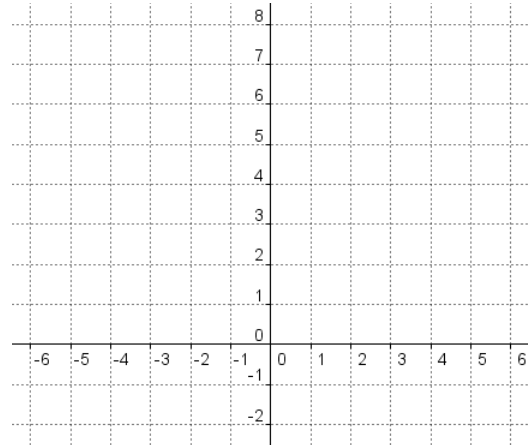


## Graphing Quadratic Relations by Factoring

Graph the quadratic relation  $y = -2(x - 4)^2 + 8$ . Write the coordinates of the vertex and x-intercepts.



Write the quadratic relation  $y = -2(x - 4)^2 + 8$  in standard form and factored form.

Conclusion →

This means that we can graph a quadratic relation from standard form, if we are able to factor it.

To graph a parabola we need to know the vertex  $(h,k)$ . This means we need to determine the axis of symmetry ( $x=h$ ) and the maximum or minimum value ( $y=k$ ).

For the equation  $y = a(x-r)(x-s)$ , the x-intercepts will be \_\_\_\_\_ and \_\_\_\_\_.

The axis of symmetry is directly in between the x-intercepts and can be found by

$x = \frac{r+s}{2}$ , where x is the x-coordinate of the vertex ( $h$ ).

To find the maximum or minimum value ( $k$ ), we need to find the y coordinate that corresponds to the x-coordinate of the vertex. This can be found by substituting  $x$  into the original equation. The original equation can be written in standard form ( $y = ax^2 + bx + c$ ) or factored form ( $y = a(x-r)(x-s)$ ).

Once the vertex has been determined, the step pattern can be applied (using  $a$  from  $ax^2+bx+c$ ) and the parabola can be completed.

### **Summary – Graphing a Quadratic Relation from its Factors**

1. Find the x-intercepts by factoring
2. Determine the axis of symmetry
3. Determine the maximum or minimum value
4. Determine the vertex
5. Graph

Examples - Graph each of the following quadratic relations by factoring.

