

Review: Radical, Rational and Composite Functions

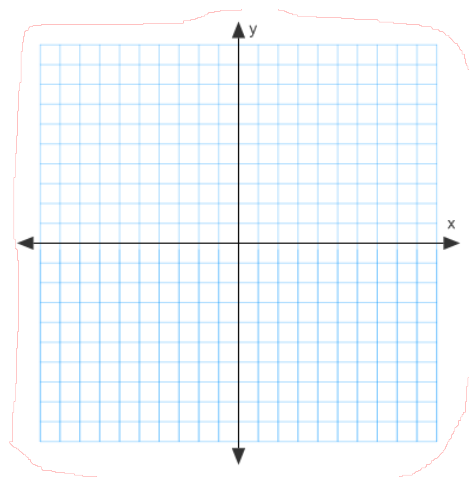
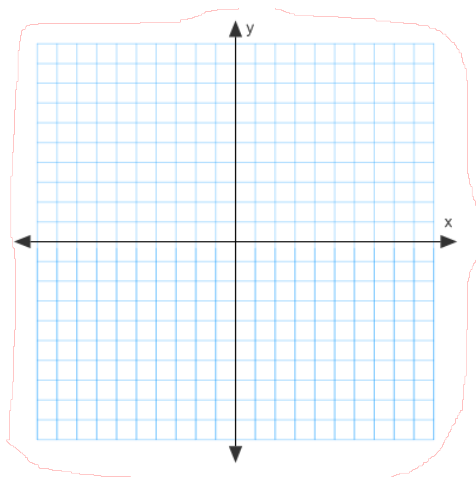
Lesson 12

Part I: Radical Functions

Example 1: Explain how to transform the graph of $y = \sqrt{x}$ to obtain the graph of each transformed function. Then draw a sketch of the new function.

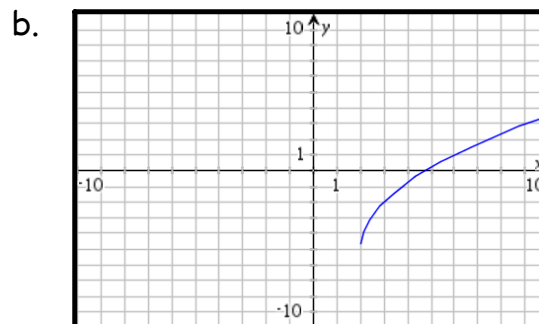
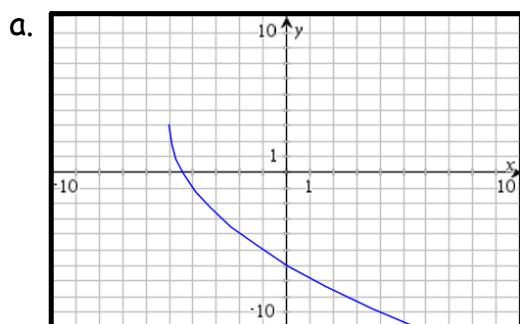
a. $y = 4\sqrt{-(x-5)} + 1$

b. $y = -3\sqrt{2(x+1)} - 3$



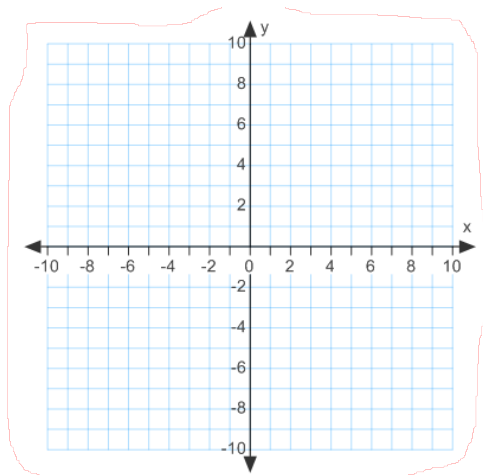
Example 2: For each graph, write the equation of a radical function in the form

