Section 2.2 Quadratic Functions: Comparing Forms

1. Expand and simplify.
   a) $3(x - 9)$
   b) $-4b(b + 2)$
   c) $6(2k^2 - 3k - 1)$
   d) $-3q(-4q + 5)$

2. Expand and simplify.
   a) $(x - 2)(x + 5)$
   b) $(3g - 2)(4g + 1)$
   c) $(2w + 3)(2w - 3)$
   d) $(4n - 3)(4n - 3)$
   e) $(3g + 1)^2$
   f) $(4f - 5)^2$
   g) $(y - 2)(y + 2) + 5(y - 1)$
   h) $v(v - 2) - (2v - 7)^2$

3. Consider the quadratic function
   $y = (x - 2)(x + 4)$.
   a) Identify
      i) the direction of opening
      ii) the x-intercepts
      iii) the coordinates of the vertex
      iv) whether the vertex is a maximum or a minimum
      v) the axis of symmetry
   b) Express the function in standard form.
   c) Identify
      i) the values of a, b, and c
      ii) the y-intercept
   d) Sketch a graph of the function.

4. Repeat question 3 for $y = -2(x + 3)(x + 7)$.

5. Consider the quadratic function
   $y = -(x - 3)^2 + 5$.
   a) Identify
      i) the direction of opening
      ii) the coordinates of the vertex
      iii) whether the vertex is a maximum or a minimum
      iv) the axis of symmetry

   b) Express the function in standard form.
   c) Identify
      i) the values of a, b, and c
      ii) the y-intercept
   d) Sketch a graph of the function.

6. Repeat question 5 for the quadratic function
   $y = 3(x + 2)^2 - 4$.

7. The sum of x and $12 - x$ is 12. The product is
   $p = x(12 - x)$.
   a) In which form is this quadratic function expressed? Justify your answer.
   b) Find the zeros, or x-intercepts, of this function.
   c) Write the function in standard form.
   d) Find the coordinates of the vertex. Is this vertex a maximum or a minimum?
   e) Sketch a graph of the function.

8. Use the results of question 7 to solve these problems.
   a) What is the maximum product of two numbers whose sum is 12?
   b) What is the maximum product of two whole numbers whose sum is 9?
   c) What is the maximum product of two numbers whose sum is 0.5?

9. The difference between two integers is 6. The sum of their squares is a minimum.
   a) Write an expression for the sum of the squares of the numbers.
   b) What are the numbers?

10. Three sides of a rectangular garden are fenced with 100 m of fencing. The fourth side is a stone wall. If the garden is of maximum area, what are its dimensions?