Algebra 1: Unit 5 Practice Test: Functions Name:

Find the domain and range of the relation. Is the relation a function?

1. $(1,3),(-1,3),(2,3),(-1,2)$

DOMAIN: $\{-1, 1, 2\}$

RANGE: $\{2, 3\}$

NOT A FUNCTION! (THE INPUT -1 HAS 2 DIFFERENT OUTPUTS)

2. $(2,2),(-3,3),(-2,7),(3,1)$

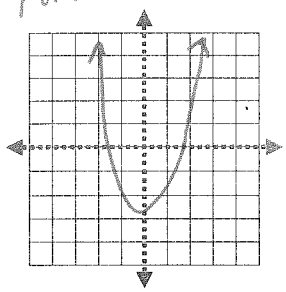
DOMAIN: $\{-3, -2, 2, 3\}$

RANGE: $\{1, 2, 3, 7\}$

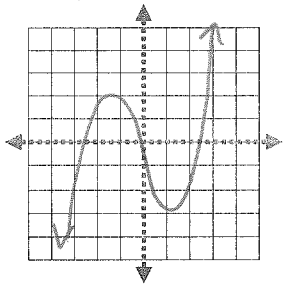
YES A FUNCTION! (EVERY INPUT HAS ONLY ONE OUTPUT)

3. Draw four relations two that are functions and two that are not. In your own words explain what a function is.

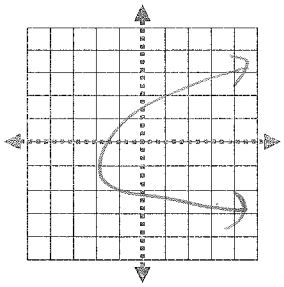
A. FUNCTION!



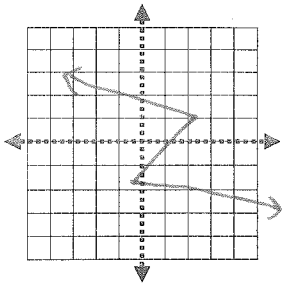
B. FUNCTION!



C. NOT A FUNCTION!



D. NOT A FUNCTION!



A FUNCTION IS A RELATIONSHIP BETWEEN TWO SETS OF NUMBERS, THE INPUTS AND OUTPUTS, IN WHICH EVERY INPUT IS PAIRED WITH ONLY ONE OUTPUT.

Perform basic operations between two functions.

4. $f(x) = 4x^2 - 2x + 7$ and $g(x) = -6x^2 + 4x - 5$ find $h(x) = f(x) + g(x)$.

$h(x) = 4x^2 - 2x + 7 + (-6x^2 + 4x - 5)$

$\boxed{h(x) = -2x^2 + 2x + 2}$

5. $f(x) = 3x - 2$ and $g(x) = 4x + 3$ find $h(x) = f(x) \cdot g(x)$.

$h(x) = (3x - 2)(4x + 3)$

	$3x$	-2
$4x$	$12x^2$	$-8x$
$+3$	$+9x$	-6

$\Rightarrow \boxed{h(x) = 12x^2 + x - 6}$

Find the inverse of the function.

6. $f(x) = 4x - 15$

$y = 4x - 15$

$x = 4y - 15$

$\frac{x+15}{4} = \frac{4y}{4} \rightarrow y = \frac{x+15}{4}$ so

$\boxed{f^{-1}(x) = \frac{x+15}{4}}$

7. $f(x) = 3x^2 - 8$

$y = 3x^2 - 8$

$x = 3y^2 - 8$

$\frac{x+8}{3} = \frac{3y^2}{3}$

$\frac{x+8}{3} = y^2$

$\sqrt{y^2} = \sqrt{\frac{x+8}{3}}$

$y = \sqrt{\frac{x+8}{3}}$

$\boxed{f^{-1}(x) = \sqrt{\frac{x+8}{3}}}$

Algebra 1: Unit 5 Practice Test: Functions Name:

Patterns and Sequences

8. Given the table

n	1	2	3	4
a_n	−3	0	3	6

a. What is the common difference: $+3 = d$

b. Write the explicit rule:

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

$a_n = -3 + 3(n-1)$

c. Write the recursive rule:

$a_n = a_{n-1} + 3$

d. Find the 8th term.

