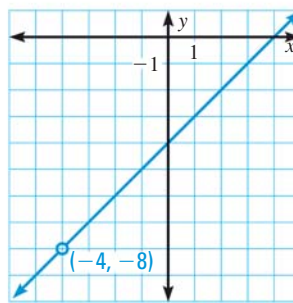


**POINT DISCONTINUITY** In Exercises 44–46, use the following information.

The graph of a rational function can have a hole in it, called a *point discontinuity*, where the function is undefined. An example is shown below.

$$y = \frac{x^2 - 16}{x + 4} = \frac{(x-4)(x+4)}{x+4} = x - 4$$

The graph of  $y = \frac{x^2 - 16}{x + 4}$  is the same as the graph of  $y = x - 4$  except that there is a hole at  $(-4, -8)$  because the rational function is not defined when  $x = -4$ .



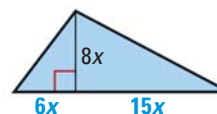
**Graph the rational function. Use an open circle for a point discontinuity.**

44.  $y = \frac{x^2 + 10x + 21}{x + 3}$

45.  $y = \frac{x^2 - 36}{x - 6}$

46.  $y = \frac{2x^2 - x - 10}{x + 2}$

47. **CHALLENGE** Find the ratio of the perimeter to the area of the triangle shown at the right.



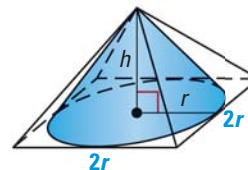
**PROBLEM SOLVING**

**EXAMPLE 2**

on p. 574 for Exs. 48, 50–52

48. **GEOMETRY** Find the ratio of the volume of the square pyramid to the volume of the inscribed cone. Write your answer in simplified form.

**TEXAS @HomeTutor** for problem solving help at classzone.com



49. **ENTERTAINMENT** From 1992 to 2002, the gross ticket sales  $S$  (in millions of dollars) to Broadway shows and the total attendance  $A$  (in millions) at the shows can be modeled by

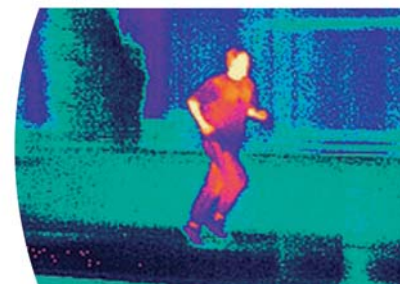
$$S = \frac{-6420t + 292,000}{6.02t^2 - 125t + 1000} \quad \text{and} \quad A = \frac{-407t + 7220}{5.92t^2 - 131t + 1000}$$

where  $t$  is the number of years since 1992. Write a model for the *average* dollar amount a person paid per ticket as a function of the year. What was the average amount a person paid per ticket in 1999?

**TEXAS @HomeTutor** for problem solving help at classzone.com

50. **TAKS REASONING** Almost all of the energy generated by a long-distance runner is released in the form of heat. For a runner with height  $H$  and speed  $V$ , the rate  $h_g$  of heat generated and the rate  $h_r$  of heat released can be modeled by  $h_g = k_1 H^3 V^2$  and  $h_r = k_2 H^2$  where  $k_1$  and  $k_2$  are constants.

- Write the ratio of heat generated to heat released. Simplify the expression.
- When the ratio of heat generated to heat released equals 1, how is speed related to height? Does a taller or shorter runner have the advantage? *Explain.*



Thermogram of runner