Name_____ Class _____ Date_____

# Extra Practice

Chapter 4

### Lessons 4-1 and 4-2

**Graph each system.**

**1.** $y = 3x^2$

**2.** $y = (x + 3)^2 + 1$

**3.** $y = 2x^2 + 4$

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

**5.** $y = (x - 2)^2$

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

**Identify the vertex, axis of symmetry, minimum or maximum value, and domain and range of each function.**

**7.** $y = 4(x - 2)^2$

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

**9.** $y = -\frac{1}{2}(x - 4)^2 - 10$

**10.** $f(x) = x^2 - 4x + 5$

**11.** $f(x) = -2x^2 + 4x - 3$

**12.** $y = x^2 + 5x - 14$

**13.** A ball is dropped from the top of a building. The distance in meters above the ground $y$ of the ball after $t$ seconds can be modeled by the equation $y = -9.8t^2 + 100$.

**a.** What is the $y$-intercept of the equation?

**b.** Describe the meaning of the $y$-intercept of the graph of the equation.

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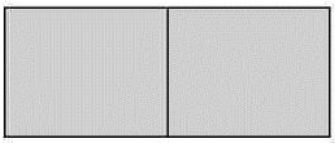
# Extra Practice (continued)

Chapter 4

**14.** Martin has 120 feet of fencing to enclose two rectangular play areas for children. He plans to enclose a rectangular area and then divide it into two equal sections, as shown in the figure.



**a.** Find the dimensions of the largest total area Martin can enclose.

**b.** Find the area of each of the small play areas.

**15.** Marnie throws a softball straight up into the air. The ball leaves her hand when it is exactly 5 ft from the ground. The height $h$ of the ball, in feet, can be written as a function of time $t$, in seconds, as $h = -16t^2 + 40t + 5$.

**a.** What is the maximum height the ball reaches?

**b.** Marnie catches the ball 5 ft from the ground. How long was the ball in the air?

## Lesson 4-3

**Find an equation in standard form of the parabola passing through the given points.**

**16.** (0, 3), (1, 2), (2, 3)

**17.** (–3, –4), (0, –4), (1, 0)

**18.** (–1, 0), (0, 3), (1, 2)

**19.** (–4, 3), (–2, –1), (2, 3)

**20.** (0, 0), (1,–3), (2, 2)

**21.** (–3, 0), (0, –3), (3, 0)

**22.** The table shows the relation between the speed of a car and its stopping distance.

| **Speed (mi/h)** | 35 | 45 | 50 | 60 |
|---|---|---|---|---|
| **Stopping Distance (ft)** | 96 | 140 | 165 | 221 |

**a.** Use a quadratic function to model the data.

**b.** Predict the stopping distance for a car traveling at 65 mi/h.

## Lesson 4-4

**Factor each expression.**

**23.** $x^2 + 3x - 54$

**24.** $x^2 + 10x + 24$

**25.** $x^2 - 36$

**26.** $x^2 - 9x - 36$

**27.** $x^2 - 15x + 56$

**28.** $25x^2 + 70x + 49$

**29.** $7x^2 - 20x - 3$

**30.** $5x^2 + 23x - 10$

**31.** $\frac{1}{4}x^2 - 4$

**32.** $x^2 - 6x - 16$

**33.** $4x^2 + 12x + 40$

**34.** $4x^2 - 6x + 9$

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# Extra Practice (continued)

Chapter 4

### Lesson 4-5

**Solve each equation by factoring, by taking square roots, or by graphing. When necessary, round your answer to the nearest hundredth.**

**35.** $x^2 + 4x - 1 = 0$ **36.** $4x^2 - 100 = 0$ **37.** $x^2 = -2x + 1$

**38.** $x^2 - 9 = 0$ **39.** $2x^2 + 4x = 70$ **40.** $x^2 - 30 = 10$

**41.** $x^2 + 4x = 0$ **42.** $x^2 + 3x + 2 = 0$ **43.** $x^2 = 8x = -16$

**44.** Hal's sister is 5 years older than Hal. The product of their ages is 456. How old are Hal and his sister?

**45.** A toy rocket is fired upward from the ground. The relation between its height $h$, in feet, and the time $t$ from launch, in seconds, can be described by the equation $h = -16t^2 + 64t$. How long does the rocket stay more than 48 feet above the ground?

