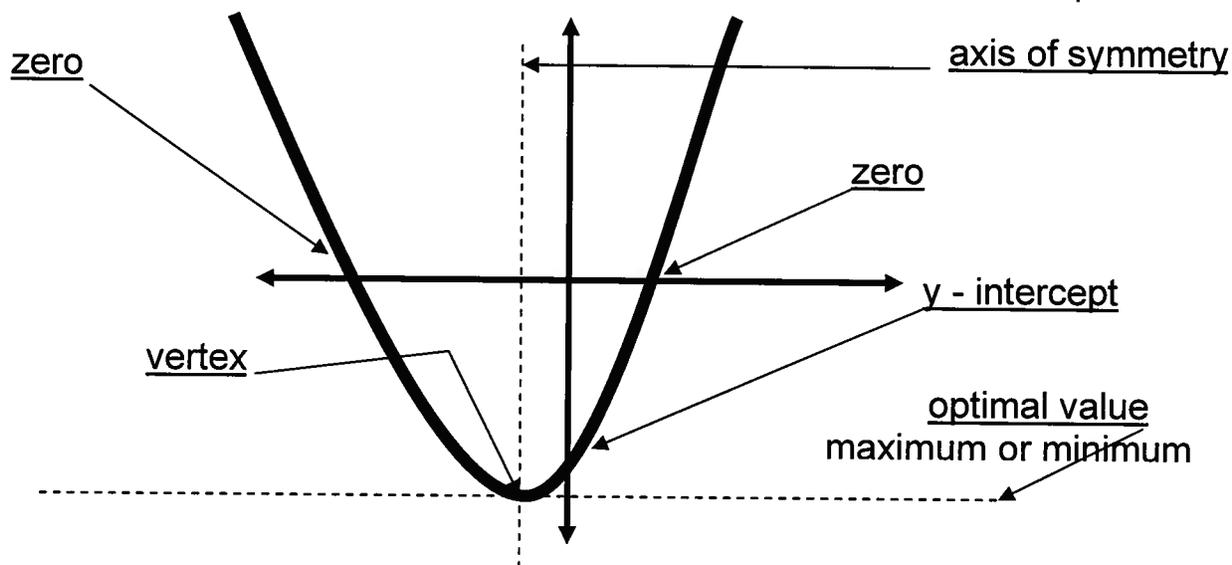


Quadratic Relations – The Parabola

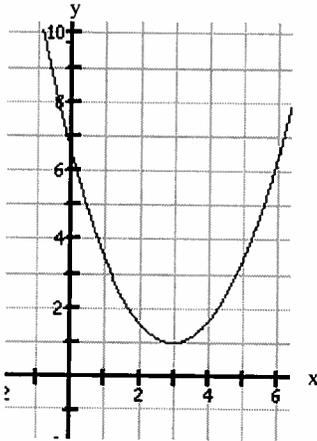
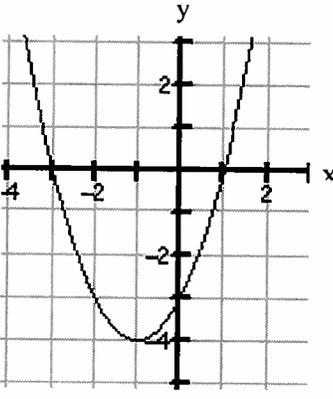
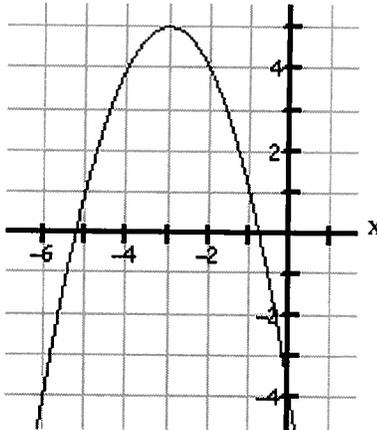
The graph of a quadratic relation is called a parabola. The parabola has some important features:



Everything you ever wanted to know about parabolas...

- Parabolas can open up or down
- The **zero** of a parabola is where the graph crosses the x – axis
- “Zeroes” can also be called “x – intercepts” or “roots”
- The **axis of symmetry** divides the parabola into two equal halves
- The **vertex** of a parabola is the point where the axis of symmetry and the parabola meet. It is the point where the parabola is at its **maximum or minimum** value.
- The **optimal value** is the value of the y co-ordinate of the vertex
- The **y-intercept** of a parabola is where the graph crosses the y – axis

For the following parabolas, fill in the table which follows.