$$y = a\sqrt{b(x-h)} + k \quad \text{State the domain and range.}$$

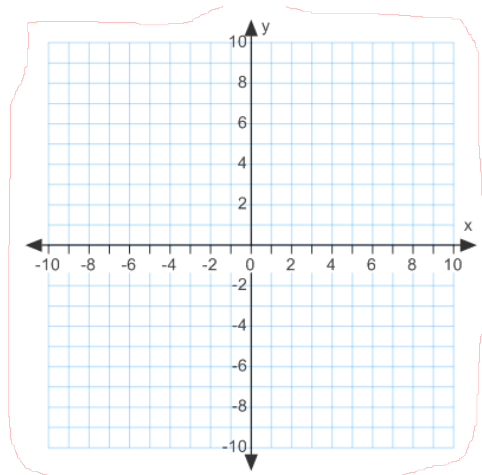


Example 3: Use technology to graph $y = \sqrt{f(x)}$ given the following functions. Sketch the graph on the grid. State the domain and range.

a. $f(x) = 4x - 1$



b. $f(x) = x^2 - 9$



Example 4: Determine the root(s) of each radical equation algebraically.

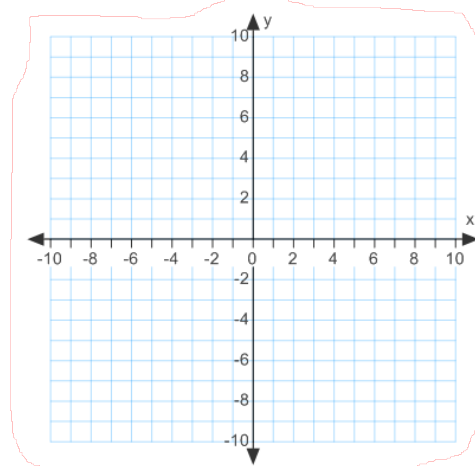
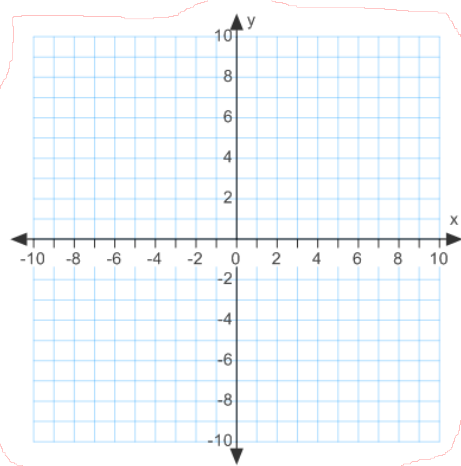
a. $0 = \sqrt{x-2} - 3$

b. $x = \sqrt{x-2} + 4$

Example 5: Identify any restrictions on the variables. Solve each radical equation graphically.

a. $\sqrt{x-1}-5=-2$

b. $\sqrt{x+3}=-1$



1. Text Pages 102 - 103, Exercises # 1 - 16

Practice!

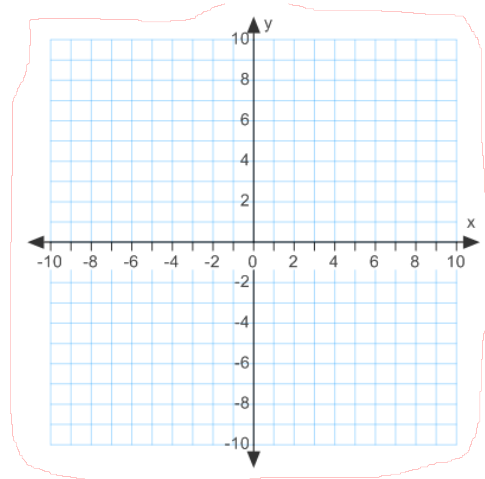
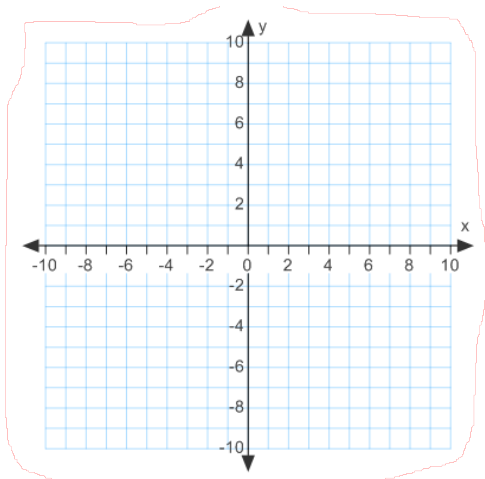


