

CHAPTER 10

Think & Discuss (p. 587)

1. a parabola

$$2. y = \frac{x^2}{1040} = \frac{(32.5)^2}{1040} = \frac{1056.25}{1040} = 1.015 \approx 1.02 \text{ cm}$$

Substitute the radius (32.5 cm) for x in the equation and solve for y .

Skill Review (p. 588)

1. $(0, 4), m = 2$

$$y - 4 = 2(x - 0)$$

$$y - 4 = 2x$$

$$y = 2x + 4$$

2. $(2, -2), m = \frac{1}{3}$

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

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

$$y = \frac{1}{3}x - \frac{8}{3}$$

3. $(-4, 1), m = -\frac{3}{4}$

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

$$y - 1 = -\frac{3}{4}x - 3$$

$$y = -\frac{3}{4}x - 2$$

4. $x + 2y = 8$

$$3x - y = 3$$

$$x + 2y = 8$$

$$6x - 2y = 6$$

$$7x = 14$$

$$x = 2$$

$$x + 2y = 8$$

$$2 + 2y = 8$$

$$2y = 6$$

$$y = 3$$

$$(2, 3)$$

5. $2x + y = 3$

$$3x + y = 2$$

$$-2x - y = -3$$

$$3x + y = 2$$

$$x = -1$$

$$2x + y = 3$$

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

$$-2 + y = 3$$

$$y = 5$$

$$(-1, 5)$$

6. $4x - y = 7$

$$5x - 2y = 2$$

$$-8x + 2y = -14$$

$$5x - 2y = 2$$

$$-3x = -12$$

$$x = 4$$

$$4x - y = 7$$

$$4(4) - y = 7$$

$$16 - y = 7$$

$$-y = -9$$

$$y = 9$$

$$(4, 9)$$

7. $y = x^2 + 4$

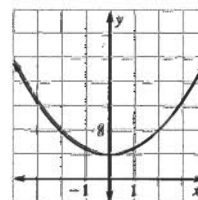
x	0	1	-1	2	-2
y	4	5	5	8	8

$$\frac{-b}{2a} = \frac{0}{1} = 0$$

$$y = 1(0)^2 + 4 = 4$$

$$\text{vertex} = (0, 4)$$

$$\text{axis of symmetry } x = 0$$



8. $y = -3x^2$

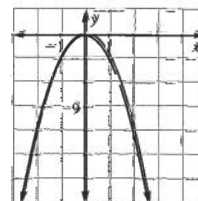
x	0	1	-1	2	-2
y	0	-3	-3	-12	-12

$$\frac{-b}{2a} = \frac{0}{2(-3)} = \frac{0}{-6} = 0$$

$$y = -3(0)^2 = 0$$

$$\text{vertex} = (0, 0)$$

$$\text{axis of symmetry } x = 0$$



9. $y = 2(x - 3)^2 - 1$

$$= 2[(x - 3)(x - 3)] - 1$$

$$= 2[x^2 - 6x + 9] - 1$$

$$= 2x^2 - 12x + 18 - 1$$

$$= 2x^2 - 12x + 17$$

x	3	2	4	1	5
y	-1	1	1	7	7

$$\frac{-b}{2a} = \frac{12}{2(2)} = \frac{12}{4} = 3$$

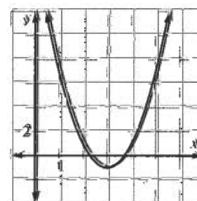
$$y = 2(3)^2 - 12(3) + 17$$

$$= 18 - 36 + 17$$

$$= -1$$

$$\text{vertex} (3, -1)$$

$$\text{axis of symmetry } x = 3$$



Chapter 10 continued

10. $x^2 + 8x + 14 = 0$

$$x^2 + 8x = -14$$

$$x^2 + 8x + (4)^2 = -14 + 16$$

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

$$x + 4 = \sqrt{2}$$

$$x = -4 \pm \sqrt{2}$$

11. $5x^2 + 15x = -25$

$$x^2 + 3x = -5$$

$$x^2 + 3x + \left(\frac{3}{2}\right)^2 = -5 + \frac{9}{4}$$

$$\left(x + \frac{3}{2}\right)^2 = -\frac{11}{4}$$

$$x + \frac{3}{2} = \pm \frac{i\sqrt{11}}{2}$$

$$x = -\frac{3}{2} \pm \frac{i\sqrt{11}}{2}$$

12. $x^2 - 2x = -8x + 14$

$$x^2 + 6x = 14$$

$$x^2 + 6x + (3)^2 = 14 + 9$$

$$(x + 3)^2 = 23$$

$$x + 3 = \pm\sqrt{23}$$

$$x = -3 \pm \sqrt{23}$$

Lesson 10.1

10.1 Guided Practice (pp. 592–594)

1. distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$;

midpoint formula: $M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

2. let $(x_1, y_1) = (3, -1)$ and $(x_2, y_2) = (-2, 5)$

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(-2 - 3)^2 + [5 - (-1)]^2} \\ &= \sqrt{(-5)^2 + (6)^2} \\ &= \sqrt{25 + 36} \\ &= \sqrt{61} \approx 7.81 \end{aligned}$$

$d = \sqrt{61}$ for each. The differences are opposite the first pair of differences. Since they are squared, the answer is the same.

3. a. $d = \sqrt{(x - 0)^2 + (y - 0)^2}$
 $d = \sqrt{x^2 + y^2}$

b. $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right) = \left(\frac{0 + x}{2}, \frac{0 + y}{2}\right) = \left(\frac{x}{2}, \frac{y}{2}\right)$

4. $(2, -1), (2, 3)$

$$d = \sqrt{(2 - 2)^2 + [3 - (-1)]^2} = \sqrt{4^2} = 4$$

5. $(-5, -2), (0, -2)$

$$d = \sqrt{[0 - (-5)]^2 + [-2 - (-2)]^2} = \sqrt{5^2} = 5$$

6. $(0, 6), (4, 9)$

$$\begin{aligned} d &= \sqrt{(4 - 0)^2 + (9 - 6)^2} = \sqrt{16 + 9} \\ &= \sqrt{25} = 5 \end{aligned}$$

7. $(10, -2), (7, 4)$

$$\begin{aligned} d &= \sqrt{(7 - 10)^2 + [(4 - (-2))]^2} = \sqrt{9 + 36} \\ &= \sqrt{45} = 3\sqrt{5} \approx 6.71 \end{aligned}$$

8. $(-3, 8), (5, 6)$

$$\begin{aligned} d &= \sqrt{[5 - (-3)]^2 + (6 - 8)^2} = \sqrt{64 + 4} \\ &= \sqrt{68} = 2\sqrt{17} \approx 8.25 \end{aligned}$$

9. $(6, -1), (-9, 8)$

$$\begin{aligned} d &= \sqrt{(-9 - 6)^2 + [8 - (-1)]^2} = \sqrt{225 + 81} \\ &= \sqrt{306} = 3\sqrt{34} \approx 17.49 \end{aligned}$$

10. $(0, 0), (-8, 14)$

$$\left(\frac{0 - 8}{2}, \frac{0 + 14}{2}\right) = \left(\frac{-8}{2}, \frac{14}{2}\right) = (-4, 7)$$

11. $(0, 3), (4, 9)$

$$\left(\frac{0 + 4}{2}, \frac{3 + 9}{2}\right) = \left(\frac{4}{2}, \frac{12}{2}\right) = (2, 6)$$

12. $(1, -2), (1, 6)$

$$\left(\frac{1 + 1}{2}, \frac{-2 + 6}{2}\right) = \left(\frac{2}{2}, \frac{4}{2}\right) = (1, 2)$$

13. $(1, 3), (3, 11)$

$$\left(\frac{1 + 3}{2}, \frac{3 + 11}{2}\right) = \left(\frac{4}{2}, \frac{14}{2}\right) = (2, 7)$$

14. $(-5, 4), (2, -4)$

$$\left(\frac{-5 + 2}{2}, \frac{4 - 4}{2}\right) = \left(\frac{-3}{2}, \frac{0}{2}\right) = \left(-\frac{3}{2}, 0\right)$$

15. $(-1, 5), (-8, -6)$

$$\left(\frac{-1 - 8}{2}, \frac{5 - 6}{2}\right) = \left(\frac{-9}{2}, \frac{-1}{2}\right) = \left(-\frac{9}{2}, -\frac{1}{2}\right)$$

16.

a.

$(-3, 2), (2, 6)$

$$\left(\frac{-3 + 2}{2}, \frac{2 + 6}{2}\right) = \left(\frac{-1}{2}, \frac{8}{2}\right) = \left(-\frac{1}{2}, 4\right)$$

b.

$$d = \sqrt{[0 - (-3)]^2 + (0 - 2)^2} = \sqrt{9 + 4} = \sqrt{13}$$

$$d = \sqrt{[-3 - (-0.5)]^2 + (2 - 4)^2} = \sqrt{6.25 + 4} = \sqrt{10.25}$$

$$\text{day 1} = \sqrt{13} + \sqrt{10.25} \approx 6.81 \text{ mi}$$

$$d = \sqrt{[2 - (-0.5)]^2 + (6 - 4)^2} = \sqrt{6.25 + 4} = \sqrt{10.25}$$

$$d = \sqrt{[(2 - 0)]^2 + (6 - 0)^2} = \sqrt{4 + 36} = \sqrt{40}$$

$$\text{day 2} = \sqrt{10.25} + \sqrt{40} \approx 9.53 \text{ mi}$$

Chapter 10 continued

—CONTINUED—

10.1 Practice and Applications (pp. 592–594)

17. (0, 0), (3, 4)

$$d = \sqrt{(3-0)^2 + (4-0)^2} = \sqrt{9+16} = \sqrt{25} = 5$$

$$\left(\frac{0+3}{2}, \frac{0+4}{2}\right) = \left(\frac{3}{2}, 2\right)$$

18. (0, 0), (4, 12)

$$d = \sqrt{(4-0)^2 + (12-0)^2} = \sqrt{16+144} = \sqrt{160}$$

$$= 4\sqrt{10} \approx 12.65$$

$$\left(\frac{0+4}{2}, \frac{0+12}{2}\right) = (2, 6)$$

19. (0, 4), (8, -3)

