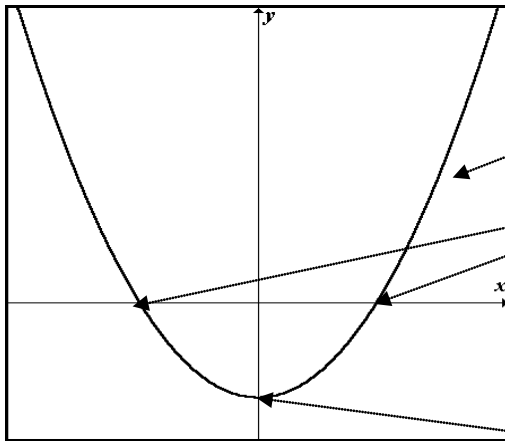


KEY FEATURES OF A PARABOLA

A **quadratic relation** has the equation in the form $y = ax^2 + bx + c$
where a, b, c are real numbers and $a \neq 0$

The graph of a **quadratic relation** is called a **parabola**.

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

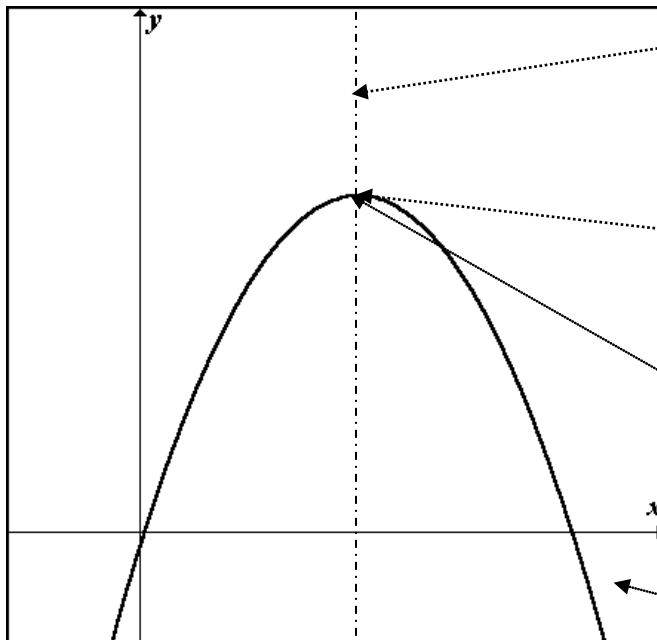


Direction of opening –
this parabola **opens
upward**.

The **x-intercepts** or the **zeros** of the function. These values may or may not exist depending on the direction of opening of the parabola and the location of the vertex.

The **vertex** – the point where the graph reaches an **Optimum Value** (either a maximum or a minimum value of y).

When a parabola opens upwards, the **y coordinate** of the vertex represents the **minimum value** of the function. It is the lowest point on the graph.



Axis Of Symmetry – the mirror line of reflectional symmetry of the parabola.

The **vertex** – the point where the axis of symmetry and the parabola intersect.

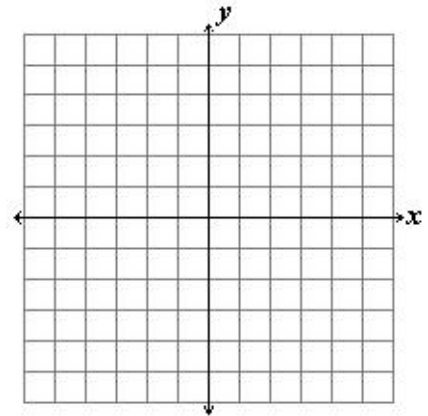
The **y coordinate** of this vertex would represent the **Optimum Value** of this function (in this case it is a **maximum**). It is the highest point on this graph.

This parabola **opens
downward**.

