Name KEY

Date _____

ions

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

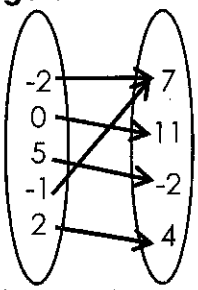
1. { (5, –1), (0 , 3), (–2 , –4), (6 , –1) (–2 , 3) }

Function? NO Why? –2 repeats

Domain: {–2, 0, 5, 6}

Range: {–4, –1, 3}

2.



Function? YES

Why? No x coordinates repeat

Domain: {–2, –1, 0, 2, 5}

Range: {–2, 4, 7, 11}

NOTE: On the mapping diagram, the input and output values should have been from least to greatest.

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

$f(-2) = -3(-2) - 2 = 4$ $f(0) = -3(0) - 2 = -2$

$f(-1) = -3(-1) - 2 = 1$ $f(2) = -3(2) - 2 = -8$

range: {–8, –2, 1, 4}

Given: f(x) = –5x + 7 **g(x) = 2^x + 3**

4. g(3) = 11

$(2)^3 + 3$

$8 + 3$

5. f(–3) = 22

$-5(-3) + 7$

$15 + 7$

6. g(-2) = $\frac{13}{4}$

$(2)^{-2} + 3$

$\frac{1}{4} + 3$

7. f(0) = 7

$-5(0) + 7$

$0 + 7$

Given: f(x) = 3x – 1 $g(x) = \frac{x+2}{3}$ $h(x) = -x - 2$

8. f(1) + 4 = 6

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

$2 + 4$

9. g(4) – h(-1) = 3

$g(4) = \frac{(4+2)}{3} = \frac{6}{3} = 2$

$h(-1) = -(-1) - 2 = 1 - 2 = -1$

$2 - -1$

10. g(7) + 3f(-2) = –18

$g(7) = \frac{(7+2)}{3} = \frac{9}{3} = 3$

$f(-2) = 3(-2) - 1 = -7 \cdot 3 = -21$

$3 + -21$

11. 2h(3) – 5 = –15

$h(3) = -3 - 2 = -5$

$2 \cdot -5 = -10$

$-10 - 5$

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

12. k(2) = 5

13. k(0) = 1

14. k(-3) = 0

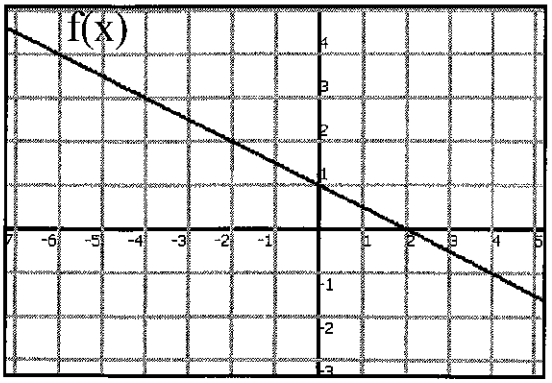
15. k(13) = 17

Given the graph to the right, evaluate the following:

16. f(-6) = 4

17. f(-3) = 2.5

18. f(2) = 0



KEY

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

19. f(-2) = 17

$-5(-2)+7$

$10+7$

20. If f(x) = -8, determine the value of x. f(3) = -8.

$-5x+7=-8$

$-5x=-15$

$\boxed{x=3}$

21. g(4) = 8

$\frac{3(4)+4}{2}=\frac{(12+4)}{2}=\frac{16}{2}$

22. If g(x) = -1, determine the value of x. g(-2) = -1.

$\cancel{2}\cdot\frac{3x+4}{\cancel{2}}=-1\cdot 2$

$3x+4=-2$

$3x=-6$

$\boxed{x=-2}$

#23 – 30: Given: $f(x)=-2x+5$ $\quad g(x)=\frac{x-6}{2}$ $\quad h(x)=3x^2-x+1$ $\quad j(x)=\frac{x}{3}-5$

