

I. Functions

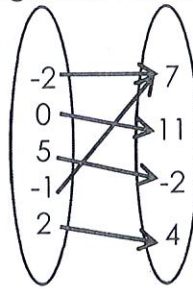
Given the following relations, state the domain, range and tell whether it is a function or not. Explain.

1. $\{(5, -1), (0, 3), (\boxed{-2}, -4), (6, -1) (\boxed{2}, 3)\}$ 2.

Function? no Why? repeated x-values

Domain: $\{-2, 0, 5, 6\}$

Range: $\{-4, -1, 3\}$



Function? yes

Why? each input has one output

Domain: $\{-2, -1, 0, 2, 5\}$

Range: $\{-2, 4, 7, 11\}$

3. Evaluate $f(x) = -3x - 2$ over the domain $\{-2, -1, 0, 2\}$. What is the range?

$f(-2) = -3(-2) - 2 = 4$

$f(-1) = -3(-1) - 2 = 1$

$f(0) = -3(0) - 2 = -2$

$f(2) = -3(2) - 2 = -8$

Range: $\{-8, -2, 1, 4\}$

Given: $f(x) = -5x + 7$

$g(x) = 2x + 3$

4. $g(3) = \underline{11}$

$g(3) = 2^3 + 3$
 $= 8 + 3$
 $= 11$

5. $f(-3) = \underline{22}$

$f(-3) = -5(-3) + 7$
 $= 15 + 7$
 $= 22$

6. $f(x) = 27, x = \underline{-4}$

$27 = -5x + 7$
 $20 = -5x$
 $x = -4$

Given: $f(x) = 3x - 1$

$g(x) = \frac{x+2}{3}$

$h(x) = -x - 2$

7. $f(1) + 4 = \underline{6}$

$f(1) = 3(1) - 1$
 $= 3 - 1$
 $= 2$
 $2 + 4 = 6$

8. $g(4) - h(-1) = \underline{3}$

$g(4) = \frac{4+2}{3} = 2$
 $h(-1) = -(-1) - 2$
 $= 1 - 2$
 $= -1$
 $2 - (-1) = 3$

Given $k(x) = \{(-5, -10), (-3, 0), (0, 1), (2, 5), (6, 9), (10, 13), (13, 17)\}$

9. $k(2) = \underline{5}$

10. $k(0) = \underline{1}$

11. $k(\underline{10}) = 13$

12. $k(\underline{-3}) = 0$

Given the graph to the right, evaluate the following:

13. $f(\underline{-6}) = \underline{4}$

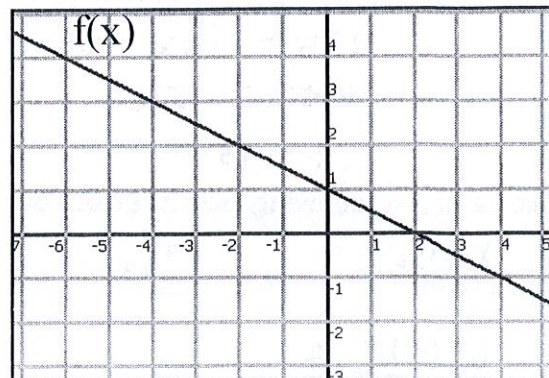
16. $f(\underline{-2}) = \underline{2}$

14. $f(\underline{-3}) = \underline{2.5}$

17. $f(x) = \underline{-1}, x = \underline{4}$

15. $f(\underline{2}) = \underline{0}$

18. $f(\underline{2}) = \underline{0}$



#19 - 22: Given $f(x) = -5x + 7$ and $g(x) = \frac{3x+4}{2}$

19. $f(-2) = \underline{17}$
 $f(-2) = -5(-2) + 7$
 $= 10 + 7$
 $= 17$

20. If $f(x) = -8$, determine the value of x . $f(\underline{3}) = -8$.

$$\begin{aligned} -8 &= -5x + 7 \\ -15 &= -5x \\ x &= 3 \end{aligned}$$

21. $g(4) = \underline{8}$
 $g(4) = \frac{3(4)+4}{2}$
 $= \frac{16}{2}$
 $= 8$

22. If $g(x) = -1$, determine the value of x . $g(\underline{-2}) = -1$.

$$\begin{aligned} -1 &= \frac{3x+4}{2} \\ -2 &= 3x+4 \\ -6 &= 3x \\ x &= -2 \end{aligned}$$