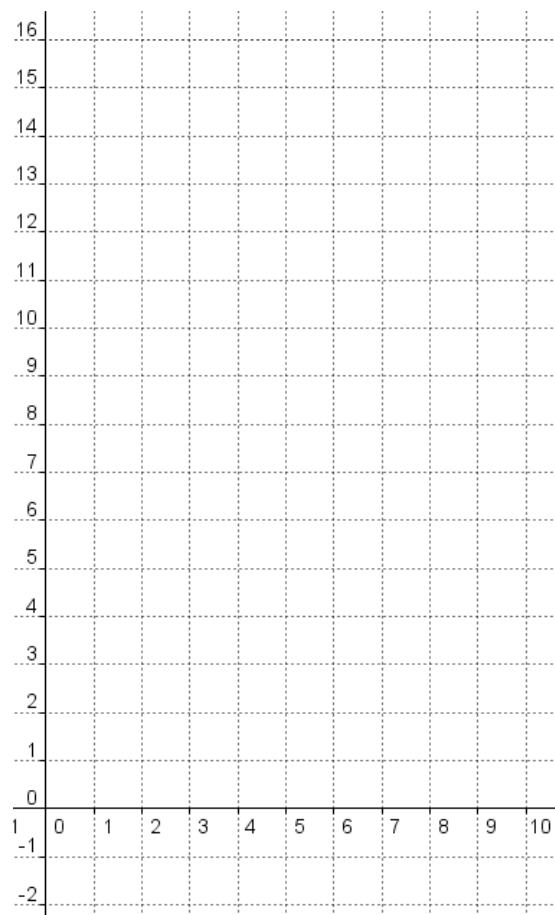
a.  $y = -x^2 + 10x - 9$

***x-intercepts***

***Axis of  
Symmetry***

***Maximum or  
Minimum Value***

***Vertex***



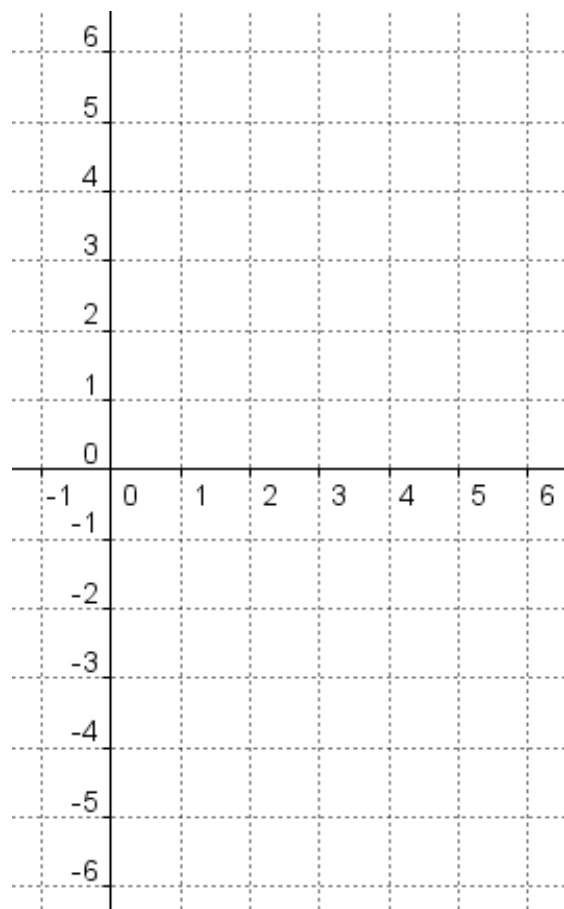
b.  $y = x^2 - 5x$

***x-intercepts***

***Axis of  
Symmetry***

***Maximum or  
Minimum Value***

***Vertex***



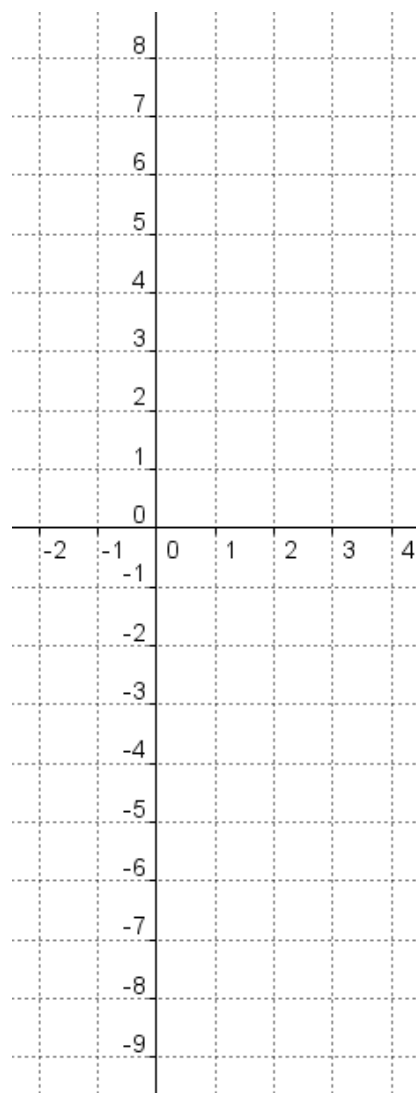
c.  $y = 4x^2 - 8x - 5$

***x-intercepts***

***Axis of  
Symmetry***

***Maximum or  
Minimum Value***

***Vertex***



## Homework

Graph each of the following quadratic relations by determining the x-intercepts, axis of symmetry, maximum or minimum value, and vertex. Show your work.

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

<b><i>x-intercepts</i></b>	<b><i>Axis of Symmetry</i></b>	<b><i>Maximum or Minimum Value</i></b>	<b><i>Vertex</i></b>

2.  $y = -x^2 + 8x - 16$

<b><i>x-intercepts</i></b>	<b><i>Axis of Symmetry</i></b>	<b><i>Maximum or Minimum Value</i></b>	<b><i>Vertex</i></b>

3.  $y = 5x^2 - 20$

<b><i>x-intercepts</i></b>	<b><i>Axis of Symmetry</i></b>	<b><i>Maximum or Minimum Value</i></b>	<b><i>Vertex</i></b>

