

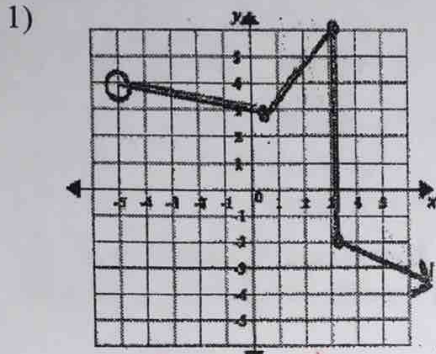
# More Unit 9 REVIEW

Relations, Functions, & Graphs

Name: Key 2014-2015  
Date:

*Learning Goal: Introduction to Functions* (What is: Function? Domain? Range?)

Is the relation a function? State the domain & range.



*not a function*  
D:  $(-5, \infty)$   
R:  $(-\infty, 6]$

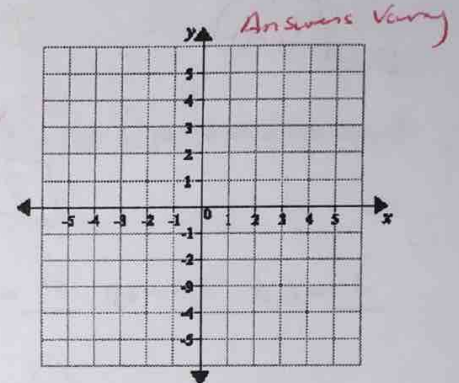
2)  $\{(-2, 5), (7, 3), (8, 5)\}$

*D:  $\{-2, 7, 8\}$   
R:  $\{5, 3, 5\}$   
IS A function*

3)  $y = 2x^2 - 5$

*IS A function*  
D:  $(-\infty, \infty)$   
R:  $[5, \infty)$

4) Draw any graph:  
with Domain:  $(-\infty, 3]$   
Range  $(-4, 5]$   
and IS a Function.



5) List a value that would be included in the domain  $[5, 9)$  6 *Answers vary* (Don't use 5 or 9)  
List a value that would not be included in this interval. 4 (Don't use 5 or 9)  
Is 9 included in this domain? YES or NO

*Learning Goal: Operations with Functions*  
(What are: Excluded Values?)

$f(x) = x^2 - 4$	$g(x) = \sqrt{2x - 1}$	$h(x) = 3x - 6$	$m(x) = x^2 - 9x + 5$
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5)  $(m \cdot h)(x)$   
 $(x^2 - 4x + 5)(3x - 6)$   
 $3x^3 - 27x^2 + 15x - 6x^2 + 54x - 30$   
 $3x^3 - 33x^2 + 69x - 30$

6)  $\frac{f(x)}{h(x)}$   
 $\frac{x^2 - 4}{3x - 6} = \frac{(x+2)(x-2)}{3(x-2)}$   
 $x \neq 2; \frac{x+2}{3}$

7)  $(f - m)(x)$   
 $(x^2 - 4) - (x^2 - 9x + 5)$   
 $x^2 - 4 - x^2 + 9x - 5$   
 $9x - 9$

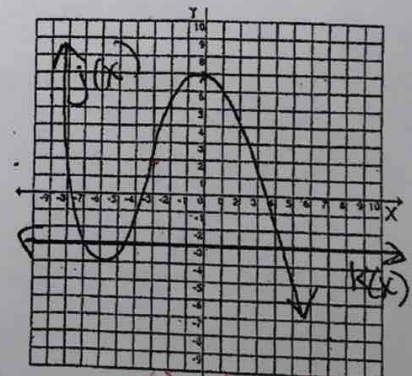
8)  $f(3) + g(5)$   
 $(3^2 - 4) + \sqrt{2(5) - 1}$   
 $5 + 3$   
8

*Learning Goal: Compositions & Inverses*  
(Remember:  $(f \circ g)(x)$  means the same as  $f[g(x)]$ .)

9) Is the inverse of a function, always a function?  
10) What are 3 ways you can determine if a pair of functions are inverse functions?