$$d = \sqrt{(8-0)^2 + (-3-4)^2}$$

$$= \sqrt{64+49}$$

$$= \sqrt{113} \approx 10.63$$

$$\left(\frac{0+8}{2}, \frac{4-3}{2}\right) = \left(4, \frac{1}{2}\right)$$

20. (-2, 8), (6, 0)

$$d = \sqrt{(6+2)^2 + (0-8)^2}$$

$$= \sqrt{64+64}$$

$$= \sqrt{128} = 8\sqrt{2} \approx 11.31$$

$$\left(\frac{-2+6}{2}, \frac{8+0}{2}\right) = (2, 4)$$

21. (-3, -1), (7, 4)

$$d = \sqrt{(7+3)^2 + (4+1)^2}$$

$$= \sqrt{100+25}$$

$$= \sqrt{125} = 5\sqrt{5} \approx 11.18$$

$$\left(\frac{-3+7}{2}, \frac{-1+4}{2}\right) = \left(2, \frac{3}{2}\right)$$

22. (9, -2), (3, 6)

$$d = \sqrt{(3-9)^2 + (6+2)^2}$$

$$= \sqrt{36+64}$$

$$= \sqrt{100} = 10$$

$$\left(\frac{9+3}{2}, \frac{-2+6}{2}\right) = (6, 2)$$

23. (-5, -8), (1, 6)

$$d = \sqrt{(1+5)^2 + (6+8)^2}$$

$$= \sqrt{36+196}$$

$$= \sqrt{232} = 2\sqrt{58} \approx 15.23$$

$$\left(\frac{-5+1}{2}, \frac{-8+6}{2}\right) = (-2, -1)$$

24. (-2, 10), (10, -2)

$$d = \sqrt{(10+2)^2 + (-2-10)^2}$$

$$= \sqrt{144+144}$$

$$= \sqrt{288} = 12\sqrt{2} \approx 16.97$$

$$\left(\frac{-2+10}{2}, \frac{10-2}{2}\right) = (4, 4)$$

25. (8, 3), (2, -1)

$$d = \sqrt{(2-8)^2 + (-1-3)^2}$$

$$= \sqrt{36+16}$$

$$= \sqrt{52} = 2\sqrt{13} \approx 7.21$$

$$\left(\frac{8+2}{2}, \frac{3-1}{2}\right) = (5, 1)$$

26. (-10, -15), (12, 18)

$$d = \sqrt{(12+10)^2 + (18+15)^2}$$

$$= \sqrt{(22)^2 + (33)^2}$$

$$= \sqrt{484+1089}$$

$$= \sqrt{1573}$$

$$= 11\sqrt{13} \approx 39.66$$

$$\left(\frac{-10+12}{2}, \frac{-15+18}{2}\right) = \left(1, \frac{3}{2}\right)$$

27. (-3.5, 1.2), (6, -3.8)

$$d = \sqrt{(6+3.5)^2 + (-3.8-1.2)^2}$$

$$= \sqrt{(9.5)^2 + (-5.0)^2}$$

$$= \sqrt{90.25+25}$$

$$= \sqrt{115.25} \approx 10.74$$

$$\left(\frac{-3.5+6}{2}, \frac{1.2-3.8}{2}\right) = \left(\frac{2.5}{2}, \frac{-2.6}{2}\right) = (1.25, -1.3)$$

28. (6.3, -9), (1.3, -8.5)

$$d = \sqrt{(1.3-6.3)^2 + (-8.5+9)^2}$$

$$= \sqrt{(5)^2 + (0.5)^2}$$

$$= \sqrt{25+0.25} = \sqrt{25.25} \approx 5.02$$

$$\left(\frac{6.3+1.3}{2}, \frac{-9-8.5}{2}\right) = \left(\frac{7.6}{2}, \frac{-17.5}{2}\right) = (3.8, -8.75)$$

Chapter 10 continued

29. $(-7, 2), \left(-\frac{11}{2}, 4\right)$

$$\begin{aligned} d &= \sqrt{\left(-\frac{11}{2} + 7\right)^2 + (4 - 2)^2} \\ &= \sqrt{\left(\frac{3}{2}\right)^2 + (2)^2} \\ &= \sqrt{\frac{9}{4} + \frac{16}{4}} \\ &= \frac{\sqrt{25}}{\sqrt{4}} = \frac{5}{2} = 2.5 \end{aligned}$$

$$\left(\frac{-7 - \frac{11}{2}}{2}, \frac{2 + 4}{2}\right) = \left(\frac{-\frac{25}{2}}{2}, \frac{6}{2}\right) = \left(\frac{-25}{4}, 3\right) = (-6.25, 3)$$

30. $\left(\frac{2}{3}, -\frac{11}{4}\right), \left(-\frac{7}{2}, -\frac{11}{2}\right)$

$$\begin{aligned} d &= \sqrt{\left(-\frac{7}{2} - \frac{2}{3}\right)^2 + \left(-\frac{11}{2} + \frac{11}{4}\right)^2} \\ &= \sqrt{\left(-\frac{21}{6} - \frac{4}{6}\right)^2 + \left(-\frac{22}{4} + \frac{11}{4}\right)^2} \\ &= \sqrt{\left(-\frac{25}{6}\right)^2 + \left(-\frac{11}{4}\right)^2} = \sqrt{\frac{625}{36} + \frac{121}{16}} \\ &= \sqrt{\frac{2500}{144} + \frac{1089}{144}} = \sqrt{\frac{3589}{144}} \approx 4.99 \end{aligned}$$

$$\begin{aligned} &\left(\frac{\frac{2}{3} - \frac{7}{2}}{2}, \frac{-\frac{11}{4} - \frac{11}{2}}{2}\right) \\ &= \left(\frac{\frac{4}{6} - \frac{21}{6}}{2}, \frac{-\frac{11}{4} - \frac{22}{4}}{2}\right) \\ &= \left[\frac{-17}{6}\left(\frac{1}{2}\right), \frac{-33}{4}\left(\frac{1}{2}\right)\right] = \left(-\frac{17}{12}, -\frac{33}{8}\right) \end{aligned}$$

31. $\left(-\frac{3}{4}, 2\right), \left(5, -\frac{7}{4}\right)$

$$\begin{aligned} d &= \sqrt{\left(5 + \frac{3}{4}\right)^2 + \left(-\frac{7}{4} - 2\right)^2} \\ &= \sqrt{\left(\frac{20}{4} + \frac{3}{4}\right)^2 + \left[-\frac{7}{4} + \left(-\frac{8}{4}\right)\right]^2} \\ &= \sqrt{\left(\frac{23}{4}\right)^2 + \left(-\frac{15}{4}\right)^2} \\ &= \sqrt{\frac{529}{16} + \frac{225}{16}} \\ &= \sqrt{\frac{754}{16}} \\ &= \frac{\sqrt{754}}{4} \approx 6.86 \end{aligned}$$

$$\begin{aligned} &\left(\frac{-\frac{3}{4} + 5}{2}, \frac{2 - \frac{7}{4}}{2}\right) \\ &= \left(\frac{-\frac{3}{4} + \frac{20}{4}}{2}, \frac{\frac{8}{4} - \frac{7}{4}}{2}\right) = \left[\frac{17}{4}\left(\frac{1}{2}\right), \frac{1}{4}\left(\frac{1}{2}\right)\right] = \left(\frac{17}{8}, \frac{1}{8}\right) \end{aligned}$$

32. $(2, 0), (0, 8), (-2, 0)$

$$\begin{aligned} d_1 &= \sqrt{(0 - 2)^2 + (8 - 0)^2} = \sqrt{4 + 64} = \sqrt{68} \\ &= 2\sqrt{17} \approx 8.25 \end{aligned}$$

$$\begin{aligned} d_2 &= \sqrt{(-2 - 0)^2 + (0 - 8)^2} = \sqrt{4 + 64} = \sqrt{68} \\ &= 2\sqrt{17} \approx 8.25 \end{aligned}$$

$$d_3 = \sqrt{(-2 - 2)^2 + (0 - 0)^2} = \sqrt{16 + 0} = \sqrt{16} = 4$$

$d_1 = d_2$, isosceles

33. $(4, 1), (1, -2), (6, -4)$

$$\begin{aligned} d_1 &= \sqrt{(1 - 4)^2 + (-2 - 1)^2} = \sqrt{9 + 9} \\ &= \sqrt{18} \approx 4.243 \end{aligned}$$

$$\begin{aligned} d_2 &= \sqrt{(6 - 1)^2 + (-4 + 2)^2} = \sqrt{25 + 4} \\ &= \sqrt{29} \approx 5.385 \end{aligned}$$

$$\begin{aligned} d_3 &= \sqrt{(6 - 4)^2 + (-4 - 1)^2} = \sqrt{4 + 25} \\ &= \sqrt{29} \approx 5.385 \end{aligned}$$

$d_2 = d_3$, isosceles

34. $(1, 9), (-4, 2), (4, 2)$

$$\begin{aligned} d_1 &= \sqrt{(-4 - 1)^2 + (2 - 9)^2} = \sqrt{25 + 49} \\ &= \sqrt{74} \approx 8.602 \end{aligned}$$

$$d_2 = \sqrt{(4 + 4)^2 + (2 - 2)^2} = \sqrt{64} = 8$$

$$\begin{aligned} d_3 &= \sqrt{(4 - 1)^2 + (2 - 9)^2} = \sqrt{9 + 49} \\ &= \sqrt{58} \approx 7.616 \end{aligned}$$

$d_1 \neq d_2 \neq d_3$, scalene

35. $(2, 5), (8, 2), (4, -1)$

$$\begin{aligned} d_1 &= \sqrt{(8 - 2)^2 + (2 - 5)^2} = \sqrt{36 + 9} \\ &= \sqrt{45} \approx 6.708 \end{aligned}$$

$$\begin{aligned} d_2 &= \sqrt{(4 - 8)^2 + (-1 - 2)^2} = \sqrt{16 + 9} \\ &= \sqrt{25} = 5 \end{aligned}$$

$$\begin{aligned} d_3 &= \sqrt{(4 - 2)^2 + (-1 - 5)^2} = \sqrt{4 + 36} \\ &= \sqrt{40} \approx 6.325 \end{aligned}$$

