EXAMPLE 4 on p. 630 for Exs. 24–32

GRAPHING QUADRATIC FUNCTIONS **Graph the function. Compare the graph with the graph of $y = x^2$.**

24. $y = 7x^2 + 7$ **25.** $y = -x^2 + 5$ **26.** $y = 2x^2 - 12$

27. $y = -2x^2 - 1$ **28.** $y = -3x^2 - 2$ **29.** $y = \frac{3}{4}x^2 - 3$

30. $y = \frac{1}{5}x^2 + 10$ **31.** $y = \frac{1}{2}x^2 - 5$ **32.** $y = -\frac{2}{3}x^2 + 9$

EXAMPLE 5 on p. 631 for Exs. 33–36

33. **TAKS REASONING** How would the graph of the function $y = x^2 + 3$ be affected if the function were changed to $y = x^2 + 9$?

(A) The graph would shift 9 units to the right.

(B) The graph would shift 6 units up.

(C) The graph would shift 9 units up.

(D) The graph would shift 6 units down.

COMPARING GRAPHS **Tell how you can obtain the graph of g from the graph of f using transformations.**

34. $f(x) = x^2 - 5$, $g(x) = x^2 + 8$ **35.** $f(x) = 3x^2 - 11$, $g(x) = 3x^2 - 16$ **36.** $f(x) = 4x^2$, $g(x) = 2x^2$

CHALLENGE **Write a function of the form $y = ax^2 + c$ whose graph passes through the two given points.**

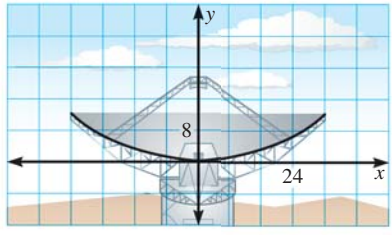
37. $(-1, 9)$, $(0, 3)$ **38.** $(2, 1)$, $(5, -20)$ **39.** $(-2, -16.5)$, $(1, 4.5)$

PROBLEM SOLVING

GRAPHING CALCULATOR **You may wish to use a graphing calculator to complete the following Problem Solving exercises.**

EXAMPLE 6 on p. 631 for Exs. 40–41

40. **ASTRONOMY** A cross section of the parabolic surface of the antenna shown can be modeled by the graph of the function $y = 0.012x^2$ where x and y are measured in meters.



a. Find the domain of the function in this situation.

b. Find the range of the function in this situation.

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41. **SAILING** Sailors need to consider the speed of the wind when adjusting the sails on their boat. The force F (in pounds per square foot) on a sail when the wind is blowing perpendicular to the sail can be modeled by the function $F = 0.004v^2$ where v is the wind speed (in knots).

a. Graph the function for wind speeds from 0 knots to 50 knots.

b. Use the graph to estimate the wind speed that will produce a force of 1 pound per square foot on a sail.

c. Estimate the wind speed that will produce a force of 5 pounds per square foot on a sail.

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