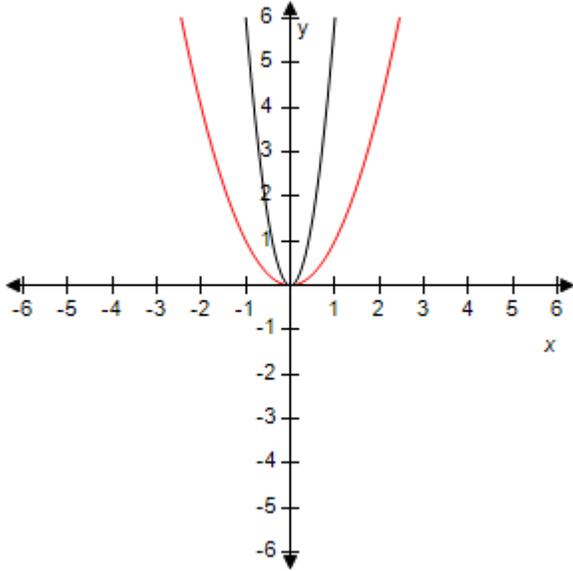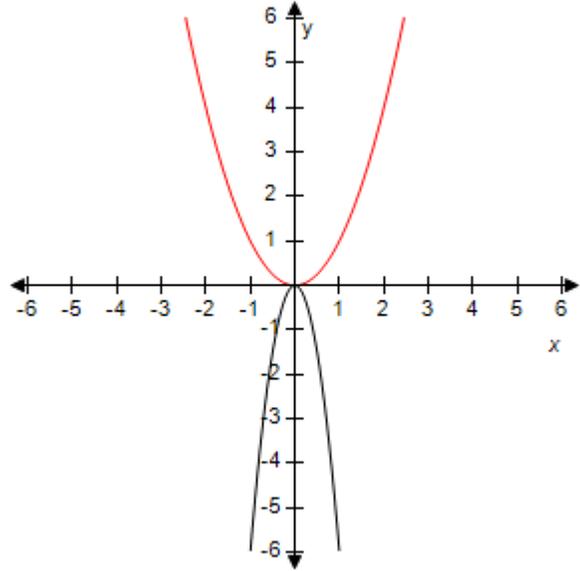1. Select the graph of the function $y = -6x^2$. Compare the graph of this function with the graph of $y = x^2$.

a.
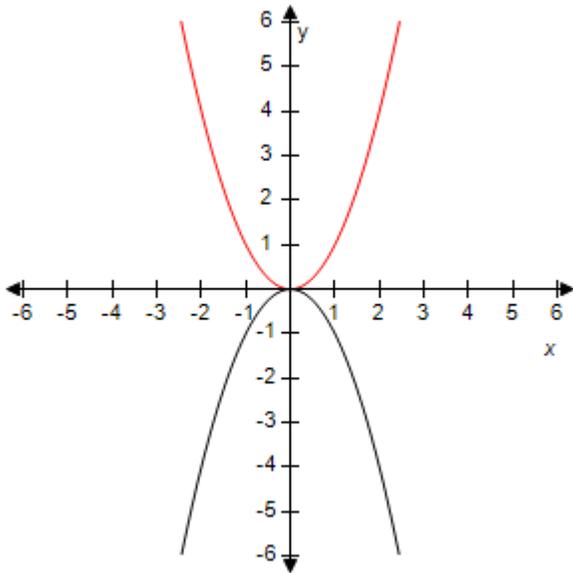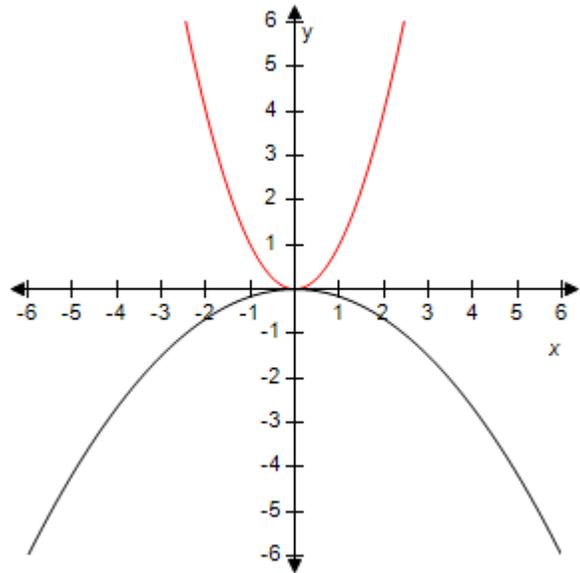