$d_1 \neq d_2 \neq d_3$, scalene

36. $(5, -1), (-4, 0), (3, 5)$

$$\begin{aligned} d_1 &= \sqrt{(-4 - 5)^2 + (0 + 1)^2} = \sqrt{81 + 1} \\ &= \sqrt{82} \approx 9.055 \end{aligned}$$

$$\begin{aligned} d_2 &= \sqrt{(3 + 4)^2 + (5 - 0)^2} = \sqrt{49 + 25} \\ &= \sqrt{74} \approx 8.602 \end{aligned}$$

$$\begin{aligned} d_3 &= \sqrt{(3 - 5)^2 + (5 + 1)^2} = \sqrt{4 + 36} \\ &= \sqrt{40} \approx 6.325 \end{aligned}$$

$d_1 \neq d_2 \neq d_3$, scalene

Chapter 10 continued

37. (4, 4), (8, 1), (6, -5)

$$d_1 = \sqrt{(8-4)^2 + (1-4)^2} = \sqrt{16+9}$$

$$= \sqrt{25} = 5$$

$$d_2 = \sqrt{(6-8)^2 + (-5-1)^2} = \sqrt{4+36}$$

$$= \sqrt{40} \approx 6.325$$

$$d_3 = \sqrt{(6-4)^2 + (-5-4)^2} = \sqrt{4+81}$$

$$= \sqrt{85} \approx 9.220$$

$d_1 \neq d_2 \neq d_3$, scalene

38. (0, -3), (3, 5), (-5, 2)

$$d_1 = \sqrt{(3-0)^2 + (5+3)^2} = \sqrt{9+64}$$

$$= \sqrt{73} \approx 8.544$$

$$d_2 = \sqrt{(-5-3)^2 + (2-5)^2} = \sqrt{64+9}$$

$$= \sqrt{73} \approx 8.544$$

$$d_3 = \sqrt{(-5-0)^2 + (2+3)^2} = \sqrt{25+25}$$

$$= \sqrt{50} \approx 7.071$$

$d_1 = d_2$, isosceles

39. (1, 1), (-4, 0), (-2, 5)

$$d_1 = \sqrt{(-4-1)^2 + (0-1)^2} = \sqrt{25+1}$$

$$= \sqrt{26} \approx 5.099$$

$$d_2 = \sqrt{(-2+4)^2 + (5-0)^2} = \sqrt{4+25}$$

$$= \sqrt{29} \approx 5.385$$

$$d_3 = \sqrt{(-2-1)^2 + (5-1)^2} = \sqrt{9+16}$$

$$= \sqrt{25} = 5$$

$d_1 \neq d_2 \neq d_3$, scalene

40. (2, 4), (3, -2), (-1, 1)

$$d_1 = \sqrt{(3-2)^2 + (-2-4)^2} = \sqrt{1+36}$$

$$= \sqrt{37} \approx 6.083$$

$$d_2 = \sqrt{(-1-3)^2 + (1+2)^2} = \sqrt{16+9}$$

$$= \sqrt{25} = 5$$

$$d_3 = \sqrt{(-1-2)^2 + (1-4)^2} = \sqrt{9+9}$$

$$= \sqrt{18} \approx 4.243$$

$d_1 \neq d_2 \neq d_3$, scalene

41. (2, 2), (6, 14)

$$\left(\frac{2+6}{2}, \frac{2+14}{2}\right) = (4, 8)$$

$$m = \frac{14-2}{6-2} = \frac{12}{4} = 3$$

$$\text{slope} = -\frac{1}{3}$$

$$y - 8 = -\frac{1}{3}(x - 4)$$

$$y - 8 = -\frac{1}{3}x + \frac{4}{3}$$

$$y = -\frac{1}{3}x + \frac{28}{3}$$

42. (0, 0), (-8, -10)

$$\left(\frac{0-8}{2}, \frac{0-10}{2}\right) = (-4, -5)$$

$$m = \frac{-10-0}{-8-0} = \frac{5}{4}$$

$$\text{slope} = -\frac{4}{5}$$

$$y + 5 = -\frac{4}{5}(x + 4)$$

$$y + 5 = -\frac{4}{5}x - \frac{16}{5}$$

$$y = -\frac{4}{5}x - \frac{41}{5}$$

43. (0, -6), (-4, 9)

$$\left(\frac{0-4}{2}, \frac{-6+9}{2}\right) = \left(-2, \frac{3}{2}\right)$$

$$m = \frac{9+6}{-4-0} = -\frac{15}{4}$$

$$\text{slope} = \frac{4}{15}$$

$$y - \frac{3}{2} = \frac{4}{15}(x + 2)$$

$$y - \frac{3}{2} = \frac{4}{15}x + \frac{8}{15}$$

$$y = \frac{4}{15}x + \frac{61}{30}$$

44. (3, -7), (-3, 1)

$$\left(\frac{3-3}{2}, \frac{-7+1}{2}\right) = (0, -3)$$

$$m = \frac{1+7}{-3-3} = -\frac{8}{6} = -\frac{4}{3}$$

$$\text{slope} = \frac{3}{4}$$

$$y + 3 = \frac{3}{4}(x - 0)$$

$$y + 3 = \frac{3}{4}x$$

$$y = \frac{3}{4}x - 3$$

45. (-3, -7.2), (-4.2, 1.8)

$$\left(\frac{-3-4.2}{2}, \frac{-7.2+1.8}{2}\right) = \left(\frac{-7.2}{2}, \frac{-5.4}{2}\right)$$

$$= (-3.6, -2.7)$$

$$m = \frac{1.8+7.2}{-4.2+3} = -\frac{9}{1.2}$$

$$\text{slope} = \frac{1.2}{9} = \frac{12}{90} = \frac{2}{15}$$

$$y + 2.7 = \frac{2}{15}(x + 3.6)$$

$$y + 2.7 = \frac{2}{15}x + 0.48$$

$$y = \frac{2}{15}x - 2.22$$

Chapter 10 continued

46. $\left(\frac{3}{2}, -6\right), (-3, 1)$

$$\left[\frac{\frac{3}{2} + (-3)}{2}, \frac{-6 + 1}{2}\right] = \left(-\frac{3}{4}, -\frac{5}{2}\right)$$

$$m = \frac{1 + 6}{-3 - \frac{3}{2}} = \frac{7}{-\frac{6}{2} - \frac{3}{2}} = \frac{7}{-\frac{9}{2}} = \frac{7}{1} \cdot \left(-\frac{2}{9}\right) = -\frac{14}{9}$$

$$\text{slope} = \frac{9}{14}$$

$$y + \frac{5}{2} = \frac{9}{14}\left(x + \frac{3}{4}\right)$$

$$y + \frac{5}{2} = \frac{9}{14}x + \frac{27}{56}$$

$$y = \frac{9}{14}x - \frac{113}{56}$$

47. $(0, 1), (x, 4); d = \sqrt{34}$

$$\sqrt{34} = \sqrt{(x-0)^2 + (4-1)^2}$$

$$\sqrt{34} = \sqrt{(x)^2 + 9}$$

$$(\sqrt{34})^2 = (\sqrt{(x)^2 + 9})^2$$

$$34 = x^2 + 9$$

$$x^2 = 34 - 9 = 25$$

$$x = \pm 5$$

48. $(1, 3), (-6, x); d = \sqrt{74}$

$$\sqrt{74} = \sqrt{(-6-1)^2 + (x-3)^2}$$

$$\sqrt{74} = \sqrt{49 + (x-3)^2}$$

$$(\sqrt{74})^2 = [\sqrt{49 + (x-3)^2}]^2$$

$$74 = 49 + (x-3)^2$$

$$(x-3)^2 = 25$$

$$x^2 - 6x - 16 = 0$$

$$(x-8)(x+2) = 0$$

$$x-8 = 0 \quad x+2 = 0$$

$$x = 8 \quad x = -2$$

49. $(x, -10), (-8, 4); d = 7\sqrt{5}$

$$7\sqrt{5} = \sqrt{(-8-x)^2 + (4+10)^2}$$

$$7\sqrt{5} = \sqrt{(-8-x)^2 + 196}$$

$$(7\sqrt{5})^2 = [\sqrt{(-8-x)^2 + 196}]^2$$

$$49(5) = (-8-x)^2 + 196$$

$$245 = (-8-x)^2 + 196$$

$$49 = 64 + 16x + x^2$$

$$x^2 + 16x + 15 = 0$$

$$(x+15)(x+1) = 0$$

$$x+15 = 0 \quad x+1 = 0$$

$$x = -15 \quad x = -1$$

50. $(0.5, x), (7, 2); d = 8.5$

$$8.5 = \sqrt{(7-0.5)^2 + (2-x)^2}$$

$$8.5 = \sqrt{42.25 + (2-x)^2}$$

$$(8.5)^2 = [\sqrt{42.25 + (2-x)^2}]^2$$

$$72.25 = 42.25 + (2-x)^2$$

$$30 = 4 - 4x + x^2$$

$$x^2 - 4x - 26 = 0$$

$$x^2 - 4x + 4 = 26 + 4$$

$$(x-2)^2 = 30$$

$$x-2 = \pm\sqrt{30}$$

$$x = 2 \pm \sqrt{30}$$

51. $(0, 0), (25, 35)$

$$\left(\frac{0+25}{2}, \frac{0+35}{2}\right) = \left(\frac{25}{2}, \frac{35}{2}\right)$$

$$(50, 0), (25, 35)$$

$$\left(\frac{50+25}{2}, \frac{0+35}{2}\right) = \left(\frac{75}{2}, \frac{35}{2}\right)$$

$$\left(\frac{25}{2}, \frac{35}{2}\right); \left(\frac{75}{2}, \frac{35}{2}\right)$$

