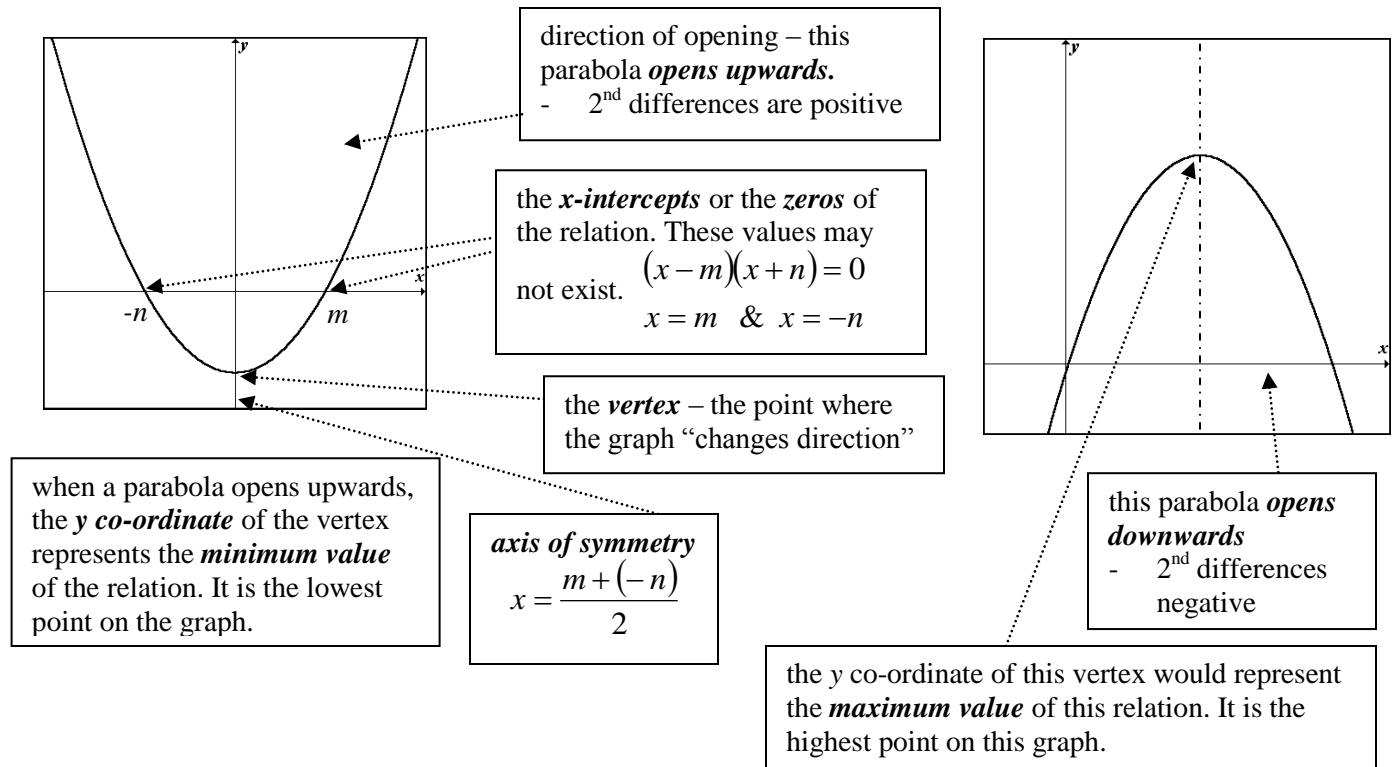


Recall: A quadratic relationship is modeled by $y = ax^2 + bx + c$ when this relationship is graphed; the graph of a quadratic relationship is called a **parabola**.