Vertical stretch

b.

Vertical stretch and reflection in the x-axis

c.

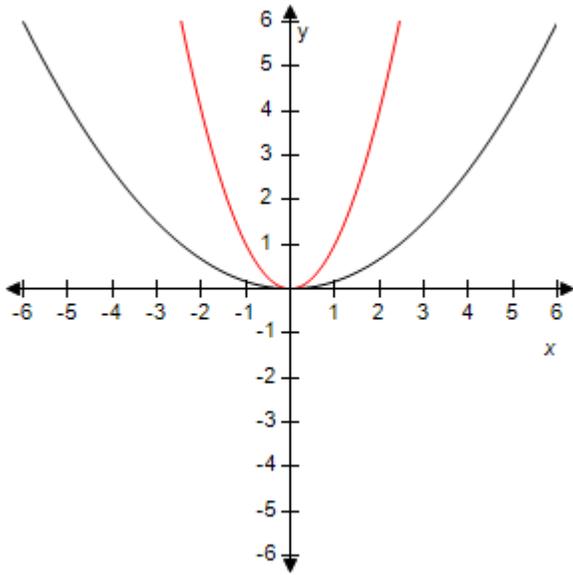Reflection in the x-axis

d.

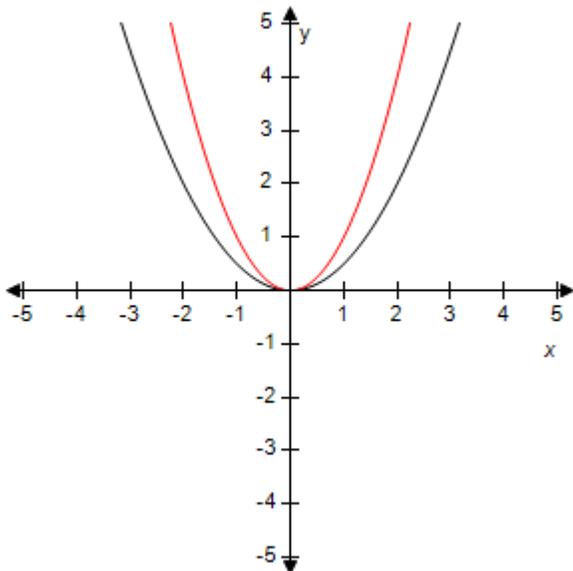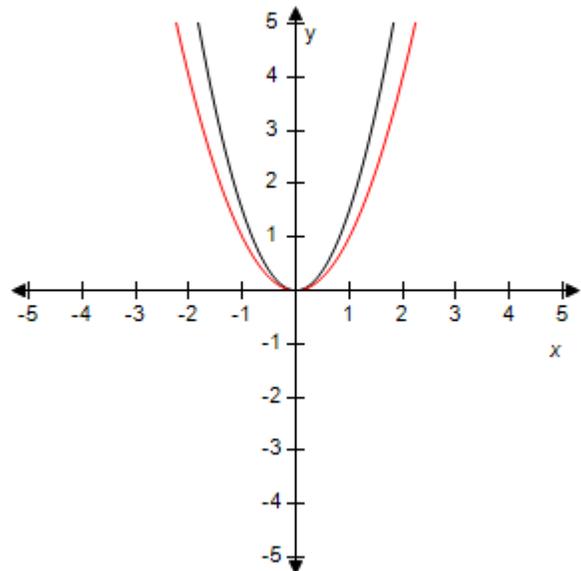Vertical shrink and reflection in the x-axis

e.