KEY FEATURES OF A PARABOLA

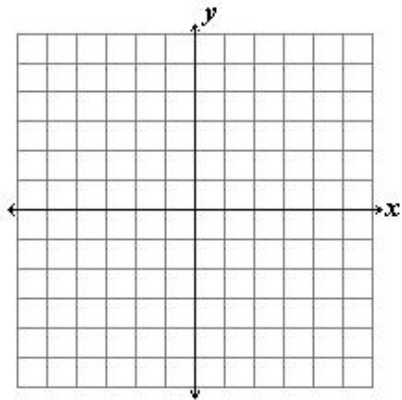
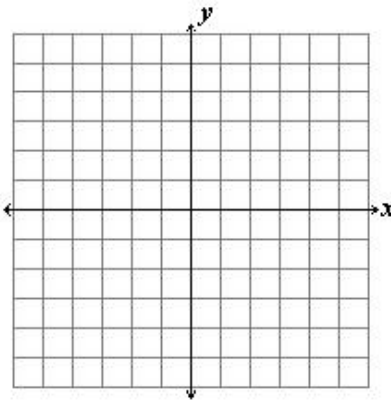
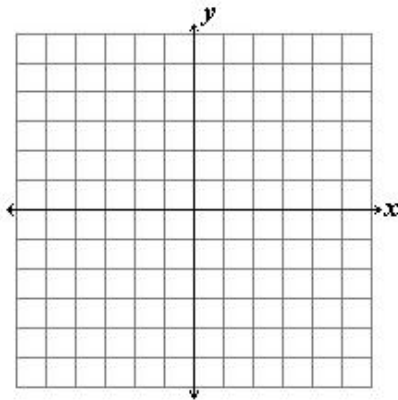
1 – AXIS OF SYMMETRY

- Unlike the human face, the parabola has a truly _____ shape.
- If one “arm” of the parabola is reflected in the _____ line or _____ the other “arm” is created.
- Because the _____ is a vertical line with an _____ slope, its equation is expressed as _____.
- The equation of the axis of symmetry for the parabola drawn is _____



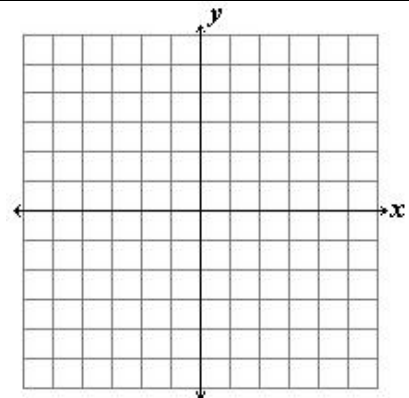
2 – X-INTERCEPTS

- The x-intercepts of the parabola are called the _____.
- There may be 0, 1, or 2 _____.



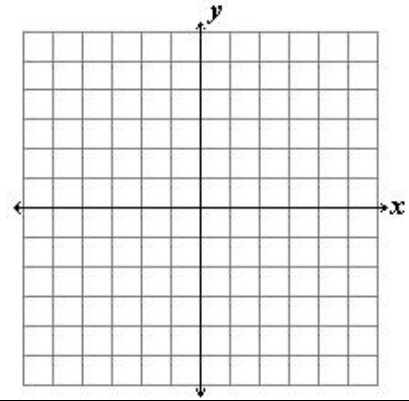
3 – Y-INTERCEPT

- The parabola crosses the _____ at the y-intercept.
- The y-intercept for the graph shown is _____
- At the y-intercept, $x = 0$



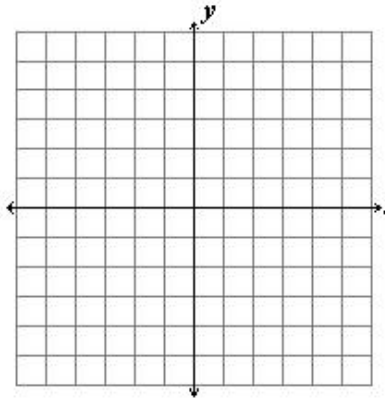
4 – REFLECTED POINT

- Any point on one arm may be reflected in the axis of symmetry to create a _____, _____, _____ on the other arm.

