

## CHAPTER 3 PRACTICE QUESTIONS

**Directions:** Complete the following open-ended problems as specified by each question stem. For extra practice after answering each question, try using an alternative method to solve the problem or check your work.

1. Solve the equation and check your solution.

$$\frac{x}{x-3} + \frac{2x}{x+3} = \frac{18}{x^2-9}$$

2. Sketch the graph of  $f(x) = \frac{2(x^2-9)}{x^2-4}$  by discussing asymptotes, intercepts, symmetry, and finding a couple of additional points to plot. Use a calculator to check your graph.

3. Find all real solutions of  $\frac{1}{(x+1)^2} = \frac{1}{x+1} + 2$ .

4. Find all real solutions to  $\sqrt[4]{5x^2-6} = x$ .

5. Solve  $\sqrt{x} - 1 = \sqrt{2x+1}$  and check the solution(s).

6. Solve  $\sqrt{x+1} < 2$  and check the solution.

7. The length of a rectangle is 7 units more than its width. Find the range of values for the length and the width if the ratio of the length to the width is no more than 10 and at least 5.

8. On her first ski run this morning, Mitsue skied a 0.3-mile trail. The second trail she skied was twice as long and steeper, and her speed on it was 1.5 times as fast as her speed on the first trail. Her ski time for the second trail was half a minute more than her time for the first trail. Write an equation for  $t$ , Mitsue's time on the first trail, as a function of  $r$ , her skiing speed on the first trail. Write another equation to represent her second trail run, in terms of the same values of  $t$  and  $r$ . What was Mitsue's skiing speed, in miles per hour, for each of the two trails?

9. Jean-Luc needs to install a new cylindrical storage tank water heater. To minimize how much space it takes in his basement, he plans to get the tallest one possible that will fit, which is 5 feet 3 inches high. Write a function for  $r$ , the radius, in feet, of a storage tank of height 5 feet 3 inches, in terms of  $v$ , the volume of water, in cubic feet, that it holds. Jean-Luc decides to get an 80-gallon storage tank. If one cubic foot contains 7.48 gallons, what is the **diameter** of the storage tank he chose?