$a_8 = -3 + 3(8-1)$

$= -3 + 3(7)$

$a_8 = 18$

9. Consider the sequence −9, −3, 3, 9, ...

a. What is the common difference: $6 = d$

b. Write the explicit rule:

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

$a_n = -9 + 6(n-1)$

c. Write the recursive rule:

$a_n = a_{n-1} + 3$

d. Find the 44th term.

$a_{44} = -9 + 6(44-1)$

$= -9 + 6(43)$

$= -9 + 258$

$a_{44} = 249$

Piecewise Functions

10. A golf course charges the following rates for nonmembers to golf (with a 10 hour limit).
    - $30 per hour for the first 4 hours
    - $20 per hour for the next 4 hours
    - No additional charge for the last 2 hours

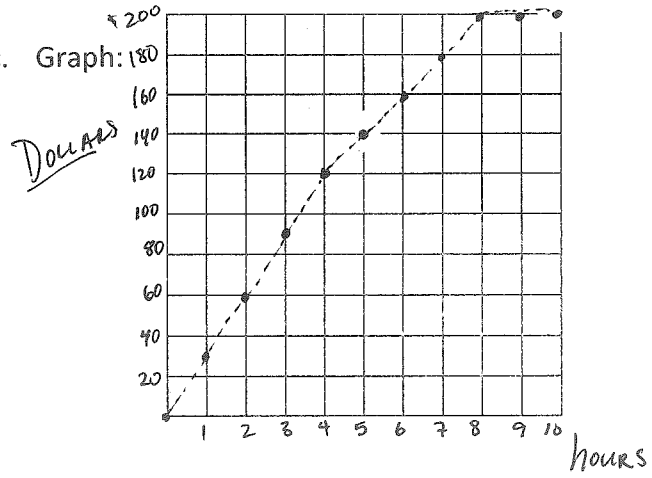
a. Express the cost C (in dollars) as a function of the time t (in hours) that the golfer is playing on their course.

$$C(t) = \begin{cases} 30t & \text{if } 0 \le t \le 4 \\ 20t + 40 & \text{if } 4 < t \le 8 \\ 200 & \text{if } 8 < t \le 10 \end{cases}$$

b. Complete the table:

t	0	1	2	3	4	5	6	7	8	9	10
$C(t)$	$C(0)=0$	$C(1)=30$	$C(2)=60$	$C(3)=90$	$C(4)=120$	$C(5)=140$	$C(6)=160$	$C(7)=180$	$C(8)=200$	$C(9)=200$	$C(10)=200$
						$20\cdot5+40$	$20\cdot6+40$	$20\cdot7+40$	$20\cdot8+40$		

c. Graph:

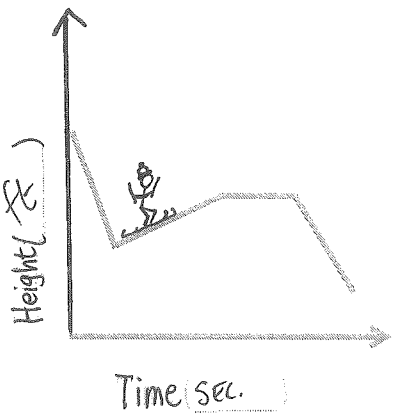


⇦ I did not solidly connect them because you are either charged for an hour of golf playing or not; it's not like you can be charged for fractions of an hour.

But, I chose to connect them with a dashed line to demonstrate the difference in rates for the different domains.