Parabola Graph			
Vertex			
Optimal Value Max/Min			
Axis of Symmetry			
Zeroes			
Direction of Opening			
Y – intercept			

True or False... (use the above for answers)

- The axis of symmetry goes through the y – intercept.
- The vertex is always located halfway between the zeroes.
- The y – coordinate of the vertex is always the same as the optimal value.
- The x – coordinate of the vertex is always the same as the axis of symmetry.
- A parabola must open up.
- The y – intercept is always positive.

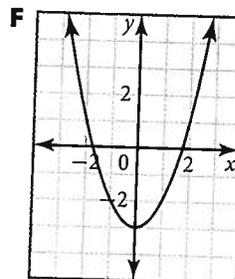
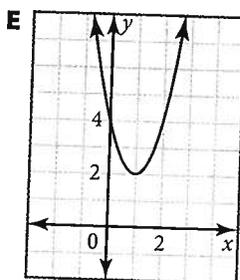
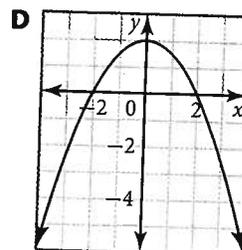
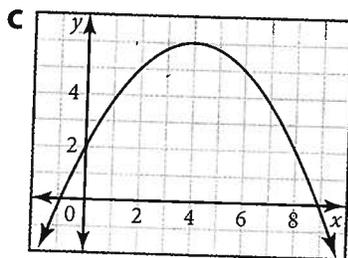
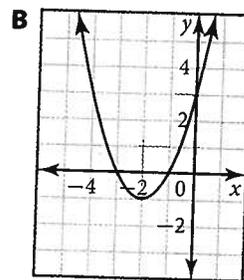
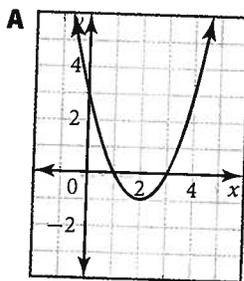
Discuss the Concepts

- D1.** Amir states that the vertex and the maximum or minimum value are the same thing. Is Amir correct? Why or why not?
- D2.** How do you know whether a quadratic relation has a maximum or a minimum value?
- D3.** A student says that a parabola has one y -intercept but could have two x -intercepts. Is the student correct? Why or why not?

Practise the Concepts **A**

For help with question 1, refer to Example 1.