23. h(-1) = 5

$3(-1)^2-{}^-1+1$

$3+1+1$

24. j(x) = -2, x = 9

$\frac{x}{3}-5=-2$

$\cancel{3}\cdot\frac{x}{\cancel{3}}=3\cdot 3$ $\quad x=9$

25. g(10) = 2

$\frac{10-6}{2}=\frac{4}{2}$

26. f(x) = -7, x = 6

$-2x+5=-7$

$-2x=-12$

$x=6$

27. g(x) = -1, x = 4

$\cancel{2}\cdot\frac{x-6}{\cancel{2}}=-1\cdot 2$

$x-6=-2$

$x=4$

28. j(12) = -1

$\frac{12}{3}-5$

$4-5$

29. f(½) = 4

$-2(\frac{1}{2})+5$

$-1+5$

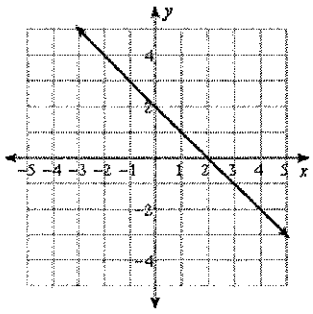
30. j(x) = -3, x = 6

$\frac{x}{3}-5=-3$

$\cancel{3}\cdot\frac{x}{\cancel{3}}=2\cdot 3$

$x=6$

Use the graph of y = f(x) to answer each question.



31. f(2) = 0

32. f(x) = -2, x = 4

33. f(-3) = 5

34. f(0) = 2

35. f(x) = 0, x = 2

36. f(x) = 5, x = -3

#26 – 28: 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.

26. Function: f(x) = $15x+200$

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

$f(9)=15(9)+200$

$f(9)=335$

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

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

$15x+200=425$

$15x=225$

$x=15$

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

KEY

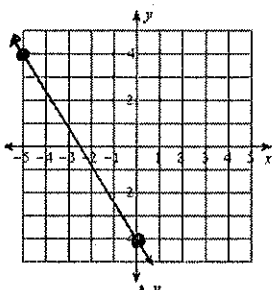
II. Slope $m = \frac{y_2 - y_1}{x_2 - x_1}$

Slope-Intercept Form: $y = mx + b$

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

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

2. $4x + 6y = 10$, $-4x$ $-4x$; $\frac{6y}{6} = \frac{-4x}{6} + \frac{10}{6}$ m = $\frac{-2}{3}$

3. 
m = $\frac{-8}{5}$

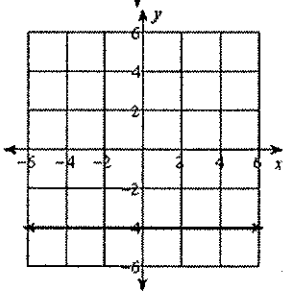
4.

x	y
-4	1
-2	4
0	7
2	10
4	13

+2, +2, +2, +2; +3, +3, +3, +3

$m = \frac{\Delta y}{\Delta x} = \frac{\text{rise}}{\text{run}}$

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

5. 
m = 0

6.

x	y
12	-1
10	-2
8	-3
6	-4
4	-5

-2, -2, -2, -2; -1, -1, -1, -1

m = $\frac{1}{2}$

III. Arithmetic Sequences

Find the next three terms of the arithmetic sequence.

1. 14, 7, 0, -7, -14, -21, ...

2. −13, −5, 3, 11, 19, 27, ...

3. Use the table to write a recursive formula for the sequence. $a_1 = 17;\ a_n = a_{n-1} + 6$

Term Number (n)	1	2	3	4
Value (a_n)	17	23	29	35

4. Given the following recursive formula, fill in the table.
$a_1 = 6;\quad a_n = a_{n-1} - 4$

Term Number (n)	1	2	3	4	5	6
Value (a_n)	6	2	-2	-6	-10	-14

5. Given the following recursive formula, find the next terms.
$a_1 = 2;\quad a_n = a_{n-1} - 12$

a_2 = -10, $a_3 = -22$, $a_4 = -34$, $a_5 = -46$, a_6 = -58, $a_7 = -70$, $a_8 = -82$, a_9 = -94

6. Given the following explicit formula, find the next terms.
$a_n = 4 - 9(n - 1)$

a_2 = -5, a_6 = -41, a_9 = -68

$a_2 = 4 - 9(2-1)$ $a_6 = 4 - 9(6-1)$ $a_9 = 4 - 9(9-1)$

7. Given the following explicit formula, fill in the table.
$a_n = 11 + 3(n - 1)$

Term Number (n)	1	2	3	4	5	6
Value (a_n)	11	14	17	20	23	26

work

$a_1 = 11 + 3(1-1)$ | $a_2 = 11 + 3(2-1)$ | $a_3 = 11 + 3(3-1)$ | $a_4 = 11 + 3(4-1)$ | $a_5 = 11 + 3(5-1)$ | $a_6 = 11 + 3(6-1)$

(simplified form) KEY

Fill in the blanks and write the explicit formula.