Task

11. Write a possible situation represented by the graph. Fill in your own units.



I jump off the ski lift and zip down the steep hill. At the base of the hill, my momentum is enough to push me (at a slower pace) up a mild hill. I eventually had to push myself forward for a bit before coming to another drop.

a. What is the independent variable: TIME

b. What is the dependent variable: HEIGHT

c. Is the relation above a function? Explain.

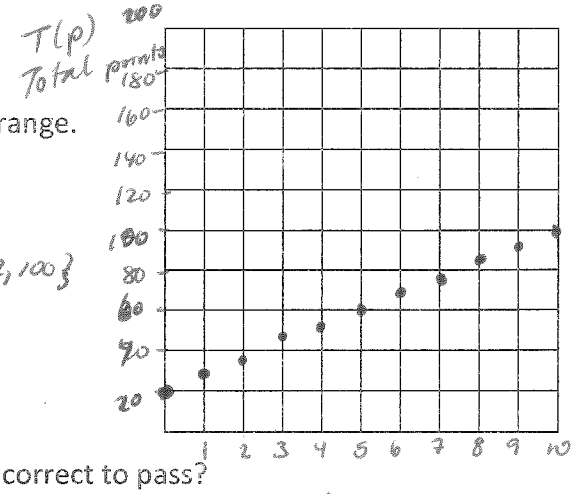
YES - IT PASSES THE VERTICAL LINE TEST

Task.

12. A Science Test is made up of 10 problems, each worth 8 points. There is no partial credit. Every test taker receives 20 points for taking a test.

a. Write a function to describe the test score determined by the number of correct answers.

$T(p) = 20 + 8p$



p	T(p)
0	20
1	28
2	36
3	44
4	52
5	60
6	68
7	76
8	84
9	92
10	100

p

b. Graph the function using a reasonable domain and range. What is the domain and range?

DOMAIN: $\{0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10\}$

RANGE: $\{20, 28, 36, 44, 52, 60, 68, 76, 84, 92, 100\}$

c. If you get 7 problems correct what is your score?

76%

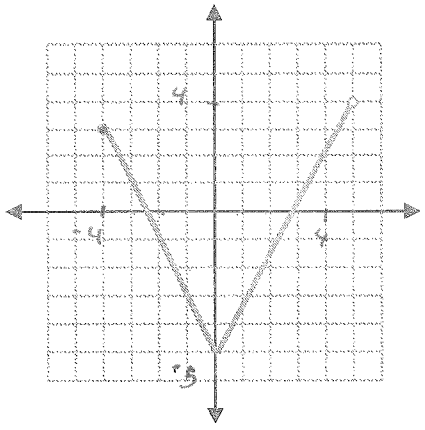
d. If passing is 60% or higher, how many must you get correct to pass?

TO PASS, YOU MUST GET AT LEAST 5 CORRECT

Algebra 1: Unit 5 Practice Test: Functions Name:

On the scantron, choose the best answer.

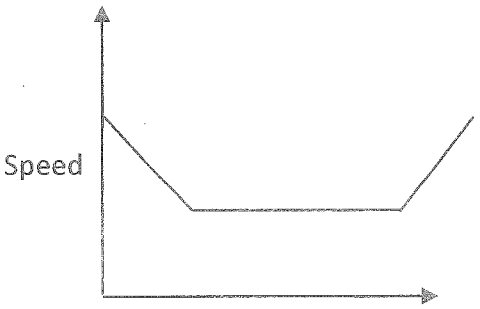
1. What is the domain and the range of the function below:



Domain: $\{x \mid -4 \le x < 4\}$

Range: $\{y \mid -5 \le y < 4\}$

2. Describe the situation represented by the graph below?



WALKING DOWN TO A RIVER BANK, I WADE THROUGH THE RIVER TO CLIMB UP ON THE OTHER SIDE
(again, trying to escape the zombies)

