

READY, SET, GO!

Name _____

Period _____

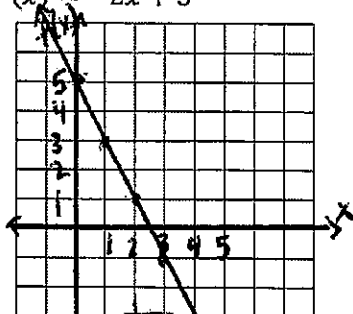
Date _____

READY

Topic: Graphing Linear and Exponential Functions

Graph each of the functions. Name 3 points that lie on each graph. Choose a scale for your graph that will make it possible to graph your 3 chosen points.

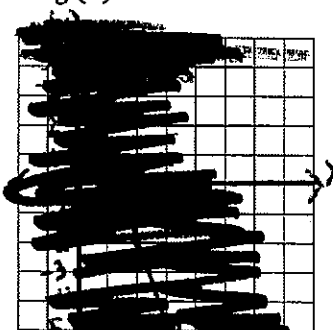
1. $f(x) = -2x + 5$ $m = -2$ $b = 5$



3 points:

x	f(x)
0	5
1	3
2	1

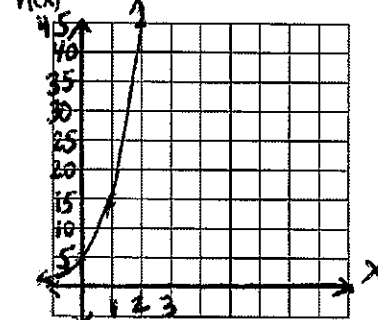
2. $g(x) = 4 - 3x$



3 points:

x	g(x)
0	4
1	1
2	-2

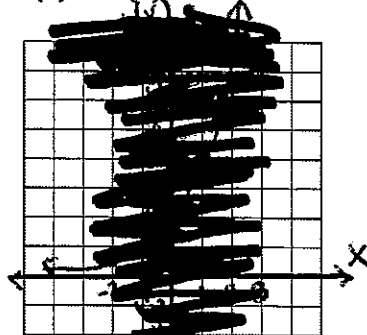
3. $h(x) = 5(3)^x$



3 points:

x	h(x)
0	5
1	15
2	45

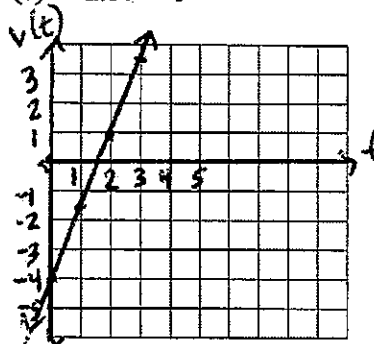
4. $k(x) = 4(2)^x$



3 points:

x	k(x)
0	4
1	8
2	16

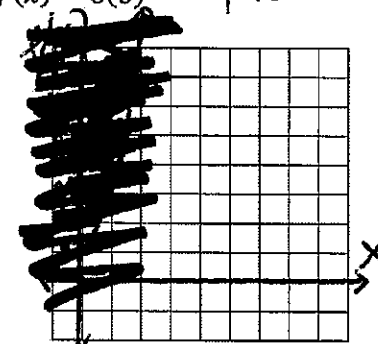
5. $v(t) = 2.5t - 4$



3 points:

t	v(t)
0	-4
1	-1.5
2	1
3	3.5

6. $f(x) = 8(3)^x$



3 points:

x	f(x)
0	8
1	24
2	72

SET

Topic: Describing attributes of a functions based on graphical representation

For each graph given match it to the contextual description that fits best. Then label the independent and dependent axis with the proper variables.

x axis

y-axis

Graphs

Contextual Descriptions

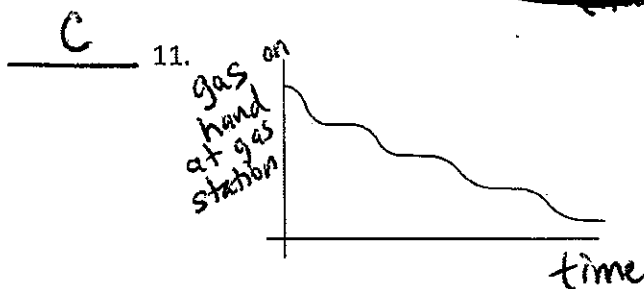
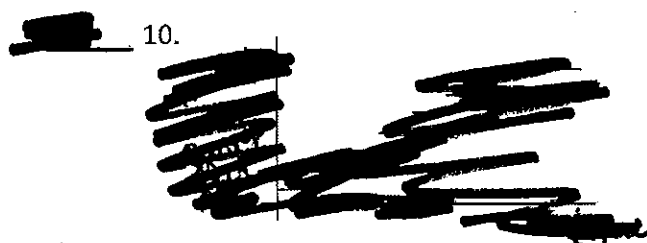
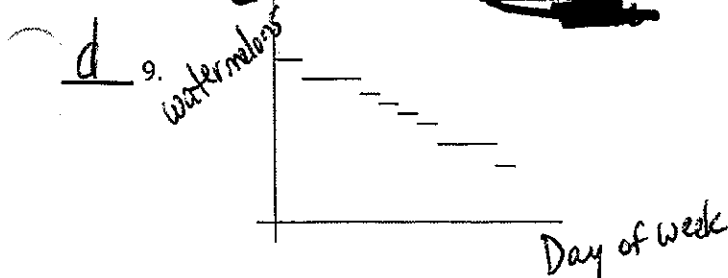
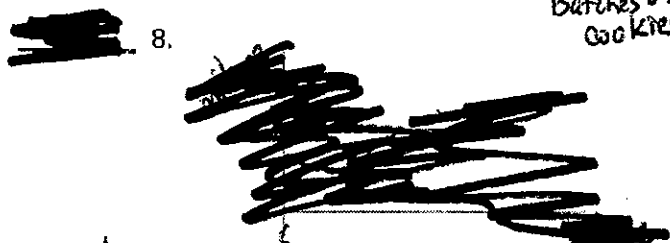
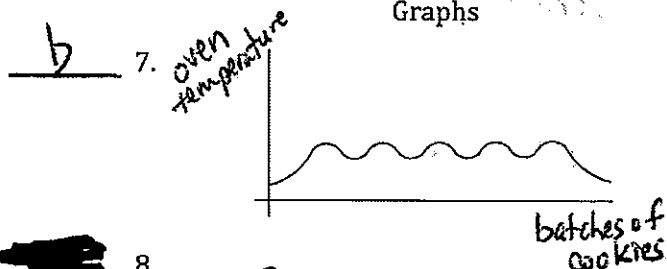
a. The amount of money in a savings account where regular deposits and some withdrawals are made. #10

b. The temperature of the oven on a day that mom bakes several batches of cookies. #7

c. The amount of gasoline on hand at the gas station before a tanker truck delivers more. #11

