Name:	Target Grade:	Actual Grade:

BRIGHT CULTURE

QUADRATIC EQUATIONS

READ THESE INSTRUCTIONS FIRST

INSTRUCTIONS TO CANDIDATES

1. Find a quiet, comfortable spot free place from distractions.

2. Spend one minute on each mark.

3. Time yourself for every single question.

4. Every chapter has their own question types. Ensure that you know the different question type for each chapter.

5. Make a conscientious effort to remember your mistakes, especially in terms of answering techniques. E.g Take a picture for the mistakes that you made, keep it in a photo album, and revise it over and over again.

6. Highlight question types that you tend to keep making mistakes and review them nearing exams.

7. Always review the common questions and question type that you tend to make mistakes nearing exams.

8. During exams, classify the question type and recall what you have learnt, how you need to analyse the questions for the different question type, what you need to take note of and answer with the correct answering techniques!

✨ Wishing you all the best for this test!

You've got this!

💡 With lots of love,
Bright Culture 💛

If you are struggling in this paper, means you need to work harder!

If you need any professional guidance and further advice
on how to advance, feel free to WhatsApp us at 91870820 or find us at
www.bright-culture.com/. We are committed to connect you to your
future to reach your goals.

MARKS
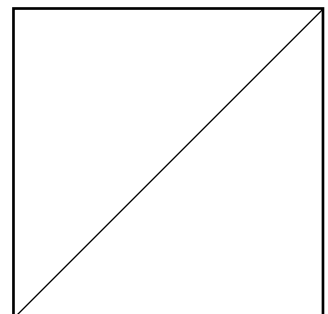
CHAPTER 1 QUADRATIC EQUATIONS

1 (a) Express $x^2 - 2x + 3$ in the form $(x - a) + b$.

Answer ……………………….. [2]
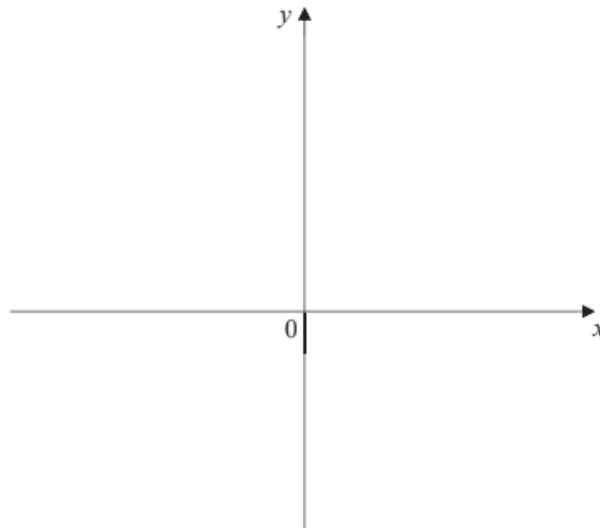
(b) Hence state the minimum value of $x^2 - 2x + 3$.

Answer .. ……….………….. [1]

(c) State the equation of the line of symmetry of the graph of $y = x^2 - 2x + 3$.

Answer .. ……….………….. [1]

2 (a) (i) Express $y = x^2 + 8x + 16$ in the form $y = (x - h)^2 + k$.

Answer .. ……….………….. [1]

(ii) Hence, sketch the graph of $y = x^2 + 8x + 16$ on the axes below. Indicate clearly the coordinates of the points where the graph crosses the axes and the turning point on the curve.

[2]

(b) State the equation of the line of symmetry for $y = x^2 + 4$.

Answer .. ……….………….. [1]

(c) State the coordinates of the turning point $y = (x + 2)^2$.

Answer .. (……….…………..) [1]

3 (a) Express $\dfrac{1}{x-3} - \dfrac{6}{x^2-9}$ as a single fraction in its simplest form.

Answer _____ [2]

(b) (i) Express $y = x^2 + 4x - 5$ in the form $y = (x + a)^2 + b$, where a and b are constants.
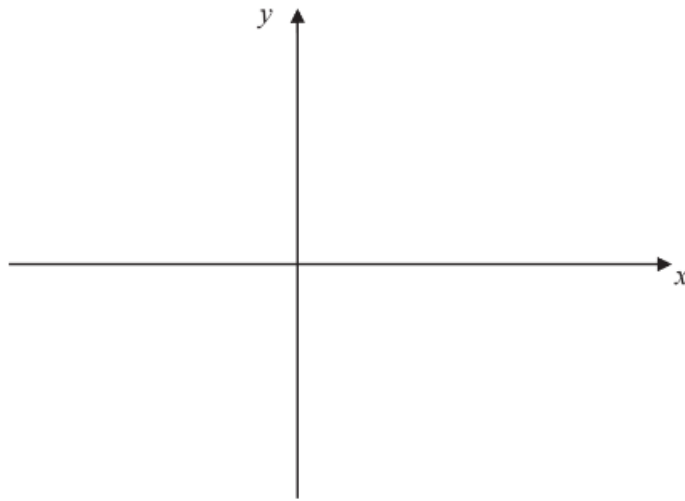
Answer _____ [2]