3. Given $f(x) = 4x + 5$ and $g(x) = -7x + 3$ find $h(x) = f(x) - g(x)$.

$h(x) = 4x + 5 - (-7x + 3)$

$= 4x + 5 + 7x - 3$

$h(x) = 11x + 2$

4. The function $C(t)$ gives the cost C of buying t tickets to a baseball game when a group discount is offered.

$$C(t) = \begin{cases} 30t & \text{if } 0 \le t < 10 \\ 25t & \text{if } t \ge 10 \end{cases}$$

a. How much would it cost if 8 people go to the game? $30(8) = C(8)$

$\$240 = C(8)$

b. How much would it cost if 10 people go to the game? $C(10) = 25(10)$

$C(10) = \$250$

c. How much would it cost if 12 people go to the game? $C(12) = 25(12)$

$C(12) = \$300$

5. Write an explicit rule for the sequence:
2, 6, 10, 14, ...
+4 +4 +4

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

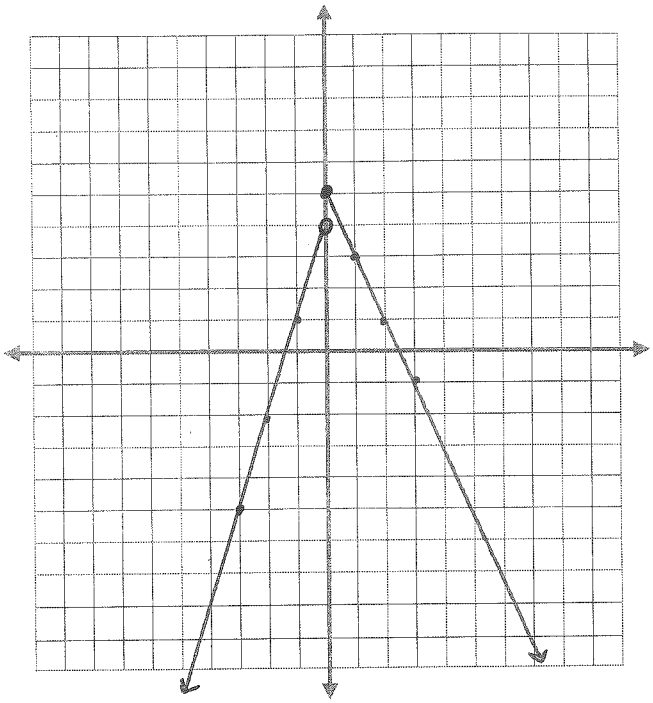
$a_n = 2 + 4(n-1)$

Algebra 1 Unit 5 Study Guide Part 2 Name:

Graph each piecewise function. Complete a table to help you.

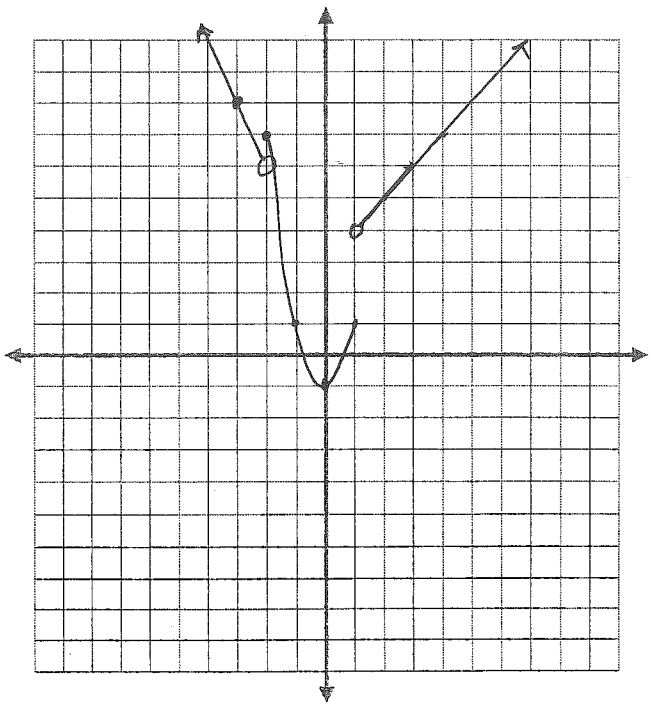
1. $f(x) = \begin{cases} 3x+4 & \text{if } x < 0 \\ -2x+5 & \text{if } x \geq 0 \end{cases}$