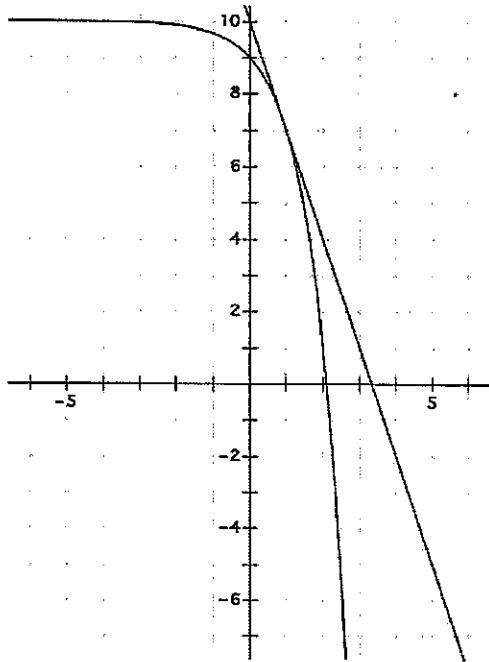
d. Watermelons are delivered to a farmer's market every Saturday morning. The number of watermelons available for sale on Thursday. #9

e. The amount of mileage recorded on the odometer of a delivery truck over a time period. #8



Given the pair of graphs on each coordinate grid, create a list of similarities the two graphs share and a list of differences. (Consider attributes like, continuous, discrete, increasing, decreasing, linear, exponential, restrictions on domain or range, etc.)

12.



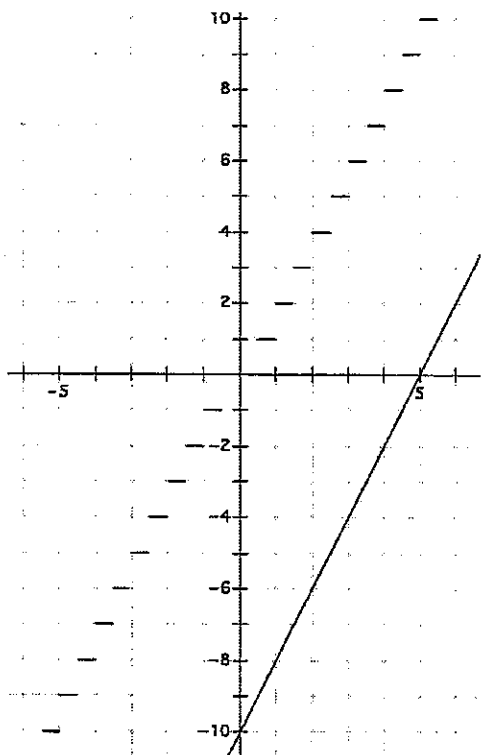
Similarities:

Both are continuous
 Both are decreasing
 Both pass through (0, 10)

Differences:

One is linear, the other is not
 One has a constant rate of change, the other does not
 One is a straight line, the other is a curve

13.



Similarities:

Linear
 Increasing
 Domain
 Rate of Change (kind of)

Differences:

Continuous / Discontinuous
 y-intercept

3.1

Topic: Solving equations

For each equation find the value of x that makes it true. (Hint for #20 and #22: when solving a linear equation, you need to get the term containing the variable alone on one side. When solving an exponential equation, you also need to get the term containing the variable alone on one side.)

[REDACTED]

[REDACTED]

Check

$$10^5 = 100000$$

$$10 \cdot 10 \cdot 10 \cdot 10 \cdot 10 = 100000 \checkmark$$

+8 +8

$$\frac{5x}{5} = \frac{45}{5}$$

$$x = 9$$

Check: $5(9) - 8 = 37$
 $45 - 8 = 37$
 $37 = 37 \checkmark$

[REDACTED]

$$\begin{array}{r} -5x-7 \\ \hline \end{array} \quad \begin{array}{r} -5x-7 \\ \hline \end{array}$$

$$\frac{-2x}{-2} = \frac{-28}{-2}$$

$$x = 14$$

Check $3(14) + 7 = 5(14) - 21$
 $49 = 49$ ✓

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

[REDACTED]

$$+4x + 12 \quad +4x + 12$$

$$\frac{7x}{7} = \frac{35}{7}$$

$x=5$

Check

$$\begin{aligned} 3(5) - 12 &= -4(5) + 23 \\ 15 - 12 &= -20 + 23 \\ 3 &= 3 \end{aligned}$$

-3 -3

$$\frac{240}{8} = \frac{8x}{8}$$

$$x = 30$$

Check: $243 = 8(30) + 3$
 $243 = 240 + 3$
 $243 = 243$

[REDACTED]

SECRET

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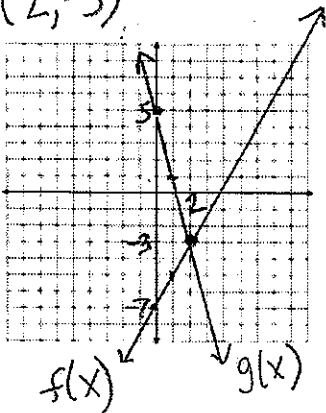
READY

Topic: Solve Linear Systems by Graphing

Graph each set of linear equations on the same set of axes. Name the coordinates of the point where the two lines intersect.

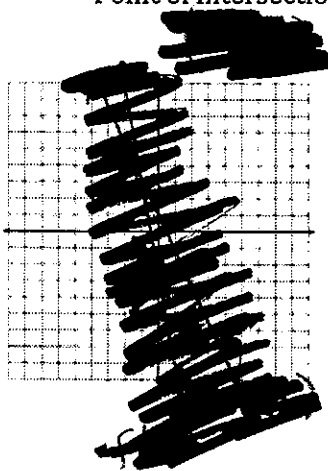
1. $\begin{cases} f(x) = 2x - 7 \\ g(x) = -4x + 5 \end{cases}$

Point of intersection:

 $(2, -3)$


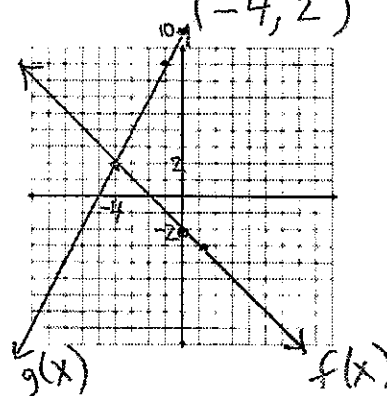
2. $\begin{cases} f(x) = -5x - 2 \\ g(x) = -2x + 1 \end{cases}$

Point of intersection:



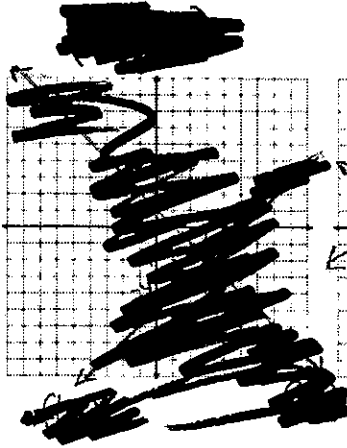
3. $\begin{cases} f(x) = -x - 2 \\ g(x) = 2x + 10 \end{cases}$

Point of intersection:

 $(-4, 2)$


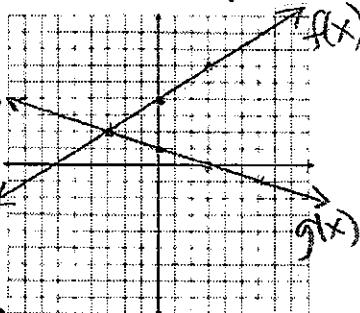
4. $\begin{cases} f(x) = x - 5 \\ g(x) = -x + 1 \end{cases}$