8. 16, 3, -10, … $a_1 =$ 16 $d =$ −13 $a_n = 16 - 13(n-1) \rightarrow \boxed{a_n = -13n + 29}$

9. 6, 15, 24, … $a_1 =$ 6 $d =$ 9 $a_n = 6 + 9(n-1) \rightarrow \boxed{a_n = 9n - 3}$

Write the explicit formula and find the terms.

✓✓10. 8, 11, 14, … $\boxed{a_n = 3n + 5}$ $a_{34} =$ 107 $a_{105} =$ 320

work
$a_{34} = 3(34) + 5$
$a_{105} = 3(105) + 5$

✓✓11. -1, -8, -15, … $\boxed{a_n = -7n + 6}$ $a_{100} =$ −694 $a_{157} =$ −1093

$a_{100} = -7(100) + 6$
$a_{157} = -7(157) + 6$

12. 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.

$a_n = 17 + 2(n-1) \longrightarrow \boxed{a_n = 2n + 15}$

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

(used simplified form from PART B) $a_{20} = 2(20) + 15$ $a_{20} = 55$

Yes, she will have $55.00 in 20 weeks and she only needs $49.00.

Given the following recursive formulas, write the *explicit* formula

13. $a_1 = -10$; $a_n = a_{n-1} + 5$ $\boxed{a_n = 5n - 15}$

Find the next three terms. Name the term a_1. State whether the sequence is arithmetic or not. If it is arithmetic, find the common difference.

14. 1, 4, 7, 10, 13, 16, 19 $a_1 =$ 1 arithmetic? YES $d =$ 3
(+3 +3 +3)

15. 3, 6, 12, 24, 48, 96, 192 $a_1 =$ 3 arithmetic? NO $d =$ N/A
(×2 ×2 ×2)

16. Write the INFINITE arithmetic sequence that is defined recursively here: $a_1 = 10$, $a_n = a_{n-1} - 6$.

10, 4, −2, −8, . . .

17. Given the arithmetic sequence, write a simplified explicit formula. Then, use your formula to find the terms. $a_n = 18 + 7(n-1) \rightarrow a_n = 18 + 7n - 7 \rightarrow a_n = 7n + 11$

18, 25, 32, 39, … $a_n = \boxed{7n + 11}$ $a_{10} =$ 81 $a_{25} =$ 186

$a_{10} = 7(10) + 11$

$a_{25} = 7(25) + 11$

KEY

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

A 1. Domain: $(-\infty, 4]$

A 2. Y-int: (0, 0)

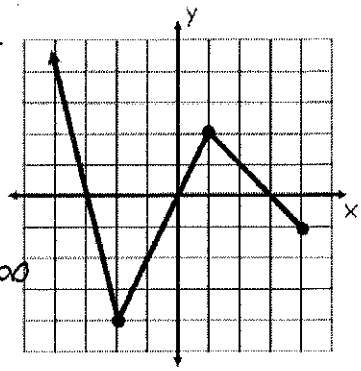
B 3. Increasing Interval: (-3, 1)

B 4. Range: $[-3, 3]$

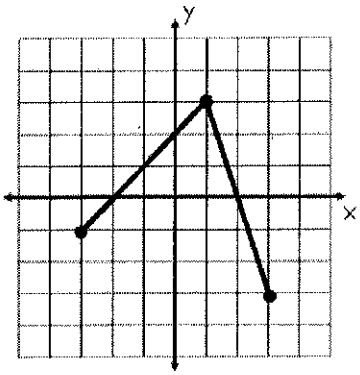
A 5. left end behavior as $x \to -\infty, y \to \infty$

A 6. Has a rate of change of 2

A.

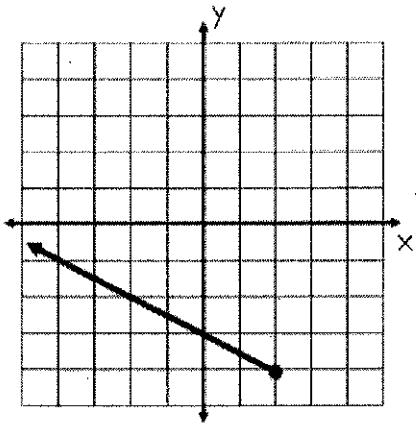


B.