Part II: Rational Functions

Example 6: Graph each function using transformations. Label the important parts of the graph

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

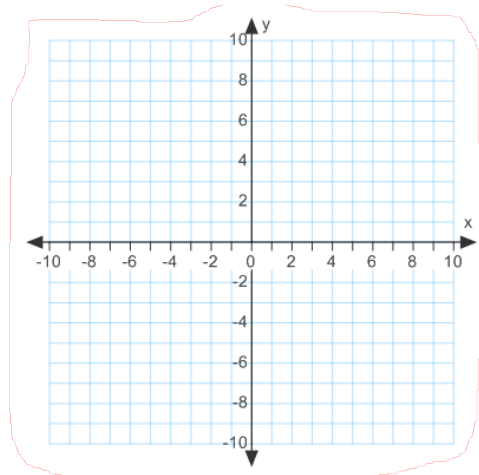
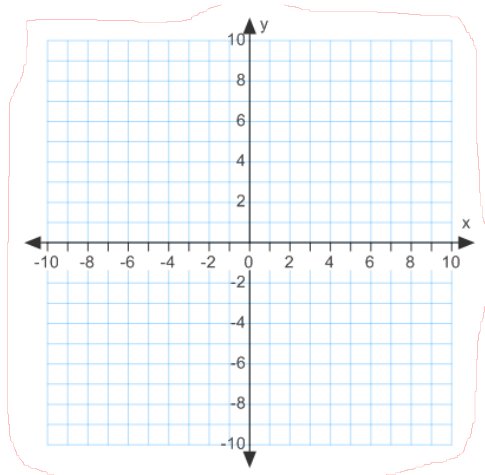
b. $y = \frac{7}{x-1} - 2$



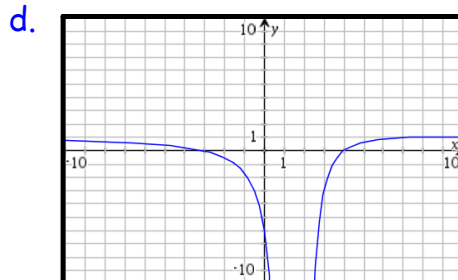
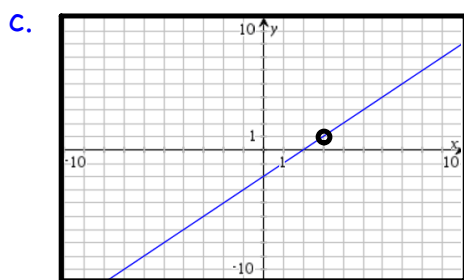
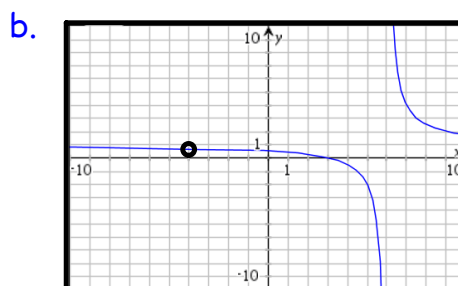
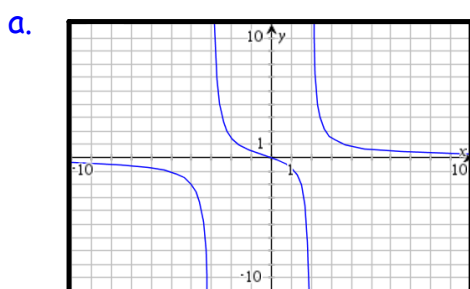
Example 7: Graph the following functions without technology. Label all the important parts.

a. $f(x) = \frac{4x+5}{x-3}$

b. $f(x) = \frac{-2x+5}{x-3}$



Example 8: Match the graph of each rational function with the most appropriate equation without using technology. Give reasons for each choice.