Point of intersection:



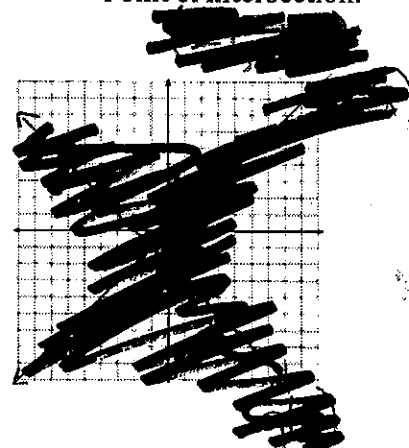
5. $\begin{cases} f(x) = \frac{2}{3}x + 4 \\ g(x) = -\frac{1}{3}x + 1 \end{cases}$

Point of intersection:

 $(-3, 2)$


6. $\begin{cases} f(x) = x \\ g(x) = -x - 2 \end{cases}$

Point of intersection:



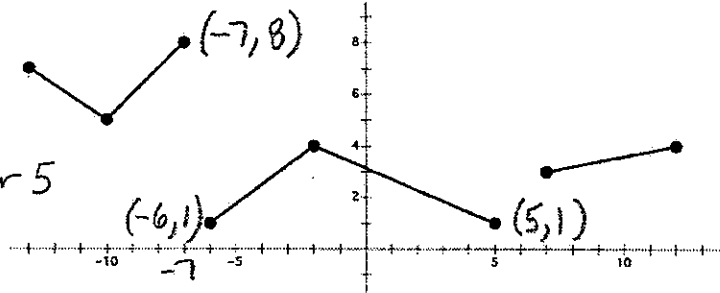
SET

Topic: Describing attributes of a functions based on graphical representation

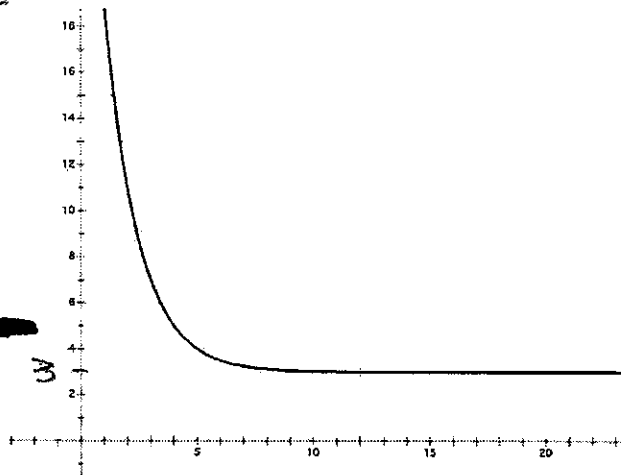
For each graph state 1)the interval(s) where it is increasing, decreasing, or constant 2)if it has a minimum or maximum, and 3)identify the domain and range. Use interval notation.

7. Description of function

- ① Increasing $[-10, -7], [-6, 2], [7, 12]$
Decreasing $[-13, -10], [-2, 5]$
- ② minimum, $y = 1$ when $x = -6$ or 5
Maximum, $y = 8$ when $x = -7$
- ③ Domain $[-13, -7], [-6, 5], [7, 12]$
Range $[1, 4], [5, 8]$

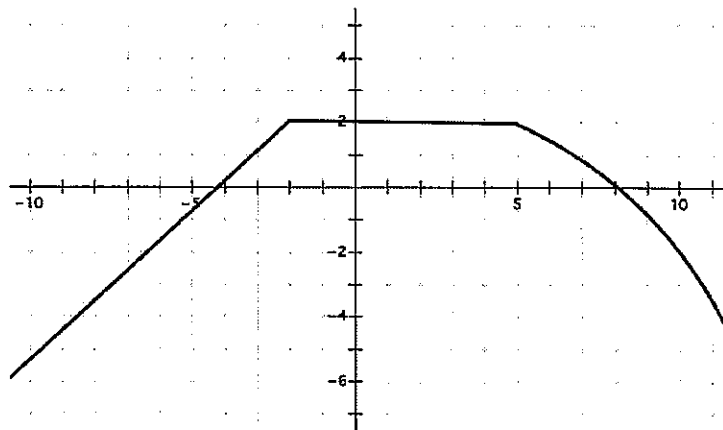


8. Description of function



9. Description of function

- ① Increasing $(-\infty, -2)$
Decreasing $[5, \infty)$
Constant $[-2, 5]$
- ② minimum, none
maximum, $y = 2$ when $-2 \leq x \leq 5$
- ③ Domain $(-\infty, \infty)$
Range $(-\infty, 2]$



GO

Topic: Creating both explicit and recursive equations

Write equations for the given tables in both recursive and explicit form.

(Find the 0.)

10.

n	$f(n)$
1	5
2	2
3	-1

Explicit:

Recursive:

11.

n	$f(n)$
1	6
2	12
3	24

Explicit:

Recursive:

12.

n	$f(n)$
0	-13
2	-5
3	-1

Explicit:

Recursive:

13.

n	$f(n)$
0	3
1	5
4	11
5	13

Explicit:

Recursive:

14.

n	$f(n)$
2	5
7	15,625
9	390,625

Explicit:

Recursive:

15.

n	$f(n)$
0	-4
1	-16
2	-64

Explicit:

Recursive:

0	1	2	3	4	5	6	7	8	9
$\frac{1}{5}$	1	5	25	125	625	3125	15625	78125	390625

$$5r^5 = 15625$$

$$r^5 = 3125$$

$$\sqrt[5]{r^5} = \sqrt[5]{3125}$$

$$r = 5$$

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READY

Topic: Find the point of intersection for two lines by looking at the table.

Fill in the table of values for each of the linear functions. Then circle the point of intersection of the two lines in each table.

1. $f(x) = 3x - 5$

$g(x) = x + 1$

 $(3, 4)$

x	$f(x)$
0	-5
1	-2
2	1
3	4
4	7

x	$g(x)$
0	1
1	2
2	3
3	4
4	5

2. $f(x) = x + 2$

$g(x) = 2x$

x	$f(x)$

x	$g(x)$

3. $f(x) = 3x - 4$

$g(x) = -2x + 6$

x	$f(x)$
1	-1
2	2
3	5
4	8
5	11

x	$g(x)$
1	4
2	2
3	0
4	-2
5	-4

 $(2, 2)$

4. $f(x) = 4x - 9$

$g(x) = 2x + 1$

x	$f(x)$

x	$g(x)$

SET

Topic: Attributes of linear and exponential functions.

Determine if the statement is true or false. If it is false, explain why.

