Station #1

Find the domain for the following functions in interval notation.

a. $f(x) = 2x^2 - 4x + 5$; b. $g(x) = \sqrt{3-x}$; c. $h(x) = \sqrt[3]{x-7}$; d. $R(x) = \frac{x-3}{x^2-9}$

If the domain of *f(x)* is $\left(\frac{2-\sqrt{14}}{2}, \frac{2+\sqrt{14}}{2}\right)$, go to Station #3.

If the domain of *g(x)* is $[3, \infty)$, go to Station #9.

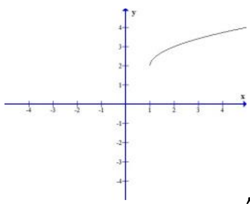
If the domain of *h(x)* is $[7, \infty)$, go to Station #6.

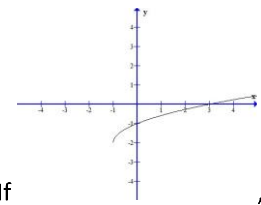
If the domain of *R(x)* is $(-\infty, -3) \cup (-3,3) \cup (3, \infty)$, go to Station #5.

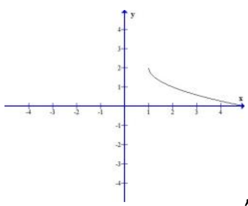
Station #2

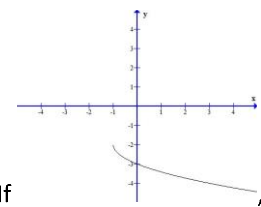
Graph the following function using transformations.

$$f(x) = -\sqrt{x+1} - 2$$

If , go to Station #3.

If , go to Station #11.

If , go to Station #14.

If , go to Station #7.

Station #3

Use $f(x) = x^2 - 4$ to answer the following.

a. Determine *f*(−1).

b. Find all *x* for which *f*(*x*) = 2.

c. Determine if *f(x)* is even, odd, or neither.

d. Find the x-intercepts and y-intercepts of *f*.

If $f(-1) = -5$, go to Station #15.

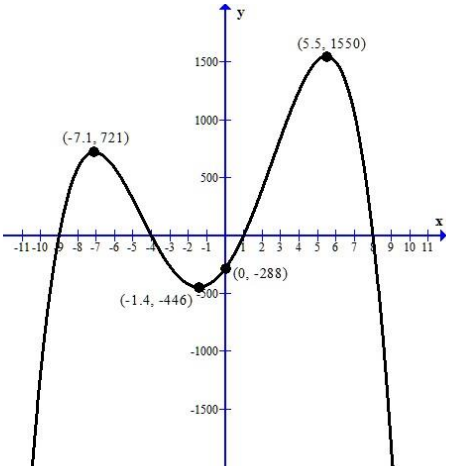
If $x = \sqrt{6}$ is all of the solutions to *f*(*x*) = 2, go to Station #14.

If *f* is odd, go to Station #6.

If the x-intercepts of *f* are $(2,0)$ and $(-2,0)$ and the y intercept of *f* is $(0, -4)$, go to Station #11.

Station #4

Use the graph below to answer the following.



a. Determine if the graph has x-axis symmetry, y-axis symmetry, origin symmetry or no symmetry.

b. Determine if the graph represents a function and is a one-to-one function.

c. Determine any relative maximums.

d. Determine the y-intercept.

If the graph has y-axis symmetry, go to Station #9.

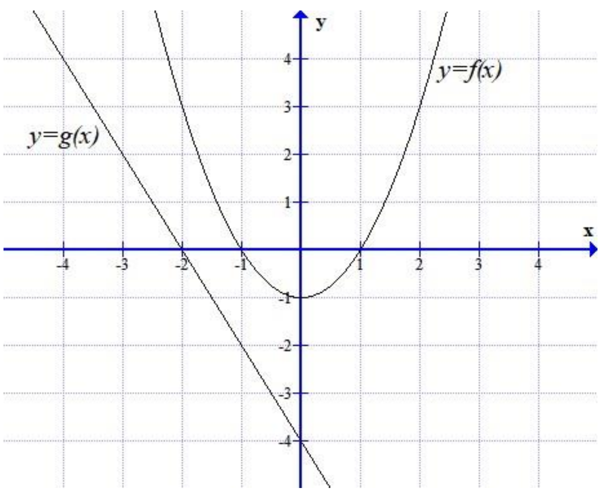
If the graph represents a one-to-one function, go to Station #10.

If the relative maximum is -446 at x=-1.4, go to Station #8.

If the y-intercept is $(0, -288)$, go to Station #6.

Station #5

Use the graph of *y* = *f*(*x*) to answer the following.



a. Determine *f*(2).

b. Find all *x* for which *g*(*x*) = 2.

c. Determine $\left(\frac{f}{g}\right)(0)$.

d. Determine $(f o g)(-3)$.

If $f(2) = -1$, go to Station #6.

