

**Determining the Equation of Quadratic Functions**

1. Write the equation for each parabola with the given vertex and the given value of  $a$ .
  - a) vertex  $(5, 0)$ ;  $a = -1$
  - b) vertex  $(-4, -2)$ ;  $a = 1$
  - c) vertex  $(0, 3)$ ;  $a = 6$
  - d) vertex  $(-2, -4)$ ;  $a = \frac{2}{3}$
  - e) vertex  $(3, 6)$ ;  $a = -\frac{1}{4}$
  
2. Write the equation for each parabola with the given information.
  - a) congruent to  $y = x^2$ ; opens down; with vertex  $(2, 5)$
  - b) congruent to  $y = 2x^2$ ; opens down; with vertex  $(0, 2)$
  - c) congruent to  $y = -4x^2$ ; minimum at  $(-3, -5)$
  - d) congruent to  $y = \frac{1}{5}x^2$ ; minimum at  $(5, 0)$
  - e) congruent to  $y = 5x^2$ ; maximum at  $(1, 1)$
  - f) congruent to  $y = -\frac{5}{4}x^2$ ; maximum value of  $-3$ , equation of axis of symmetry  $x = 4$ .
  
3. Write the equation for each of the following parabolas with the given vertex if they pass through the given points.
  - a) vertex  $(1, 0)$ ; passing through the point  $(3, 2)$
  - b) vertex  $(-3, -2)$ ; passing through the point  $(-6, -4)$
  - c) vertex  $(0, 5)$ ; passing through the point  $(5, 0)$
  - d) vertex  $(1, 3)$ ; passing through the point  $(4, 5)$
  - e) vertex  $(-3, -5)$ ; has  $y$ -intercept of  $2$

4. If the vertex of a parabola is at  $(2, 5)$  and one of its x-intercepts is at  $(5, 0)$  find the other x-intercept and the y-intercept.
5. Two points on a parabola are at  $(3, -5)$  and  $(7, -5)$ , what is equation of the axis of symmetry?
6. Find the values of  $a$  and  $k$  so the given points lie on the graph of the parabola:
  - a)  $y = a(x+3)^2 + k$ ;  $(2, 4), (4, 7)$
  - b)  $y = a(x-1)^2 + k$ ;  $(-1, -3), (0, -6)$
7. An arch is in the shape of a parabola. If the arch was 70 meters across at its base and 25 meters high in the middle, how high would it be 12 meters from the middle?
8. Find the value of  $k$  so that the parabola  $y = -3x^2 + k$  passes through the point  $(-2, 4)$
9. Write the new equation for the parabola  $y = -4(x-2)^2 - 5$  after a reflection the x-axis.
10. Find the equation of the axis of symmetry for the parabola  $y = -4(x-2)^2 - 5$  after a reflection in the y-axis.

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10. Find the equation of the axis of symmetry for the parabola

$$y = -4(x-2)^2 - 5 \text{ after a reflection in the y-axis.}$$

**ANSWERS**

1a)  $y = -(x-5)^2$

2a)  $y = -(x-2)^2 + 5$

1b)  $y = (x+4)^2 - 2$

2b)  $y = -2x^2 + 2$

1c)  $y = 6x^2 + 3$

2c)  $y = 4(x+3)^2 - 5$

1d)  $y = \frac{2}{3}(x+2)^2 - 4$

2d)  $y = \frac{1}{5}(x-5)^2$

1e)  $y = -\frac{1}{4}(x-3)^2 + 6$

2e)  $y = -5(x-1)^2 + 1$

2f)  $y = -\frac{5}{4}(x-4)^2 - 3$

3a)  $y = \frac{1}{2}(x-1)^2$

3b)  $y = -\frac{2}{9}(x+3)^2 - 2$

3c)  $y = -\frac{1}{5}x^2 + 5$

3d)  $y = \frac{2}{9}(x-1)^2 + 3$

3e)  $y = \frac{7}{9}(x+3)^2 - 5$

4. x-intercept  $(-1, 0)$ ; y-intercept  $(0, \frac{25}{9})$

5.  $x = 5$

6a.  $a = \frac{1}{8}$ ;  $k = \frac{7}{8}$

6b.  $a = 1, k = -7$

7.  $\frac{1089}{49}$  or 22.06

8. 16

9.  $y = 4(x-2)^2 + 5$

10.  $x = -2$