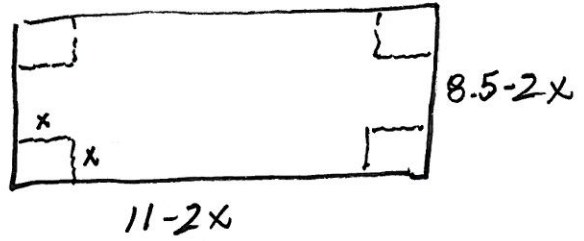Name: _____Key_____

Date: _____ Period: _____

Directions: Suppose you cut an x-inch square out of each corner of an 8.5 inch by 11 inch sheet of paper. Fold the sides up to form a box without a top.

1.) Write an expression to calculate each dimension of the box.
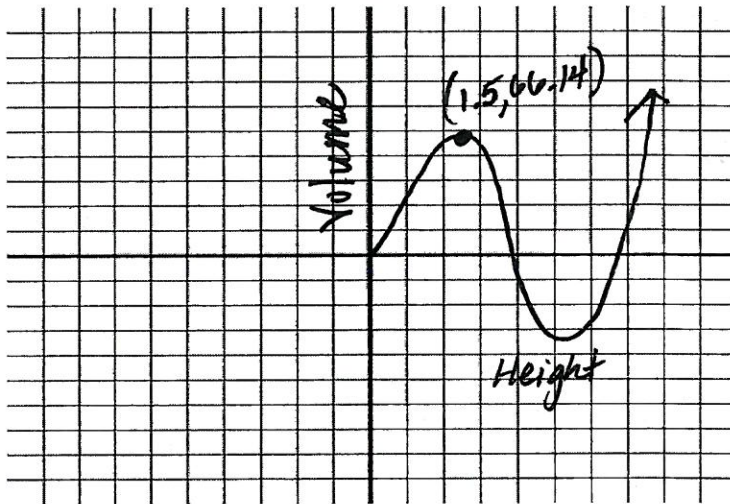
$$W = 8.5 - 2x$$
$$L = 11 - 2x$$
$$H = x$$

8.5-2x

11-2x

2.) Write an expression to calculate the volume of the box.

$$V = x(8.5 - 2x)(11 - 2x)$$

3.) Graph the volume using your TI.

4.) Determine the dimensions of the box that maximizes the volume and then find the maximum volume.

$$H = 1.58 \text{ in.}$$
$$W = 5.34 \text{ in. } (8.5 - 2(1.58))$$
$$L = 7.84 \text{ in. } (11 - 2(1.58))$$

$$\text{Max Vol} = 66.14 \text{ in}^3$$

5. Write each polynomial function in standard form.

   a. y = (3x - 4)(x + 3)

   $$y = 3x^2 + 5x - 12$$

   b. a = (12 - w)(7 - 2w)

   $$a = 2w^2 - 31w + 84$$

   c. v = h(h + 3)(2h - 5)

   $$v = 2h^3 + h^2 - 15h$$

   d. c = (2b + 5)(4b^2 - 10b + 25)

   $$c = 8b^3 + 125$$

6. Write each polynomial function in factored form.

   a. v = h^3 - 27

   $$v = (h - 3)(h^2 + 3h + 9)$$

   b. y = 6x^2 - 27x - 15

   $$y = 3(2x^2 - 9x - 5)$$
   $$y = 3(2x + 1)(x - 5)$$

   c. y = 2x^3 + x^2 - 3x.

   $$y = x(2x^2 + x - 3)$$
   $$y = x(x - 1)(2x + 3)$$

   d. p = 64q^3 + 343

   $$p = (4q + 7)(16q^2 - 28q + 49)$$