5. All linear functions are increasing. *False, some are decreasing.*

6. Arithmetic sequences are an example of linear functions. ~~True~~

7. Exponential functions ^{may} have a domain that includes all real numbers.

False

8. Geometric sequences have a domain that includes all integers.

9. The range for an exponential function includes all real numbers.

False. Exponential functions are generally larger or smaller than a particular number

10. All linear relationships are functions with a domain and range containing all real numbers.

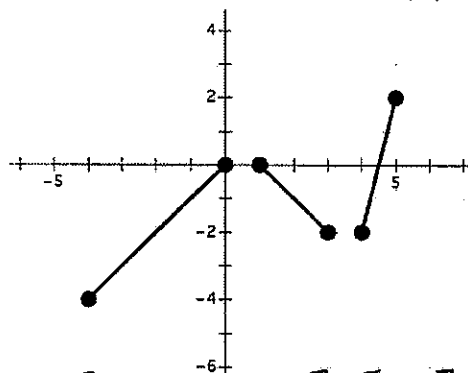
GO

Topic: Determine the domain of a function from a graphical representation.

For each graph state the domain of the function. Use interval notation.

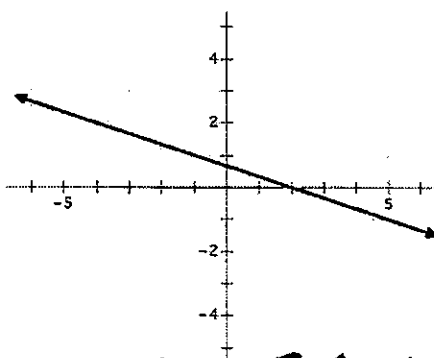
→ X values

11.

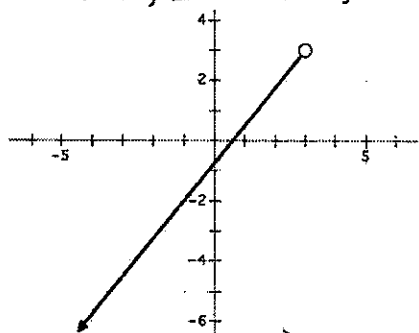


Domain $[-4, 0], [1, 3], [4, 5]$

12.

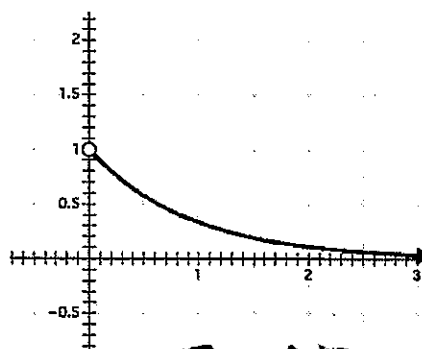


13.



Domain $(-\infty, 3)$

14.



READY, SET, GO!

Name _____

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READY

Topic: Attributes of linear and exponential functions.

1. Comparing and contrasting linear and exponential functions. Provide a comparison between linear and exponential functions, be sure to include as many characteristics of each function as possible and be clear about the similarities and differences between these functions.

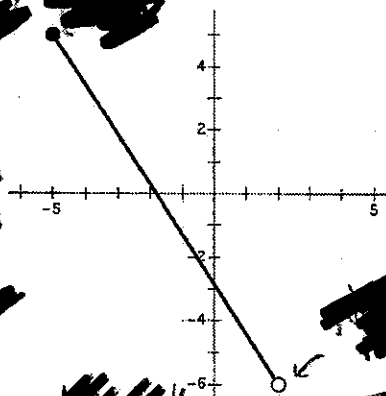
Linear and exponential functions can be discrete or continuous. Linear functions usually have a range and a domain that go from negative infinity to positive infinity. Exponential functions have an asymptote.

SET

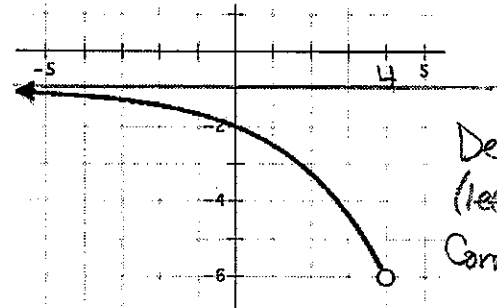
Topic: Identifying attributes of functions from their graphs.

For each graph, identify the domain, range and whether or not the function is increasing or decreasing. Use interval notation when you state the domain and range.

2.



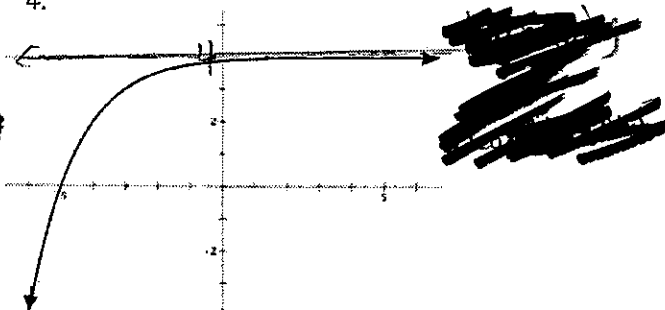
3. No defined minimum or maximum

Decreasing
(left to right)
ContinuousDomain $(-\infty, 4)$ $\{x \mid x < 4\}$ Range $(-6, -1)$
 $\{y \mid -6 < y < -1\}$

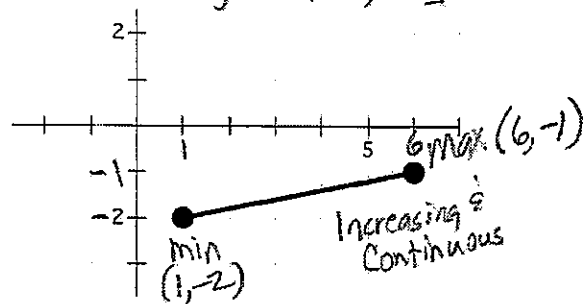
SECONDARY MATH I // MODULE 3

FEATURES OF FUNCTIONS - 3.4

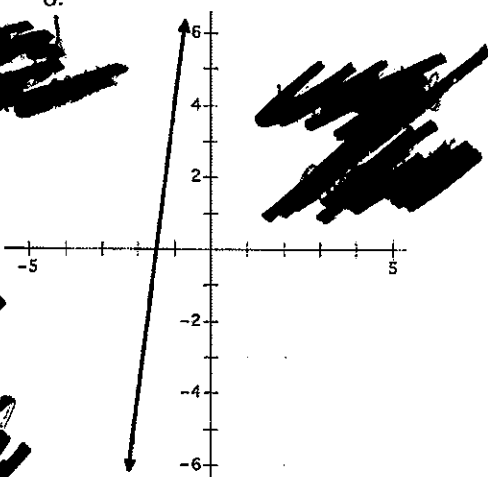
4.