A. $f(x) = \frac{x^2 + x - 12}{x^2 - 2x - 24}$

B. $f(x) = \frac{x^2 - x - 12}{x^2 - 3x + 2}$

C. $h(x) = \frac{x^2 - 5x + 6}{x - 3}$

D. $j(x) = \frac{3x}{x^2 + x - 6}$

Example 9: For each function, predict the location of any points of discontinuity, vertical asymptotes, and intercepts.

a. $f(x) = \frac{2x+1}{x+5}$

b. $f(x) = \frac{x^2 - 8x + 12}{x - 2}$

Example 10: Solve each rational equation algebraically.

a. $\frac{3}{x} - \frac{6}{x-2} = \frac{1}{4}$

b. $\frac{x-2}{3} = \frac{2x-4}{x}$

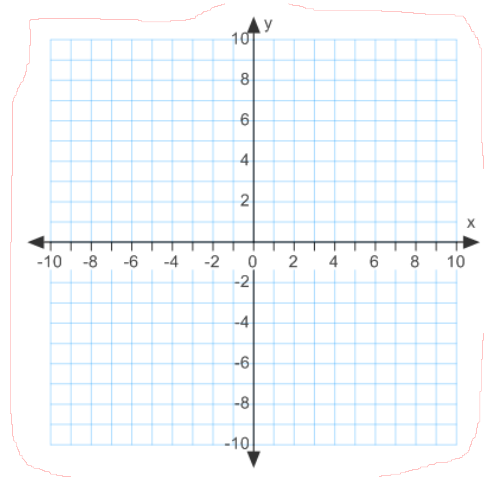
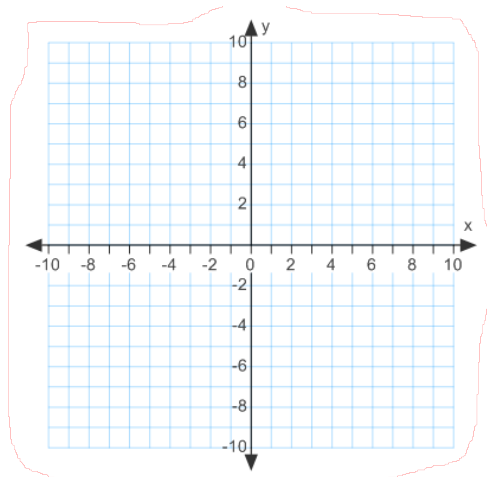
c. $\frac{x+1}{x+3} = \frac{x+4}{x+5}$

d. $\frac{x+2}{x-2} = \frac{2x+4}{x+1}$

Example 11: Solve each rational equation graphically. Sketch and label the graph of the solution. Provide answers to the nearest tenth.

a. $\frac{4}{x} + \frac{3}{x+1} = \frac{1}{2}$

b. $\frac{3x-1}{x+4} + 3 = \frac{6}{x-4}$



2. Text Pages 470 - 471, Exercises # 1 - 16

Practice!!



Part III: Composite Functions

Example 12: Given $f(x) = 3x - 2$ and $g(x) = x^2 + 3$, determine the following.

a. $(f + g)(-2)$

b. $(f - g)(4)$

Example 13: Let $f(x) = \sqrt{x+4}$ and $g(x) = 2x^2 - 1$

Determine $h(x) = f(x) + g(x)$ algebraically and using technology.

State the domain and range (approximate from graph) of $h(x)$.

Determine $k(x) = f(x) - g(x)$ algebraically and using technology.

State the domain and range (approximate from graph) of $k(x)$.

Example 14: If $h(x) = (f - g)(x)$ and $f(x) = -x + 6$, determine $g(x)$.

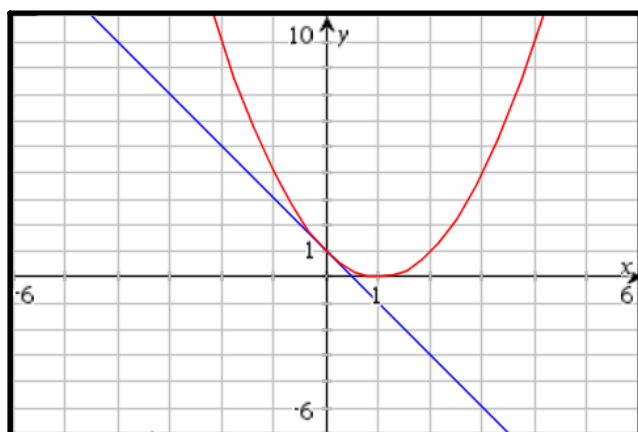
a. $h(x) = 4x^2 - 12x + 9$

b. $h(x) = \sqrt{x} + x - 6$

Example 15: Let $f(x) = 1 - 2x$ and $g(x) = x^2 + 3$. Determine each combined function and state any restrictions on the variable.