52. $d = \sqrt{\left(\frac{75}{2} - \frac{25}{2}\right)^2 + \left(\frac{35}{2} - \frac{35}{2}\right)^2}$

$$= \sqrt{\left(\frac{50}{2}\right)^2} = \sqrt{625} = 25$$

53. $(1, 0), (19, 6)$

$$d = \sqrt{(19-1)^2 + (6-0)^2} = \sqrt{(18)^2 + (6)^2}$$

$$= \sqrt{324 + 36} = \sqrt{360} \approx 18.97 \text{ miles}$$

54. $(1, 0), (6, -9)$

$$d = \sqrt{(6-1)^2 + (-9-0)^2} = \sqrt{25 + 81}$$

$$= \sqrt{106} \approx 10.30 \text{ miles}$$

55. $(1, 0), (-6, -9)$

$$d = \sqrt{(-6-1)^2 + (-9-0)^2} = \sqrt{49 + 81}$$

$$d = \sqrt{130} \approx 11.40 \text{ miles}$$

56. $(1, 0), (-14, 1)$

$$d = \sqrt{(-14-1)^2 + (1-0)^2} = \sqrt{225 + 1}$$

$$= \sqrt{226} \approx 15.03 \text{ miles}$$

Chapter 10 continued

57. $(-10, 1), (0, 0)$

$$\left(\frac{-10+0}{2}, \frac{1+0}{2}\right) = \left(-5, \frac{1}{2}\right)$$

$$m = \frac{0-1}{0+10} = -\frac{1}{10}$$

slope = 10

$$y - \frac{1}{2} = 10(x + 5)$$

$$y - \frac{1}{2} = 10x + 50$$

$$y = 10x + 50.5$$

$(16, 2), (0, 0)$

$$\left(\frac{16+0}{2}, \frac{2+0}{2}\right) = (8, 1)$$

$$m = \frac{0-2}{0-16} = \frac{1}{8}$$

slope = -8

$$y - 1 = -8(x - 8)$$

$$y - 1 = -8x + 64$$

$$y = -8x + 65$$

$$-8x + 65 = 10x + 50.5$$

$$14.5 = 18x$$

$$0.806 = x$$

$$y = 10(0.806) + 50.5$$

$$= 58.56$$

$C(0.806, 58.56)$

$$r = \sqrt{(0.806 - 0)^2 + (58.56 - 0)^2} = \sqrt{0.65 + 3429.27}$$

$$= \sqrt{3429.92} \approx 58.57 \text{ m}$$

$$v = \sqrt{ar} = \sqrt{6.86(58.57)} = \sqrt{401.79}$$

$$\approx 20 \text{ meters per second}$$

58. $(1, 127), (2, 120)$

$$d = \sqrt{(2-1)^2 + (120-127)^2}$$

$$= \sqrt{1+49} = \sqrt{50} \approx 7.07$$

$(1, 127), (5, 127)$

$$d = \sqrt{(5-1)^2 + (127-127)^2}$$

$$= \sqrt{16+0} = \sqrt{16} = 4$$

$(1, 127), (1, 140)$

$$d = \sqrt{(1-1)^2 + (140-127)^2}$$

$$= \sqrt{(13)^2} = 13$$

—CONTINUED—

58. —CONTINUED—

$(1, 127), (7, 115)$

$$d = \sqrt{(7-1)^2 + (115-127)^2}$$

$$= \sqrt{36+144} = \sqrt{180} \approx 13.42$$

$(1, 127), (3, 112)$

$$d = \sqrt{(3-1)^2 + (112-127)^2}$$

$$= \sqrt{4+225} = \sqrt{229} \approx 15.13$$

$(1, 127), (4, 125)$

$$d = \sqrt{(4-1)^2 + (125-127)^2}$$

$$= \sqrt{9+4} = \sqrt{13} \approx 3.61$$

$(1, 127), (1, 130)$

$$d = \sqrt{(1-1)^2 + (130-127)^2} = \sqrt{0+9} = \sqrt{9} = 3$$

59. $(0, 7), (1, -1)$

$$d = \sqrt{(1-0)^2 + (-1-7)^2}$$

$$= \sqrt{1+64} = \sqrt{65} \approx 8.06$$

$(9, 2), (3, 8)$

$$d = \sqrt{(3-9)^2 + (8-2)^2}$$

$$= \sqrt{36+36} = \sqrt{72} \approx 8.49$$

$$8.06 < 8.49 \text{ B}$$

60. $(-5, -2), (5, 2)$

$$d = \sqrt{(5+5)^2 + (2+2)^2}$$

$$= \sqrt{100+16} = \sqrt{116} \approx 10.77$$

$(-5, 5), (2, -2)$

$$d = \sqrt{(2+5)^2 + (-2-5)^2}$$

$$= \sqrt{49+49} = \sqrt{98} \approx 9.9$$

$$10.77 > 9.9 \text{ A}$$

61. $(-3, 0), (2, -4)$

$$d = \sqrt{(2+3)^2 + (-4-0)^2}$$

$$= \sqrt{25+16} = \sqrt{41} \approx 6.4$$

$(7, 6), (1, 5)$

$$d = \sqrt{(1-7)^2 + (5-6)^2}$$

$$= \sqrt{36+1} = \sqrt{37} \approx 6.08$$

$$6.4 > 6.08 \text{ A}$$

62. $(2, -5), (1, 6)$

$$d = \sqrt{(1-2)^2 + (6+5)^2}$$

$$= \sqrt{1+121} = \sqrt{122} \approx 11.05$$

$(0, 8), (6, 0)$

$$d = \sqrt{(6-0)^2 + (0-8)^2}$$

$$= \sqrt{36+64} = \sqrt{100} = 10$$

$$11.05 > 10 \text{ A}$$

Chapter 10 continued

63. a. $y = k$ horizontal line $(x, y) \rightarrow (x, k), (x, y)$

$$d = \sqrt{(x-x)^2 + (y-k)^2} = \sqrt{0 + (y-k)^2}$$

$$= \sqrt{(y-k)^2} = |y-k|$$

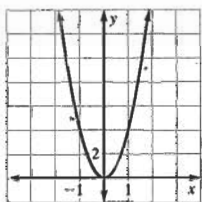
b. $x = h$ vertical line $(x, y) \rightarrow (h, y), (x, y)$

$$d = \sqrt{(x-h)^2 + (y-y)^2} = \sqrt{(x-h)^2} = |x-h|$$

10.1 Mixed Review (p. 594)

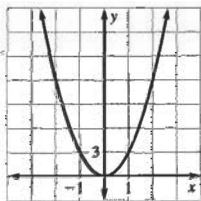
64. $y = 4x^2$

x	y
0	0
1	4
-1	4



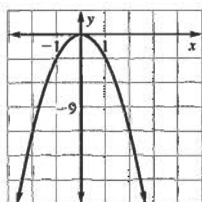
65. $y = 3x^2$

x	y
0	0
1	3
-1	3



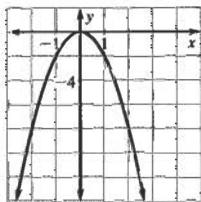
66. $y = -3x^2$

x	y
0	0
1	-3
-1	-3



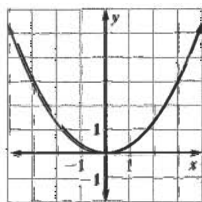
67. $y = -2x^2$

x	y
0	0
1	-2
-1	-2



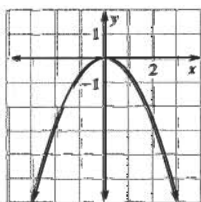
68. $y = \frac{1}{3}x^2$

x	y
0	0
1	$\frac{1}{3}$
-1	$\frac{1}{3}$



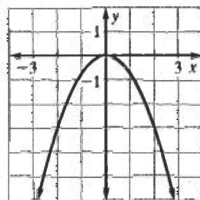
69. $y = -\frac{2}{3}x^2$

x	y
0	0
1	$-\frac{2}{3}$
-1	$-\frac{2}{3}$



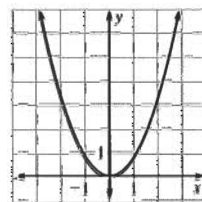
70. $y = -\frac{3}{4}x^2$

x	y
0	0
1	$-\frac{3}{4}$
-1	$-\frac{3}{4}$



71. $y = \frac{5}{6}x^2$

x	y
0	0
1	$\frac{5}{6}$
-1	$\frac{5}{6}$



72. $x^{2/3} + 13 = 17$

$$x^{2/3} = 4$$

$$\sqrt[3]{x^2} = 4$$

$$(\sqrt[3]{x^2})^3 = (4)^3$$

$$x^2 = 64$$

$$x = \pm 8$$

73. $\sqrt{x+100} = 25$

$$(\sqrt{x+100})^2 = (25)^2$$

$$x+100 = 625$$

$$x = 625 - 100$$

$$x = 525$$

74.

$$\sqrt{2x} = x - 4$$

$$(\sqrt{2x})^2 = (x-4)^2$$

$$2x = x^2 - 8x + 16$$

$$x^2 - 10x + 16 = 0$$

$$(x-8)(x-2) = 0$$

$$x-8 = 0 \quad x-2 = 0$$

$$x = 8 \quad x = 2$$

$x = 2$ is extraneous

75. $\sqrt{x+2} = \sqrt{3x}$

$$(\sqrt{x+2})^2 = (\sqrt{3x})^2$$

$$x+2 = 3x$$

$$2 = 2x$$

$$1 = x$$

76. $2\sqrt[3]{3x} = 6$

$$(2\sqrt[3]{3x})^3 = (6)^3$$

$$8(3x) = 216$$

$$24x = 216$$

$$x = 9$$

77. $-2x^{3/2} = -8$

$$x^{3/2} = 4$$

$$(x^{3/2})^{2/3} = 4^{2/3}$$

$$x \approx 2.52$$

78. $\frac{2}{x+1} - \frac{x}{x^2-1} = \frac{2}{x+1} - \frac{x}{(x+1)(x-1)}$

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

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

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

$$= \frac{x-2}{x^2-1}$$

Chapter 10 continued

$$79. \frac{4}{2x^2} + \frac{1}{3x} = \frac{4}{2x^2} \left(\frac{3}{3}\right) + \frac{1}{3x} \left(\frac{2x}{2x}\right)$$

$$= \frac{12 + 2x}{6x^2}$$

$$= \frac{6 + x}{3x^2}$$

$$= \frac{x + 6}{3x^2}$$

$$80. \frac{11}{4(x-5)} - \frac{x+1}{4x} = \frac{11x}{4(x-5)x} - \frac{(x+1)(x-5)}{4x(x-5)}$$

$$= \frac{11x - [x^2 - 4x - 5]}{4x^2 - 20x}$$

$$= \frac{11x - x^2 + 4x + 5}{4x^2 - 20x}$$

$$= \frac{-x^2 + 15x + 5}{4x^2 - 20x}$$

$$81. \frac{3x}{x^2} - \frac{x-1}{x+3} = \frac{3x(x+3) - x^2(x-1)}{x^3 + 3x^2}$$

$$= \frac{3x^2 + 9x - x^3 + x^2}{x^3 + 3x^2}$$

$$= \frac{-x^3 + 4x^2 + 9x}{x^3 + 3x^2}$$

$$= \frac{x(-x^2 + 4x + 9)}{x(x^2 + 3x)}$$

$$= \frac{-x^2 + 4x + 9}{x^2 + 3x}$$

$$82. \frac{2}{3x+2} + \frac{5x^2}{x-4} = \frac{2}{3x+2} \left(\frac{x-4}{x-4}\right) + \frac{5x^2}{x-4} \left(\frac{3x+2}{3x+2}\right)$$

$$= \frac{2x - 8 + 15x^3 + 10x^2}{(3x+2)(x-4)}$$

$$= \frac{15x^3 + 10x^2 + 2x - 8}{(3x+2)(x-4)}$$

$$83. \frac{1-3x}{x-6} + \frac{2}{2x+1} = \frac{1-3x}{x-6} \left(\frac{2x+1}{2x+1}\right) + \frac{2}{2x+1} \left(\frac{x-6}{x-6}\right)$$

