

Key

III. Linear Functions

** Remember that all linear functions have a constant rate of change.

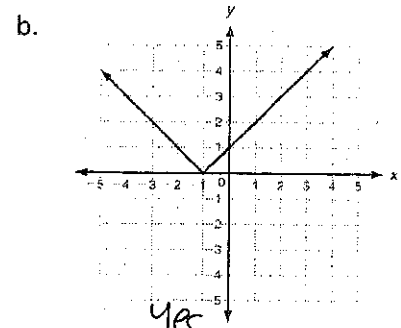
Function notation

19. Determine if the following is a relation or a function.

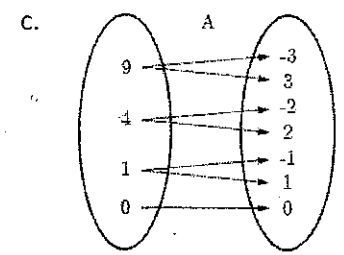
a.

x	0	1	2	3	4
y	8	11	14	14	20

yes



yes



No!

20. Rewrite the equation as a function.

$y = 5x - 2$ $f(x) = 5x - 2$

21. Write the coordinate point that this corresponds to.

$f(8) = 0$ $(8, 0)$

Continuous/Discrete

21. Determine if the relations/functions from problem #19 are discrete or continuous.

- a. Discrete b. Continuous c. discrete

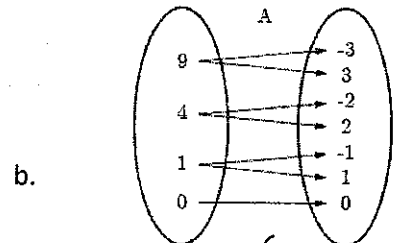
Domain/Range and Input/output

22. Identify the domain and range.

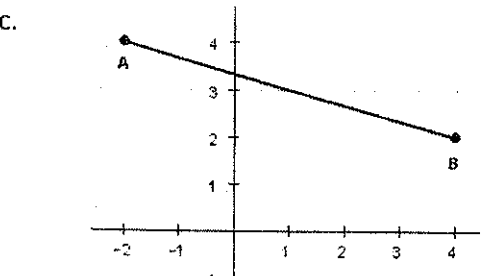
a.

x	0	1	2	3	4
y	8	11	14	17	20

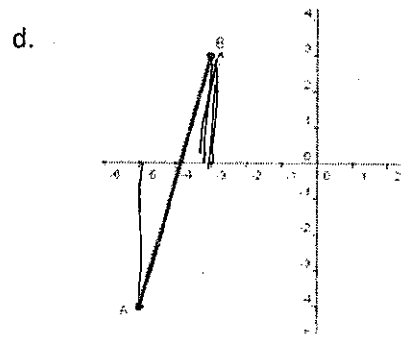
$d = \{0, 1, 2, 3, 4\}$
 $R = \{8, 11, 14, 17, 20\}$



$d = \{0, 1, 4, 9\}$
 $R = \{-3, -2, -1, 0, 1, 2, 3\}$



$D = [-2, 4]$
 $R = [2, 4]$



$D = [-5, 3]$
 $R = [-4, 3]$

Evaluation functions

23. $h(x) = x^2 - x + 1$ $g(x) = 3x - 6$

a. $h(-7) =$

$$(-7)^2 - (-7) + 1$$

$$49 + 7 + 1$$

$$\boxed{57}$$

b. find x , if $g(x) = 12$

$$3x - 6 = 12$$

$$\begin{array}{r} +6 \\ +6 \\ \hline 3x = 18 \end{array}$$

$$\boxed{x = 6}$$

24.

x	0	1	2	3	4
$f(x)$	8	3	0	17	1

a. $f(1) = 3$

b. find x , if $f(x) = 0$

$$x = 2$$

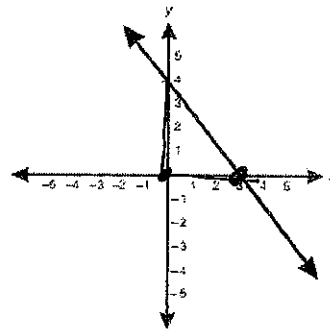
Finding slope- graph, table, 2 points, function

25. Find the slope over the interval $[2, 3]$

x	0	1	2	3	4
$f(x)$	8	3	0	17	1

$$\frac{\Delta y}{\Delta x} = \frac{17 - 0}{3 - 2} = \boxed{17}$$

26. Find the slope over the interval $[0, 3]$



$$\boxed{-\frac{4}{3}}$$

27. Find the slope over the interval $[0, 5]$ of the function $f(x) = 3x + 1$

$$\frac{16 - 1}{5 - 0} = \frac{15}{5} = \boxed{3}$$

$$f(0) = 3(0) + 1 = 1$$

$$f(5) = 3(5) + 1 = 16$$

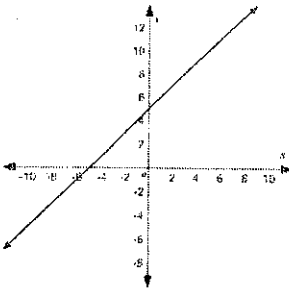
28. Find the slope between the two points $(10, 20)$ and $(-4, 5)$

$$x_1, y_1 \quad x_2, y_2$$

$$\frac{5 - 20}{-4 - 10} = \frac{-15}{-14} = \boxed{\frac{15}{14}}$$

Characteristics of linear functions

29.



Domain: $(-\infty, \infty)$ or \mathbb{R}

Range: $(-\infty, \infty)$ or \mathbb{R}

x-intercept: $(-5, 0)$

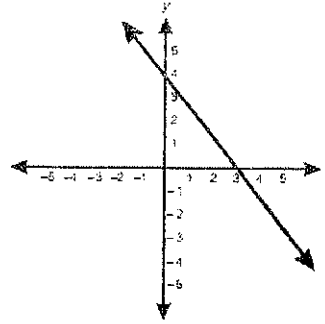
y-intercept: $(0, 5)$

increasing/decreasing: Increasing

end behavior: as $x \rightarrow \infty, y \rightarrow \infty$

as $x \rightarrow -\infty, y \rightarrow -\infty$

30.



Domain: $(-\infty, \infty)$

Range: $(-\infty, \infty)$

x-intercept: $(3, 0)$

y-intercept: $(0, 4)$

increasing/decreasing: Decreasing

end behavior: as $x \rightarrow \infty, y \rightarrow -\infty$

as $x \rightarrow -\infty, y \rightarrow \infty$

Arithmetic sequences

***Remember that an arithmetic sequence has a constant different between consecutive terms*

31. Is this an arithmetic sequence?

a. 2, 3, 5, 8, 12, 17, ... No

b. 4, 0, -4, -8, -12, ... yes $d = -4$

32. a. Write the explicit formula to give the nth term:

4, 0, -4, -8, -12, ...

$$a_n = 4 + (-4)(n-1)$$

b. What is the 122nd term of this sequence?

$$a_{122} = 4 - 4(122-1) = -480$$

33. All arithmetic sequences represent a linear function.