Vertical shrink

2. Select the graph of the function $y = \dfrac{3}{2}x^2$. Compare the graph of this function with the graph of $y = x^2$.
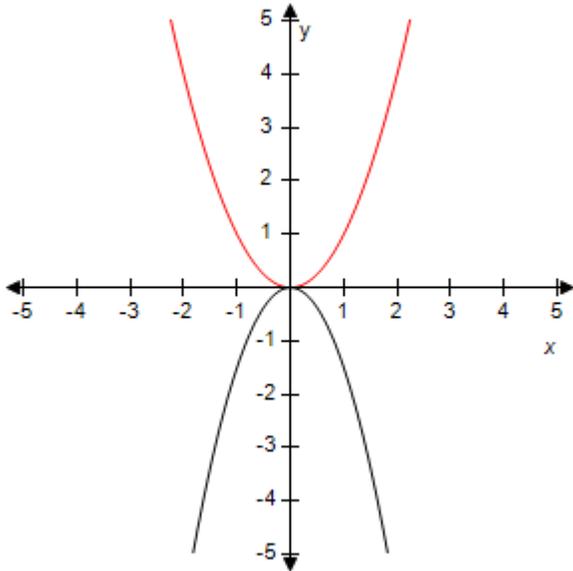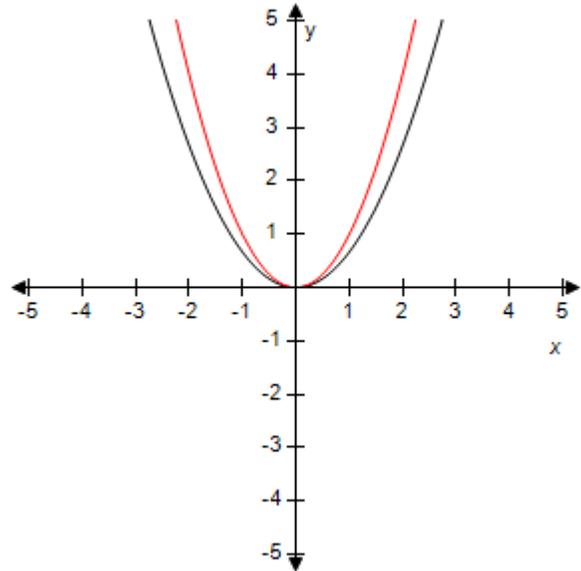
a.

b.

Vertical shrink.
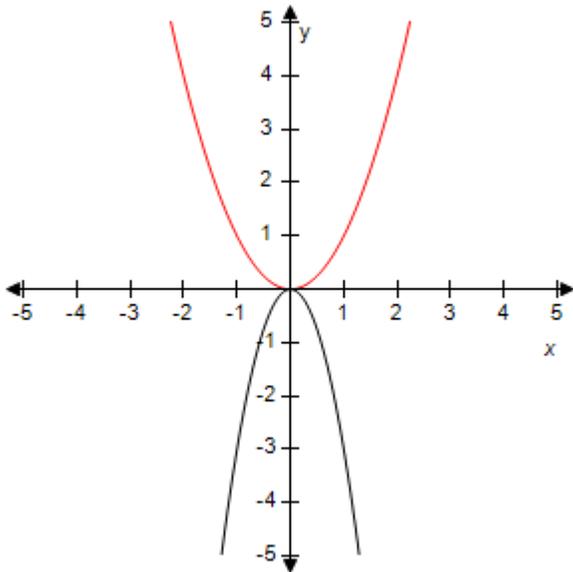
Vertical stretch.

c.

d.

Vertical stretch and reflection in the *x*-axis.

Vertical shrink.

e.

Vertical stretch and reflection in the *x*-axis.