4.  $y = 0.5x^2 - 3x - 8$

<b><i>x-intercepts</i></b>	<b><i>Axis of Symmetry</i></b>	<b><i>Maximum or Minimum Value</i></b>	<b><i>Vertex</i></b>

5.  $y = 2x^2 + 6x + 4$

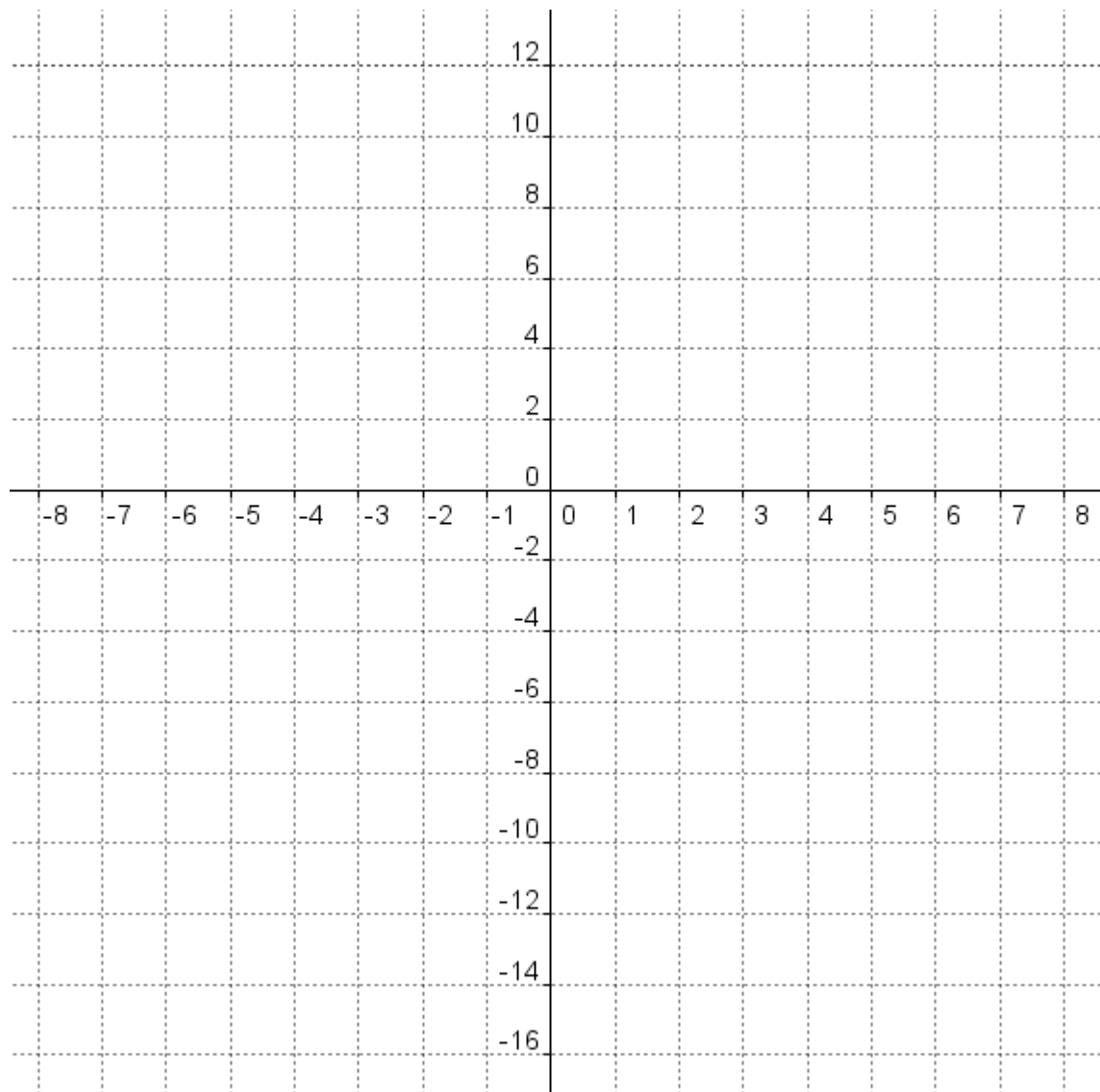
<b><i>x-intercepts</i></b>	<b><i>Axis of Symmetry</i></b>	<b><i>Maximum or Minimum Value</i></b>	<b><i>Vertex</i></b>

