1. Factor these polynomials.

a) $x^2 + 7x + 10$

b) $x^2 - 7x + 12$

c) $y^2 - 8y + 15$

d) $y^2 + 10y - 39$

e) $x^2 - 2x - 8$

f) $w^2 - 30w - 64$

g) $r^2 + 12r + 27$

h) $x^2 - 8xy + 15y^2$

2. You dive directly upward from a board that is 32 feet high. After t seconds, your height above the water is described by the polynomial

$$-16t^2 + 16t + 32$$

   a) Evaluate this polynomial at $t = 2$.

   b) Factor the polynomial completely. The first step should be to look for a Greatest Common Factor.

   c) Evaluate your answer from part (b) at $t = 2$. Do you get the same result as you did in part (a)? Describe what this answer means in the context of the dive.

3. There was a rectangle with two edges of different length. After you had computed the area of the rectangle, you had found that the area was

$$2x^2 - 10x - 48$$

measured in square inches, where x is in inches. What is one possibility for the dimensions (height and width) of the rectangle. (There are several possibilities.)

4. Factor each polynomial completely. If it can't be done, then label the polynomial as prime. Note that these are all trinomials with a leading coefficient of 1.

a) $2x^2 - 16x + 30$

b) $5a^2 - 90a + 225$

c) $4y^2 - 4y - 8$

d) $x^2 - 3x + 6$

e) $2r^3 + 6r^2 + 4r$

f) $y^8 - 7y^7 + 5y^6$

g) $2w^4 - 26w^3 - 96w^2$

h) $x^5y^2 + 3x^4y^2 - 4x^3y^2$

5. Start with a square of cardboard that is 24 in on each side (sketch a picture of this). You will cut out a little square of the same size from each corner (add this to your picture). After folding up the tabs that this leaves, you end up with a box that is open on its top (sketch a 3D picture of this).

    a) If x is the the length (in inches) of the little square that you cut out, then this box has volume $4x^3 - 96x^2 + 576x$ cubic inches. Factor this polynomial completely.

    b) Thinking about the physical piece of cardboard and the cuts that you make, what volume would you expect to have in the box if $x = 12$? Note how much cardboard this would mean you cut away.

    c) What does your factored polynomial evaluate to if $x = 12$?