GUIDED PRACTICE

1. **Vocabulary** The highest or lowest point on the graph of a quadratic function is the __?__ . (*vertex* or *parabola*)

SEE EXAMPLE 1

Graph each function by using a table.

2. $f(x) = -2x^2 - 4$　　　3. $g(x) = -x^2 + 3x - 2$　　　4. $h(x) = x^2 + 2x$

SEE EXAMPLE 2

Using the graph of $f(x) = x^2$ as a guide, describe the transformations, and then graph each function.

5. $d(x) = (x - 4)^2$　　　6. $g(x) = (x - 3)^2 + 2$　　　7. $h(x) = (x + 1)^2 - 3$

SEE EXAMPLE 3

8. $g(x) = 3x^2$　　　9. $h(x) = \left(\frac{1}{8}x\right)^2$　　　10. $p(x) = 0.25x^2$

11. $h(x) = -(5x)^2$　　　12. $g(x) = 4.2x^2$　　　13. $d(x) = -\frac{2}{3}x^2$

SEE EXAMPLE 4

Use the description to write each quadratic function in vertex form.

14. The parent function $f(x) = x^2$ is vertically stretched by a factor of 2 and translated 3 units left to create g.

15. The parent function $f(x) = x^2$ is reflected across the x-axis and translated 6 units down to create h.

SEE EXAMPLE 5

16. **Physics** The safe working load L in pounds for a natural rope can be estimated by $L(r) = 5920r^2$, where r is the radius of the rope in inches. For an old rope, the function $L_o(r) = 4150r^2$ is used to estimate its safe working load. What kind of transformation describes this change, and what does this transformation mean?

PRACTICE AND PROBLEM SOLVING

Extra Practice

See Extra Practice for more Skills Practice and Applications Practice exercises.

Graph each function by using a table.

17. $f(x) = -x^2 + 4$　　　18. $g(x) = x^2 - 2x + 1$　　　19. $h(x) = 2x^2 + 4x - 1$

Using the graph of $f(x) = x^2$ as a guide, describe the transformations, and then graph each function.

20. $g(x) = x^2 - 2$　　　21. $h(x) = (x + 5)^2$　　　22. $j(x) = (x - 1)^2$

23. $g(x) = (x + 4)^2 - 3$　　　24. $h(x) = (x + 2)^2 + 2$　　　25. $j(x) = (x - 4)^2 - 9$

26. $g(x) = \frac{4}{7}x^2$　　　27. $h(x) = -20x^2$　　　28. $j(x) = \left(\frac{1}{3}x\right)^2$

Use the description to write each quadratic function in vertex form.

29. The parent function $f(x) = x^2$ is reflected across the x-axis, vertically compressed by a factor of $\frac{1}{2}$, and translated 1 unit right to create g.

30. The parent function $f(x) = x^2$ is vertically stretched by a factor of 2.5 and translated 2 units left and 1 unit up to create h.

31. **Consumer Economics** The average gas mileage m in miles per gallon for a compact car is modeled by $m(s) = -0.015(s - 47)^2 + 33$, where s is the car's speed in miles per hour. The average gas mileage for an SUV is modeled by $m_u(s) = -0.015(s - 47)^2 + 15$. What kind of transformation describes this change, and what does this transformation mean?