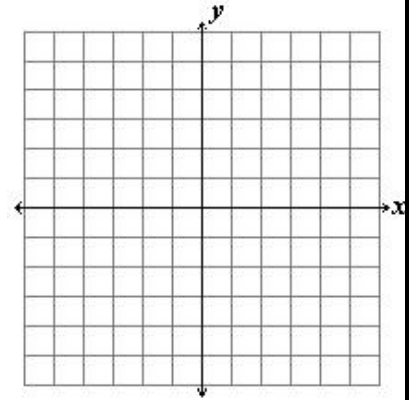
**5 – DIRECTION OF OPENING**

- The sign in front of the x^2 term determines the _____

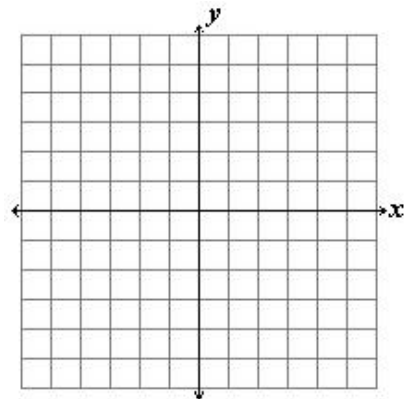
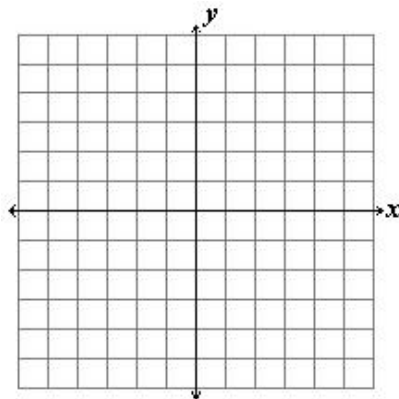
The parabola
may open
_____ when
the sign is



The parabola
may open
_____ when
the sign is

**6 – VERTEX (MAXIMUM or MINIMUM)**

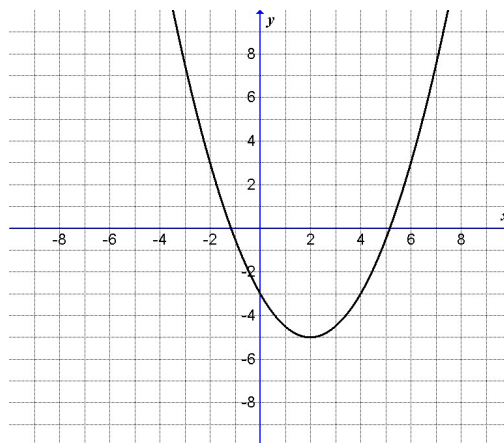
- The parabola changes direction at the point called the _____.
- The vertex can be the “top of a mountain”, or a _____ point.
- The vertex can be the “bottom of a valley”, or a _____ point.
- The _____ always passes through the _____.



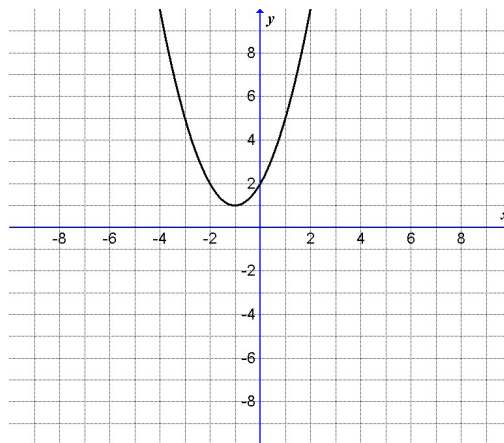
Examples

Complete the analysis for each of the following parabolas.

Draw the axis of symmetry and state its equation	
Draw and state the zeroes (x-intercepts)	
Draw and state the y-intercept	
State the direction of opening of the parabola	
Draw and state the vertex as an (x, y) point	



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Draw and state the zeroes (x-intercepts)	
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