Evaluate  $f(x)$  at  $x = 0$  and  $x = -3$  for the following:

a)  $f(x) = 3x + 3$

yes = linear

$f(0) = 3$   
 $f(-3) = 12$



b)  $f(x) = \frac{1}{3}x + 3$

yes = linear