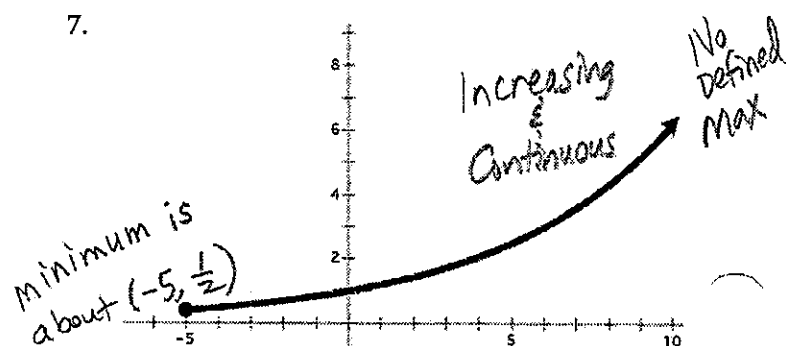
3.4
Domain $[1, 6]$
5. Range $[-2, -1]$



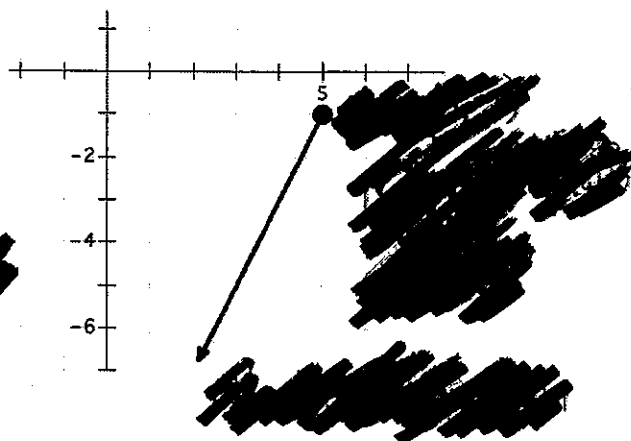
6.



7.

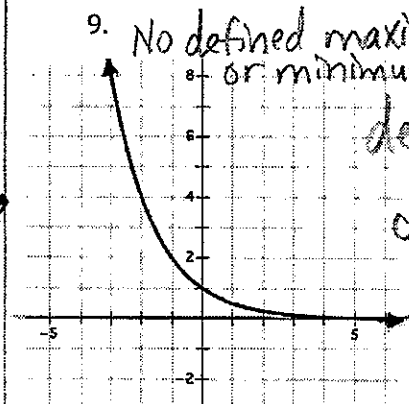
Domain $[-5, \infty)$ Range $[\frac{1}{2}, \infty)$

8.



9. No defined maximum or minimum

decreasing & continuous

Domain $(-\infty, \infty)$ Range $(0, \infty)$

20 The students will write their answers in many different forms, depending on the points they use. Possible answers are given below: 3.4

SECONDARY MATH I // MODULE 3
FEATURES OF FUNCTIONS - 3.4

GO

Topic: Finding equations for functions.

Find both the explicit and recursive equations for the tables below.

10.

n	$f(n)$
1	3
2	5
3	7
4	9

Explicit:

Recursive:

11.

n	$f(n)$
2	4
3	8
4	16
5	32

Explicit:

Recursive:

12.

n	$f(n)$
6	23
7	19
8	15
9	11

Explicit:

Recursive:

13.

n	$f(n)$
1	1
2	3
3	9

Explicit:

Recursive:

14.

n	$f(n)$
3	8
4	4
5	2

Explicit:

Recursive:

15.

n	$f(n)$
6	7
9	13
12	19

Explicit:

Recursive:

16.

n	$f(n)$
2	40
4	32
8	16

Explicit:

Recursive:

17.

n	$f(n)$
2	16
3	4
4	1

Explicit:

Recursive:

18.

n	$f(n)$
17	5
20	10
26	20

Explicit:

Recursive:

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READY

Topic: Interpreting function notation to find the output or input based on what is given

For each function, find the indicated values.

1. Given: $h(t) = 2t - 5$

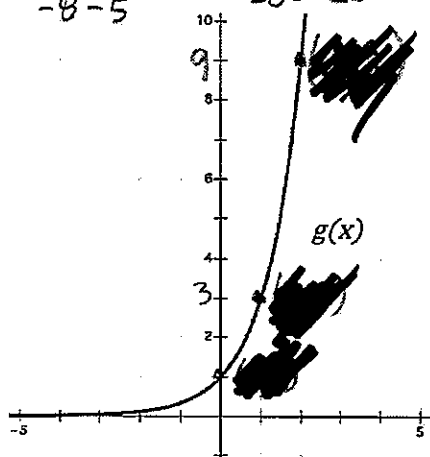
a. $h(-4) = -13$
 $2(-4) - 5$
 $-8 - 5$

b. $h(t) = 23, t = 14$
 $23 = 2t - 5$
 $28 = 2t$

c. $h(13) = 21$
 $2(13) - 5$
 $26 - 5$

d. $h(t) = -33, t = -14$
 $-33 = 2t - 5$
 $-28 = 2t$

2.



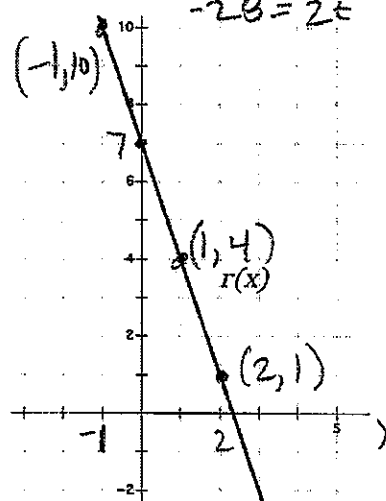
a. $g(2) = 9$

b. $g(x) = 3, x = 1$

c. $g(0) = 1$

 d. Write the explicit rule for $g(x)$.

3.



a. $r(-1) = 10$

b. $r(x) = 4, x = 1$

c. $r(2) = 1$

 d. Write the explicit rule for $r(x)$.

$$r(x) = -3x + 7$$

x	r(x)
-1	10
0	7
1	4
2	1

$$m = -\frac{6}{2} = -3$$

$$m = -\frac{3}{1}$$

SET

Topic: Adding functions

Two functions are graphed. Graph a new function on the same grid by adding the two given functions.

(Directions on previous page)

SECONDARY MATH I // MODULE 3

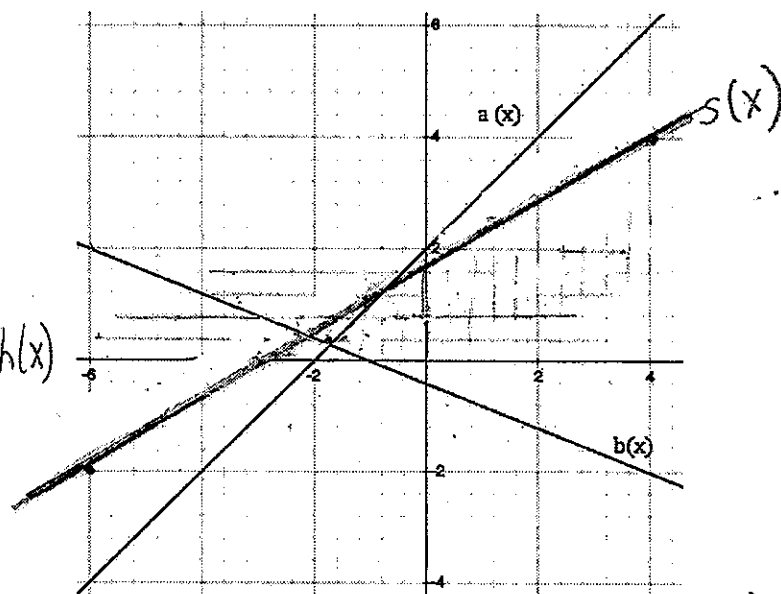
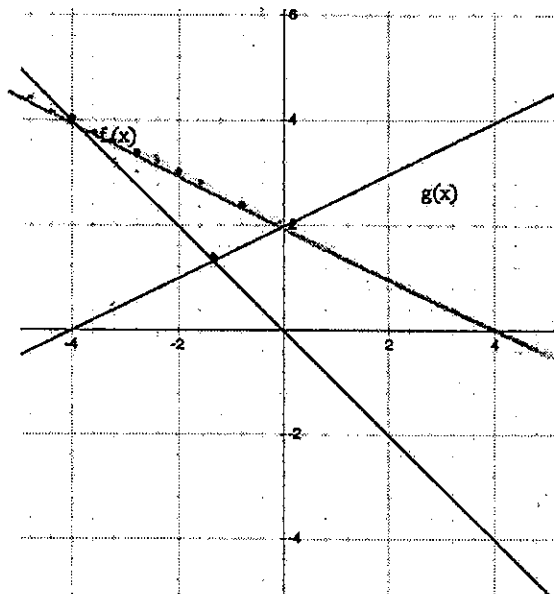
FEATURES OF FUNCTIONS - RSG 3.5

3.5

Graph a new function on the same graph by adding the two given functions.