The general shape of a quadratic relation is shown in the sketches below:



Example 1: Solving Quadratic equation

Solve the equation and check your solutions for b

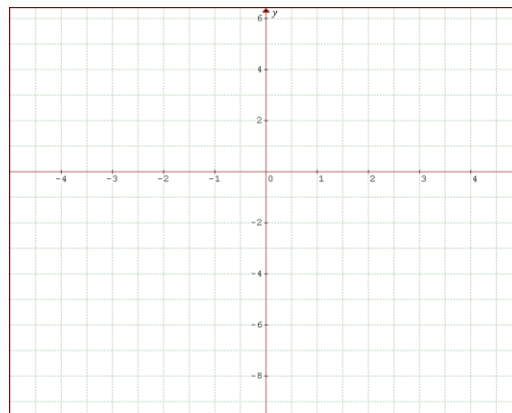
a) $x^2 + 7x - 30 = 0$

b) $18y - 14 = 4y^2$

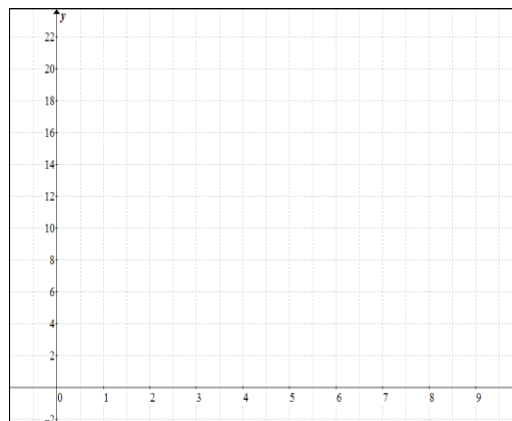
Example 2: Quadratic Relation

Determine the vertex, axis of symmetry, the zeros (x -intercepts), and y -intercept for the following quadratic relation. Sketch the relation on the given grid.

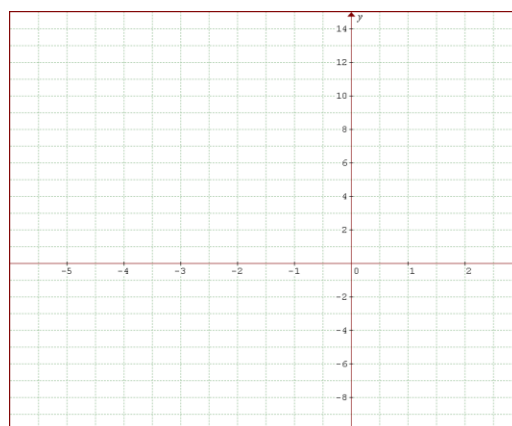
a) $y = 2(x - 3)(x + 1)$



b) $y = x^2 - 9x + 20$



c) $y = -2x^2 - 7x + 4$



Exercise

1) The name of the images in the form of $y = a(x - s)(x - t)$ are _____, provided that $a \neq$ _____ are called _____ relations

The equation written the form $y = a(x - s)(x - t)$ is said to be in _____ form and the equation written the form $y = ax^2 + bx + c$ is said to be in _____ form.

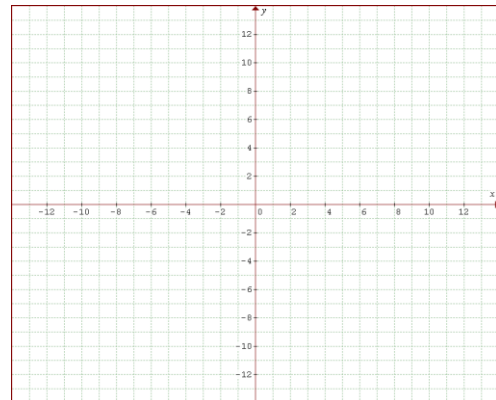
If $a > 0$, the parabola opens _____ and has a _____ point.

If $a < 0$, the parabola opens _____ and has a _____ point.

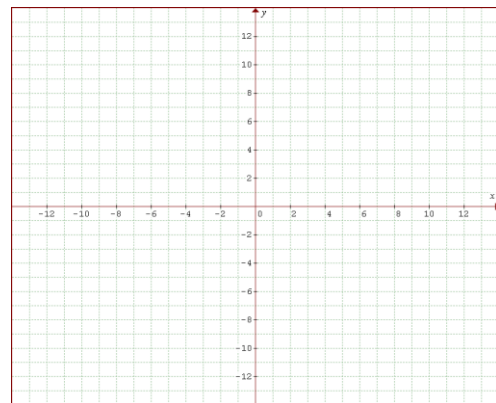
The zeros of the quadratic can be determined by letting _____ and solve for _____.

2) Determine the zeros (x -intercepts), y -intercept, axis of symmetry, and the vertex, the for the following quadratic relation. Sketch the relation on the given grid.