#23 - 30: Given: $f(x) = -2x + 5$

$$g(x) = \frac{x-6}{2}$$

$$h(x) = 3x^2 - x + 1$$

$$j(x) = \frac{x}{3} - 5$$

23. $h(-1) = \underline{5}$
 $h(-1) = 3(-1)^2 - (-1) + 1$
 $= 3(1) + 1 + 1$
 $= 3 + 1 + 1$
 $= 5$

24. $j(x) = -2$, $x = \underline{9}$
 $-2 = \frac{x}{3} - 5$
 $3 = \frac{x}{3}$
 $x = 9$

25. $g(10) = \underline{2}$
 $g(10) = \frac{10-6}{2}$
 $= \frac{4}{2}$
 $= 2$

26. $f(x) = -7$, $x = \underline{6}$
 $-7 = -2x + 5$
 $-12 = -2x$
 $x = 6$

27. $g(x) = -1$, $x = \underline{4}$
 $-1 = \frac{x-6}{2}$
 $-2 = x-6$
 $x = 4$

28. $j(12) = \underline{-1}$
 $j(12) = \frac{12}{3} - 5$
 $= 4 - 5$
 $= -1$

29. $f(\frac{1}{2}) = \underline{\quad}$
 $f(\frac{1}{2}) = -2(\frac{1}{2}) + 5$
 $= -1 + 5$
 $= 4$

30. $j(x) = -3$, $x = \underline{6}$
 $-3 = \frac{x}{3} - 5$
 $2 = \frac{x}{3}$
 $x = 6$

#31 - 33: Marcus currently owns 200 songs in his iTunes collection. Every month, he plans to add 15 new songs. Write a function $f(x)$ to model this scenario, and use the function to answer the questions.

31. Function: $f(x) = \underline{15x + 200}$

32. Evaluate $f(9)$. Explain its meaning in the context of the problem.

$$\begin{aligned} f(9) &= 15(9) + 200 \\ &= 135 + 200 \\ &= 335 \end{aligned}$$

After 9 months, Marcus will have 335 songs in his iTunes collection.

33. Determine when $f(x) = 425$. Explain its meaning in the context of the problem.

$$\begin{aligned} 425 &= 15x + 200 \\ 225 &= 15x \\ x &= 15 \end{aligned}$$

After 15 months, Marcus will have 425 songs in his iTunes collection.

II. Slope

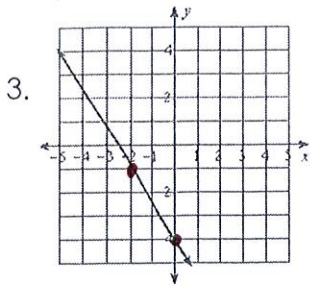
Find the slope of the following points, equations, tables, and graphs.

1. $(10, -1)$ & $(-2, 6)$ $m = \underline{-7/12}$

2. $4x + 6y = 10$ $m = \underline{-2/3}$

$$\frac{y_2 - y_1}{x_2 - x_1} = \frac{6 - (-1)}{-2 - 10} = \frac{7}{-12}$$

$$\begin{aligned} 4x + 6y &= 10 \\ -4x & \quad -6y \\ \hline 6y &= -4x + 10 \\ y &= -\frac{2}{3}x + \frac{5}{3} \end{aligned}$$



$m = -\frac{3}{2}$

4.

| | RUN | RISE |
|----|-----|------|
| x | | y |
| -4 | | 1 |
| -2 | +2 | 4 |
| 0 | +2 | 7 |
| 2 | +2 | 10 |
| 4 | +2 | 13 |

$m = \frac{3}{2}$

$m = \frac{\text{Rise}}{\text{Run}} = \frac{3}{2}$

III. Arithmetic Sequences

Find the next three terms of the arithmetic sequence.