11)  $(f \circ h)(x)$     12)  $[h(f(x))]$     13)  $f[h(-2)]$   
14)  $j[k(0)]$  (use graph)

*ON BACK*



$k(0) = (0, ?) = -3$   
 $j(-3) = (-3, ?) =$

$$11. \quad (f \circ h)(x) = \frac{(3x-6)^2 - 4}{(3x-6)(3x-6) - 4}$$

$$9x^2 - 18x - 18x + 36 - 4$$

$$\boxed{9x^2 - 36x + 32}$$

$$12. \quad h(f(x)) = 3(x^2 - 4) - 6$$

$$3x^2 - 12 - 6$$

$$\boxed{3x^2 - 18}$$

$$13. \quad f(h(-2)) =$$

$$h(-2) = 3(-2) - 6$$

$$= -6 - 6$$

$$= -12$$

$$f(-12) = (-12)^2 - 4$$

$$144 - 4$$

$$\boxed{140}$$

14. 6w front 😊

14) Find the inverse of:  $f(x) = \frac{2}{3}x - 4$

Graph & label  $f(x)$  and  $f^{-1}(x)$ .

$$y = \frac{2}{3}x - 4$$

$$x = \frac{2}{3}y - 4$$

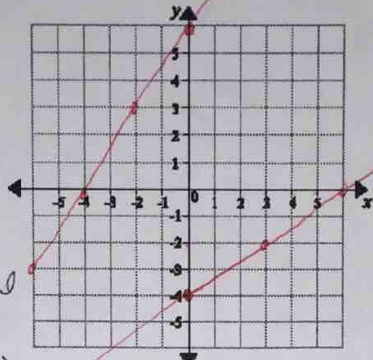
$$\frac{3}{2}(x+4) = \frac{2}{3}y \cdot \frac{3}{2}$$

$$\frac{3}{2}x + 6 = y$$

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

Switch  $x, y$

Solve for  $y$   
ADD 4  
multiply reciprocal  
Distribute  
function notation



15) Are these functions inverses?

Explain.

$$f(x) = 2x + 4$$

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

method 1

$$f \circ g = 2\left(\frac{1}{2}x - 2\right) + 4$$

$$= x - 4 + 4$$

$$= x$$

$$g \circ f = \frac{1}{2}(2x + 4) - 2$$

$$= x + 2 - 2$$

$$= x$$

Yes!!

method 2

$$y = 2x + 4$$

$$x = 2y + 4$$

$$x - 4 = 2y$$

$$\frac{1}{2}x - 2 = y$$

yes, b/c it matches

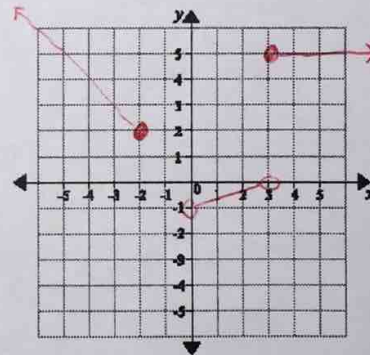
### Learning Goal: Piecewise & Step Functions

(Describe a Piecewise Function. Describe a Step Function. Is a step function a type of piecewise function?)

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

Find:  $f(2) = 2$     $f(7) = -7$     $f(0) = 4$     $f(4) = \emptyset$     $f(-3) = 6$

17) Graph:  $h(x) = \begin{cases} -x & \text{when } x \leq -2 \\ \frac{1}{3}x - 1 & \text{when } 0 < x < 3 \\ 5 & \text{when } x \geq 3 \end{cases}$



### Learning Goal: Transformations of Functions

18) Given the parent function:  $f(x) = x^2$

a) Write a new function that is shifted 2 units to the left and 5 units down and reflected over the y-axis.

$$f(x) = (x-h)^2 + k$$

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

$$= (x + 2) - 5$$

$$= (-x + 2)^2 - 5$$

Reflect over y-axis,  
Switch  $x$  to negative