6.  $y = -4x^2 + 4x + 3$

<b><i>x-intercepts</i></b>	<b><i>Axis of Symmetry</i></b>	<b><i>Maximum or Minimum Value</i></b>	<b><i>Vertex</i></b>

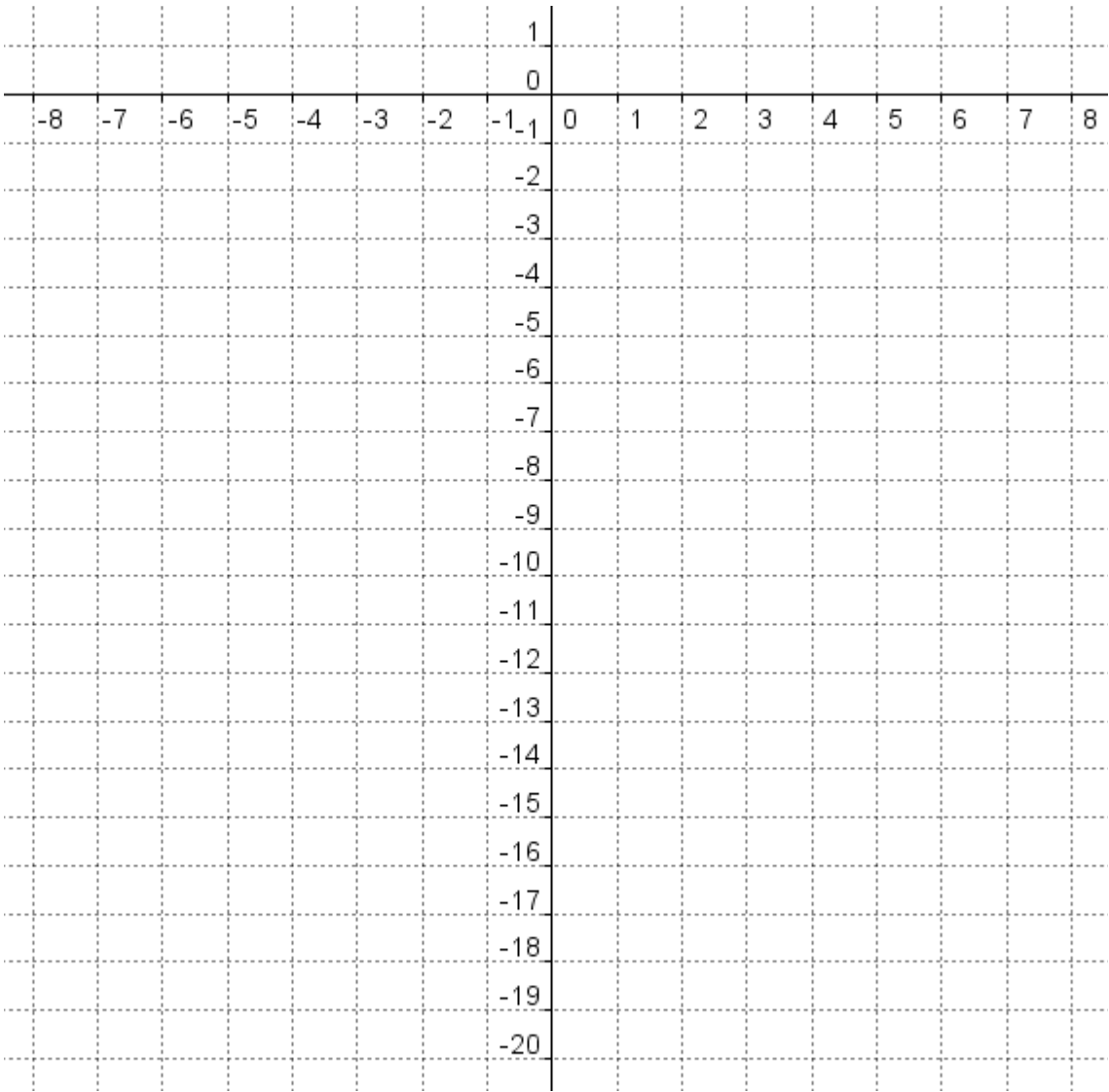
Homework grids:

Questions 1 and 2:





Questions 3 and 4:



Questions 5 and 6:

