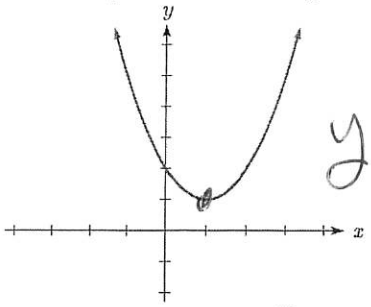
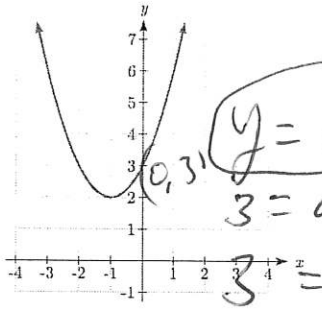
Section 3.2 Exercises

Write an equation for the quadratic function graphed.

1. 

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

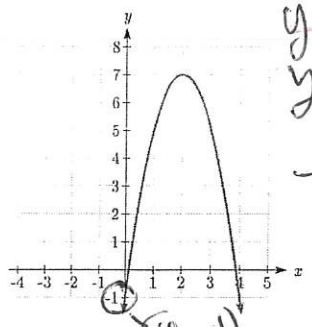
2. 

$y = (x+1)^2 + 2$

$3 = a(0+1)^2 + 2$

$3 = a(1) + 2$

$1 = a$ ✓

3. 

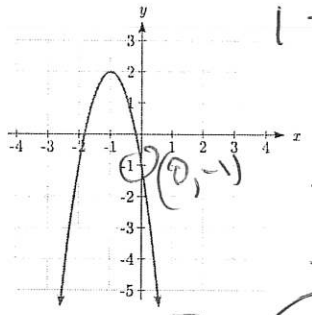
$y = -2(x-2)^2 + 7$

$y = a(x-2)^2 + 7$

$-1 = a(0-2)^2 + 7$

$-8 = a(4)$

$-2 = a$

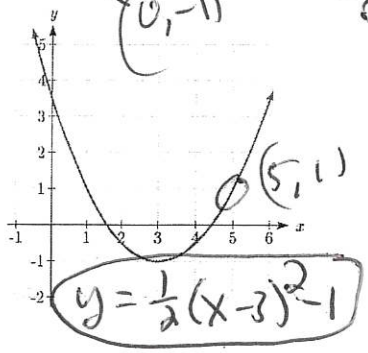
4. 

$y = a(x+1)^2 + 2$

$-1 = a(0+1)^2 + 2$

$-3 = a$

$y = -3(x+1)^2 + 2$

5. 

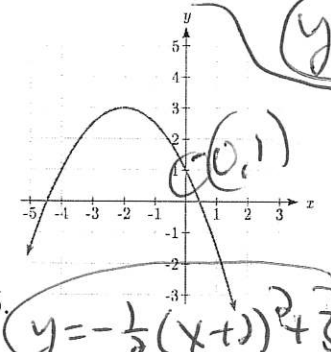
$y = a(x-3)^2 - 1$

$1 = a(5-3)^2 - 1$

$2 = a(4)$

$\frac{1}{2} = a$

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

6. 

$y = a(x+3)^2 + 3$

$1 = a(0+3)^2 + 3$

$-2 = a(4)$

$-\frac{1}{2} = a$

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

For each of the follow quadratic functions, find a) the vertex, b) the vertical intercept, and c) the horizontal intercepts.

7. $y(x) = 2x^2 + 10x + 12$

9. $f(x) = 2x^2 - 10x + 4$

11. $h(t) = -4t^2 + 6t - 1$

See next Pg

Rewrite the quadratic function into vertex form.

13. $f(x) = x^2 - 12x + 32$

15. $h(x) = 2x^2 + 8x - 10$

(13) $x = \frac{12}{2(1)} \to 6$ $f(6) = 36 - 72 + 32 \to -4$

$F(x) = (x-6)^2 - 4$

17. Find the values of b and c so $f(x) = -8x^2 + bx + c$ has vertex $(2,-7)$

Done on Bl

(15) $x = \frac{-8}{2(2)} = -2$

$f(-2) = 2(4) - 16 - 10 \to 18$

$F(x) = 2(x+2)^2 - 18$

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#9 $y = 2x^2 - 10x + 4$

Vertex $= \frac{+10}{2(2)} = \frac{5}{2}$ $f(\frac{5}{2}) = 2(\frac{25}{4}) - 25 + 4$

$\frac{25}{2} - \frac{50}{2} + \frac{8}{2}$

$-\frac{17}{2}$

$(\frac{5}{2}, -\frac{17}{2})$

Vertical int $f(0) = 4$ (0, 4)

X int $0 = 2(x^2 - 5x + 2)$

Doesn't factor so $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$0 = x^2 - 5x + 2$

$a = 1$

$b = -5$

$c = 2$

$\frac{5 \pm \sqrt{25-4(1)(2)}}{2(1)}$

$\frac{5 \pm \sqrt{17}}{2}$

$(\frac{5-\sqrt{17}}{2}, 0)$ $(\frac{5+\sqrt{17}}{2}, 0)$

#11 $y = -4t^2 + 6t - 1$

Vertex $= \frac{-6}{2(-4)} = \frac{3}{4}$ $f(\frac{3}{4}) = -4(\frac{9}{16}) + 6(\frac{3}{4}) - 1$

$-4(\frac{9}{16}) + \frac{18}{4} - \frac{4}{4}$

$-\frac{9}{4} + \frac{18}{4} - \frac{4}{4}$

$\frac{5}{4}$

Vertex $(\frac{3}{4}, \frac{5}{4})$

11 Continued

Vertical int (y-int)