1. 14, 7, 0, -7, -14, -21, ... $d = -7$ 2. -13, -5, 3, 11, 19, 27, ... $d = 8$

3. Given the arithmetic formula for each of the 2 problems above.

$a_n = 14 - 7(n-1)$

$a_n = -13 + 8(n-1)$

4. Given the following recursive formula, find the next terms.

$a_1 = 2$; $a_n = a_{n-1} - 12$ $a_2 = -10$ $a_6 = -58$ $a_9 = -94$
 $d = -12$

5. Given the following explicit formula, find the next terms.

$a_n = 4 - 9(n-1)$ $a_2 = -13$ $a_6 = -41$ $a_9 = -68$
 $a_2 = 4 - 9(2-1) = 4 - 9(1) = -13$
 $a_6 = 4 - 9(6-1) = 4 - 9(5) = 4 - 45 = -41$
 $a_9 = 4 - 9(9-1) = 4 - 9(8) = 4 - 72 = -68$

Fill in the blanks and write the explicit formula.

6. 16, 3, -10, ... $a_1 = 16$ $d = -13$ $a_n = 16 - 13(n-1)$
7. 6, 15, 24, ... $a_1 = 6$ $d = 9$ $a_n = 6 + 9(n-1)$

Write the explicit formula and find the terms.

8. 8, 11, 14, ...
 $d = 3$
 $a_{34} = 107$
 $a_{34} = 8 + 3(34-1) = 8 + 3(33) = 107$

$a_n = 8 + 3(n-1)$
 $a_{105} = 329$
 $a_{105} = 8 + 3(105-1) = 8 + 3(104) = 320$

| Term Number (n) | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------------|---|----|----|----|----|----|
| Value (a_n) | 8 | 11 | 14 | 17 | 20 | 23 |

9. -1, -8, -15, ...
 $d = -7$

$a_n = -1 - 7(n-1)$ $a_{100} = -694$ $a_{157} = -1093$
 $a_{100} = -1 - 7(100-1) = -1 - 7(99) = -694$
 $a_{157} = -1 - 7(157-1) = -1 - 7(156) = -1093$

10. Kerpippy has \$15 in her piggy bank. She decides to add \$2 each week.

a) Write the first four terms of the arithmetic sequence. (Hint: Term 1 is after week 1.)

17, 19, 21, 23

b) Write the explicit formula for the arithmetic sequence.

$a_n = 17 + 2(n-1)$

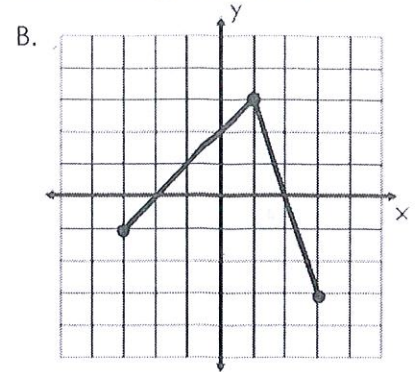
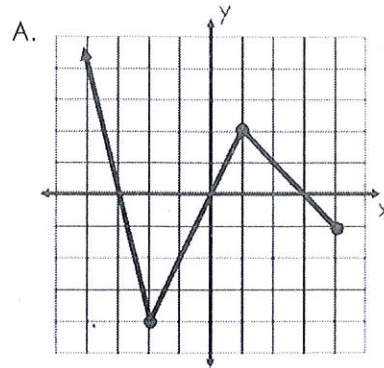
c) Her goal is to buy Barbie a tank for \$49 in 20 weeks. Will she have enough money by then?

