Name:

Sydney Girls High School
Mathematics Department

Year 10
Class Test 4 – The Parabola and other graphs.

Time Allowed: 60 minutes

Instructions: • All necessary working must be shown for questions 4 and 5.
• Draw all graphs on the graph paper provided

Question 1: (8 marks)

On separate sets of axes sketch the following parabolas:

(a) $y = 2x^2$

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

(c) $y = (x+3)^2$

(d) $y = -x^2 + 6x - 5$

Question 2: (7 marks)

(a) On the same set of axes sketch and label the graphs of the following parabolas:

(i) $y = x^2$ (ii) $y = 3x^2$ (iii) $y = \frac{1}{3}x^2$

(b) Comment (1 sentence only) on the effect of the co-efficient of x^2 on the graph $y = x^2$

Question 3: (8 marks)

On separate sets of axes sketch the graphs of the following:

(a) $x^2 + y^2 = 25$

(b) $4x + 2y = 12$

(c) $y = 3^{-x}$

(d) $y = -\frac{3}{x}$

Question 4: (11 marks)

Given the parabola $y = x^2 - 6x + 8$:

(a) find the x-intercepts

(b) find the y-intercept

(c) find the equation of the axis of symmetry

(d) find the co-ordinates of the vertex

(e) determine its concavity

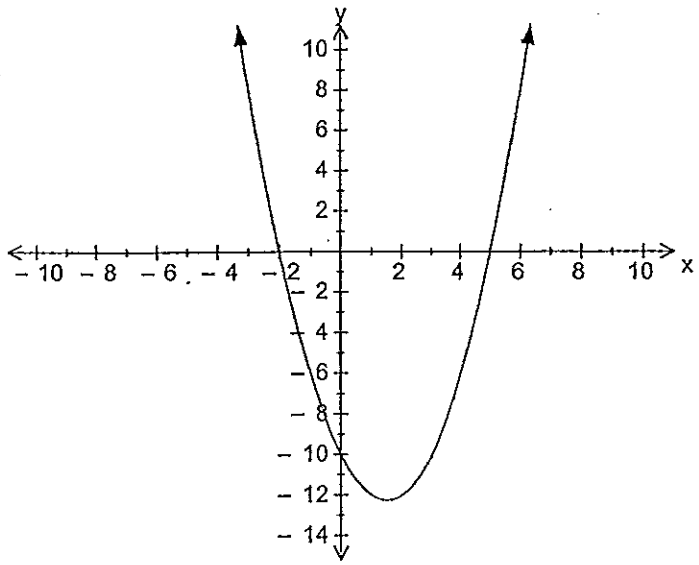
(f) Find the min/max value of the parabola

(g) Sketch the parabola (show all relevant features)

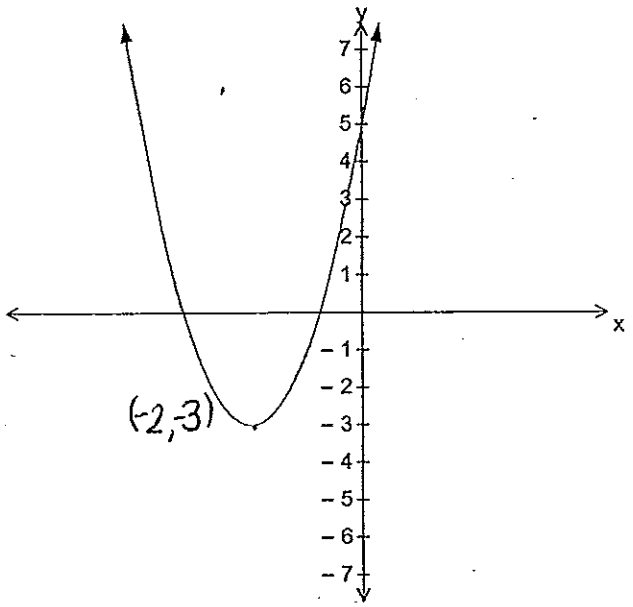
Question 5: (6 marks)

