Formulas: $y = a(x - x_1)(x - x_2)$ $y = ax^2 + bx + c$ x-value of vertex: $x = \dfrac{-b}{2a}$

1) a) Find an equation of the parabola with x-intercepts at $(-3,0)$ and $(1,0)$ that goes through the point $(0,6)$.

   b) Find the vertex of this parabola.

2) a) Find an equation of the parabola with x-intercepts at $(-3,0)$ and $(1,0)$ that goes through the point $(0,-6)$.
   b) Find the vertex of this parabola.

3) At a contest for jumping frogs, the flight of the frogs followed a parabolic path. One frog jumped and landed 9 feet from the starting point. When it had traveled a horizontal distance of 6 feet, it was 2 feet off the ground.

   a) On graph paper, draw a graph that illustrates this information with the frog starting at the origin.

   b) What was the maximum height reached by the frog?

   c) What horizontal distance had the frog traveled when it reached its maximum height?

4) a) For this parabola, $y = x^2 - 10x + 21$, find the vertex.

   b) Does this equation have a maximum or minimum value?

   c) What is that value?

5) Laurel makes and sells hair ribbons at gymnastics tournaments. She has discovered that if she sets her price as high as $12.50 per ribbon, she sells none at all and therefore makes no profit. If she sets her price at $3, she normally earns a profit of $57. However, she feels that the $3 price is too low and wants to raise the price. Note that if she sets the price at $0, she makes no profit at all.

   a) On graph paper, draw a graph that shows the price of the ribbons on the x-axis and the profit on the y-axis.

   b) Find the parabolic equation.

   c) What price will give her the most profit if the graph of the profit equation follows a parabolic path?

   d) What will her maximum profit be?