(ii) Write down the equation of the line of symmetry of the graph of $y = x^2 + 4x - 5$.
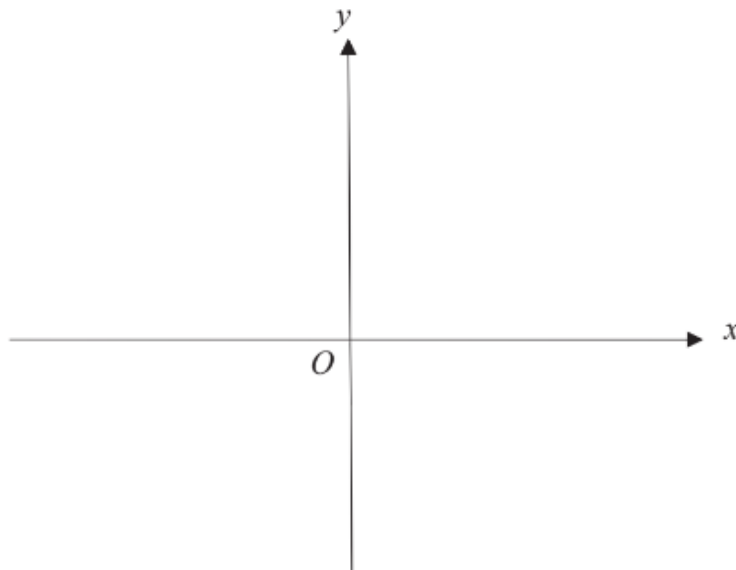
Answer _____ [1]

4   Sketch the graph of $y = 4(x-1)^2$ on the axes below.
Indicate clearly the coordinates of the points where the graph crosses the axes and the turning point of the curve.
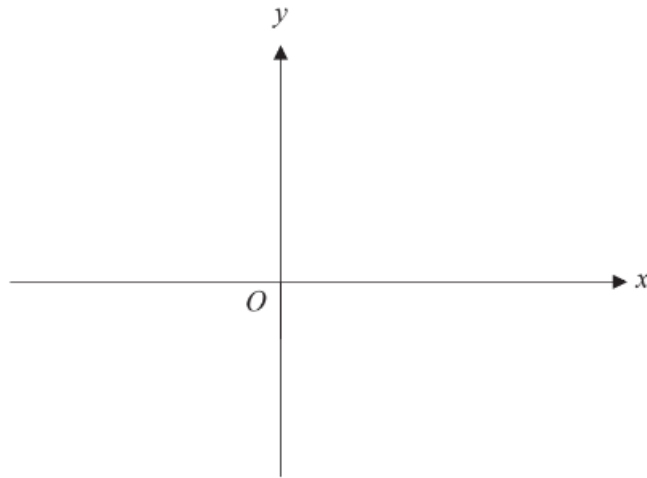
[3]

Answer

5   **(a)** Use a graphical method to solve $: 1 + 2x^3 = \dfrac{1}{7^x}$.

Answer ……………..………………… [3]

(b) (i) Sketch the graph of $y = (4 - x)$ on the axes below.

[2]

(b) (ii) Hence find the maximum value of 15^{4x-x^2}.

Answer ………………………….. [1]

6 (i) Express $x^2 - 6x + 10$ in the form $(x - p)^2 + q$.
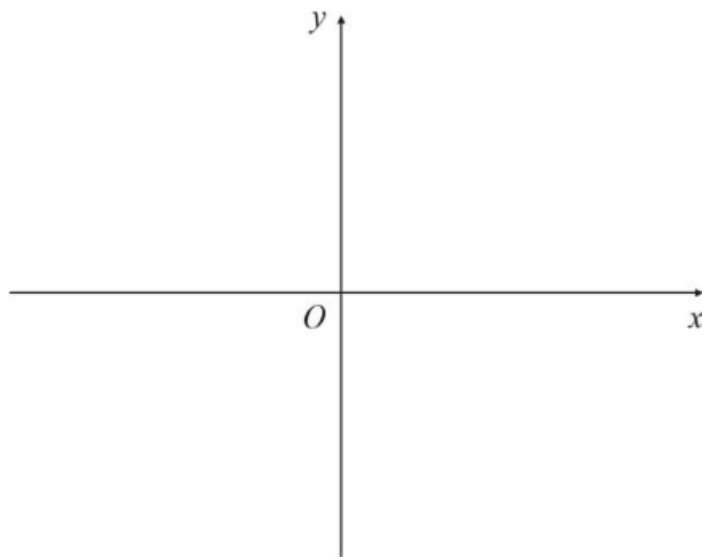
Answer …………………………….. [2]

