Algebra 2 Review: Functions & Transformations

Station 1 of 4: Function Notation, Relations, Domain, and Range

Name: _____ Date: _____

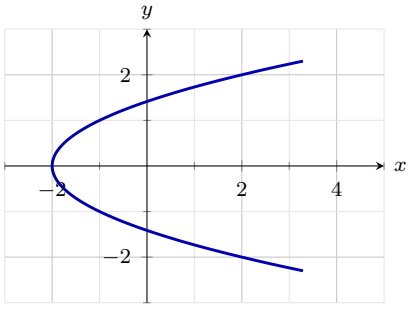
Give domains and ranges in interval notation unless told otherwise. Show how you decide.

1. Let $f(x) = 2x^2 - 5x + 1$. Find $f(-3)$.

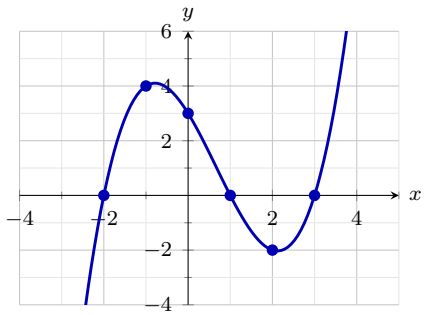
2. Let $f(x) = x^2 - 4x$. Simplify $f(a + 2)$.

3. Is each relation a function? If so, state the domain and range. $A = \{(1, 3), (2, 5), (3, 3), (4, 7)\}$ and $B = \{(2, -1), (5, 0), (2, 3)\}$.

4. Does the graph show y as a function of x? Use the vertical line test and name two points that prove your answer.



5. The graph of f is shown. Find $f(-1)$, $f(2)$, and all x with $f(x) = 0$.



6. State the domain of $f(x) = \sqrt{5 - 2x}$ in interval notation.

7. State the domain of $g(x) = \dfrac{x + 4}{x^2 - 9}$ in interval notation.

8. State the domain and range of $h(x) = -|x - 2| + 3$.

9. A truck rental costs $C(m) = 35 + 0.25m$ dollars for m miles. Find $C(120)$ and solve $C(m) = 80$. What does each answer mean?

10. State the domain of $f(x) = \dfrac{\sqrt{x + 3}}{x - 1}$ in interval notation.

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Station 2 of 4: Parent Functions and Transformations of Graphs

Name: _____ Date: _____

Apply transformations in the correct order. Remember that $f(x+3)$ moves the graph LEFT.

1. Describe, in order, how $g(x) = -2|x+3|+1$ is obtained from $y = |x|$. State the vertex.

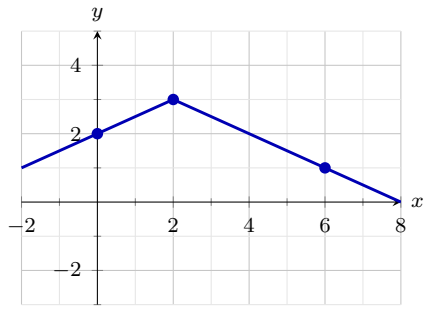
2. Describe how $h(x) = -\frac{1}{2}(x-4)^2 + 2$ is obtained from $y = x^2$. State the vertex and the range.

3. The point $(-2, 5)$ is on $y = f(x)$. Find its image on $y = f(x+3) - 4$.

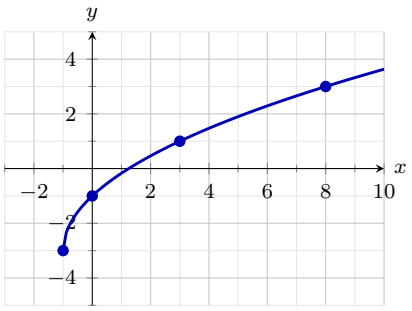
4. The point $(6, -2)$ is on $y = f(x)$. Find its image on $y = -f\left(\frac{1}{2}x\right)$.

5. Write the equation for $y = \sqrt{x}$ reflected in the y-axis and then shifted down 1. State the domain and range.

6. Write an equation for the graph, which is a transformation of $y = |x|$.



7. Write an equation for the graph, which is a transformation of $y = \sqrt{x}$.



8. Are the graphs of $y = 2x^2 + 3$ and $y = 2(x^2 + 3)$ the same? Give the vertex of each and explain how order matters.