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

$$= \frac{-6x^2 + x - 11}{(x-6)(2x+1)}$$

Lesson 10.2

10.2 Guided Practice (p. 598)

- focus; directrix
- The graph of $y = ax^2$ rotated 90° clockwise is the graph of $x = ay^2$.

$$3. y = ax^2$$

$$x^2 = \frac{1}{a}y$$

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

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

$$\text{focus: } \left(0, \frac{1}{4a}\right)$$

$$\text{directrix: } y = -\frac{1}{4a}$$

$$4. x^2 = 4y$$

$$4p = 4$$

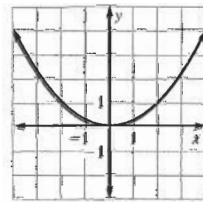
$$p = 1$$

$$\text{focus: } (0, 1)$$

$$\text{directrix: } y = -1$$

$p > 1$ parabola opens up only positive y values

x	± 2	± 2.83	± 3.46
y	1	2	3



$$5. y = -5x^2$$

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

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

$$4p = -\frac{1}{5}$$

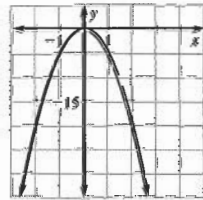
$$p = -\frac{1}{20}$$

$$\text{focus: } \left(0, -\frac{1}{20}\right)$$

$$\text{directrix: } y = \frac{1}{20}$$

$p < 0$ parabola opens down, only negative y -values

x	-1	-2	-3	4
y	± 0.45	± 0.63	± 0.77	± 0.89



$$6. -12x = y^2$$

$$4p = -12$$

$$p = -\frac{12}{4} = -3$$

$$\text{focus: } (-3, 0)$$

$$\text{directrix is } x = 3$$

$p < 0$ parabola opens left, only negative x -values

x	-1	-2	-3	-4
y	± 3.46	± 4.90	± 6	± 6.93



Chapter 10 continued

10.2 Mixed Review (p. 600)

85. $8^{5x} = 16^{2x+1}$

$$(2^3)^{5x} = (2^4)^{2x+1}$$

$$(2)^{15x} = (2)^{8x+4}$$

$$15x = 8x + 4$$

$$7x = 4$$

$$x = \frac{4}{7}$$

87. $5^x = 7$

$$\log_5 7 = x$$

$$\frac{\log 7}{\log 5} = x$$

$$1.209 \approx x$$

86. $3^x = 15$

$$\log_3 15 = x$$

$$\frac{\log 15}{\log 3} = x$$

$$2.465 \approx x$$

88. $10^{3x+1} + 4 = 33$

$$10^{3x+1} = 29$$

$$\log 29 = 3x + 1$$

$$\log 29 - 1 = 3x$$

$$\frac{\log 29 - 1}{3} = x$$

$$0.154 \approx x$$

89. $\log_7(3x - 5) = \log_7 8x$

$$3x - 5 = 8x$$

$$-5 = 5x$$

$$-1 = x$$

no solution

90. $\log_3(4x - 3) = 3$

$$3^3 = 4x - 3$$

$$27 = 4x - 3$$

$$30 = 4x$$

$$\frac{30}{4} = x$$

$$\frac{15}{2} = x$$

91. $\frac{8xy^3}{x^3y} \cdot \frac{y}{6x} = \frac{y^3}{2x^3}$

92. $\frac{3xy^3}{2x} \div \frac{2xy^3}{3x}$

$$\frac{3xy^3}{2x} \cdot \frac{3x}{2xy^3} = \frac{9}{4}$$

93. $\frac{x^2 - 9}{x^2 - x - 6} \cdot (x + 2) = \frac{(x-3)(x+3)}{(x-3)(x+2)} \cdot \frac{(x+2)}{1}$

$$= x + 3$$

94. $\frac{-3x}{x+2} + \frac{4x}{x-1} = \frac{-3x(x-1)}{(x+2)(x-1)} + \frac{4x(x+2)}{(x+2)(x-1)}$

$$= \frac{-3x^2 + 3x + 4x^2 + 8x}{(x+2)(x-1)}$$

$$= \frac{x^2 + 11x}{(x+2)(x-1)}$$

95. $\frac{x+1}{6x^2} - \frac{x+1}{6x^2+6x} = \frac{(x+1)\left(1 + \frac{1}{x}\right)}{6x^2\left(1 + \frac{1}{x}\right)} - \frac{x+1}{6x^2+6x}$

$$= \frac{x+1 + 1 + \frac{1}{x} - x - 1}{6x^2\left(1 + \frac{1}{x}\right)}$$

$$= \frac{1 + \frac{1}{x}}{6x^2\left(1 + \frac{1}{x}\right)} = \frac{1}{6x^2}$$

96. $\frac{x^2 - 3x + 2}{x-1} - \frac{x^2 - 4}{x-2}$

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

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

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

$$= \frac{-4x^2 + 12x - 8}{(x-1)(x-2)} = \frac{-4(x^2 - 3x + 2)}{(x-1)(x-2)}$$

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

97. (3, 4), (6, 7)

$$d = \sqrt{(6-3)^2 + (7-4)^2} = \sqrt{9+9}$$

$$= \sqrt{18} = \sqrt{9(2)} = 3\sqrt{2} \approx 4.243$$

98. (-3, 7), (-7, 3)

$$d = \sqrt{(-7+3)^2 + (3-7)^2} = \sqrt{16+16}$$

$$= \sqrt{2(16)} = 4\sqrt{2} \approx 5.657$$

99. (18, -4), (-2, 9)

$$d = \sqrt{(-2-18)^2 + (9+4)^2}$$

$$= \sqrt{400+169} = \sqrt{569} \approx 23.854$$

100. (3.7, 5.1), (2, 5)

$$d = \sqrt{(2-3.7)^2 + (5-5.1)^2}$$

$$= \sqrt{2.89+0.01} = \sqrt{2.9} \approx 1.703$$

101. (-9, -31), (8, 7)

$$d = \sqrt{(8+9)^2 + (7+31)^2}$$

$$= \sqrt{289+1444} = \sqrt{1733} \approx 41.629$$

102. (8.8, 3.3), (1.2, 6)

$$d = \sqrt{(1.2-8.8)^2 + (6-3.3)^2}$$

$$= \sqrt{57.76+7.29} = \sqrt{65.05} \approx 8.065$$

103. $A = 2.25$, $P = 1.5$, $\frac{A}{P} = x$

$$\frac{2.25}{1.5} = 1.5, \frac{A}{P} = x, A = xp, A = 1.5p$$

Lesson 10.3

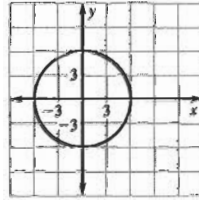
10.3 Guided Practice (p. 604)

- The set of all points (x, y) equidistant from a fixed point.
- sometimes true
- They are negative reciprocals of each other (except if one line is vertical).
- The student failed to square the radius; $x^2 + y^2 = 16$

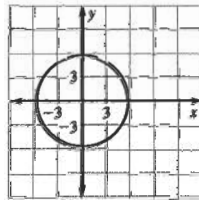
Chapter 10 continued

5. (4, 0)
 $r = \sqrt{(4-0)^2 + (0-0)^2}$
 $= \sqrt{16+0} = \sqrt{16} = 4$
 $x^2 + y^2 = (4)^2$
 $x^2 + y^2 = 16$
6. (0, -2)
 $r = \sqrt{(0-0)^2 + (-2-0)^2}$
 $= \sqrt{0+4} = \sqrt{4} = 2$
 $x^2 + y^2 = (2)^2$
 $x^2 + y^2 = 4$
7. (-8, 6)
 $r = \sqrt{(-8-0)^2 + (6-0)^2}$
 $= \sqrt{64+36} = \sqrt{100} = 10$
 $x^2 + y^2 = (10)^2$
 $x^2 + y^2 = 100$
8. (-5, -12)
 $r = \sqrt{(-5-0)^2 + (-12-0)^2}$
 $= \sqrt{25+144} = \sqrt{169} = 13$
 $x^2 + y^2 = (13)^2$
 $x^2 + y^2 = 169$
9. (6, -9)
 $r = \sqrt{(6-0)^2 + (-9-0)^2}$
 $= \sqrt{36+81} = \sqrt{117}$
 $x^2 + y^2 = (\sqrt{117})^2$
 $x^2 + y^2 = 117$
10. (3, 1)
 $r = \sqrt{(3-0)^2 + (1-0)^2}$
 $= \sqrt{9+1} = \sqrt{10}$
 $x^2 + y^2 = (\sqrt{10})^2$
 $x^2 + y^2 = 10$
11. (-5, -5)
 $r = \sqrt{(-5-0)^2 + (-5-0)^2}$
 $= \sqrt{25+25} = \sqrt{50}$
 $x^2 + y^2 = (\sqrt{50})^2$
 $x^2 + y^2 = 50$
12. (-2, 4)
 $r = \sqrt{(-2-0)^2 + (4-0)^2}$
 $= \sqrt{4+16} = \sqrt{20}$
 $x^2 + y^2 = (\sqrt{20})^2$
 $x^2 + y^2 = 20$