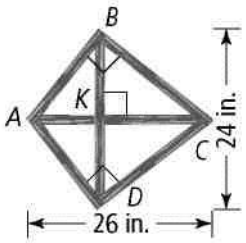
**46.** The expression $P(x) = 2500x - 2x^2$ describes the profit of a company that customizes bulldozers when it customizes $x$ bulldozers in a month.

**a.** How many bulldozers per month must the company customize to make the maximum possible profit? What is the maximum profit?

**b.** Describe a reasonable domain and range for the function $P(x)$.

**c.** For what number of bulldozers per month is the profit at least $750,000?

**47.** Flor is designing a kite with two perpendicular crosspieces that are 26 inches and 24 inches long, as shown in the figure. How long should $\overline{Ak}$ be so that $\overline{AB} \perp \overline{BC}$ and $\overline{AD} \perp \overline{DC}$?




**48.** The lengths of the sides of a right triangle are $x$, $x + 4$, and $x + 8$ inches. What is the value of $x$? What is the length of the hypotenuse of the triangle?

### Lessons 4-6 and 4-7

**Solve each equation by completing the square or using the Quadratic Formula.**

**49.** $x^2 + 5x + 8 = 4$ **50.** $2x^2 - 5x + 1 = 0$ **51.** $x^2 - 7x = 0$

**52.** $x^2 + 4x + 4 = 0$ **53.** $x^2 - 7 = 0$ **54.** $x^2 + 8x - 17 = 0$

# Extra Practice (continued)

Chapter 4

**Evaluate the discriminant of each equation. Tell how many real solutions each equation has.**

**55.** $x^2 + 4x = 17$ **56.** $2x^2 + x = -1$ **57.** $x^2 - 4x + 5 = 0$

**58.** $2x^2 + 5x = 0$ **59.** $x^2 - 19 = 1$ **60.** $3x^2 = 8x - 4$

**61.** $-2x^2 + 1 = 7x$ **62.** $4x^2 + 4x = -1$ **63.** $x^2 + 16 = 0$

**64.** The height $y$ of a parabolic arch is given by $y = -\frac{1}{16}x^2 + 40$, where $x$ is the horizontal distance from the center of the base of the arch. All distances are in feet.

**a.** What is the highest point on the arch?

**b.** How wide is the arch at the base to the nearest tenth of a foot?

**65.** An archer's arrow follows a parabolic path. The path of the arrow can be described by the equation $y = -0.005x^2 + 2x + 5$.

**a.** Describe the meaning of the $y$-intercept of the graph of the equation.

**b.** What is the horizontal distance the arrow travels before it hits the ground? Round your answer to the nearest foot.

## Lesson 4-8

**Simplify each number by using the imaginary number *i*.**

**66.** $\sqrt{-9}$ **67.** $\sqrt{-36}$ **68.** $\sqrt{-80}$

**69.** $\sqrt{-289}$ **70.** $\sqrt{-175}$ **71.** $\sqrt{-117}$

**Simplify each expression.**

**72.** $(3 - i) + (5 - 2i)$ **73.** $(4 + 2i)(1 - i)$ **74.** $(4 + 2i) - (3 + 5i)$

**75.** $(8 - 3i)(6 + 9i)$ **76.** $(2 + 5i) - (-6 + i)$ **77.** $(-2 - 3i)(7 - i)$

**Solve each equation. Check your answers.**

**78.** $x^2 + 16 = 0$ **79.** $3x^2 = x - 9$ **80.** $x^2 + 10 = 4x - 2$

## Lesson 4-9

**Solve each system.**

**81.** $\begin{cases} y = x^2 - 11x + 24 \\ y = x - 3 \end{cases}$ **82.** $\begin{cases} y = x^2 + 2x - 8 \\ y = x + 4 \end{cases}$ **83.** $\begin{cases} y = 2x^2 + 9x - 5 \\ y = x + 5 \end{cases}$

**84.** $\begin{cases} y = x^2 - 3x - 7 \\ y = -x^2 - x + 5 \end{cases}$ **85.** $\begin{cases} y = 2x^2 + x + 4 \\ y = -x^2 - x + 9 \end{cases}$ **86.** $\begin{cases} y = x^2 - 2x - 1 \\ y = \frac{3}{4}x^2 + x - 6 \end{cases}$