Given $f(x) = x^2$ and $g(x) = \sqrt{x-1}$, write each composite function. State the domain of each.

$f(g(x))$

$(\sqrt{x-1})^2$

$x-1 \qquad x \geq 1$

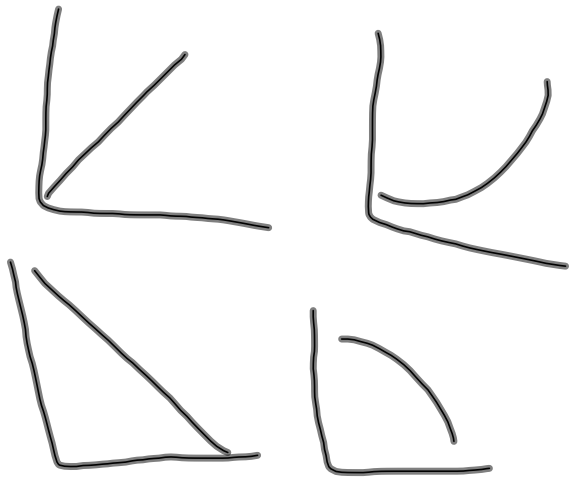
$g(f(x))$

$\sqrt{x^2-1}$

$x \geq 1$ or $x \leq -1$

9-1: Representations of Functions

Be able to translate between charts, tables, graphs, and equations. Look for key words that would match a graph, table, etc.



A sports team owners find that when they charge $15 for a ticket they average 500 fans. For every $1 they add to the ticket they lose 25 fans. How much should they charge per ticket to maximize revenue?

Ticket (L_1)	Fans	L_2
15	500	7500
16	475	7600
17	450	7650
18	425	7650

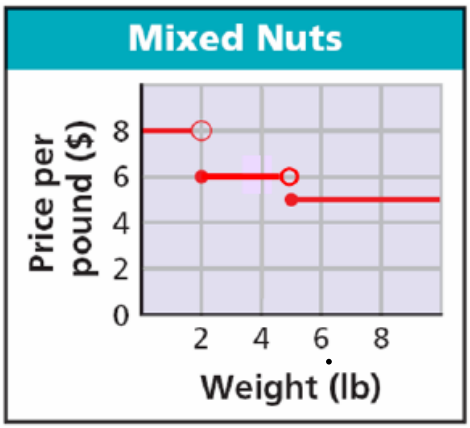
$-25x^2+875x$

Xmin: 0
Xmax: 20
Ymin: 0
Ymax: 8000

17.50

9-2: Piece-wise Functions

Multiple functions put together with restricted domains.



$$f(x)=\begin{cases} 8, & x<2 \\ 6, & 2\le x<5 \\ 5, & x\ge 5 \end{cases}$$

Write the equation for the function graphed.

When evaluating a value for x, find the domain in which it belongs and use that equation.

Evaluate each piecewise function for $x = -1$ and $x = 4$.

$$g(x) = \begin{cases} 2^x & \text{if } x \le -1 \\ 5x & \text{if } x > -1 \end{cases}$$

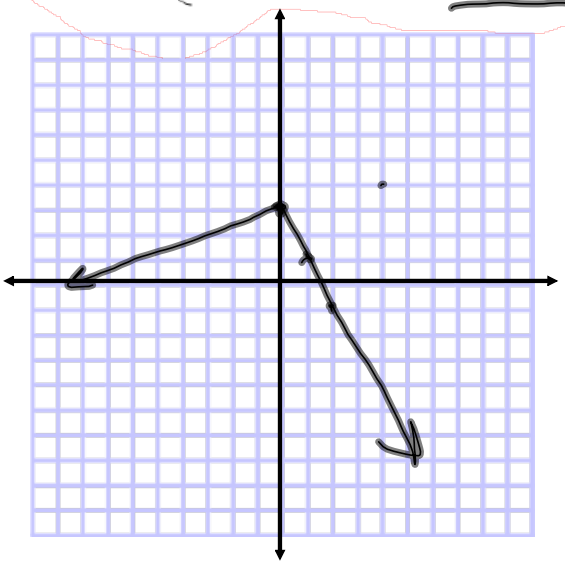
$g(-1) = 2^{-1} = \frac{1}{2}$

$g(4) = 5 \cdot 4 = 20$

To graph, use the domain and sketch the graph.