x	Evaluate $f(x)$	$f(x)$	Ordered Pair
-3	$f(-3) = 3 \cdot -3 + 4$ $= -9 + 4$	-5	(-3, -5)
-2	$f(-2) = 3 \cdot -2 + 4$ $= -6 + 4$	-2	(-2, -2)
-1	$f(-1) = 3 \cdot -1 + 4$ $= -3 + 4$	1	(-1, 1)
0	$f(0) = 3 \cdot 0 + 4$ $= 4$ open || $f(0) = -2(0) + 5$ $= 5$ closed	4 / 5	(0, 4) open (0, 5) closed
1	$f(1) = -2(1) + 5$ $= -2 + 5$	3	(1, 3)
2	$f(2) = -2(2) + 5$ $= -4 + 5$	1	(2, 1)
3	$f(3) = -2(3) + 5$ $= -6 + 5$	-1	(3, -1)



2. $f(x) = \begin{cases} -2x+2 & \text{if } x < -2 \\ 2x^2 - 1 & \text{if } -2 \leq x \leq 1 \\ x+3 & \text{if } x > 1 \end{cases}$

x	Evaluate $f(x)$	$f(x)$	Ordered Pair
-3	$f(-3) = -2(-3) + 2$ $= +6 + 2$	8	(-3, 8)
-2	$f(-2) = -2(-2) + 2$ $= 4 + 2$ open || $f(-2) = 2(-2^2) - 1$ $= 8 - 1$ closed	6 / 7	(-2, 6) open (-2, 7) closed
-1	$f(-1) = 2(-1^2) - 1$ $= 2 - 1$	1	(-1, 1)
0	$f(0) = 2(0^2) - 1$ $= -1$	-1	(0, -1)
1	$f(1) = 2(1^2) - 1$ $= 2 - 1$ closed || $f(1) = 1 + 3$ $= 4$ open	1 / 4	(1, 1) closed (1, 4) open
2	$f(2) = 2 + 3$	5	(2, 5)
3	$f(3) = 3 + 3$	6	(3, 6)



Algebra 1 Unit 5 Study Guide Part 2 Name:

Evaluate each piecewise function for the given values.

3. Find

$f(-3), f(-2.1), f(0.6), and\ f(3.3)\ for\ f(x) = \begin{cases} 2x-6 & if\ x \le 0 \\ x^3-3 & if\ 0 < x < 2 \\ 3x-2 & if\ x \ge 2 \end{cases}$

$f(-3) = 2(-3) - 6$
$= -6 - 6$
$= -12$

$f(-2.1) = 2(-2.1) - 6$
$= -4.2 - 6$
$= -10.2$

$f(0.6) = 0.6^3 - 3$
$0.216 - 3$

$f(2) = 3 \cdot 2 - 2$
$6 - 2$

$f(-3) = -12$

$f(-2.1) = -10.2$

$f(0.6) = -2.784$

$f(2) = 4$

4. Find

$f(-4), f(-2.9), f(0), and\ f(1.9)\ for\ f(x) = \begin{cases} -3 & if\ x \le -1 \\ 4x+2 & if\ -1 < x \le 2 \\ 7 & if\ x > 2 \end{cases}$

$f(-4) = -3$

$f(-0.9) = 4(-0.9) + 2$
$= -3.6 + 2$

$f(0) = 4 \cdot 0 + 2$
$= 0 + 2$

$f(4.9) = 7$

$f(-4) = -3$

$f(-0.9) = -1.6$

$f(0) = 2$

$f(4.9) = 7$