# The quadratic model

1 Observe the following graphs closely; they represent quadratic functions.

  a) Determine the coordinates of the vertex of each parabola.

  b) Determine the coordinates of point A whose x-coordinate is one unit greater than the x-coordinate of the vertex.

  c) Estimate the value of parameter **a** of the quadratic function by calculating the difference between the value of the y-coordinate of point A and the vertex.

 **d)** Using your answers to the preceding questions, determine the rule for each of these functions.
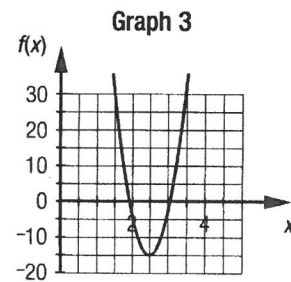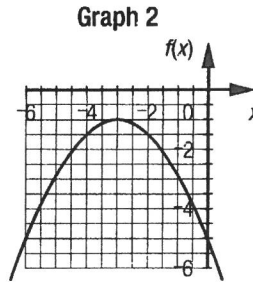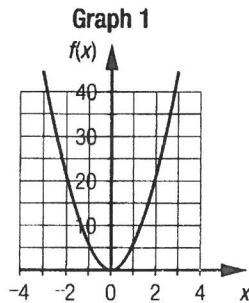
Graph 1	Graph 2	Graph 3

  a) Vertex (_____ , _____)

  b) Point A (_____ , _____)

  c) Parameter **a** = _____

  d) Rule: _____

  a) Vertex (_____ , _____)

  b) Point A (_____ , _____)

  c) Parameter **a** = _____

  d) Rule: _____

  a) Vertex (_____ , _____)

  b) Point A (_____ , _____)

  c) Parameter **a** = _____

  d) Rule: _____

2 Consider the table of values below.

x	0	1	2	3	4	5	6	7	8
x^2									
y	0	-2.5	-10	-22.5	-40	-62.5	-90	-122.5	-160

  a) Complete the table of values.

  b) Draw a scatter plot with the values of x^2 as the x-coordinates and the values of y as the y-coordinates.

  c) Which model best represents this scatter plot?

  _____

  d) Determine the equation of this function.

  _____
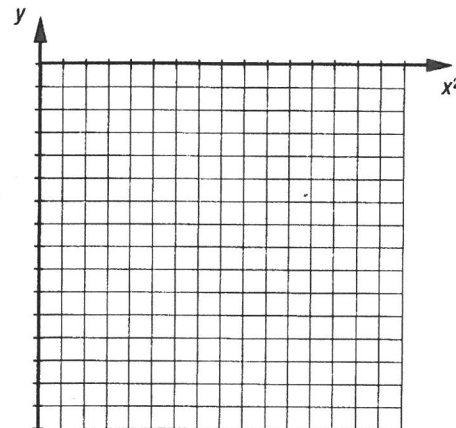
3 Associate each of the equations below with the corresponding curve on the graph.

$f(x) = 3(x - 4)^2 + 2$ Curve _____

$f(x) = -3(x + 4)^2 - 2$ Curve _____

$f(x) = 0.5(x + 4)^2 + 2$ Curve _____

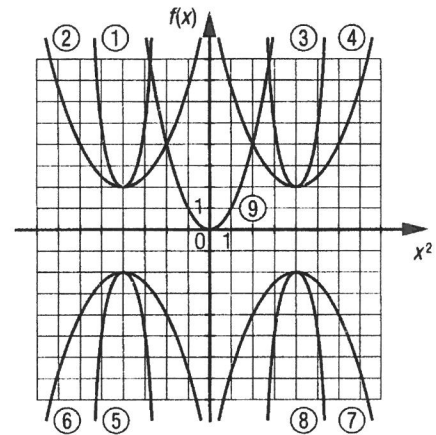$f(x) = -0.5(x - 4)^2 - 2$ Curve _____

$f(x) = -3(x - 4)^2 - 2$ Curve _____

$f(x) = x^2$ Curve _____

$f(x) = 3(x + 4)^2 + 2$ Curve _____

$f(x) = -0.5(x + 4)^2 - 2$ Curve _____

$f(x) = 0.5(x - 4)^2 + 2$ Curve _____

4 a) Tom throws a ball that attains its maximum height of 6 m, 2 s after it is thrown. One second later, the ball reaches a height of 5.1 m. Since the height as a function of time can be modelled by a quadratic function, determine the coordinates of the vertex of the parabola for this function. What are the values of the parameters **h** and **k**?

_____

b) Determine the value of parameter **a** using the same method as in number **1**.

_____

c) What is the equation of this function?

_____

d) Represent this function in the adjacent Cartesian plane.

e) What was the initial height of the ball when Tom threw it?

_____

_____

Tom's throw

Height (m)

0

Time (s)