

Name \_\_\_\_\_ Date \_\_\_\_\_

## The Form Is “Key” Vertex Form of a Quadratic Function

### Vocabulary

Write a definition for the term in your own words.

1. vertex form

### Problem Set

Determine the vertex of each quadratic function given in vertex form.

1.  $f(x) = (x - 3)^2 + 8$

The vertex is (3, 8).

2.  $f(x) = (x + 4)^2 + 2$

3.  $f(x) = -2(x - 1)^2 - 8$

4.  $f(x) = \frac{1}{2}(x - 2)^2 + 6$

5.  $f(x) = -(x + 9)^2 - 1$

6.  $f(x) = (x - 5)^2$

Determine the vertex of each quadratic function given in standard form. Use your graphing calculator. Rewrite the function in vertex form.

7.  $f(x) = x^2 - 6x - 27$

The vertex is (3, -36).

The function in vertex form is

$$f(x) = (x - 3)^2 - 36.$$

8.  $f(x) = -x^2 - 2x + 15$

9.  $f(x) = 2x^2 - 4x - 6$

10.  $f(x) = x^2 - 10x + 24$

11.  $f(x) = -x^2 + 15x - 54$

12.  $f(x) = -2x^2 - 14x - 12$

Determine the  $x$ -intercepts of each quadratic function given in standard form. Use your graphing calculator. Rewrite the function in factored form.

13.  $f(x) = x^2 + 2x - 8$

The  $x$ -intercepts are  $(2, 0)$  and  $(-4, 0)$ .

The function in factored form is

$f(x) = (x - 2)(x + 4)$ .

14.  $f(x) = -x^2 - x + 12$

15.  $f(x) = -4x^2 + 12x - 8$

16.  $f(x) = 2x^2 + 18x + 16$

17.  $f(x) = \frac{1}{2}x^2 - \frac{1}{2}x - 3$

18.  $f(x) = \frac{1}{3}x^2 - 2x$

Identify the form of each quadratic function as either standard form, factored form, or vertex form. Then state all you know about the quadratic function's key characteristics, based only on the given equation of the function.

19.  $f(x) = 5(x - 3)^2 + 12$

The function is in vertex form.

The parabola opens up and the vertex is  $(3, 12)$ .

20.  $f(x) = -(x - 8)(x - 4)$

21.  $f(x) = -3x^2 + 5x$

22.  $f(x) = \frac{2}{3}(x + 6)(x - 1)$

23.  $f(x) = -(x + 2)^2 - 7$

24.  $f(x) = 2x^2 - 1$



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Write an equation for a quadratic function with each set of given characteristics.

25. The vertex is  $(-1, 4)$  and the parabola opens down.

Answers will vary but functions should be in the form:

$$f(x) = a(x - h)^2 + k$$

$$f(x) = a(x + 1)^2 + 4, \text{ for } a < 0$$

26. The  $x$ -intercepts are  $-3$  and  $4$  and the parabola opens down.

27. The vertex is  $(3, -2)$  and the parabola opens up.

28. The vertex is  $(0, 8)$  and the parabola opens up.

29. The  $x$ -intercepts are  $5$  and  $12$  and the parabola opens up.

30. The  $x$ -intercepts are  $0$  and  $7$  and the parabola opens down.