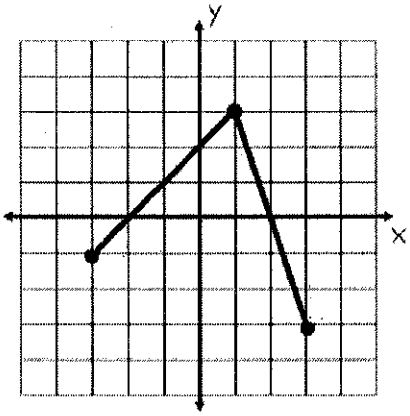
Fill in the table of characteristics for the graph shown.

7.



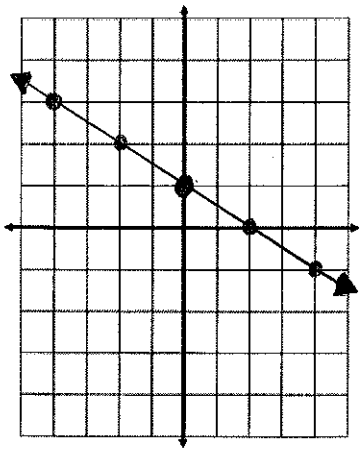
Characteristic	Answer
Rate of Change	$-1/2$
Domain	$(-\infty, 2]$
Range	$[-4, \infty)$
Increasing Interval	NONE
Decreasing Interval	$(-\infty, 2)$
x-intercept	estimate... $(-6, 0)$
y-intercept	$(0, -3)$
Left End Behavior	as $x \to -\infty$, $y \to \infty$
Right End Behavior	as $x \to 2$, $y \to -4$

8.



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	as $x \to -3$, $y \to -1$
Right End Behavior	as $x \to 3$, $y \to -3$

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



f(x) = $-\frac{1}{2}x + 1$

*rate of change: **-1/2**

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

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

end behavior: left **As x → -∞ , y →** ∞

right **As x → ∞ , y →** $-\infty$

x-intercept: $(2, 0)$

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

5

Unit 2B Test review

KEY

III. Linear Functions

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

Function notation

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

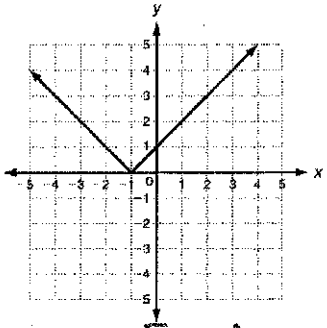
a.

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

Function

(NO x coordinates repeat)

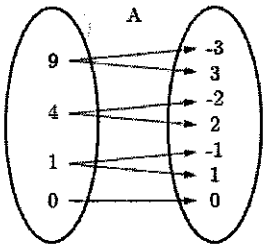
b.



Function

(passes vertical line test)

c.



Relation

(Every x-value does not map to only one y-value)

2. Rewrite the equation as a function.

y = 5x – 2 $f(x) = 5x - 2$

3. Write the coordinate point that this corresponds to.

f(8) = 0 (8, 0)

Continuous/Discrete

4. Determine if the relations/functions from problem #1 are discrete or continuous.

a. Discrete b. Continuous c. Discrete

Domain/Range and Input/output

5. Identify the domain and range.

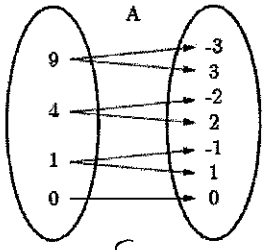
a.

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

DOMAIN: {0, 1, 2, 3, 4}

RANGE: {8, 11, 14, 17, 20}

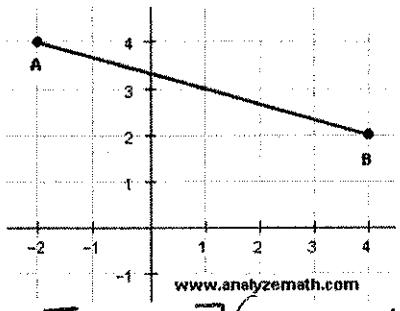
b.



DOMAIN: {0, 1, 4, 9}

RANGE {-3, -2, -1, 0, 1, 2, 3}

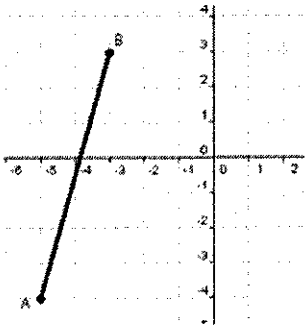
c.



