43. Vertex: $(5, 2)$; Focus: $(3, 2)$

44. Vertex: $(-1, 2)$; Focus: $(-1, 0)$

45. Vertex: $(0, 4)$; Directrix: $y = 2$

46. Vertex: $(-2, 1)$; Directrix: $x = 1$

47. Focus: $(2, 2)$; Directrix: $x = -2$

48. Focus: $(0, 0)$; Directrix: $y = 8$

In Exercises 49 and 50, change the equation so that its graph matches the description.

49. $(y - 3)^2 = 6(x + 1)$; upper half of parabola

50. $(y + 1)^2 = 2(x - 4)$; lower half of parabola

In Exercises 51–58, find dy/dx.

51. $x^2 = 4y$

52. $x^2 = \frac{1}{4}y$

53. $y^2 = 6x$

54. $y^2 = -8x$

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

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

57. $(y + 3)^2 = -8(x - 2)$

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

In Exercises 59–66, find an equation of the tangent line to the parabola at the given point.

	Parabola	*Point*
59.	$x^2 = 2y$	$(4, 8)$
60.	$x^2 = 2y$	$\left(-3, \frac{9}{2}\right)$
61.	$y = -2x^2$	$(-1, -2)$
62.	$y = -2x^2$	$(2, -8)$
63.	$y^2 = 2(x - 3)$	$(5, 2)$
64.	$y^2 = 2(x - 3)$	$(11, 4)$
65.	$(x - 1)^2 = 6(y + 2)$	$(-5, 4)$
66.	$(x - 1)^2 = 6(y + 2)$	$(10, 11.5)$

67. ***Revenue*** The revenue R generated by the sale of x units of a product is

$$R = 265x - \frac{5}{4}x^2.$$

Find the number of sales that will maximize revenue.

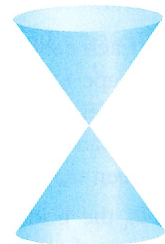
68. ***Revenue*** The revenue R generated by the sale of x units of a product is

$$R = 378x - \frac{7}{5}x^2.$$

Find the number of sales that will maximize revenue.

Writing About Concepts

In Exercises 69–72, describe in words how a plane could intersect with the double-napped cone shown to form the conic section.



69. Circle

70. Ellipse

71. Parabola

72. Hyperbola

73. Consider the parabola given by $x^2 = 4py$.

(a) Use a graphing utility to graph the parabola for $p = 1$, $p = 2$, $p = 3$, and $p = 4$. Describe the effect on the graph when p increases.

(b) Locate the focus for each parabola in part (a).

(c) For each parabola in part (a), find the length of the chord passing through the focus and parallel to the directrix. How can the length of this chord be determined directly from the standard form of the equation of the parabola?

(d) Explain how the result of part (c) can be used as a sketching aid when graphing parabolas.

74. Let (x_1, y_1) be the coordinates of a point on the parabola given by $x^2 = 4py$. The equation of the line tangent to the parabola at the point is

$$y - y_1 = \frac{x_1}{2p}(x - x_1).$$

What is the slope of the tangent line?