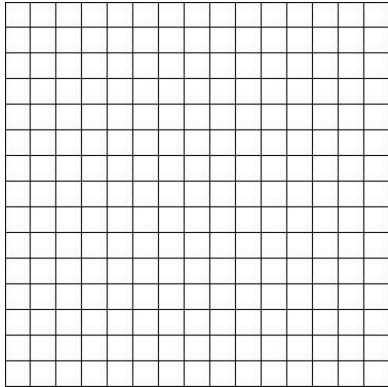


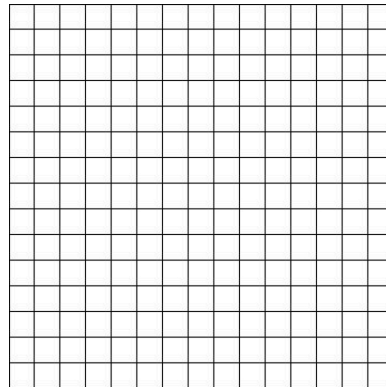
**Aim: How do we use completing the square to graph quadratic equations?**

**I. Do Now:**

1. Sketch the graph of  $y = |x + 2| + 1$



2. (a) Sketch the graph of  $y = (x - 2)^2 + 3$



- (b) How can you transform the equation below into the form given in #2 (a)?

$$y = x^2 - 8x + 12$$

**II. Review:**

**III. Recall:**

3.  $(x - 3)(x - 3) = x^2 - 6x + 9$

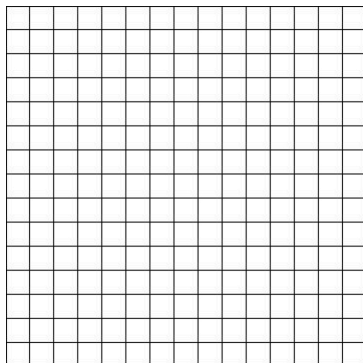
4. For value of  $k$  will each trinomial be a perfect square?