3. Find two positive real numbers whose product is a maximum. The sum is 140.

    a. 90, 50

    b. 100, 40

    c. 70, 70

    d. 80, 60

    e. 10, 130

4. Find two positive real numbers whose product is a maximum.

The sum of the first and twice the second is 56.
(Round your answer to two decimal places if necessary.)

    a. 28, 5.6

    b. 28, 9.33

    c. 28, 7

    d. 28, 14

    e. 14, 14

5. The height y (in feet) of a punted football is given by

$$y = -\frac{20}{2025}x^2 + \frac{9}{5}x + 1.6$$

where x is the horizontal distance (in feet) from the point at which the ball is punted.
What is the maximum height of the punt? (Round your answer to two decimal places.)

    a. 123.61

    b. 113.61

    c. 103.61

    d. 83.61

    e. 93.61

6. A manufacturer of lighting fixtures has daily production costs of $C = 800 - 80x + 0.25x^2$
where C is the total cost (in dollars) and x is the number of units produced. How many fixtures should be produced each day to yield a minimum cost?
(Round your answer to two decimal places.)

    a. 160

    b. 106.67

    c. 320

    d. 400

    e. 800

7. The profit P (in hundreds of dollars) that a company makes depends on the amount x (in hundreds of dollars) the company spends on advertising according to the model

$$P = 230 + 30x - 0.5x^2$$

What expenditure for advertising will yield a maximum profit?

    a. 30
    b. 0.5
    c. 230
    d. 15
    e. 115

8. The total revenue R earned (in thousands of dollars) from manufacturing handheld video games is given by

$$R(p) = -25p^2 + 1200p$$

where p is the price per unit (in dollars).

Find the revenue when the price per unit is $20.

    a. \$14,000,300
    b. \$14,000,200
    c. \$14,000,400
    d. \$14,000,000
    e. \$14,000,100

9. A small theater has a seating capacity of 2000. When the ticket price is $20, attendance is 1500. For each $1 decrease in price, attendance increases by 125. Write the revenue R of the theater as a function of ticket price x.

    a. $R(x) = 125x^2 + 3000x, \ 16 \le x \le 20$

    b. $R(x) = -125x^2 + 1000x, \ 16 \le x \le 20$

    c. $R(x) = -125x^3 + 500x, \ 16 \le x \le 20$

    d. $R(x) = -125x^2 - 350x, \ 16 \le x \le 20$

    e. $R(x) = -125x^2 + 4000x, \ 16 \le x \le 20$

10. Determine whether the statement is true or false.

The function given by $f(x) = -16x^2 - 7$ has no x-intercepts.

    a. True
    b. False

11. Find the values of b such that the function $f(x) = -x^2 + bx - 75$ has the given maximum value 94.

    a. ± 32
    b. ± 28
    c. ± 26
    d. ± 30
    e. ± 34

12. Find the standard form of the quadratic function shown below:
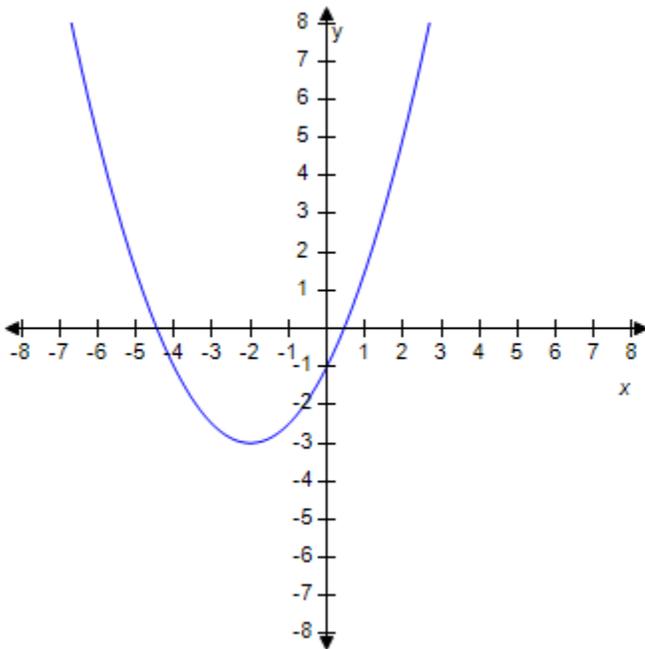
    a. $f(x) = (x+2)^2 - 3$