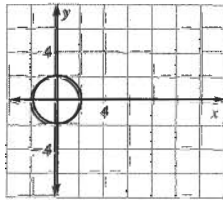
13. $x^2 + y^2 = 36$
 radius = 6



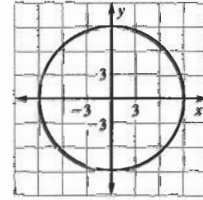
15. $x^2 + y^2 = 32$
 radius = $\sqrt{32} = 4\sqrt{2}$
 ≈ 5.66



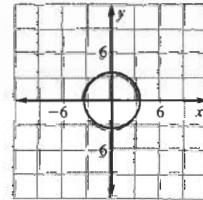
17. $36x^2 + 36y^2 = 144$
 $36(x^2 + y^2) = 36(4)$
 $x^2 + y^2 = 4$
 radius = 2



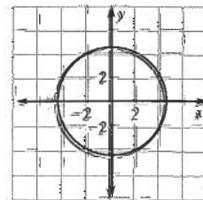
14. $x^2 + y^2 = 81$
 radius = 9



16. $x^2 + y^2 = 12$
 radius = $\sqrt{12} = 2\sqrt{3}$
 ≈ 3.46



18. $9x^2 + 9y^2 = 162$
 $9(x^2 + y^2) = 9(18)$
 $x^2 + y^2 = 18$
 $r = \sqrt{18} = 3\sqrt{2}$
 ≈ 4.24



19. diameter = 7
 radius = 3.5
 $x^2 + y^2 = (3.5)^2$
 $x^2 + y^2 = 12.25$

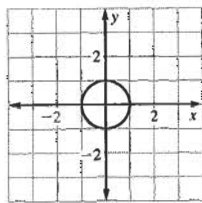
Practice and Applications (pp. 604–606)

20. $x^2 + y^2 = 16$ C 21. $x^2 + y^2 = 5$ F
 22. $x^2 + y^2 = 4$ D 23. $x^2 + y^2 = 25$ B
 24. $x^2 + y^2 = 100$ E 25. $x^2 + y^2 = 10$ A

Chapter 10 continued

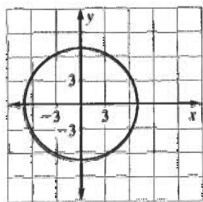
26. $x^2 + y^2 = 1$

$r = 1$



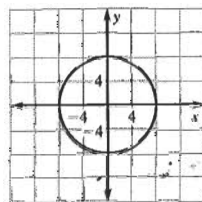
27. $x^2 + y^2 = 49$

$r = 7$



28. $x^2 + y^2 = 64$

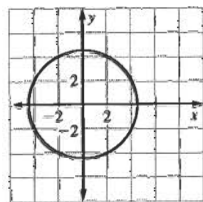
$r = 8$



29. $x^2 + y^2 = 20$

$r = \sqrt{20}$

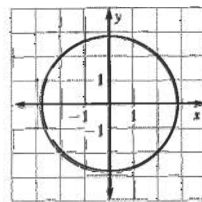
$= 2\sqrt{5} \approx 4.47$



30. $x^2 + y^2 = 8$

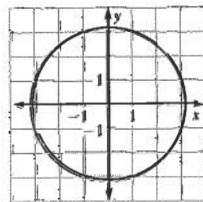
$r = \sqrt{8}$

$= 2\sqrt{2} \approx 2.83$



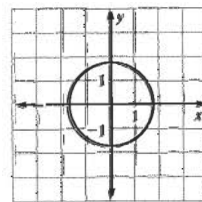
31. $x^2 + y^2 = 10$

$r = \sqrt{10} \approx 3.16$



32. $x^2 + y^2 = 3$

$r = \sqrt{3} \approx 1.73$

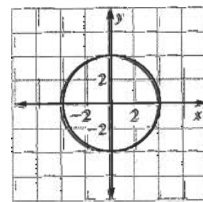


33. $5x^2 + 5y^2 = 80$

$5(x^2 + y^2) = 5(16)$

$x^2 + y^2 = 16$

$r = 4$

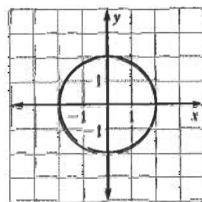


34. $24x^2 + 24y^2 = 96$

$24(x^2 + y^2) = 24(4)$

$x^2 + y^2 = 4$

$r = 2$



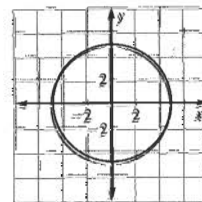
35. $8x^2 + 8y^2 = 192$

$8(x^2 + y^2) = 8(24)$

$x^2 + y^2 = 24$

$r = \sqrt{24}$

$= 2\sqrt{6} \approx 4.9$



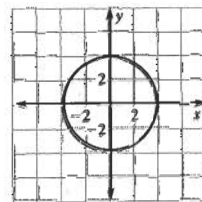
36. $9x^2 + 9y^2 = 135$

$9(x^2 + y^2) = 9(15)$

$x^2 + y^2 = 15$

$r = \sqrt{15}$

≈ 3.87



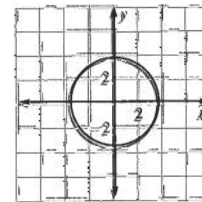
37. $4x^2 + 4y^2 = 52$

$4(x^2 + y^2) = 4(13)$

$x^2 + y^2 = 13$

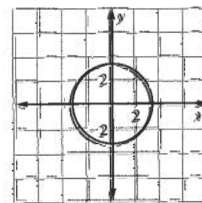
$r = \sqrt{13}$

≈ 3.61



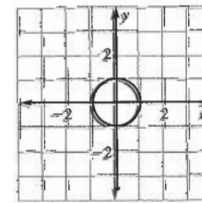
38. $x^2 + y^2 = 11$

$r = \sqrt{11} \approx 3.32$



39. $x^2 + y^2 = 1$

$r = 1$



40. $x^2 + y = 0$

$x^2 = -y$

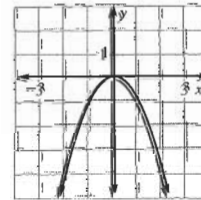
$4p = -1$

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

focus: $(0, \frac{1}{4})$

directrix: $y = -\frac{1}{4}$

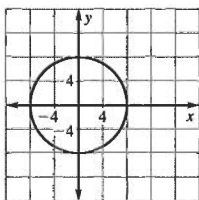
$p < 0$ parabola opens down, only negative y -values



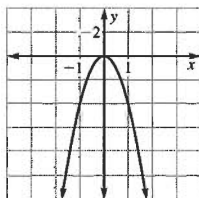
x	-1	-2	-3
y	± 1	± 1.41	± 1.73

Chapter 10 continued

41. $\frac{1}{4}x^2 + \frac{1}{4}y^2 = 16$
 $\frac{1}{4}(x^2 + y^2) = \frac{1}{4}(64)$
 $x^2 + y^2 = 64$
 $r = 8$



42. $4x^2 + y = 0$
 $4x^2 = -y$
 $x^2 = -\frac{1}{4}y$
 $4p = -\frac{1}{4}$
 $p = -1$

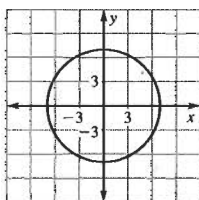


focus: $(0, -1)$
 directrix: $y = 1$

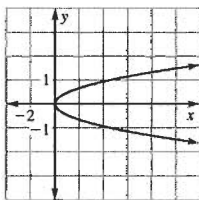
$p < 0$ parabola opens down only negative y -values

x	-1	-2	-3
y	$\pm\frac{1}{2}$	± 0.707	± 0.866

43. $9x^2 + 9y^2 = 441$
 $9(x^2 + y^2) = 9(49)$
 $x^2 + y^2 = 49$
 $r = 7$



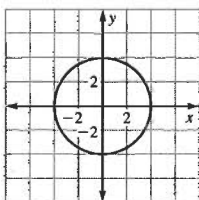
44. $-2x + 9y^2 = 0$
 $9y^2 = 2x$
 $y^2 = \frac{2}{9}x$
 $4p = \frac{2}{9}$
 $p = \frac{2}{36} = \frac{1}{18}$
 focus: $(\frac{1}{18}, 0)$
 directrix: $x = -\frac{1}{18}$



$p > 0$ parabola opens right, only positive x -values

x	1	2	3
y	± 0.47	± 0.67	± 0.82

45. $\frac{3}{8}x^2 + \frac{3}{8}y^2 = 6$
 $\frac{3}{8}(x^2 + y^2) = \frac{3}{8}(16)$
 $x^2 + y^2 = 16$
 $r = 4$



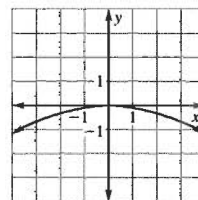
46. $x^2 + 12y = 0$
 $x^2 = -12y$
 $4p = -12$
 $p = -3$

focus: $(0, -3)$

directrix: $y = 3$

$p < 0$ parabola opens down

x	-1	-2	-3
y	± 3.46	± 4.9	± 6



47. $r = 3$
 $x^2 + y^2 = (3)^2$
 $x^2 + y^2 = 9$

48. $r = 9$
 $x^2 + y^2 = (9)^2$
 $x^2 + y^2 = 81$

49. $r = 6$
 $x^2 + y^2 = (6)^2$
 $x^2 + y^2 = 36$

50. $r = 11$
 $x^2 + y^2 = (11)^2$
 $x^2 + y^2 = 121$

51. $r = \sqrt{7}$
 $x^2 + y^2 = (\sqrt{7})^2$
 $x^2 + y^2 = 7$

52. $r = \sqrt{30}$
 $x^2 + y^2 = (\sqrt{30})^2$
 $x^2 + y^2 = 30$

53. $r = \sqrt{11}$
 $x^2 + y^2 = (\sqrt{11})^2$
 $x^2 + y^2 = 11$

54. $r = \sqrt{21}$
 $x^2 + y^2 = (\sqrt{21})^2$
 $x^2 + y^2 = 21$

55. $r = 5\sqrt{6}$
 $x^2 + y^2 = (5\sqrt{6})^2$
 $x^2 + y^2 = 25(6) = 150$

56. $r = 4\sqrt{5}$
 $x^2 + y^2 = (4\sqrt{5})^2$
 $x^2 + y^2 = 16(5) = 80$

57. $r = 2\sqrt{7}$
 $x^2 + y^2 = (2\sqrt{7})^2$
 $x^2 + y^2 = 4(7) = 28$

58. $r = 3\sqrt{3}$
 $x^2 + y^2 = (3\sqrt{3})^2$
 $x^2 + y^2 = 9(3) = 27$

59. $(0, -10)$
 $r = \sqrt{(0 - 0)^2 + (-10 - 0)^2} = \sqrt{100} = 10$
 $x^2 + y^2 = (10)^2$
 $x^2 + y^2 = 100$