$f(0) = -1$ $(0, -1)$

X-intercepts $0 = -4t^2 + 6t - 1$

$a = -4 \quad b = 6 \quad c = -1$

$$x = \frac{-6 \pm \sqrt{36 - 4(-4)(-1)}}{2(-4)} \rightarrow \frac{-6 \pm \sqrt{20}}{-8} \rightarrow \frac{-6 \pm 2\sqrt{5}}{-8}$$

$$x = \frac{-3 \pm \sqrt{5}}{-4}$$

$\left(\frac{3}{4} - \frac{\sqrt{5}}{4}, 0\right)$

$\left(\frac{3}{4} + \frac{\sqrt{5}}{4}, 0\right)$

p14 work

(7) Vertex $2x^2+10x+12$

$x = \frac{-10}{2(2)} \rightarrow -\frac{5}{2}$

$f(-\frac{5}{2}) = 2(-\frac{5}{2})^2 + 10(-\frac{5}{2}) + 12$

$2(\frac{25}{4}) + (-25) + 12$

$\frac{25}{2} - \frac{50}{2} + \frac{24}{2}$

$-\frac{1}{2}$

$(-\frac{5}{2}, -\frac{1}{2})$

Vertical int (AKA y int)

$f(0) = 12$

$(0, 12)$

X ints $\quad 0 = 2x^2 + 10x + 12$

$0 = 2(x^2 + 5x + 6)$

$0 = (x+3)(x+2)$

$x = -3 \quad x = -2$

$(-3, 0)$ and $(-2, 0)$

Write a quadratic equation given these properties:

19. x-intercepts (-3, 0) and (1, 0), and y intercept (0, 2)

21. x-intercepts (2, 0) and (5, 0), and y intercept (0, 6)

23. Vertex at (4, 0), and y intercept (0, -4)

25. Vertex at (-3, 2), and passing through (3, -2)

27. A rocket is launched in the air. Its height, in meters above sea level, as a function of time, in seconds, is given by $h(t) = -4.9t^2 + 229t + 234$.

a. From what height was the rocket launched? $h(0) = 234$

b. How high above sea level does the rocket reach its peak? Vertex

c. Assuming the rocket will splash down in the ocean, at what time does splashdown occur?

29. The height of a ball thrown in the air is given by $h(x) = -\frac{1}{12}x^2 + 6x + 3$, where x is the horizontal distance in feet from the point at which the ball is thrown.

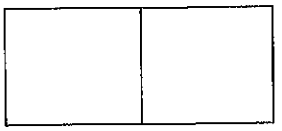
a. How high is the ball when it was thrown?

b. What is the maximum height of the ball?

c. How far from the thrower does the ball strike the ground?

31. A box with a square base and no top is to be made from a square piece of cardboard by cutting 6 in. squares out of each corner and folding up the sides. The box needs to hold 1000 in^3. How big a piece of cardboard is needed?

33. A farmer wishes to enclose two pens with fencing, as shown. If the farmer has 500 feet of fencing to work with, what dimensions will maximize the area enclosed?



35. You have a wire that is 56 cm long. You wish to cut it into two pieces. One piece will be bent into the shape of a square. The other piece will be bent into the shape of a circle. Let A represent the total area enclosed by the square and the circle. What is the circumference of the circle when A is a minimum?

37. A soccer stadium holds 62,000 spectators. With a ticket price of \$11, the average attendance has been 26,000. When the price dropped to \$9, the average attendance rose to

Pg (17)

(-3, 0) (1, 0)

(19) $y = a(x+3)(x-1)$

$2 = a(3)(-1)$

$-\frac{2}{3} = a$

$\boxed{y = -\frac{2}{3}(x+3)(x-1)}$

(21) $y = a(x-2)(x-5)$

$(0,6) \Rightarrow 6 = a(-2)(-5)$

$a = \frac{6}{10}$ or $\frac{3}{5}$

$\boxed{y = \frac{3}{5}(x-2)(x-5)}$

(23) $y = a(x-4)^2 + 0$

$-4 = a(-4)^2$

$-\frac{1}{4} = a$

$\boxed{y = -\frac{1}{4}(x-4)^2}$

(25) ~~$y = a(x+2)^2 + 2$~~

vertex $(-3, 2)$ $y = a(x+3)^2 + 2$

$(3, -2)$ $-2 = a(3+3)^2 + 2$

$-4 = a(36)$

$a = \frac{-4}{36}$ or $-\frac{1}{9}$

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

p 17 Continued

(27) $h(t) = \underset{a}{-4.9}t^2 + \underset{b}{225}t + \underset{c}{234}$

(b) $T = \frac{-225}{2(-4.9)} \approx 23.367$ sec

$h(23.367) = -4.9(23.367)^2 + 225(23.367) + 234$

$\approx$ 2909.561 meters

(a) $h(0) = 234$ meters

(c) ~~h(0)~~ $h(t) = 0$ use Quad 3

$T = -1$

$T = 47.735$ sec

(29) (a) $h(0) = 3$

(b) $h(x) = -\frac{1}{12}x^2 + 6x + 3$

$x = \frac{-6}{2(-\frac{1}{12})} \rightarrow \frac{-6}{-\frac{1}{6}} \rightarrow 36$

$h(36) = -\frac{1}{12}(36)^2 + 6(36) + 3$

$= 111$

(c) $h(t) = 0$ use quad 3 72.497 ft