Determine the equation of the following graphs

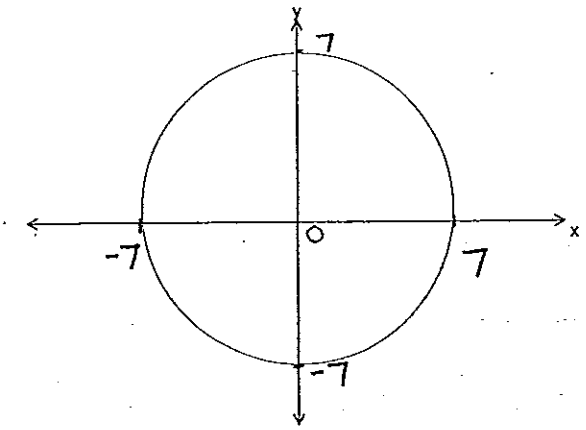
(a)



(b)



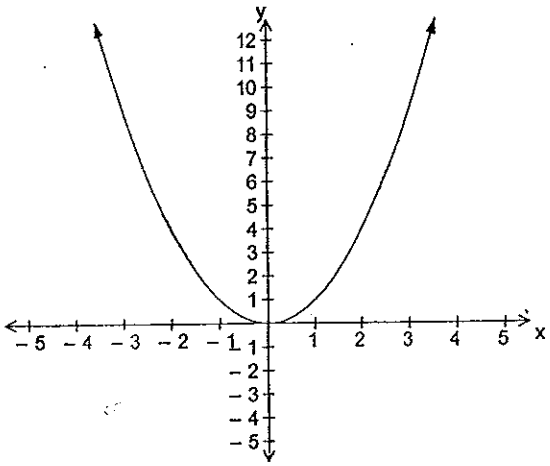
(c)



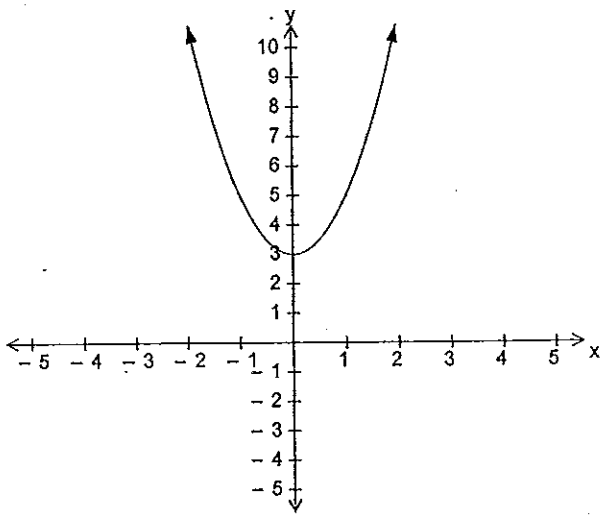
Solutions to Class test 4: The Parabola and other graphs

Question 1: (8 marks)