60. $(8, 0)$
 $r = \sqrt{(8 - 0)^2 + (0 - 0)^2} = \sqrt{64} = 8$
 $x^2 + y^2 = (8)^2$
 $x^2 + y^2 = 64$

61. $(-3, -4)$
 $r = \sqrt{(-3 - 0)^2 + (-4 - 0)^2} = \sqrt{9 + 16}$
 $= \sqrt{25} = 5$
 $x^2 + y^2 = (5)^2$
 $x^2 + y^2 = 25$

Chapter 10 continued

62. $(-4, -1)$

$$r = \sqrt{(-4 - 0)^2 + (-1 - 0)^2}$$

$$= \sqrt{16 + 1} = \sqrt{17}$$

$$x^2 + y^2 = (\sqrt{17})^2$$

$$x^2 + y^2 = 17$$

63. $(5, -3)$

$$r = \sqrt{(5 - 0)^2 + (-3 - 0)^2}$$

$$= \sqrt{25 + 9} = \sqrt{34}$$

$$x^2 + y^2 = (\sqrt{34})^2$$

$$x^2 + y^2 = 34$$

64. $(-6, 4)$

$$r = \sqrt{(-6 - 0)^2 + (4 - 0)^2}$$

$$= \sqrt{36 + 16} = \sqrt{52}$$

$$x^2 + y^2 = (\sqrt{52})^2$$

$$x^2 + y^2 = 52$$

65. $(-6, 1)$

$$r = \sqrt{(-6 - 0)^2 + (1 - 0)^2}$$

$$= \sqrt{36 + 1} = \sqrt{37}$$

$$x^2 + y^2 = (\sqrt{37})^2$$

$$x^2 + y^2 = 37$$

66. $(-1, -9)$

$$r = \sqrt{(-1 - 0)^2 + (-9 - 0)^2}$$

$$= \sqrt{1 + 81} = \sqrt{82}$$

$$x^2 + y^2 = (\sqrt{82})^2$$

$$x^2 + y^2 = 82$$

67. $(7, -4)$

$$r = \sqrt{(7 - 0)^2 + (-4 - 0)^2}$$

$$= \sqrt{49 + 16} = \sqrt{65}$$

$$x^2 + y^2 = (\sqrt{65})^2$$

$$x^2 + y^2 = 65$$

68. $(10, 2)$

$$r = \sqrt{(10 - 0)^2 + (2 - 0)^2}$$

$$= \sqrt{100 + 4} = \sqrt{104}$$

$$x^2 + y^2 = (\sqrt{104})^2$$

$$x^2 + y^2 = 104$$

69. $(5, 8)$

$$r = \sqrt{(5 - 0)^2 + (8 - 0)^2}$$

$$= \sqrt{25 + 64} = \sqrt{89}$$

$$x^2 + y^2 = (\sqrt{89})^2$$

$$x^2 + y^2 = 89$$

70. $(2, -12)$

$$r = \sqrt{(2 - 0)^2 + (-12 - 0)^2}$$

$$= \sqrt{4 + 144} = \sqrt{148}$$

$$x^2 + y^2 = (\sqrt{148})^2$$

$$x^2 + y^2 = 148$$

71. $x^2 + y^2 = 10; (1, 3)$

$$m = \frac{3 - 0}{1 - 0} = 3$$

$$\text{Slope of tangent line} = -\frac{1}{3}$$

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

$$y - 3 = -\frac{1}{3}x + \frac{1}{3}$$

$$y = -\frac{1}{3}x + \frac{1}{3} + \frac{9}{3}$$

$$y = -\frac{1}{3}x + \frac{10}{3}$$

72. $x^2 + y^2 = 5; (2, 1)$

$$m = \frac{1 - 0}{2 - 0} = \frac{1}{2}$$

$$\text{Slope of tangent line} = -2$$

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

$$y - 1 = -2x + 4$$

$$y = -2x + 5$$

73. $x^2 + y^2 = 41; (-4, -5)$

$$m = \frac{-5 - 0}{-4 - 0} = \frac{5}{4}$$

$$\text{Slope of tangent line} = -\frac{4}{5}$$

$$y + 5 = -\frac{4}{5}(x + 4)$$

$$y + 5 = -\frac{4}{5}x - \frac{16}{5}$$

$$y = -\frac{4}{5}x - \frac{16}{5} - \frac{25}{5}$$

$$y = -\frac{4}{5}x - \frac{41}{5}$$

Chapter 10 continued

74. $x^2 + y^2 = 145$; (12, 1)

$$m = \frac{1 - 0}{12 - 0} = \frac{1}{12}$$

Slope of tangent line = -12

$$y - 1 = -12(x - 12)$$

$$y - 1 = -12x + 144$$

$$y = -12x + 145$$

75. $x^2 + y^2 = 65$; (-8, 1)

$$m = \frac{1 - 0}{-8 - 0} = -\frac{1}{8}$$

Slope of tangent line = 8

$$y - 1 = 8(x + 8)$$

$$y - 1 = 8x + 64$$

$$y = 8x + 65$$

76. $x^2 + y^2 = 40$; (-2, 6)

$$m = \frac{6 - 0}{-2 - 0} = -3$$

Slope of tangent line = $\frac{1}{3}$

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

$$y - 6 = \frac{1}{3}x + \frac{2}{3}$$

$$y = \frac{1}{3}x + \frac{2}{3} + \frac{18}{3}$$

$$y = \frac{1}{3}x + \frac{20}{3}$$

77. $x^2 + y^2 = 244$; (-10, -12)

$$m = \frac{-12 - 0}{-10 - 0} = \frac{12}{10} = \frac{6}{5}$$

Slope of tangent line = $-\frac{5}{6}$

$$y + 12 = -\frac{5}{6}(x + 10)$$

$$y + 12 = -\frac{5}{6}x - \frac{50}{6}$$

$$y = -\frac{5}{6}x - \frac{50}{6} - \frac{72}{6}$$

$$y = -\frac{5}{6}x - \frac{122}{6}$$

$$y = -\frac{5}{6}x - \frac{61}{3}$$

78. $x^2 + y^2 = \frac{257}{4}$; $(\frac{1}{2}, -8)$

$$m = \frac{-8 - 0}{\frac{1}{2} - 0} = \frac{-8}{\frac{1}{2}} = -8(2) = -16$$

Slope of tangent line = $\frac{1}{16}$

$$y + 8 = \frac{1}{16}\left(x - \frac{1}{2}\right)$$

$$y + 8 = \frac{1}{16}x - \frac{1}{32}$$

$$y = \frac{1}{16}x - \frac{1}{32} - \frac{256}{32}$$

$$y = \frac{1}{16}x - \frac{257}{32}$$

79. $x^2 + y^2 = 13$; (2, -3)

$$m = \frac{-3 - 0}{2 - 0} = -\frac{3}{2}$$

Slope of tangent line = $\frac{2}{3}$

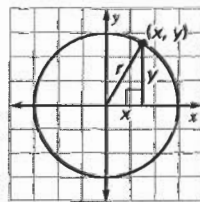
$$y + 3 = \frac{2}{3}(x - 2)$$

$$y + 3 = \frac{2}{3}x - \frac{4}{3}$$

$$y = \frac{2}{3}x - \frac{13}{3}$$

They have opposite slopes and intercepts.

80. A radius of the circle from (0, 0) to a point on the circle (x, y) is the hypotenuse of a right triangle, so $x^2 + y^2 = r^2$.



81. $x^2 + y^2 < 80^2$
 $(-60)^2 + (-45)^2 \stackrel{?}{<} 80^2$
 $3600 + 2025 \stackrel{?}{<} 6400$
 $5625 < 6400$ yes

