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

    a. Complete the square to put the quadratic in **vertex form**.   1a.)_____

    b. Identify the vertex.   1b.)_____

    c. Does the quadratic have a maximum or a minimum value?   1c.)_____

    d. What is the max/min value?   1d.)_____

    e. Identify the y-intercept.   1e.)_____

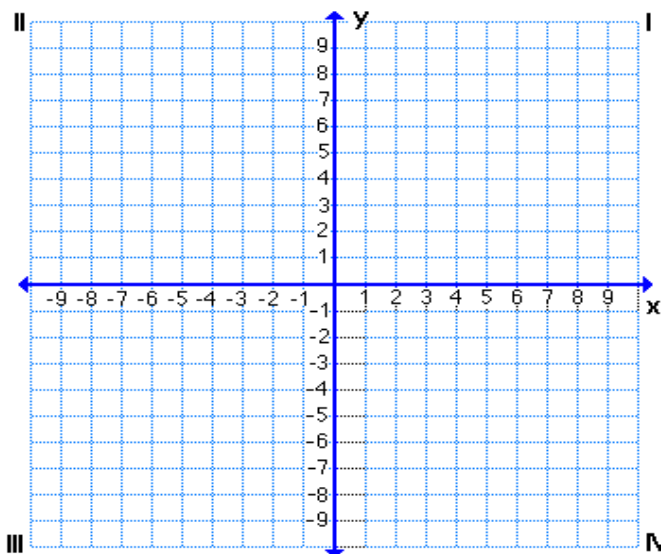   **f.** Identify the x-intercept(s).   1f.)_____

    g. What is the domain?   1g.)_____

    h. What is the range?   1h.)_____

    i. Sketch the graph

2. $y = -x^2 - 4x + 12$

    a. Complete the square to put the quadratic in **vertex form**.   **2a.)**_____

    b. Identify the vertex.   **2b.)**_____

    c. Does the quadratic have a maximum or a minimum value?   **2c.)**_____

    d. What is the max/min value?   **2d.)**_____

    e. Identify the y-intercept.   **2e.)**_____

    f. Identify the x-intercept(s).   **2f.)**_____

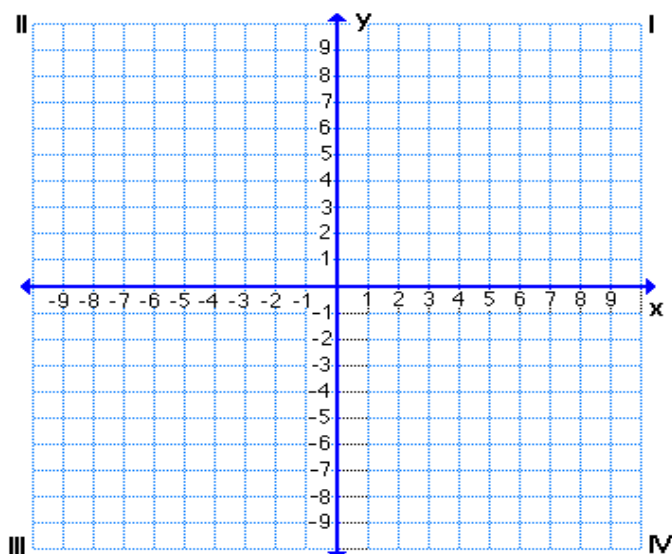   **g.** What is the domain?   **2g.)**_____

    h. What is the range?   **2h.)**_____

    i. Sketch the graph

Applications

3. If a ball is thrown directly upward with a velocity of 40 ft/s, its height (in feet) after t seconds is given by $y = 40t - 16t^2$. What is the maximum height attained by the ball?

3.)_____

4. A manufacturer finds that the revenue generated by selling x units of a certain commodity is given by the function $R(x) = 80x - 0.4x^2$, where the revenue $R(x)$ is measured in dollars.

   a. What is the maximum revenue?

   4a.)_____

   b. How many units should be manufactured to obtain this maximum?

   4b.)_____

5. The number of apples produced by each tree in an apple orchard depends on how densely the trees are planted. If n trees are planted on an acre of land, then each tree produces $900 - 9n$ apples. So the number of apples produced per acre is $A(n) = n(900 - 9n)$. How many trees should be planted per acre in order to obtain the maximum yield of apples?

   5.)_____

*In these exercises, you are asked to find a function that models a real-life situation. **You** <u>do</u> <u>not</u> <u>need</u> <u>to</u> <u>solve</u> – only set up the equation.*

6. A rectangular building lot is three times as long as it is wide. Find a function that models its area $A(w)$ in terms of its width w.

    6.)_____

7. A rectangular box has a square base. Its height is half the width of the base. Find a function that models its volume $V(w)$ in terms of its width w.

    7.)_____

8. A rectangle has a perimeter of 20 ft. Find a function that models its area $A(x)$ in terms of the length x of one of its sides.

    8.)_____

9. Find a function that models the radius r of a circle in terms of its area A.   9.)_____

10. The sum of two positive numbers is 60. Find a function that models their product $P(x)$ in terms of x, one of the numbers.

    10.)_____

11. A right triangle has one leg twice as long as the other. Find a function that models its perimeter $P(x)$ in terms of the length x of the shorter leg.

    11.)_____

12. A farmer has 2400 feet of fencing and wants to fence a rectangular field that borders a straight river. He does not need a fence along the river. Find a function that models the area of the field in terms of one of its sides.

    12.)_____