(a)  $x^2 - 12x + k$

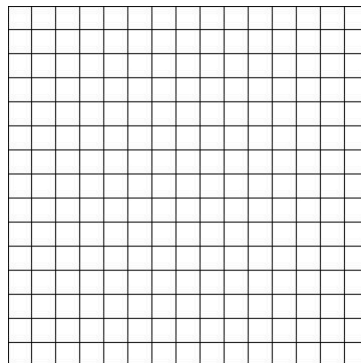
(b)  $x^2 + 3x + k$

**IV. Applications:** Write each quadratic equation in vertex form  $y = a(x - h)^2 + k$  and sketch its graph.

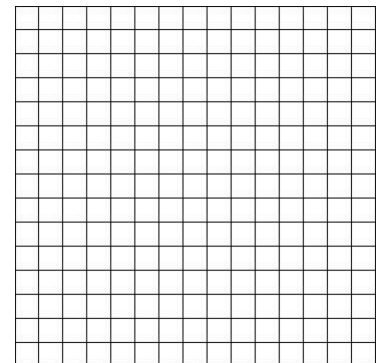
5.  $y = x^2 - 8x + 12$



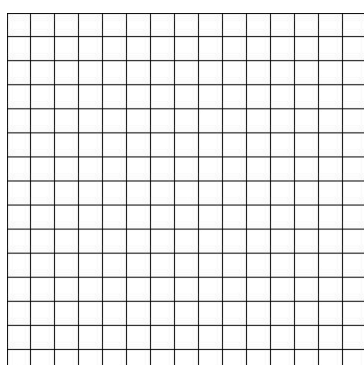
6.  $y = x^2 + 10x + 28$



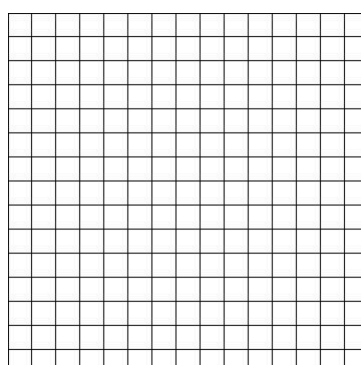
7.  $y = 2x^2 + 12x + 15$



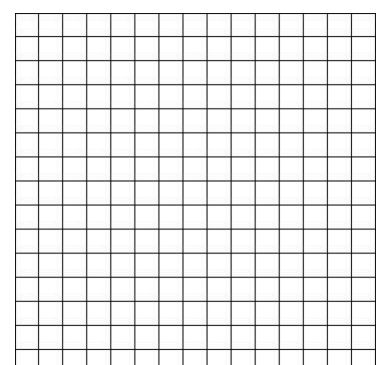
8.  $y = -x^2 + 4x - 8$



9.  $y = 2x^2 - 20x + 51$



10.  $y = 3x^2 + 36x + 107$



## MPS21 Homework 23

1. Solve by factoring:

(a)  $x^2 - 2x - 8 = 0$

(b)  $x^2 + 9 = 6x$

(c)  $x^2 - 8x = -15$

2. For each equation below:

(i) Find the axis of symmetry ( $x = \frac{-b}{2a}$ ) to obtain the  $x$ -coordinate of the vertex.

(ii) Substitute the value you found for  $x$  in order to find the  $y$ -coordinate of the vertex.

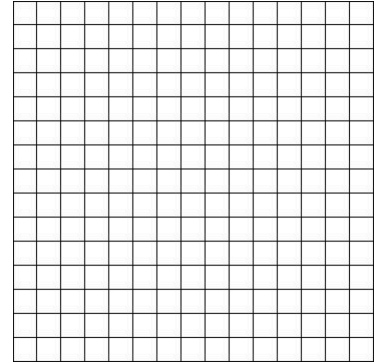
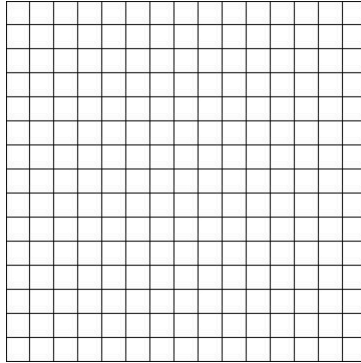
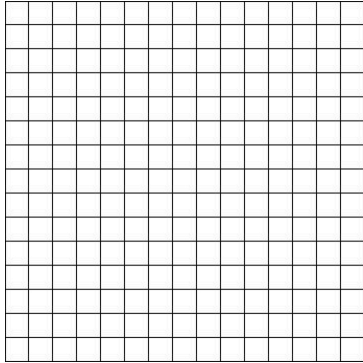
(iii) Plot the vertex and use the  $1a, 3a, 5a, \dots$  method to graph the parabola.

(iv) Identify the roots of the equation (i.e., the zeros or  $x$ -intercepts)

(a)  $y = x^2 - 2x - 8$

(b)  $y = x^2 - 6x + 9$

(c)  $y = x^2 - 8x + 15$

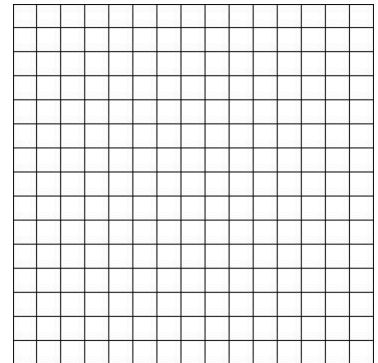
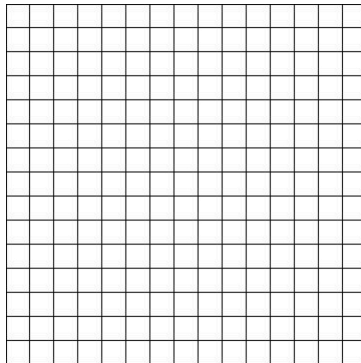
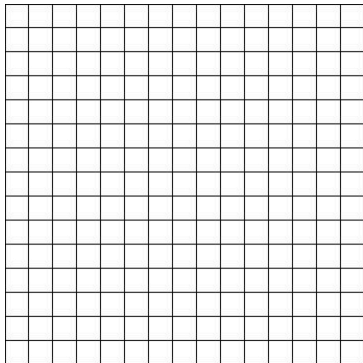


3. Complete the square to write each equation in vertex form ( $y = a(x - h)^2 + k$ ) and then use the equation in vertex form to sketch the graph. Identify the roots from your graph.

(a)  $y = x^2 - 2x - 8$

(b)  $y = x^2 - 6x + 9$

(c)  $y = x^2 - 8x + 15$



4. Write in vertex form and sketch the graph:  $y = 2x^2 - 4x + 3$