$$x^2 + y^2 = 80$$

$$(-60)^2 + y^2 = (80)^2$$

$$3600 + y^2 = 6400$$

$$y^2 = 6400 - 3600$$

$$y^2 = 2800$$

$$y \approx \pm 52.92$$

$$-52.92 - (-45) = -7.92$$

about 7.92 mi

Chapter 10 continued

82. Area of circle

$$A = 2,400,000 = \pi r^2$$

$$\frac{2,400,000}{\pi} = r^2$$

$$763,944 \approx r^2$$

$$764,000 \approx r^2$$

$$x^2 + y^2 = r^2$$

$$x^2 + y^2 = 764,000$$

where x and y are in yards

83. $d = 20, r = 10$

$$d = 16, r = 8$$

$$x^2 + (-6)^2 = (10)^2$$

$$x^2 + 36 = 100$$

$$x^2 = 64$$

$$x = \pm 8$$

$$8 + 8 = 16 \text{ mm}$$

84. $r = 180 \text{ ft}$

$$180 - 45 = 135$$

$$x^2 + y^2 = r^2$$

$$(135)^2 + y^2 = (180)^2$$

$$18,225 + y^2 = 32,400$$

$$y^2 = 32,400 - 18,225$$

$$y^2 = 14,175$$

$$y \approx \pm 119$$

$$119 + 119 = 238 \text{ ft}$$

85. $30 - 6 = 24$

$$(24)^2 + y^2 = (30)^2$$

$$576 + y^2 = 900$$

$$y^2 = 900 - 576$$

$$y^2 = 324$$

$$y = \pm 18$$

$$18 + 18 = 36 \text{ in.}$$

86. $x^2 + y^2 \leq (50)^2$

$$x^2 + y^2 \leq 2500$$

$$(42)^2 + (43)^2 \stackrel{?}{\leq} 2500$$

$$1764 + 1849 \stackrel{?}{\leq} 2500$$

$$3613 \not\leq 2500$$

no

87. $(35)^2 + y^2 = (50)^2$

$$1225 + y^2 = 2500$$

$$y^2 = 2500 - 1225$$

$$y^2 = 1275$$

$$y \approx 35.71$$

$$66 - 35.71 = 30.29$$

$$\frac{500}{30.29} = \frac{60}{x}$$

$$500x = 1817.4$$

$$x \approx 3.63$$

$$x \approx 3.6 \text{ minutes}$$

88. $x^2 + y^2 = 53; (7, 2)$

$$m = \frac{2 - 0}{7 - 0} = \frac{2}{7}$$

Slope of tangent line is $-\frac{7}{2}$

$$y - 2 = -\frac{7}{2}(x - 7)$$

$$y - 2 = -\frac{7}{2}x + \frac{49}{2}$$

$$y = -\frac{7}{2}x + \frac{49}{2} + \frac{4}{2}$$

$$y = -\frac{7}{2}x + \frac{53}{2} \text{ B}$$

89. $(105)^2 + (120)^2 \stackrel{?}{\leq} (150)^2$

$$11,025 + 14,400 \stackrel{?}{\leq} 22,500$$

$$25,425 \not\leq 22,500 \text{ C}$$

90. $A \triangle ABC = \frac{1}{2}bh$

$$= \frac{1}{2}(8)2$$

$$= 8 \text{ units}^2$$

$$A(3, 4) \quad m = \frac{4 - 0}{3 - 0} = \frac{4}{3}$$

$$y - 4 = \frac{3}{4}(x - 3)$$

$$y - 4 = \frac{3}{4}x + \frac{9}{4}$$

$$y = \frac{3}{4}x + \frac{9}{4} + 4$$

$$y = \frac{3}{4}x + \frac{25}{4}$$

$$0 = \frac{3}{4}x + \frac{25}{4}$$

—CONTINUED—

Chapter 10 continued

90. —CONTINUED—

$$\frac{3}{4}x = \frac{25}{4}$$

$$3x = 25$$

$$x = 8\frac{1}{3}$$

$$D\left(8\frac{1}{3}, 0\right)$$

$$A_{\triangle ABD} = \frac{1}{2}bh$$

$$= \frac{1}{2}(8)\left(8\frac{1}{3} - 3\right)$$

$$= 4\left(5\frac{1}{3}\right)$$

$$= 21\frac{1}{3}$$

$$8 \text{ units}^2 < \text{Area} < 21\frac{1}{3} \text{ units}^2$$

10.3 Mixed Review (p. 607)

91. $x - 9y = 25$

$$6x - 5y = 3$$

$$-6x + 54y = -150$$

$$\frac{6x - 5y = 3}{49y = -147}$$

$$y = -3$$

$$x - 9(-3) = 25$$

$$x + 27 = 25$$

$$x = -27 + 25$$

$$x = -2$$

$$(-2, -3)$$

93. $2x - 3y = 2$

$$-7x + 4y = 6$$

$$8x - 12y = 8$$

$$\frac{-21x + 12y = 18}{-13x = 26}$$

$$x = -2$$

$$2(-2) - 3y = 2$$

$$-4 - 3y = 2$$

$$-3y = 6$$

$$y = -2$$

$$(-2, -2)$$

92. $9x - y = 8$

$$3x + 10y = -49$$

$$90x - 10y = 80$$

$$\frac{3x + 10y = -49}{93x = 31}$$

$$x = \frac{31}{93} = \frac{1}{3}$$

$$9\left(\frac{1}{3}\right) - y = 8$$

$$3 - y = 8$$

$$-y = 8 - 3$$

$$y = -5$$

$$\left(\frac{1}{3}, -5\right)$$

94. $8x - 5y = 4$

$$2x + y = 1$$

$$8x - 5y = 4$$

$$\frac{10x + 5y = 5}{18x = 9}$$

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

$$2\left(\frac{1}{2}\right) + y = 1$$

$$1 + y = 1$$

$$y = 0$$

$$\left(\frac{1}{2}, 0\right)$$

95. $-x + 5y = 3$

$$4x - 9y = 10$$

$$-4x + 20y = 12$$

$$\frac{4x - 9y = 10}{11y = 22}$$

$$y = 2$$

$$-x + 5(2) = 3$$

$$-x + 10 = 3$$

$$-x = -7$$

$$x = 7$$

$$(7, 2)$$

96. $-9x + 4y = 15$ $3\left(-\frac{1}{3}\right) + 2y = 5$

$$3x + 2y = 5$$

$$-9x + 4y = 15$$

$$\frac{-6x - 4y = -10}{-15x = 5}$$

$$x = -\frac{1}{3}$$

$$\left(-\frac{1}{3}, 3\right)$$

97. $f(x) = x + 1$

$$g(x) = 2x$$

$$f(g(x)) = 2x + 1$$

$$g(f(x)) = 2(x + 1)$$

$$= 2x + 2$$

98. $f(x) = 4x + 1$

$$g(x) = x - 5$$

$$f(g(x)) = 4(x - 5) + 1$$

$$= 4x - 20 + 1$$

$$= 4x - 19$$

$$g(f(x)) = 4x + 1 - 5$$

$$= 4x - 4$$

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

$$g(x) = x + 5$$

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

$$= -(x^2 + 10x + 25) - 1$$

$$= -x^2 - 10x - 26$$

$$g(f(x)) = -x^2 - 1 + 5 = -x^2 + 4$$

Chapter 10 continued

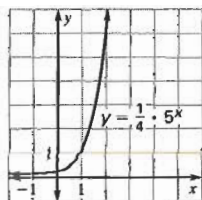
100. $f(x) = x^2 - 7$

$g(x) = 3x + 1$

$f(g(x)) = (3x + 1)^2 - 7 = 9x^2 + 6x + 1 - 7$
 $= 9x^2 + 6x - 6$

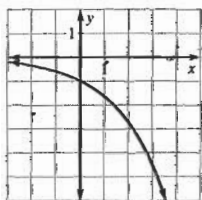
$g(f(x)) = 3(x^2 - 7) + 1 = 3x^2 - 21 + 1 = 3x^2 - 20$

101. $y = \frac{1}{4} \cdot 5^x$



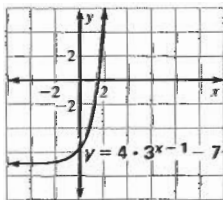
x	0	1	-1	2	-2
y	1/4	5/4	1/20	25/4	1/100

102. $y = -\left(\frac{5}{3}\right)^x$



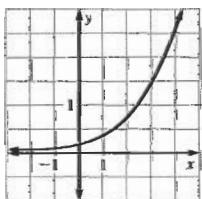
x	0	1	-1	2	-2
y	-1	-5/3	-3/5	-25/9	-9/25

103. $y = 4 \cdot 3^{x-1} - 7$



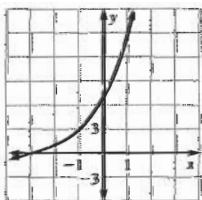
x	1	2	0	1.51
y	-3	5	-17/3	0.004

104. $y = 3 \cdot 2^{x-4}$



x	4	3	5	2	1	0
y	3	3/2	6	3/4	3/8	3/16

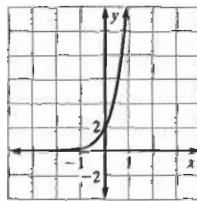
105. $y = 2^{x+3} - 1$



x	-3	-4	-2	-1	0
y	0	1/2	1	3	7

106. $y = \frac{1}{4} \cdot 8^{x+1}$

x	-1	-2	0	1
y	1/4	1/32	2	16



107. $\begin{bmatrix} 35 & 52 \\ 112 & 40 \\ 95 & 63 \end{bmatrix}$

108. $6 \begin{bmatrix} 35 & 52 \\ 112 & 40 \\ 95 & 63 \end{bmatrix} = \begin{bmatrix} 210 & 312 \\ 672 & 240 \\ 570 & 378 \end{bmatrix}$ Total
 210
 672
 570
 312
 240
 378
 \$2382

Quiz 1 (p. 607)

1. $d = \sqrt{(0-8)^2 + (0-6)^2} = \sqrt{64 + 36} = \sqrt{100} = 10$

$\left(\frac{0+8}{2}, \frac{0+6}{2}\right) = \left(\frac{8}{2}, \frac{6}{2}\right) = (4, 3)$

2. $d = \sqrt{(3+3)^2 + (3+3)^2} = \sqrt{36 + 36} = \sqrt{72}$
 $= 6\sqrt{2} \approx 8.485$

$\left(\frac{3-3}{2}, \frac{3-3}{2}\right) = \left(\frac{0}{2}, \frac{0}{2}\right) = (0, 0)$

3. $d = \sqrt{(-2-4)^2 + (7+10)^2} = \sqrt{36 + 289} = \sqrt{325}$
 $= 5\sqrt{13} \approx 18.028$

$\left(\frac{-2+4}{2}, \frac{7-10}{2}\right) = \left(\frac{2}{2}, \frac{-3}{2}\right) = \left(1, -\frac{3}{2}\right)$

4. $d = \sqrt{(3+5)^2 + (-7+9)^2} = \sqrt{64 + 4} = \sqrt{68}$
 $= 2\sqrt{17} \approx 8.246$

$\left(\frac{3-5}{2}, \frac{-7-9}{2}\right) = \left(\frac{-2}{2}, \frac{-16}{2}\right) = (-1, -8)$

5. $d = \sqrt{(8+4)^2 + (6-4)^2} = \sqrt{144 + 4} = \sqrt{148}$
 $= 2\sqrt{37} \approx 12.166$

$\left(\frac{8-4}{2}, \frac{6+4}{2}\right) = \left(\frac{4}{2}, \frac{10}{2}\right) = (2, 5)$

6. $d = \sqrt{(-1-11)^2 + (-13-15)^2} = \sqrt{144 + 784}$
 $= \sqrt{928} = 4\sqrt{58} \approx 30.463$

$\left(\frac{-1+11}{2}, \frac{-13+15}{2}\right) = \left(\frac{10}{2}, \frac{2}{2}\right) = (5, 1)$