4. $h(x) = f(x) + g(x)$

5. $s(x) = a(x) + b(x)$



$$s(-6) = a(-6) + b(-6)$$

$$s(-6) = -4 + 2 = -2$$

$$s(4) = a(4) + b(4)$$

$$s(4) = 6 + (-2)$$

$$s(4) = 4$$

5. Use the graph to answer the following questions.

a. Where does $f(x) = g(x)$?

$$(2, 5)$$

b. What is $f(4) + g(4)$?

$$7 + 6$$

$$\boxed{13}$$

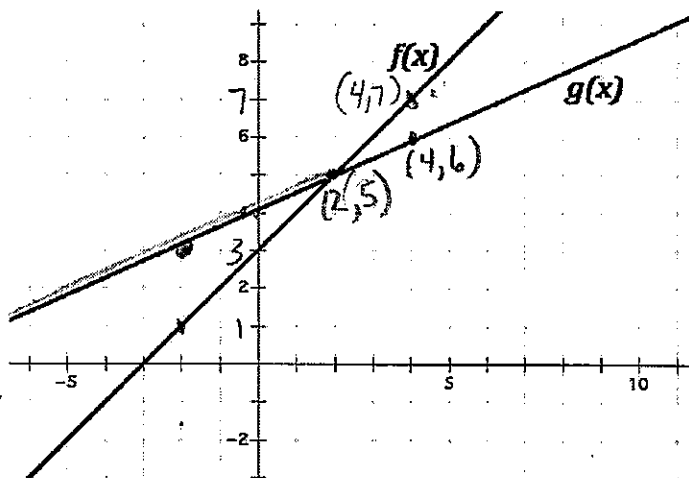
c. What is $g(-2) - f(-2)$?

$$3 - 1$$

$$\boxed{2}$$

d. State the interval where $g(x) \geq f(x)$.

$g(x)$ is greater than
 $f(x)$: $(-\infty, 2)$



6. Use the graph to answer the following questions.

a. Where is $r(x) > h(x)$?

b. What is $r(1) - h(1)$?

c. What is $r(0) + h(0)$?

d. Write an explicit rule for $r(x)$ and for $h(x)$.

e. Sketch $r(x) - h(x)$ on the graph.



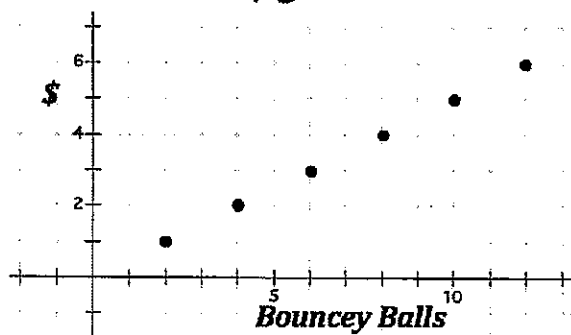
GO

Topic: Distinguishing between discrete and continuous functions

For each context or representation determine whether it is discrete or continuous or could be modeled best in a discrete or continuous way. Justify your answer.

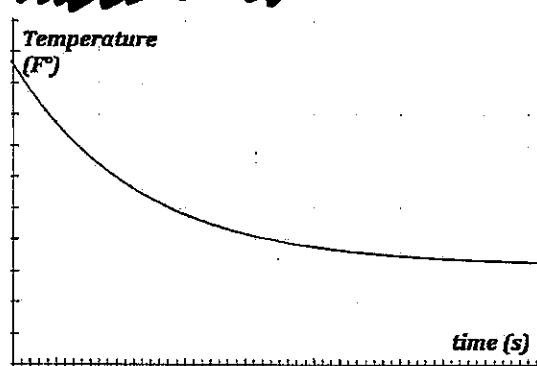
8. Susan puts exactly \$5 a week in her piggy bank.

9. Discrete



You can't have a part of a ball

10.



11. Marshal tracks the number of hits he gets each baseball game and is recording his total number of hits for the season in a table.

Discrete - tracked at specific intervals
 no partial hits

12. The distance you have traveled since the day began.



13.

Number of gumballs	Cost
5	10¢
10	20¢
15	30¢
20	40¢

Discrete

14. Stephen deposited \$1,000 in a savings account at the bank when he turned 21. He deposits \$100 each month. He plans to never withdraw any money until the balance is \$150,000.



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READY

Topic: Solving Systems by Substitution

In prior work the meaning of $f(x) = g(x)$ was discussed. This means to find the point where the two equations are equal and where the two graphs intersect. It is possible to find the point of intersection algebraically instead of graphing the two lines. Since $f(x) = g(x)$, it's possible to set each equation equal to the other and solve for x .

Example: Find the point of intersection of function $f(x) = 3x + 4$ and function $g(x) = 4x + 1$.

Since, $f(x) = g(x)$, let $3x + 4 = 4x + 1$. Then solve for x .

$$3x + 4 = 4x + 1 \quad \text{Subtract } 3x \text{ and } 1 \text{ from both sides of the equation.}$$

$$\underline{-3x - 1 = -3x - 1}$$

$$0x + 3 = 1x + 0$$

$$3 = 1x$$

Now let $x = 3$ in each equation to find $f(x)$ and $g(x)$ when $x = 3$.

$$f(3) = 3(3) + 4 \rightarrow 9 + 4 = 13 \quad \text{and} \quad g(3) = 4(3) + 1 \rightarrow 12 + 1 = 13$$

When $x = 3$, $f(3)$ and $g(3)$ both equal 13. The point of intersection is $(3, 13)$.

Find the point of intersection for $f(x)$ and $g(x)$ using the algebraic method in the example above.