Graph each function.

$$g(x) = \begin{cases} \frac{1}{4}x + 3 & \text{if } x < 0 \\ -2x + 3 & \text{if } x \ge 0 \end{cases}$$



9-3:Transforming Functions

Follow the same transformation rules we have always used. Keep in mind that if we have a horizontal translation or a reflection over the y-axis we must change our parameters as well.

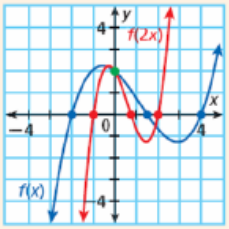
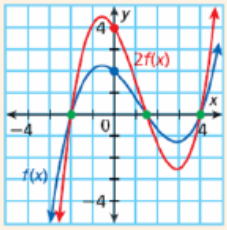
Given $f(x) = \begin{cases} -\frac{1}{2}x & \text{if } x < 0 \\ \frac{1}{2}x^2 & \text{if } x \geq 0 \end{cases}$ write the rule $g(x)$, a vertical stretch by a factor of 3.

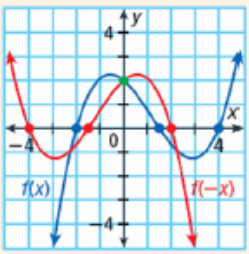
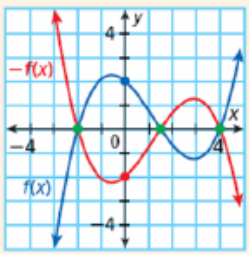
$$g(x) = \begin{cases} -\frac{3}{2}x, & x < 0 \\ \frac{3}{2}x^2, & x \geq 0 \end{cases}$$

Given $f(x) = \begin{cases} x^2 & \text{if } x \le 0 \\ x - 3 & \text{if } x > 0 \end{cases}$ write the rule

for $g(x)$, a horizontal stretch of $f(x)$ by a factor of 2.

Effects of Transformations on Intercepts of $f(x)$

Horizontal Stretch or Compression by a Factor of b	Vertical Stretch or Compression by a Factor of a
	
x-intercepts are multiplied by b. y-intercept stays the same.	x-intercepts stay the same. y-intercept is multiplied by a.

Reflection Across y-axis	Reflection Across x-axis
	
x-intercepts are negated. y-intercept stays the same.	x-intercepts stay the same. y-intercept is negated.

9-4: Composite Functions

Do what the problem says. If you have multiplication use FOIL, if you have subtraction make sure to subtract the whole function.

Given $f(x) = 5x - 6$ and $g(x) = x^2 - 5x + 6$, find each function.

$(f - g)(x)$

$5x-6-(x^2-5x+6)$

$-x^2+10x-12$

Given $f(x) = x + 2$ and $g(x) = x^2 - 4$, find each function.

$(fg)(x)$

$(x+2)(x^2-4)$

$x^3-4x+2x^2-8$

x^3+2x^2-4x-8

For composite values, plug the x-value in the inner function, solve, then plug that into the outer function.

Given $f(x) = 2x - 3$ and $g(x) = x^2$, find each value.

$g(f(3))$

$2(3)-3$

$=3$

$g(3) = 3^2 = 9$

For composite functions plug the inner most function in for x in the outer function and simplify.

Given $f(x) = 3x - 4$ and $g(x) = \sqrt{x} + 2$, write each composite. State the domain of each.

$g(f(x))$

$\sqrt{3x-4} + 2$

$x \geq \frac{4}{3}$

Any other questions or problems you want to try before the quiz?