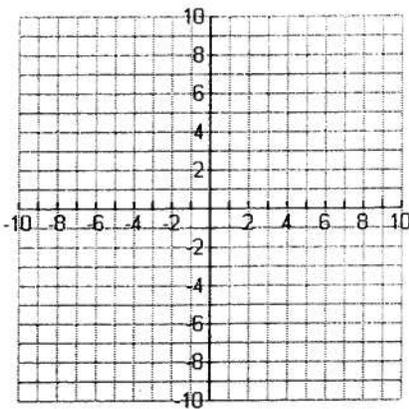
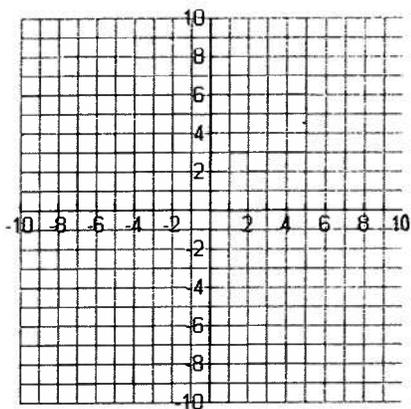
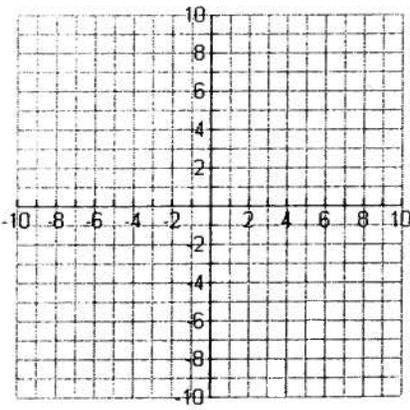
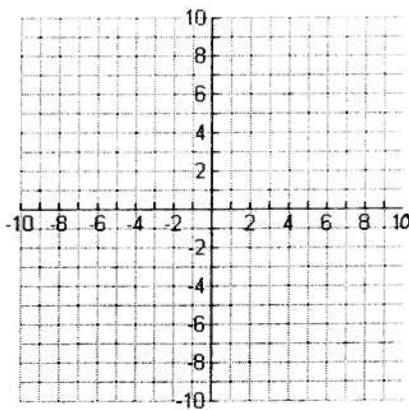
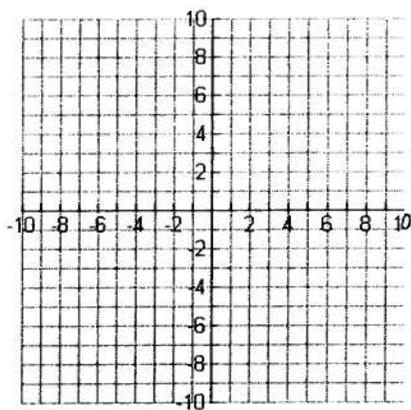
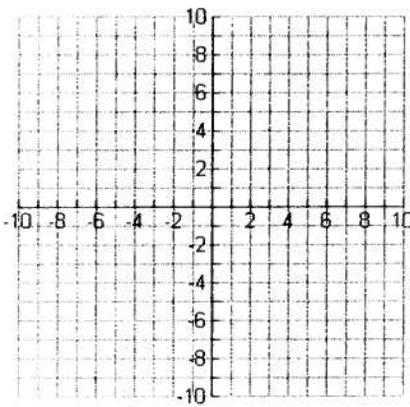
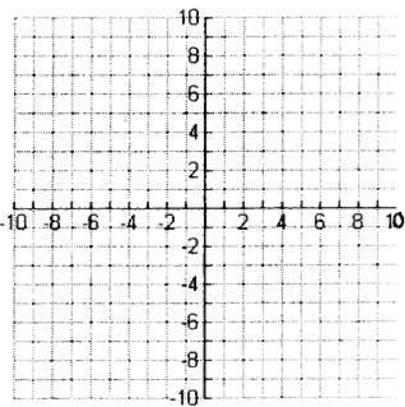
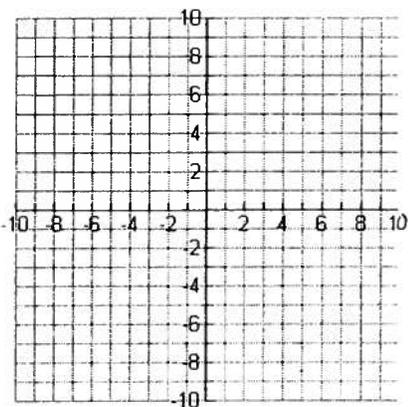
1. For each graph, identify
- the coordinates of the vertex
 - the equation of the axis of symmetry
 - the y -intercept
 - the maximum or minimum value
 - the x -intercepts



Parabola Practice

Graph each of the following parabolas:

- 1) vertex at $(3,4)$ with zeros at 1 and 5
- 2) minimum value of -4 , zeros at -1 and -5 , y -intercept at $(0,5)$
- 3) vertex at $(2, -1)$, y -intercept at $(0,3)$, zero at $(1,0)$
- 4) axis of symmetry at $x=-2$, maximum value of -1 , y -intercept $(0,-5)$
- 5) vertex at $(-2,4)$ and zeros at -1 and -3
- 6) minimum value of 2 , no zeros, y -intercept of $(0,8)$
- 7) vertex at $(2,0)$, y -intercept at $(0,-8)$
- 8) axis of symmetry at $x=-3$, minimum value of -3 , y -intercept at 0

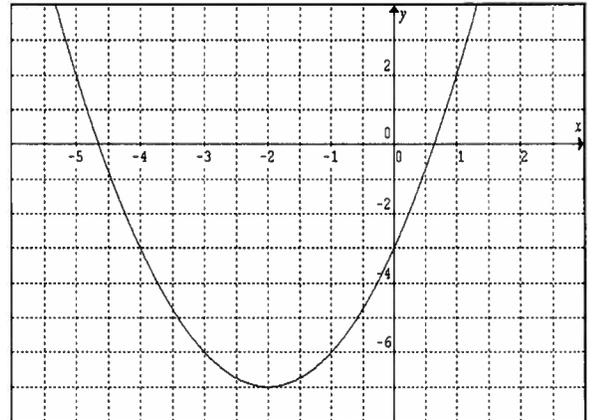


Assessment and Evaluation: Unit 3 Lesson 2

1. (10 marks) Find the five key features of the following functions.