1. $f(x) = -5x + 12$ and $g(x) = -2x - 3$

2. $f(x) = \frac{1}{2}x + 2$ and $g(x) = 2x - 7$

$$f(x) = g(x)$$

$$\begin{array}{r} -5x + 12 = -2x - 3 \\ +2x - 12 \end{array}$$

$$\begin{array}{r} f(5) = -5(5) + 12 \\ = -25 + 12 \end{array}$$

$$\begin{array}{r} -3x = -15 \\ \underline{-3} \end{array}$$

$$f(5) = -13$$

$$\boxed{(5, -13)}$$

3. $f(x) = -\frac{2}{3}x + 5$ and $g(x) = -x + 7$

4. $f(x) = x - 6$ and $g(x) = -x - 6$

$$\begin{array}{r} -\frac{2}{3}x + 5 = -x + 7 \\ \underline{-5} \quad \underline{-5} \end{array}$$

$$f(6) = -\frac{2}{3}(6) + 5 = 1$$

$$g(6) = -6 + 7 = 1$$

$$3 \left(-\frac{2}{3}x = -x + 2 \right)$$

$$\boxed{(6, 1)}$$

$$\begin{array}{r} -2x = -3x + 6 \\ +3x \quad +3x \end{array}$$

$$x = 6$$

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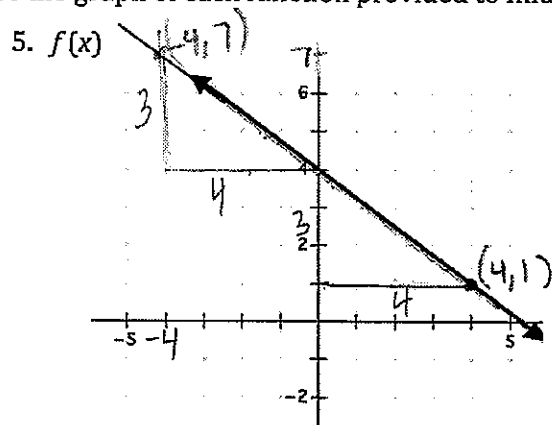


mathematics
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SET

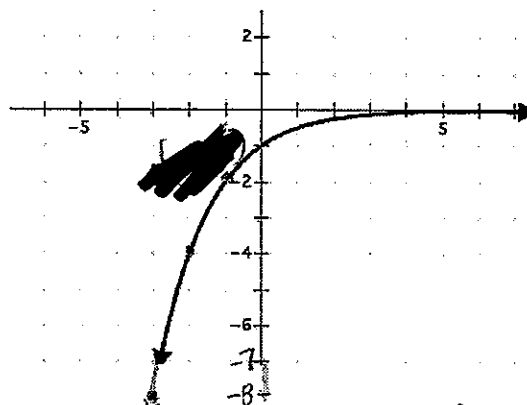
Topic: Describing attributes of a functions based on graphical representation

Use the graph of each function provided to find the indicated values.



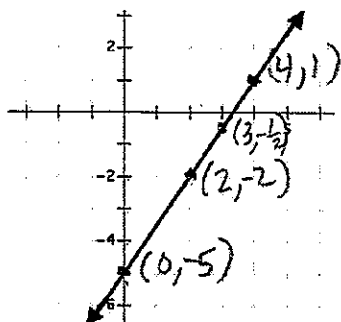
a. $f(4) = 1$ b. $f(-4) = 7$
c. $f(x) = 4$, $x = 0$ d. $f(x) = 7$, $x = -4$

6. $g(x)$



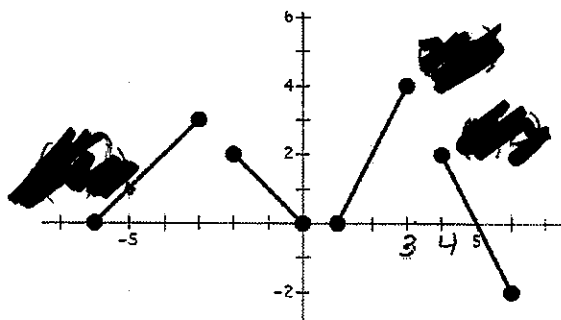
a. $g(-1) = -2$ b. $g(-3) = -4$
c. $g(x) = -4$, $x = -3$ d. $g(x) = -1$, $x = 0$

7. $h(x)$



a. $h(0) = -5$ b. $h(3) = -\frac{1}{2}$
c. $h(x) = 1$, $x = 4$ d. $h(x) = -2$, $x = 2$

8. $d(x)$



a. $d(-5) = 1$ b. $d(4) = 2$
c. $d(x) = 4$, $x = 2$ d. $d(x) = 0$, $x = 0$

For each situation either create a function or use the given function to find and interpret solutions.

9. Fran collected data on the number of feet she could walk each second and wrote the following rule to model her walking rate $d(t) = 4t$.

a. What is Fran looking for if she writes $d(12) = \underline{\hspace{2cm}}$?

A time of 12 seconds was walked

b. In this situation what does $d(t) = 100$ tell you?

- How many seconds did it take to walk 100 feet?
- A distance of 100 feet was walked

c. How can the function rule be used to indicate a time of 16 seconds was walked?

$$d(16) = 4t$$

$$d(16) = 4(16)$$

d. How can the function rule be used to indicate that a distance of 200 feet was walked?

$$d(t) = 200$$

$$200 = 4t$$

$$\rightarrow t = 50 \text{ seconds}$$

10. Mr. Multbank has developed a population growth model for the rodents in the field by his house. He believes that starting each spring the population can be modeled based on the number of weeks with the function $p(t) = 8(2^t)$.

Find $p(t) = 128$.

Find $p(4)$.

Find $p(10)$.

d. Find the number of weeks it will take for the population to be over 20,000.

e. In a year with 16 weeks of summer, how many rodents would he expect by the end of the summer using Mr. Multbank's model?

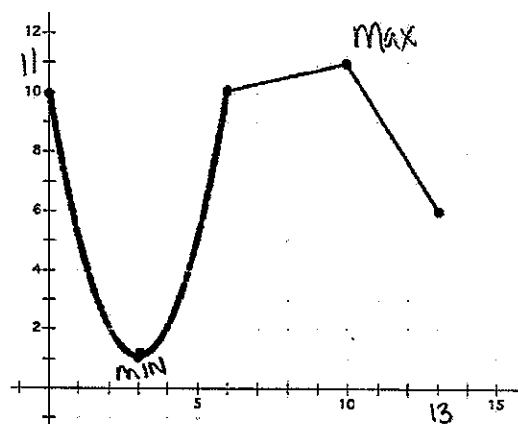
What are some factors that could change the actual result from your estimate?

GO

Topic: Describe features of functions from the graphical representation.

For each graph given provide a description of the function. Be sure to consider the following: decreasing/increasing, min/max, domain/range, etc.

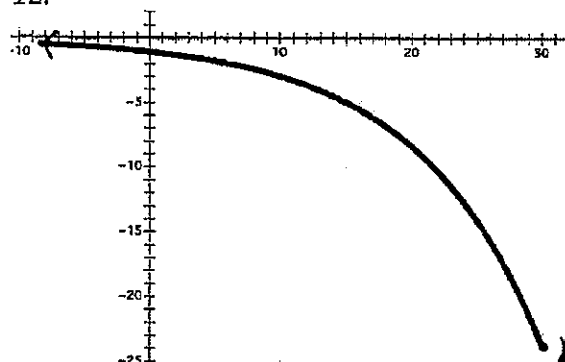
11.