$a_{20} = 17 + 2(20-1)$
 $= 17 + 2(19)$
 $= 17 + 38$
 $= 55$

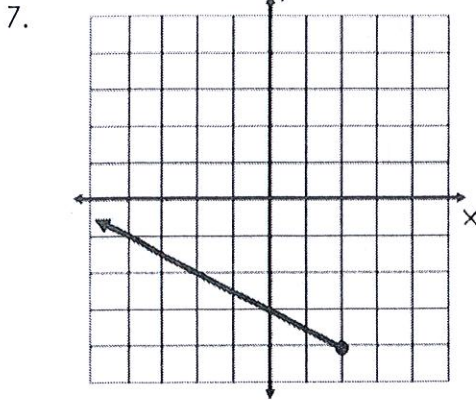
yes! In 20 weeks, she'll have \$55.

IV. Graph Characteristics – Matching. Choose the graph that has the characteristic given below.

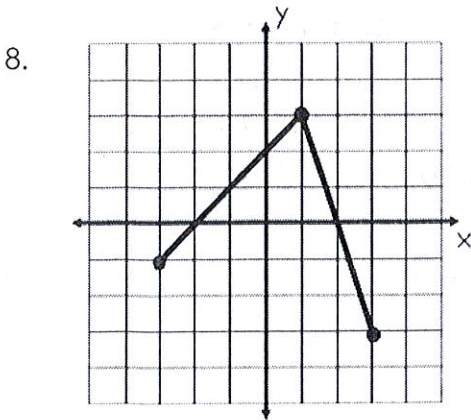
- A 1. Domain: $(-\infty, 4]$
- A 2. Y-int: $(0, 0)$
- B 3. Increasing Interval: $(-3, 1)$
- B 4. Range: $[-3, 3]$
- B 5. No left end behavior
- A 6. Has a rate of change of 2



Fill in the table of characteristics for the graph shown.

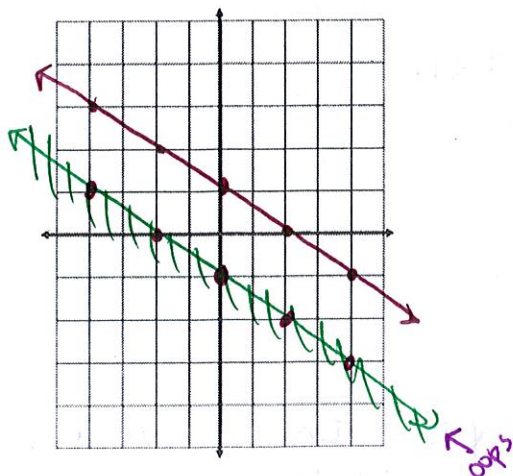


| Characteristic | Answer |
|---------------------|--------------------------------------------------|
| Rate of Change | $-1/2$ |
| Domain | $(-\infty, 2]$ |
| Range | $[-4, \infty)$ |
| Increasing Interval | none |
| Decreasing Interval | $(-\infty, 2]$ |
| x-intercept | $(-6, 0)$ |
| y-intercept | $(0, -3)$ |
| Left End Behavior | as $x \rightarrow -\infty, y \rightarrow \infty$ |
| Right End Behavior | \times OMIT |



| Characteristic | Answer |
|---------------------|--------------------|
| Rate of Change | $1 + -3$ |
| Domain | $[-3, 3]$ |
| Range | $[-3, 3]$ |
| Increasing Interval | $[-3, 1]$ |
| Decreasing Interval | $[1, 3]$ |
| x-intercept | $(-2, 0) + (2, 0)$ |
| y-intercept | $(0, 2)$ |
| Left End Behavior | \times |
| Right End Behavior | \times OMIT |

9. Given some characteristics, sketch the line and then fill in the rest of the characteristics.



$f(x) = -1/2 x + 1$

*rate of change: $-1/2$

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

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

end behavior: left As $x \rightarrow -\infty, y \rightarrow \infty$

right As $x \rightarrow \infty, y \rightarrow -\infty$

x-intercept: $(2, 0)$

*y-intercept: $(0, 1)$