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

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

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

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

13. Compare the graph of $t(x) = 5(x-9)^2 + 4$ with $t(x) = x^2$.

    a. $t(x) = x^2$ shifts left 9 units, shifts downward 4 units, and stretches by a factor of 5.

    b. $t(x) = x^2$ shifts left 9 units, shifts upward 4 units, and stretches by a factor of 5.

    c. $t(x) = x^2$ shifts right 9 units, shifts downward 4 units, and shrinks by a factor of $\frac{1}{5}$.

    d. $t(x) = x^2$ shifts right 9 units, shifts upward 4 units, and shrinks by a factor of $\frac{1}{5}$.

    e. $t(x) = x^2$ shifts right 9 units, shifts upward 4 units, and stretches by a factor of 5.

14. Compare the graph of $t(x) = \left[-\frac{1}{7}(x+8) \right]^2 - 4$ with $t(x) = x^2$.

    a. $t(x) = x^2$ shifts left 8 units, shifts downward 4 units, and shrinks by a factor of $\frac{1}{49}$.

    b. $t(x) = x^2$ shifts right 8 units, shifts upward 4 units, and shrinks by a factor of $\frac{1}{49}$.

    c. $t(x) = x^2$ shifts left 64 units, shifts upward 4 units, and shrinks by a factor of $-\frac{1}{7}$.

    d. $t(x) = x^2$ shifts right 64 units, shifts upward 4 units, and shrinks by a factor of $\frac{1}{49}$.

    e. $t(x) = x^2$ shifts right 8 units, shifts downward 4 units, and shrinks by a factor of $-\frac{1}{49}$.

15. From the graph of the quadratic function $f(x) = (x+6)^2 - 1$, determine the equation of the axis of symmetry.

    a. $x = -6$

    b. $x = -1$

    c. $x = -\frac{1}{6}$

    d. $x = 1$

    e. $x = 6$

16. Determine the x-intercept(s) of the quadratic function $f(x)=x^2+2x+2$.

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

    b. $(-7, 0), (-4, 0)$

    c. no x-intercept(s)

    d. $(-7, 0), (-5, 0)$

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

17. Determine the vertex of the graph of the quadratic function $f(x)=x^2+5x+\dfrac{29}{4}$.

    a. $\left(\dfrac{5}{2}, \dfrac{29}{4}\right)$ b. $\left(\dfrac{5}{4}, \dfrac{21}{4}\right)$

    c. $\left(-\dfrac{5}{2}, 1\right)$ d. $\left(-\dfrac{5}{2}, \dfrac{27}{2}\right)$

    e. $\left(5, \dfrac{29}{4}\right)$

18. From the graph of the quadratic function $f(x)=-x^2+12x+4$, determine the equation of the axis of symmetry.

    a. $x=6$

    b. $x=4$

    c. $x=40$

    d. $x=-12$

    e. $x=-32$

19. Write the quadratic function $f(x)=x^2+2x+5$ in standard form.

    a. $f(x)=-(x+1)^2-4$

    b. $f(x)=(x-4)^2-1$

    c. $f(x)=-(x-1)^2-4$

    d. $f(x)=(x+1)^2+4$

    e. $f(x)=-(x-4)^2+1$

20. Write the standard form of the equation of the parabola that has a vertex at $\left(-\dfrac{2}{3}, \dfrac{1}{9}\right)$ and passes through the point $(2, 3)$.