DOMAIN: [-2, 4] (OR $-2 \le x \le 4$)

RANGE: [2, 4] (OR $2 \le y \le 4$)

d.



DOMAIN: [-5, -3] (OR $-5 \le x \le -3$)

RANGE: [-4, 3] (OR $-4 \le y \le 3$)

KEY

Evaluation functions

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

a. h(-7)= $(-7)^2 - (-7) + 1$
$= 49 + 7 + 1$
$= \boxed{57}$

b. g(0)= $3(0) - 6$
$= 0 - 6$
$= \boxed{-6}$

c. find x, if g(x) = 12

$3x - \cancel{6} = 12$
$\quad +\cancel{6} \quad +6$
$\frac{\cancel{3}x}{\cancel{3}} = \frac{18}{3}$
$\boxed{x = 6}$

7.

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

a. f (1) = $\boxed{3}$

b. find x, if f(x) = 0 $\boxed{x = 2}$

Finding slope- graph, table, 2 points, function

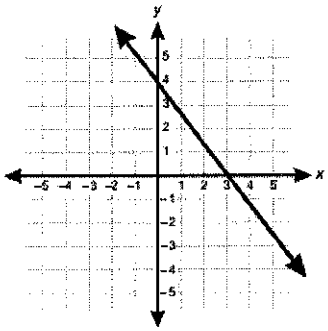
8. Find the slope over the interval [2, 3] (x_1 x_2)

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

$(2, 0)$ $(3, 17)$ (x_1 y_1 x_2 y_2)

$m = \frac{(17-0)}{(3-2)} = \frac{17}{1} = \boxed{17}$

9. Find the slope over the interval [0, 3] (x_1 x_2)



at $x=0$, $y=4$
at $x=3$, $y=0$
$(0, 4)$ $(3, 0)$ (x_1 y_1 x_2 y_2)

$m = \frac{(0-4)}{(3-0)} = \boxed{\frac{-4}{3}}$

10. Find the slope over the interval [0, 5] of the function f(x) = 3x + 1 (x_1 x_2)

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

$(0, 1)$ (x_1 y_1)

$f(5) = 3(5) + 1$
$= 15 + 1$
$= 16$

$(5, 16)$ (x_2 y_2)

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

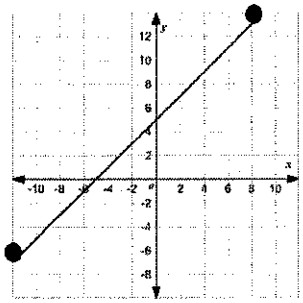
11. Find the slope between the two points (10, 20) and (-4, 5) (x_1 y_1 x_2 y_2)

SLOPE: $m = \frac{(5-20)}{(-4-10)} = \frac{-15}{-14} = \boxed{\frac{15}{14}}$

KEY

Characteristics of linear functions

12.



Domain: $[-12, 8]$ (OR $-12 \le x \le 8$)

Range: $[-6, 14]$ (OR $-6 \le y \le 14$)

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

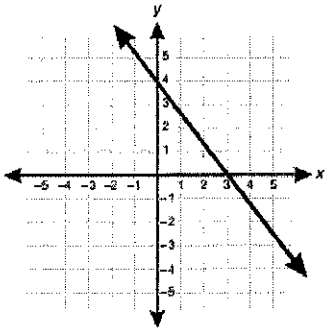
y-intercept: $(0, 5)$

increasing/decreasing: $(-12, 8)$

end behavior: as $x \to -11$, $y \to -6$

as $x \to 8$, $y \to 13$

13.



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

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

x-intercept: $(3, 0)$

y-intercept: $(0, 4)$

increasing/decreasing: $(-\infty, \infty)$

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

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

Arithmetic sequences

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

14. Is this an arithmetic sequence? If so, name the common difference, d.

a. 2, 3, 5, 8, 12, 17....

+1 +2 +3 +4 +5

$\boxed{\text{NO}}$, not a constant difference

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

-4 -4 -4 -4

$\boxed{\text{YES, } d = -4}$

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

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

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

KNOW: Explicit Formula

$a_n = a_1 + d(n-1)$

$\boxed{a_n = -4n + 8}$ ← simplified form

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

$a_{122} = -4(122) + 8$

$\boxed{a_{122} = -480}$

16. All arithmetic sequences represent a Linear function.