(ii) Write down the coordinates of the minimum point of the graph of $y = x^2 - 6x + 10$.

Answer (…………… , ……………..) [1]

(iii) Sketch the graph of $y = x^2 - 6x + 10$ on the axes below.

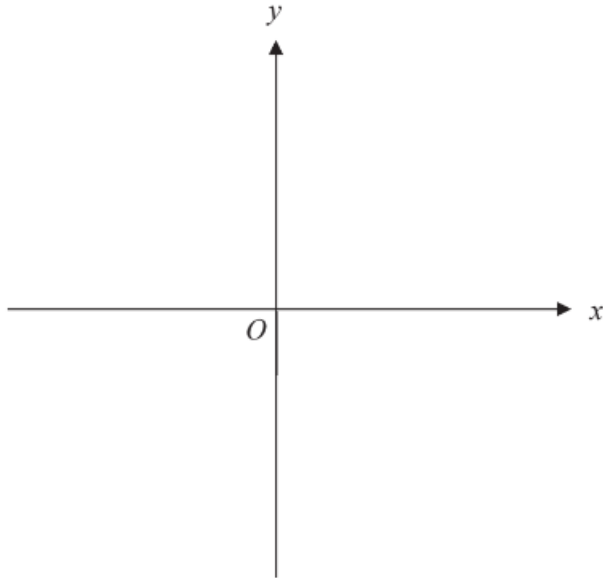Indicate clearly the value where the graph crosses the y-axis.

[2]

(iv) Explain why the equation $x^2 - 6x + 10 = k$ does not have solutions for some values of k.

Answer ………………………………………………………………………………………………

………………………………………………………………………………………………[1]

7   Sketch the graph of $y = 16 - (x - 3)^2$ on the axes below.
    Indicate clearly the coordinates of the points where the graph crosses the axes and the maximum point on the curve.

[2]

8   $\dfrac{3a - bc}{2ac - 5b} = \dfrac{1}{2}$

   (a) Rearrange the formula to make c the subject.

Answer c= …………………….. [3]

(b) Calculate the value of c when $a = -3$ and $b = 2$.
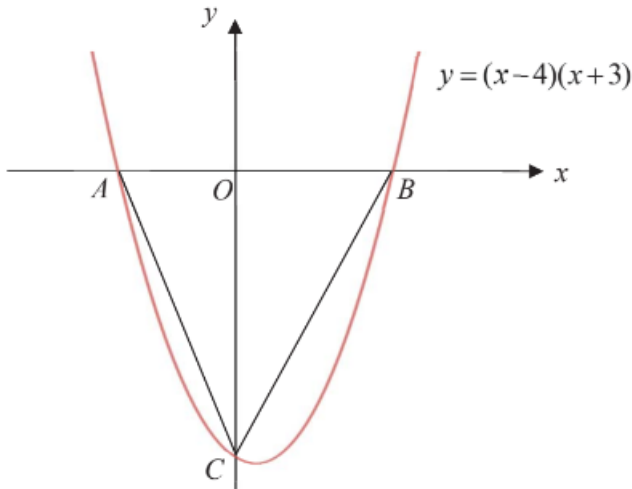
Answer …………………….. [1]

9 (a) Express $y = -x^2 - 8x - 10$ in the form of $y = -(x-h)^2 + k$.

Answer …………………….. [1]

(b) Hence, solve $-x^2 - 8x - 10 = 0$, giving your answer to 2 decimal places.

Answer x =…………… or …………….. [2]

10 The diagram below shows the graph of $y=(x-4)(x+3)$ which cuts the x-axis at A and b, and the y-axis at C.

(a) Find the coordinates of points A, B and C.

Answer A (………. ,   )

B (………. ,   )

C (………. , ……….) [2]

(b) Find the length of line AC.

Answer ………………………….. units [1]

(c) Find the equation of line BC.