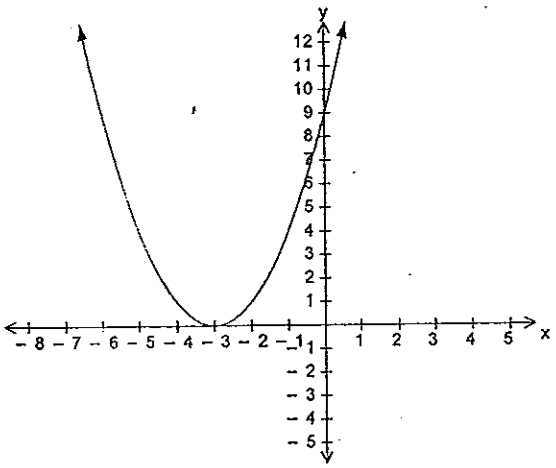
(a) $y = 2x^2$



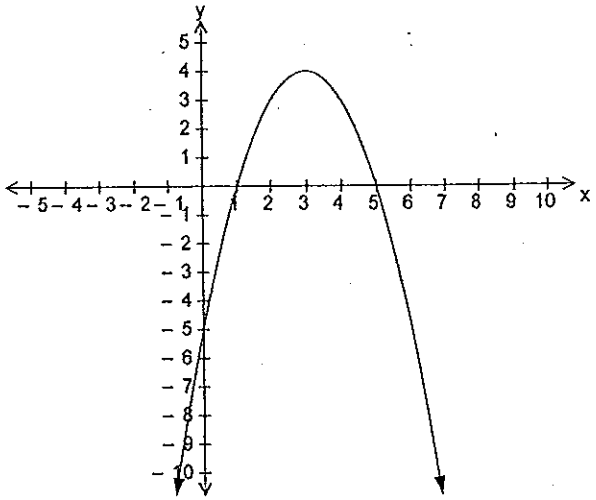
(b) $y = 2x^2 + 3$



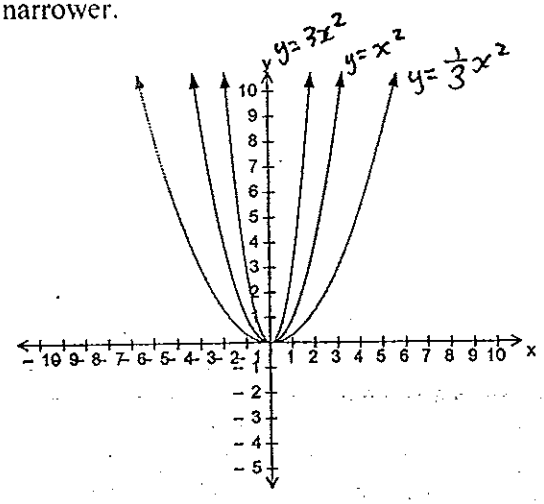
(c) $y = (x+3)^2$



(d) $y = -x^2 + 6x - 5$

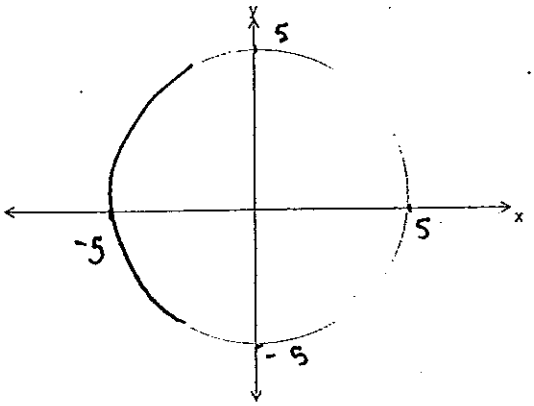


(2) (b) The effect of the co-efficient is that as 'a' increases the graph of the parabola becomes narrower.

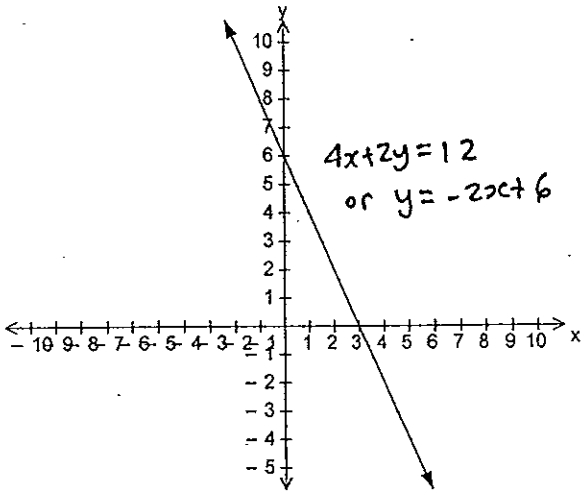


Question 3: (8 marks)

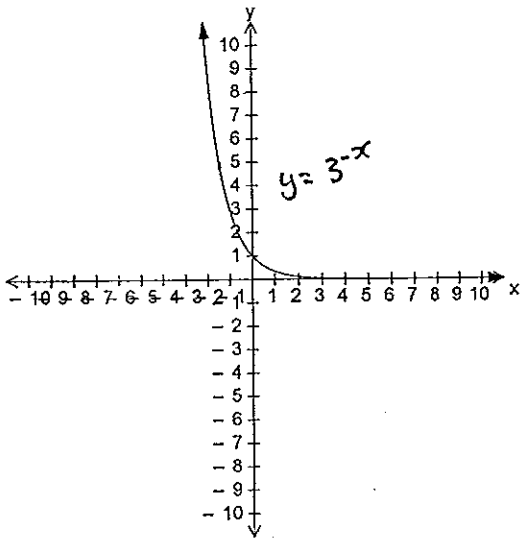
(a)