a. $f(x) = \dfrac{13}{32}\left(x - \dfrac{3}{2}\right)^2 + \dfrac{1}{9}$

b. $f(x) = \dfrac{13}{32}\left(x + \dfrac{2}{3}\right)^2 + \dfrac{1}{9}$

c. $f(x) = \dfrac{13}{4}\left(x - \dfrac{2}{3}\right)^2 - \dfrac{1}{9}$

d. $f(x) = \dfrac{13}{8}\left(x - \dfrac{3}{2}\right)^2 - \dfrac{1}{9}$

e. $f(x) = \dfrac{13}{4}\left(x + \dfrac{2}{3}\right)^2 + \dfrac{1}{9}$

21. Find two positive real numbers whose product is a maximum and whose sum is 160.

a. 89, 71
b. 85, 75
c. 80, 80
d. 78, 82
e. 92, 68

22. The height, $h(x)$, of a punted rugby ball is given by $h(x) = -\dfrac{1}{64}x^2 + \dfrac{21}{32}x + 3$ where x is the horizontal distance in feet from the point where the ball is punted. How far, horizontally, is the ball from the kicker when it is at its highest point?

a. 45 feet
b. 21 feet
c. 26 feet
d. 31 feet
e. 24 feet

23. A farmer has 216 feet of fencing and wants to build two identical pens for his prize-winning pigs. The pens will be arranged as shown. Determine the dimensions of a pen that will maximize its area.
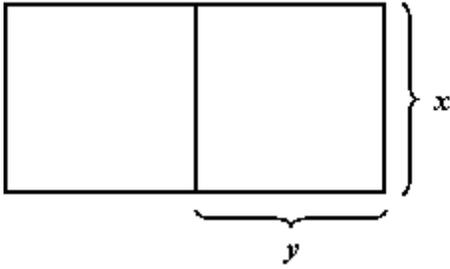
a. $7' \times 176'$

b. $21' \times 52'$

c. $27' \times 72'$

d. $9' \times 108'$

e. $27' \times 36'$

24. A Norman window has the shape of a rectangle surmounted by a semicircle as in the figure below. If the perimeter of the window is 40 ft, express the area, A, as a function of the width, x, of the window.
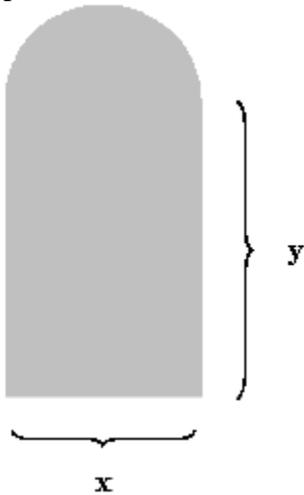
a. $A(x) = \dfrac{160x - 4x^2 - \pi x^2}{8}$

b. $A(x) = \dfrac{80x - x^2}{2}$

c. $A(x) = \dfrac{80x - 2x^2 - \pi x^2}{4}$

d. $A(x) = \dfrac{80x + (2 - \pi)x^2}{4}$

e.
$$A(x) = \frac{160x - 4x^2 - \pi x^2}{2}$$

25. Find the vertex of the parabola.

$$y = 3x^2 - 1$$

    a. (−1, 3)
    b. (0, −1)
    c. (3, −1)
    d. (−1, 0)
    e. (0, 3)

26. The function $f(x) = x^2 - 5$ is one-to-one on the domain $(x \le 0)$. Find $f^{-1}(x)$.

    a. $f^{-1}(x) = x^2 + 5$

    b. $f^{-1}(x) = \sqrt{x + 5}$

    c. $f^{-1}(x) = -\sqrt{x + 5}$

    d. $f^{-1}(x) = \dfrac{1}{x^2 - 5}$

    e. $f^{-1}(x) = \sqrt{x - 5}$

27. Find the inverse of the one-to-one function.

$$y = 7x + 5$$

    a. $y = \dfrac{x - 7}{5}$

    b. $y = \dfrac{x - 5}{7}$

    c. $y = \dfrac{7}{x - 5}$

    d. $y = \dfrac{x + 5}{7}$

    e. none of the above