9. Describe $g(x) = \left(\frac{1}{2}x\right)^3 - 2$ as a transformation of $y = x^3$, then find $g(4)$.

10. The graph of $y = \frac{1}{x}$ is shifted right 2 and up 5. Write the equation and give both asymptotes.

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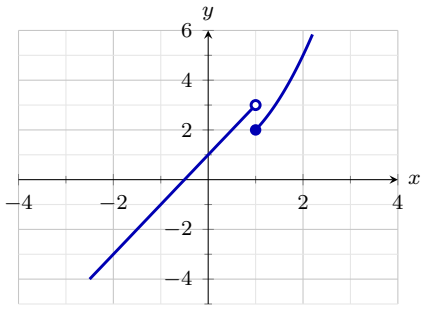
Station 3 of 4: Piecewise Functions, Operations, and Composition

Name: _____ Date: _____

Read $(f \circ g)(x)$ as $f(g(x))$: work from the inside out.

1. Let $f(x) = \begin{cases} x+4, & x < -1 \\ x^2, & -1 \le x \le 2 \\ 6-x, & x > 2 \end{cases}$. Find $f(-3)$, $f(-1)$, $f(2)$, and $f(3)$.

2. The graph of a piecewise function f is shown. Find $f(-1)$, $f(1)$, and $f(2)$. Is f continuous? Explain.



3. Rewrite $g(x) = |x-3| + 1$ as a piecewise-defined function.

4. Let $f(x) = x^2 - 1$ and $g(x) = 3x + 2$. Find $(f+g)(x)$ and $(f \cdot g)(2)$.

5. Let $f(x) = x^2 + 2x$ and $g(x) = x - 4$. Find $(f \circ g)(x)$ and $(g \circ f)(x)$.

6. Let $f(x) = \sqrt{x}$ and $g(x) = x^2 - 9$. Find $(f \circ g)(x)$ and its domain.

7. Use the table to find $(f \circ g)(3)$, $(g \circ f)(1)$, and $(f \circ f)(2)$.

x	1	2	3	4
$f(x)$	4	1	2	3
$g(x)$	3	4	1	2

8. A circular ripple has radius $r(t) = 3t$ cm after t seconds, and its area is $A(r) = \pi r^2$. Write $A(r(t))$ and find the area at $t = 4$ seconds.

9. Temperature in Celsius is $C(F) = \frac{5}{9}(F - 32)$ and in kelvins is $K(C) = C + 273.15$. Write $K(C(F))$ and find $K(C(212))$.

10. Write $h(x) = (5x-2)^4$ as a composition $h(x) = f(g(x))$ of two simpler functions.

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Station 4 of 4: Inverse Functions

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Remember that $f^{-1}(x)$ *means the inverse of* f*, not* $\dfrac{1}{f(x)}$.

1. Find the inverse of $f(x) = 3x - 7$.

2. Find the inverse of $f(x) = \dfrac{2x+1}{x-3}$.

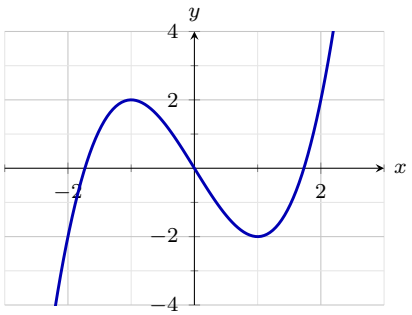
3. Find the inverse of $f(x) = (x-2)^2 + 1$ for $x \geq 2$, and state its domain.

4. Verify by composition that $f(x) = x^3 + 1$ and $g(x) = \sqrt[3]{x-1}$ are inverses.

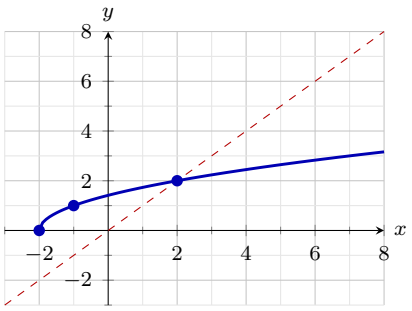
5. The function f is given by the table. Find $f^{-1}(7)$, $f^{-1}(-1)$, and $\left(f^{-1} \circ f\right)(4)$.

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

6. The graph of $f(x) = x^3 - 3x$ is shown. Is f one-to-one? Use the horizontal line test and name a line that proves it.



7. The graph of $f(x) = \sqrt{x+2}$ and the line $y = x$ are shown. Give the points on f^{-1} that correspond to the three marked points, then write $f^{-1}(x)$ and its domain.



8. A taxi charges $c(m) = 2.50 + 1.60m$ dollars for m miles. Find $c^{-1}(x)$ and use it to find how far you can ride for \$18.50.

9. A student says the inverse of $f(x) = 2x + 6$ is $\dfrac{1}{2x+6}$. Explain the error, find the correct inverse, and compare the two at $x = 4$.

10. State the domain and range of $f(x) = \sqrt{x-1} + 3$ and of f^{-1}.