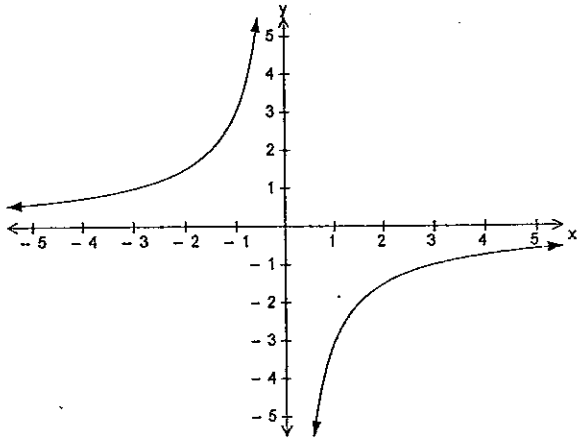
(b)



(c)



(d)



$y = -\frac{3}{x}$

Question 4: (11 marks)

Given the parabola $y = x^2 - 6x + 8$:

(a) x-intercepts $\Rightarrow$ let $y = 0$

$0 = x^2 - 6x + 8$

$0 = (x-4)(x-2)$

$2,4 = x$

x-intercepts are 2 and 4 (2 marks)

(b) y-intercept is 8 (1 mark)

Q4(c) Axis of symmetry $x = \dfrac{-b}{2a}$

$= \dfrac{6}{2}$ (2 marks)

$= 3$

(d) if $x = 3$, $y = (3)^2 - 6(3) + 8$

$= 9 - 18 + 8$

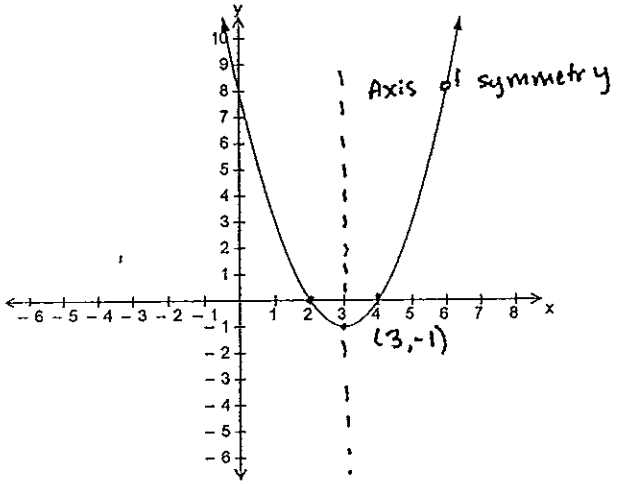
$= -1$

vertex is (3, -1) (2 marks)

(e) since $a > 0$, the parabola is concave up (1 mark)

(f) minimum value occurs at $y = -1$ (1 mark)

(g)



Question 5 (6 marks)

(a) Case 1: $y = a(x - p)(x - q)$ where p and q are the x-intercepts, $p = -2$, $q = 5$, & $x = 0$, $y = -10$

Firstly, find a

$-10 = a(0 + 2)(0 - 5)$

$-10 = -10a$

$1 = a$

$y = (x + 2)(x - 5)$

(b) Case 2: $y = a(x - k)^2 + h$ where (k, h) is the vertex

$k = -2$, $h = -3$, and $x = 0$, $y = 5$

Firstly, find a

$5 = a(0 + 2)^2 - 3$ $\quad \therefore y = 2(x + 2)^2 - 3$ or $y = 2x^2 + 8x + 5$

$5 = 4a - 3$

$8 = 4a$

$2 = a$

(c) equation of a circle

$x^2 + y^2 = r^2$

$x^2 + y^2 = 7^2$

$x^2 + y^2 = 49$