Description of function:

minimum (3, 1)
maximum (10, 11)
Decreasing $[0, 3]$ $[10, 13]$
Increasing $[3, 10]$
Domain $[0, 13]$
Range $[1, 11]$

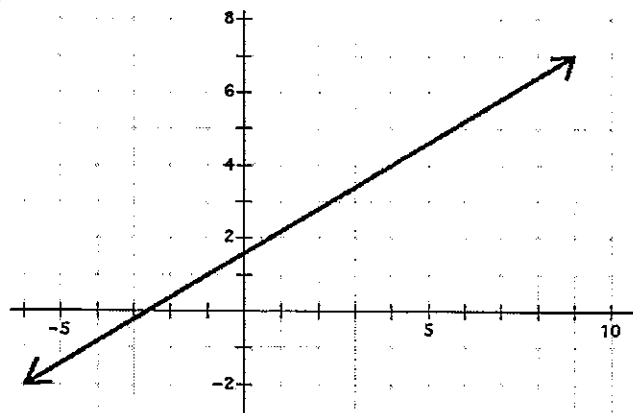
12.



Description of function:

~~minimum (-10, 0)~~
~~maximum (30, -25)~~
~~Decreasing $[-10, 30]$~~
~~Domain $[-10, 30]$~~
~~Range $[-25, 0]$~~

13.



Description of function:

No defined minimum or maximum
Increasing $(-\infty, \infty)$
Domain $(-\infty, \infty)$
Range $(-\infty, \infty)$

READY, SET, GO!

Name _____

Period _____

Date _____

READY

Topic: Determine domain and range and whether the relation is a function or not.

Determine if each set of ordered pairs is a function or not and then state the domain and range.

Determine if each set of ordered pairs is a function, then state the domain and range.

1. $\{(-7, 2), (3, 5), (8, 4), (-6, 5), (-2, 3)\}$

Function: Yes / No

Domain: $\{x \mid -7, -6, -2, 3, 8\}$

Range: $\{y \mid 2, 3, 4, 5\}$

2. $\{(9, 2), (0, 4), (4, 0), (5, 3), (2, 7), (0, -3), (3, -1)\}$

Function: ~~Yes~~Domain: ~~_____~~Range: ~~_____~~

3. $\{(1, 2), (2, 3), (3, 4), (4, 5), (5, 6), (6, 7), (7, 8), (8, 9)\}$

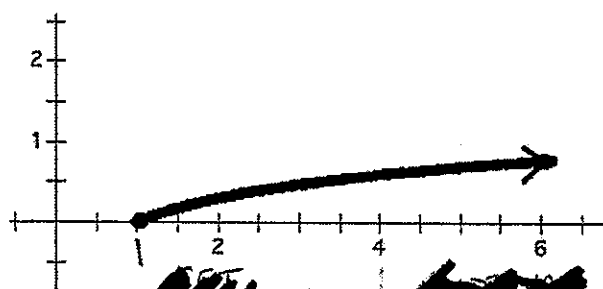
Function: Yes / No

Domain: $\{x \mid x \in \mathbb{W}, 1 \leq x \leq 8\}$

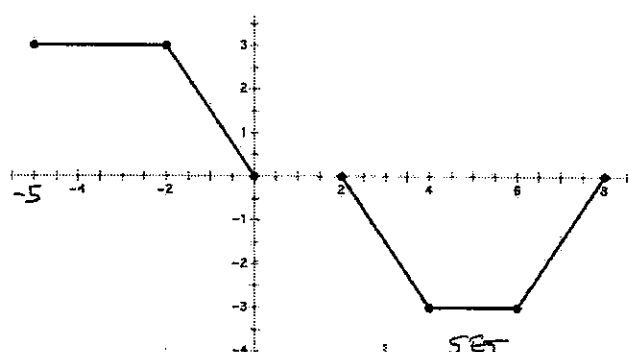
Range: $\{y \mid y \in \mathbb{W}, 2 \leq y \leq 9\}$

Determine the domain and range for each of the given functions.

4.

Domain: ~~_____~~Range: ~~_____~~

5.

Domain: $[-5, 0], [2, 8]$ Range: $[-3, 3]$

$$\begin{aligned} \text{set } \{x \mid -5 \leq x \leq 0, 2 \leq x \leq 8\} \\ \{y \mid -3 \leq y \leq 3\} \end{aligned}$$

6. $f(x) = -2x + 7$

Domain:

Range:

7. $g(x) = 3(5)^x$

Domain: $\{x | x \in \mathbb{R}\}$ Range: $\{y | y > 0\}$

8. The elements in the table define the entire function.

Domain:

Range:

x	h(x)
1	9
2	98
3	987
4	9876

SET

Topic: Determine whether or not the relationship is a function.

Determine the domain and range then determine whether or not the relationship is a function.

9. The distance a person is from the ground related to time as they ride a Ferris Wheel.

Domain: time Range: distance

Yes

10. The amount of daylight during a day throughout the calendar year.

11. The value of a Volkswagen Bug convertible from time of first purchase in 1978 to now.

Domain: time from 1978 to now; Range: Value of VW Bug

Yes

12. A person's name and their phone number.

13. The stadium in which a football player is playing related to the outcome of the game.

No**GO**

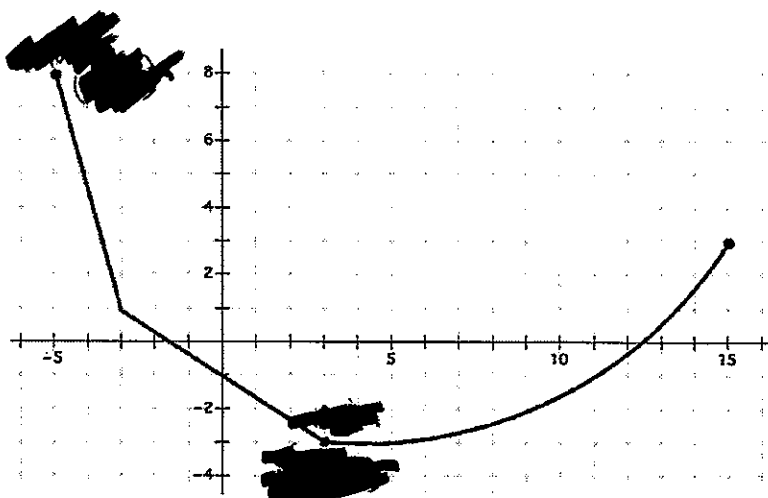
Topic: Determine the features of functions.

14. Describe the function in the graph.

Write the intervals where it is decreasing and/or increasing.

Identify the min and/or max.

State the domain and range.



15. For each situation use the given function to find and interpret solutions.

Hope has been tracking the progress of her family as they travel across the country, she knows they are driving 78 miles per hour, during their vacation and she has created a function, $d(t) = 78t$ to model the progress they are making.

- a. What would Hope be attempting to find if she writes $d(4) = 78(4)$?

How far they travelled if they travelled for 4 hours at 78 miles per hour

- b. What would the expression $d(t) = 450$ mean in this situation?

How long it took to travel 450 miles

- c. What would the expression $d(3.5)$ mean in this situation?

How far they travelled in 3.5 hours

- d. How could Hope use the function to find the time it would take to travel 800 miles?

$d(t) = 800$ $d(t) = 78t$ $800 = 78t \rightarrow t \approx 10.3 \text{ hours}$

16. Use the given representation of the functions to answer the questions.

- a. Where does $f(x) = g(x)$?

- b. What is $g(0) + f(0)$?

- c. On what interval(s) is $g(x) > f(x)$?

- d. What is $g(-8) + f(-8)$?