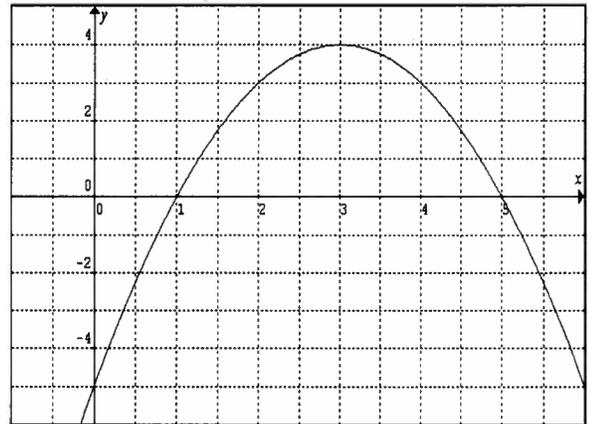
(a)

- Zeroes _____
- Axis of Symmetry _____
- Maximum/Minimum _____
- Vertex _____
- y-intercept _____



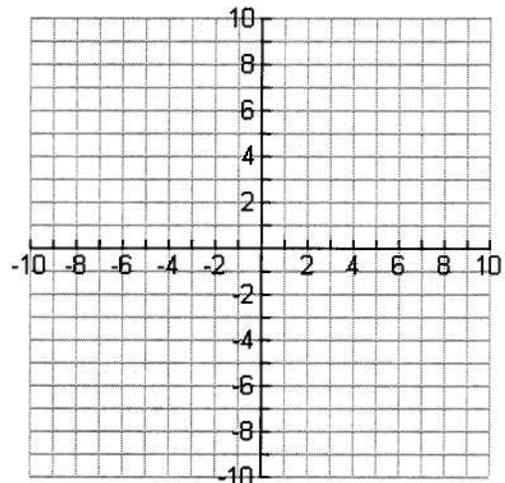
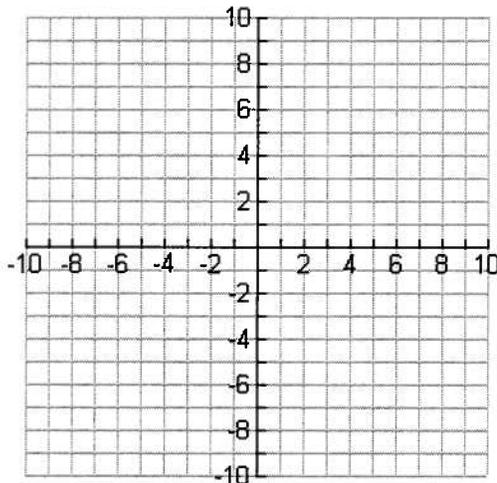
(b)

- Zeroes _____
- Axis of Symmetry _____
- Maximum/Minimum _____
- Vertex _____
- y-intercept _____



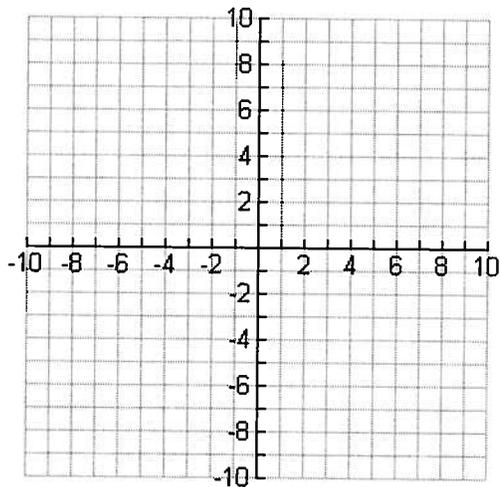
2. (8 marks) Using the given information, sketch each of the following parabolas.

- a) Vertex at (5,1) with zeros at 3 and 7 b) vertex at (2, -1), y-intercept at (0,3), zero at (1,0)



Assessment and Evaluation: Unit 3 Lesson 2

c) axis of symmetry at -4 , maximum value of -3 , y -intercept of $(0, -7)$



d) vertex at $(2, 0)$, y -intercept at $(0, -8)$