If $x = -3$ is the solution set for *g*(*x*) = 2, go to Station #4.

If $\left(\frac{f}{g}\right)(0)$=-1., go to Station #9.

If $(f o g)(-3)$=2, go to Station #10.

Station #6

Use $f(x) = x^2 + 5x - 9$ and $g(x) = 3x - 2$ to answer the following.

a. Evaluate $(fg)(1)$.

b. Determine $(f - g)(x)$.

c. Evaluate $(gof)(2)$.

d. Determine $(fog)(x)$.

If $(fg)(1) = 3$, go to Station #10.

If $(f - g)(x) = x^2 + 2x - 11$, go to Station #8.

If $(gof)(2) = 25$, go to Station #2.

If $(fog)(x) = 9x^2 + 3x - 15$, go to Station #9.

Station #7

Let $f(x) = x^3 - 4$. Which of the following is a formula for $f^{-1}(x)$.

If $f^{-1}(x) = x^3 - 4$, go to Station #11

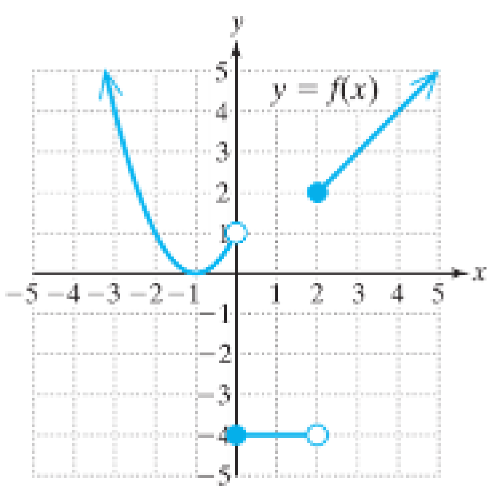
If $f^{-1}(x) = x^3 + 4$, go to Station #15

If $f^{-1}(x) = \sqrt[3]{x + 4}$, go to Station #3

If *f* doesn't have an inverse, go to Station #14

Station #8

Use the graph of *y* = *f*(*x*) to answer the following.



a. Determine *f*(−2).

b. Find all *x* for which *f*(*x*) = −4.

c. Determine the intervals of increasing for *f*.

d. Determine the range of the function *f*.

If $f(-2) = -4$, go to Station #7.

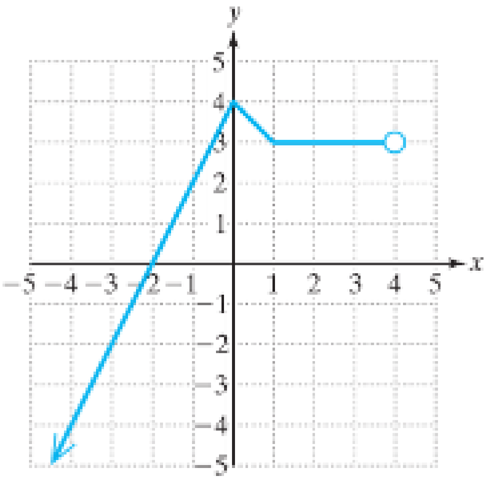
If $f(x) = -4$ for all x on the interval $[0,2)$, go to Station #2.

If the intervals of increasing are $(-1,1)$ and $(2, \infty)$, go to Station #3.

If the range of f is $(0, \infty)$, go to Station #11.

Station #9

Determine the domain and range of the function.



If the domain is $[-2,4)$, go to Station #8.

If the domain is $(-\infty, 4)$, go to Station #10.

If the range is $(-\infty, 3)$, go to Station #2.

If the range is $(-\infty, 4)$, go to Station #7.

Station #10

Determine the x- and y-intercepts for the given function.

$$g(x) = -\sqrt{x} + 3$$

If $(-9,0)$ and $(0,3)$, go to Station #2.

If $(3,0)$ and $(0,-9)$, go to Station #3.

If $(3,0)$ and $(0,9)$, go to Station #7.

If $(9,0)$ and $(0,3)$, go to Station #8.

Station #11

Use $f(x) = -2(x+3)^2 + 8$ to answer the following.

e. Find the vertex for the function f.

f. Determine if the parabola is facing up or down and the axis of symmetry.

g. Find the intercepts of the function.

h. Determine the domain and range of the function

If the vertex is $(3,8)$, go to Station #12.

If the parabola is facing down and the axis of symmetry is $x = 3$, go to Station #13.

If the x-intercepts are $(-5,0)$ and $(-1,0)$ and the y-intercept is $(0,-10)$, go to Station #14.

If the domain is $(-\infty, \infty)$ and the range is $[8, \infty)$, go to Station #1.

Station #12

Use $f(x) = 3x^2 - 12x + 3$ to answer the following.

a. Find the vertex for the function *f.*
b. Determine if the parabola is facing up or down and the axis of symmetry.
c. Find the intercepts of the function.
d. Determine the domain and range of the function

If the vertex is $(12, 3)$, go to Station #1.