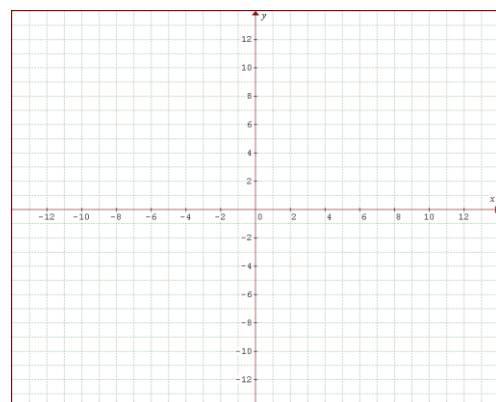
a) $y = x^2 - 4x - 5$



b) $y = -x^2 - 6x - 8$



c) $y = 2x^2 - 4x - 6$



3) Complete the table. You don't need to graph.

a) $y = 2x^2 - 16x - 210$	Zeros (x -intercepts):	y -intercept:
	Axis of Symmetry:	Vertex:
b) $y = -3x^2 + 21x - 18$	Zeros (x -intercepts):	y -intercept:
	Axis of Symmetry:	Vertex:
c) $y = 4x^2 + 16x + 7$	Zeros (x -intercepts):	y -intercept:
	Axis of Symmetry:	Vertex:
d) $y = 16x^2 - 9$	Zeros (x -intercepts):	y -intercept:
	Axis of Symmetry:	Vertex:
e) $y = -\frac{1}{4}x^2 + 4x - 15$	Zeros (x -intercepts):	y -intercept:
	Axis of Symmetry:	Vertex:
f) $y = \frac{-1}{2}x^2 + x + \frac{21}{8}$	Zeros (x -intercepts):	y -intercept:
	Axis of Symmetry:	Vertex:

Properties of Quadratic Relations

Date: _____

4) For each of the following quadratic functions:

- Factor the trinomial to determine the zeros.
- Determine the equation of the axis of symmetry
- Determine the vertex of the parabola
- Use the vertex and the zeros to draw a sketch (Create your own grid).

a) $y = x^2 - 6x + 8$

b) $y = x^2 + 2x - 3$

c) $y = x^2 - 9x + 18$

d) $y = -x^2 - 8x - 12$

e) $y = -x^2 + 5x - 4$

f) $y = 20x^2 + 60x + 45$

Answers:

1) parabolas $a \neq 0$ quadratic factored form standard form / expanded form
 up minimum down maximum $y = 0$ x

2a) x -int: -1 & 5 y -int: -5 Axis of symmetry: $x = 2$ Vertex: (2,-9)b) x -int: -4 & -2 y -int: -8 Axis of symmetry: $x = -3$ Vertex: (-3,1)c) x -int: -1 & 3 y -int: -6 Axis of symmetry: $x = 1$ Vertex: (1,-8)3a) x -int: -7 & 15 y -int: -210 Axis of symmetry: $x = 4$ Vertex: (4,-242)b) x -int: 1 & 6 y -int: -18 Axis of symmetry: $x = 3.5$ Vertex: (3.5, 18.75)c) x -int: -3.5 & -0.5 y -int: 7 Axis of symmetry: $x = -2$ Vertex: (-2,-9)d) x -int: -0.75 & 0.75 y -int: -9 Axis of symmetry: $x = 0$ Vertex: (0,-9)e) x -int: 6 & 10 y -int: -15 Axis of symmetry: $x = 8$ Vertex: (8,1)f) x -int: -1.5 & 3.5 y -int: 2.625 Axis of symmetry: $x = 1$ Vertex: (1,3.125)4a) x -int: 2 & 4 y -int: 8 Axis of symmetry: $x = 3$ Vertex: (3,-1)b) x -int: -3 & 1 y -int: -3 Axis of symmetry: $x = -1$ Vertex: (-1,-4)c) x -int: 3 & 6 y -int: 18 Axis of symmetry: $x = 4.5$ Vertex: (4.5,-2.25)d) x -int: -6 & -2 y -int: -12 Axis of symmetry: $x = -4$ Vertex: (-4,4)e) x -int: 1 & 4 y -int: -4 Axis of symmetry: $x = 2.5$ Vertex: (2.5,2.25)f) x -int: -1.5 y -int: 45 Axis of symmetry: $x = -1.5$ Vertex: (-1.5,0)