a. $h(x) = f(x) \cdot g(x)$ b. $k(x) = \frac{f(x)}{g(x)}$

Example 16: Use the graphs of $f(x)$ and $g(x)$ to determine the following.



a. $(f \cdot g)(0)$

b. $(f \cdot g)(-1)$

c. $\left(\frac{f}{g}\right)(2)$

d. $\left(\frac{f}{g}\right)(-2)$

Example 17: If $h(x) = f(x) \cdot g(x)$ and $f(x) = 2x - 3$ determine $g(x)$.

a. $h(x) = 2x^2 - 5x + 3$

b. $h(x) = -2x^3 + 3x^2$

Example 18: Let $f(x) = x - 3$ and $g(x) = 1 - x^2$.

Determine the following.

a. $(f \circ g)(x)$

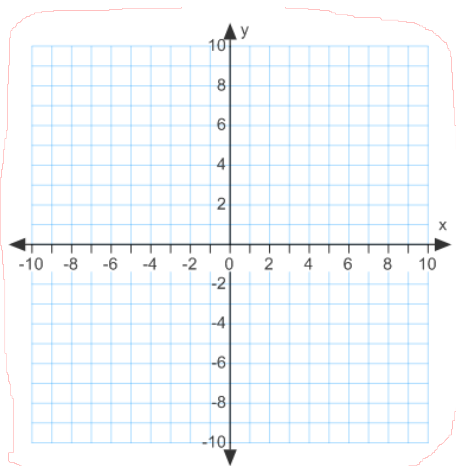
b. $(f \circ g)(-3)$

c. $(g \circ g)(x)$

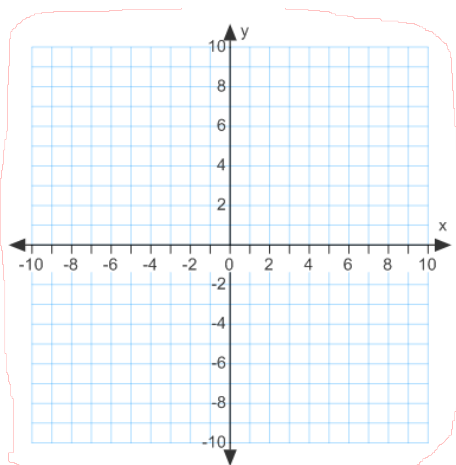
d. $(g \circ g)(2)$

Example 19: Let $f(x) = x^2 - 9$ and $g(x) = \sqrt{x}$.

a. Sketch the graph of $y = f(g(x))$ and state its domain and range.



b. Sketch the graph of $y = g(f(x))$ and state its domain and range.



Example 20: Given that $h(x) = (f \circ g)(x)$, determine $g(x)$.

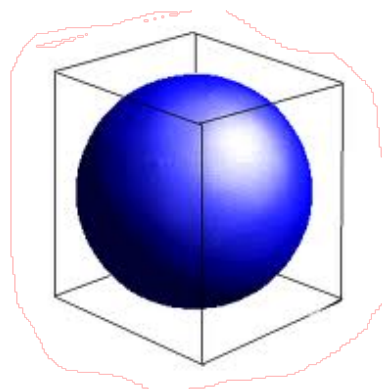
a. $h(x) = \sqrt{9-x}$ and $f(x) = \sqrt{x}$

b. $h(x) = \frac{12}{(7x-2)^2}$ and $f(x) = \frac{12}{x^2}$

c. $h(x) = 4x^2 - 20x + 25$ and $f(x) = x^2$

Example 21: The side length, d , of a cube that contains a sphere depends the radius, r , of the sphere. Assume that the faces of the cube are tangent to the sphere.

- a. Write the side length of the cube as a function of the radius of the sphere.



- b. Write the volume of the cube as a function of the radius of the sphere.
- c. What is the volume of a cube that contains a sphere of radius 7.5 cm?

3. Text Pages 512 - 513, Exercises # 1 - 5, 8 - 11, 13, 14

4. **Practice Test Next Class**

- Radical, Rational and Composite Functions.



Practice!!!

Attachments

Translations Assignment 1.doc

Rational Functions Formative Assessment Quiz 1.docx