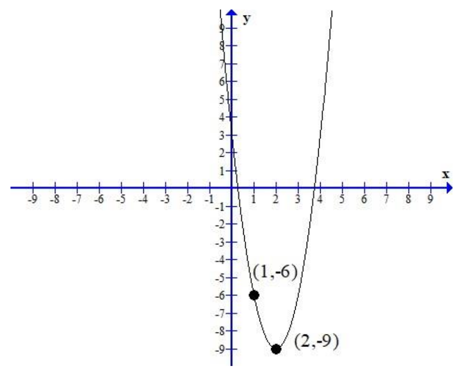
If the parabola is facing up and the axis of symmetry is $x = 12$, go to Station #5.

If the x-intercepts are $(3,0)$ and $(1,0)$ and the y-intercept is $(0,3)$, go to Station #4.

If the domain is $(-\infty, \infty)$ and the range is $[-9, \infty)$, go to Station #13.

Station #13

Use the graph to answer the following questions.



a. Determine the vertex of the parabola.
b. Determine the leading coefficient, a.
c. Write the equation of the parabola in standard form.
d. Write the equation of the parabola in general form.

If the vertex of the parabola is $(1, -6)$, go to Station #5.

If the leading coefficient, a is 2, go to Station #6.

If the standard form of the parabola is $f(x) = 3x^2 - 12x + 3$, go to Station #4.

If the general form of the parabola is $f(x) = 3x^2 - 12x + 3$, go to Station #1.

Station #14

A person standing close to the edge on top of an 80-foot building. The person throws the ball vertically upward with a velocity of 64 feet per second. The quadratic function below models the ball's height above the ground, *s(t),* in feet, *t* seconds after it was thrown.

$$s(t) = -16t^2 + 64t + 80$$

After how many seconds does the ball reach its maximum height?

What is the maximum height of the ball?

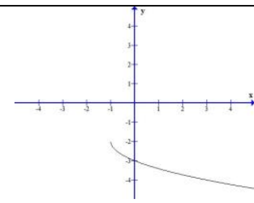
If the ball reaches its maximum height at 4 seconds, go to Station #1.

If the ball reaches its maximum height at 2 seconds, go to Station #12.

If the balls maximum height is 2 feet, go to Station #5.

If the balls maximum height is 80 feet, go to Station #13.

Answers:

Station 1	a. The domain of *f(x)* is $(-\infty,\infty)$. b. The domain of *g(x)* is $(-\infty,3]$. c. The domain of *h(x)* is $(-\infty,\infty)$. d. The domain of *R(x)* is $(-\infty,-3)\cup(-3,3)\cup(3,\infty)$
Station 5	a. $f(2)=3$ b. $x=-3$ for *g*(*x*) = 2. c. $\left(\frac{f}{g}\right)(0)=\frac{1}{4}$ d. $(fog)(-3)=3$
Station 4	a. The graph has no symmetry. b. The graph represents a function but is not one-to-one. c. The graph has a relative maximum of 721 at x=-7.1 and a relative maximum of 1550 at x=5.5. d. The y-intercept is $(0,-288)$
Station 6	a. $(fg)(1)$=-3 b. $(f-g)(x)=x^2+2x-7$ c. $(gof)(2)=13$ d. $(fog)(x)=9x^2+3x-15$
Station 9	D: $(-\infty,4)$ R: $(-\infty,4]$
Station 10	$(9,0)$ and $(0,3)$
Station 8	a. $f(-2)=1$ b. $f(x)=-4$ for all x on the interval $[0,2)$ c. The intervals of increasing are $(-1,0)$ and $(2,\infty)$. d. The range is $\{-4\}\cup[0,\infty)$
Station 2	
Station 7	$f^{-1}(x)=\sqrt[3]{x+4}$
Station 3	a. $f(-1)=-3$ b. $x=\pm\sqrt{6}$ c. Even d. x-intercepts: $(2,0),(-2,0)$; y-intercept: $(0,-4)$
Station 11	a. The vertex is $(-3,8)$. b. The parabola opens down and the axis of symmetry is x=-3. c. The x-intercepts are $(-5,0)$ and $(-1,0)$. The y-intercept is $(0,-10)$. d. The domain is $(-\infty,\infty)$ and the range is $(-\infty,8]$.
Station 14	The ball reaches its maximum height at $t=2$ seconds. The maximum height is 144 feet.
Station 12	a. The vertex is $(2,-9)$. b. The parabola opens up and the axis of symmetry is x=2. c. The x-intercepts are $(2-\sqrt{3},0)$ and $(2+\sqrt{3},0)$. The y-intercept is $(0,3)$. d. The domain is $(-\infty,\infty)$ and the range is $[-9,\infty)$.
Station 13	a. The vertex is $(2,-9)$. b. a=3. c. The standard form of the parabola is $f(x)=3(x-2)^2-9$ d. The general form of the parabola is $f(x)=3x^2-12x+3$