**3.5 Solving Quadratic Equations**

**Problem 1:** The profit function for a business is modelled by the equation P(x) = -0.5x2 +8x -24, where x is the quantity sold, in thousands, and P(x) is the profit in thousands of dollars. Determine the number of items that must be sold to break even.

(**Hint:** If you break even, your profit is 0 – so you are trying to find the zeroes of the function)

When you graph the function, you can see that you make zero profit at x=4 and x=12.

How can you find the zeroes without graphing?

**METHOD 1: FACTORING**

**Step 1:** Factor out the -0.5 from the entire equation.

**Step 2:** Factor the simple trinomial using the method 3.

**Step 3:** Find the zeroes and answer the question.

**METHOD 2: QUADRATIC FORMULA:** Use Quadratic Formula

**Problem 2:** A water balloon is catapulted into the air from the top of a building. The height, , in metres, of the balloon after seconds is

1. What are the domain and range of this function?

**TO KNOW THE DOMAIN WE MUST KNOW THE ZEROS (WE NEED TO KNOW WHEN IT LANDS) SO USE Q.F.**

**TO KNOW THE RANGE WE MUST KNOW THE VERTEX (WE NEED TO KNOW HOW HIGH IT GOES) SO FIND THE VERTEX LOCATED IN THE MIDDLE OF THE ZEROS.**

1. When will the balloon reach a height of 30 m?

**STEP 1:** SUB IN 30 FOR SINCE 30 IS THE HEIGHT

**STEP 2:** MOVE THE 30 OVER TO THE OTHER SIDE OF THE EQUATION SO THAT ONE SIDE OF THE EQUATION IS ZERO AND THEN YOU CAN USE THE QUADRATIC FORMULA.

**HOMEWORK** WITH HINTS

PG 177 #4 ( FOR EACH YOU NEED TO BRING EVERYTHING TO ONE SIDE TO MAKE ONE SIDE EQUAL TO **ZERO** SO THAT YOU CAN USE THE QUADRATIC **FORMULA**. ONCE YOU MOVE EVERYTHING TO ONE SIDE YOU WILL NEED TO **SIMPLIFY** SO THAT IT IS IN STANDARD FORM)

PG 177 #5 ( EITHER FACTOR OR USE QUADRATIC FORMULA TO FIND ZEROES OR COMPLETE THE SQUARE TO FIND VERTEX)

PG 178 #6b,d (BREAK EVEN MEANS PROFIT =0)

PG 178 #7 (HINT: FACTOR -4.9 OUT OF THE FUNCTION)

PG 178 #13