

## MCF 3MI

### Unit 4 - Standard and Vertex Form

### Day 3 - Completing the Square - Day 1

Example 1: Write in vertex form. State the minimum value of the function and when it occurs.  $y = x^2 + 5x - 6$

Step 1: Factor "a" out of the first two terms

Step 2: Divide "b" by 2, square it, then add and subtract that number

Step 3: Pull the special number out of the brackets

Step 4: Factor the perfect square trinomial

Example 2: Find the vertex by completing  
the square:  $f(x) = 2x^2 + 20x - 13$

Step 1: Factor  
two terms

Step 2: Factor  
then add

Step 3: Factor  
of the k

Step 4: Factor  
trinomial

Also state the axis of symmetry, the max or min value, the domain  
and the range.

Example 3: Write in vertex form. State the maximum value of the function and when it occurs.

$$f(x) = -\frac{1}{2}x^2 - 3x + 5$$

## Practice Questions.

Find the maximum or minimum value of the function and the value of  $x$  when it occurs.

1)  $y = x^2 + 12x - 7$

2)  $y = -x^2 + 6x + 1$

3)  $y = 13 + x^2 - 20x$

4)  $y = -x^2 - 14x - 5$

5)  $y = 10 - 10x - x^2$

6)  $y = 2x^2 + 12x$

7)  $y = 3x^2 - 12x + 11$

8)  $y = -2x^2 - 4x + 1$

9)  $y = -36x + 6x^2 - 5$

10)  $y = x^2 + 3x + 1$

11)  $y = x^2 - x - 2$

12)  $y = 3x^2 + 2x$

13)  $y = -4x^2 + 4x - 9$

## ANSWERS

1) min of -43 at  $x = -6$

2) max of 10 at  $x = 3$

3) min of -87 at  $x = 10$

4) max of 44 at  $x = -7$

5) max of 35 at  $x = -5$

6) min of -18 at  $x = -3$

7) min of -1 at  $x = 2$

8) max of 3 at  $x = -1$

9) min of -59 at  $x = 3$

10) min of  $-5/4$  at  $x = -3/2$

11) min of  $-9/4$  at  $x = 1/2$

12) min of  $-1/3$  at  $x = -1/3$

13) max of -8 at  $x = 1/2$