Answer ………………………….. [1]

(d) Find the coordinates of the minimum point.

Answer (………… , ……………..) [1]

(e) Explain why the equation $(x-4)(x+3)=k$ does not have solutions for some values of k.
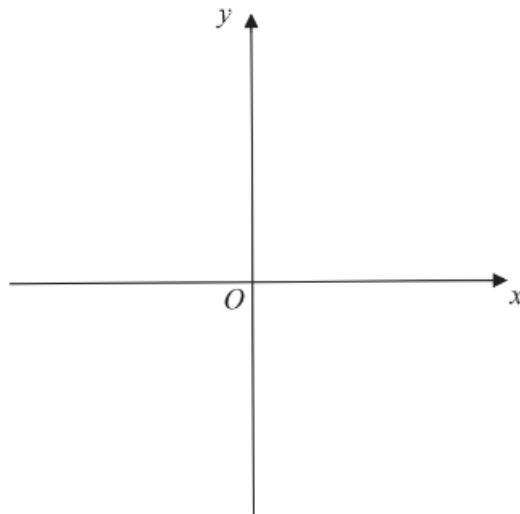
Answer ……………………………………………………………………………………..

……………………………………………………………………………………………………..[1]

11 (a) Express $-2x^2 - 6x - 2$, in the form $a(x+h)^2 + k$ where *a*, *h* and *k* are constants.

Answer ………………………….. [2]

(b) Sketch the graph of $y = -2x^2 - 6x - 2$. Indicate clearly the coordinates of the points where the graph crosses the axes and the turning point on the curve.
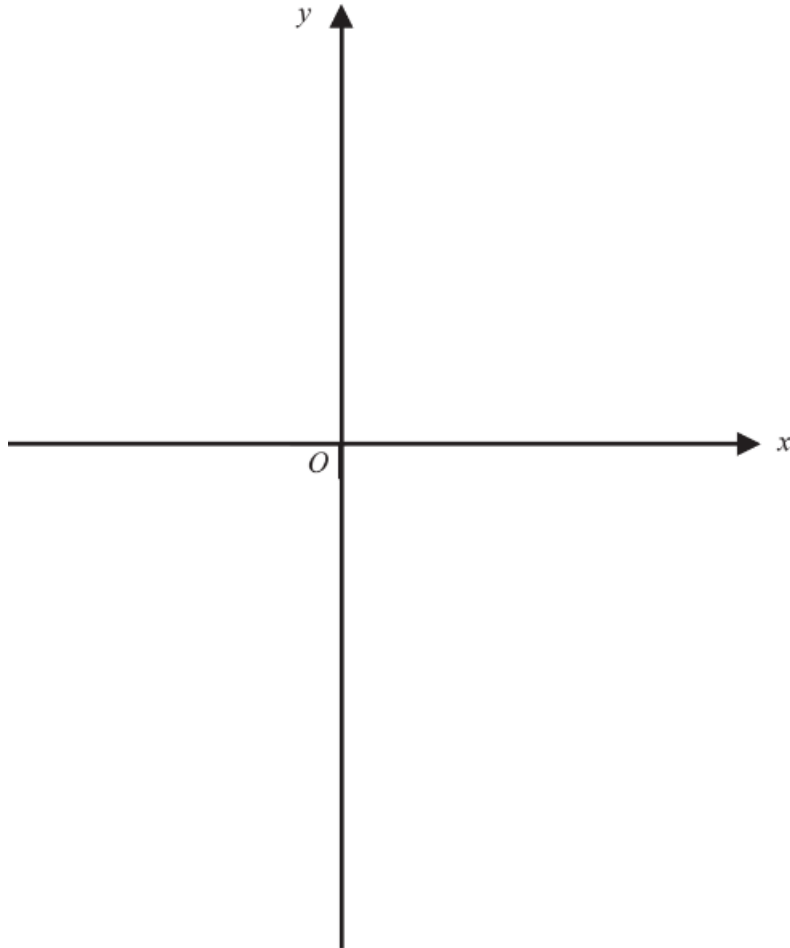
[2]

Answer

(c) Write down the equation of the line of symmetry of the curve $y = -2x^2 - 6x - 2$

Answer ………………………….. [1]

12 Sketch the graph of $y = 9 - (x-1)^2$ on the axes below.
Indicate clearly the coordinates of the points where the graph crosses the axes and the maximum point on the curve.

Answer

[3]

13 The graph of the function $y = ax^2 + bx + c$ passes through the points (2, 4) and (1, 0). The y-intercept of the graph is -2.

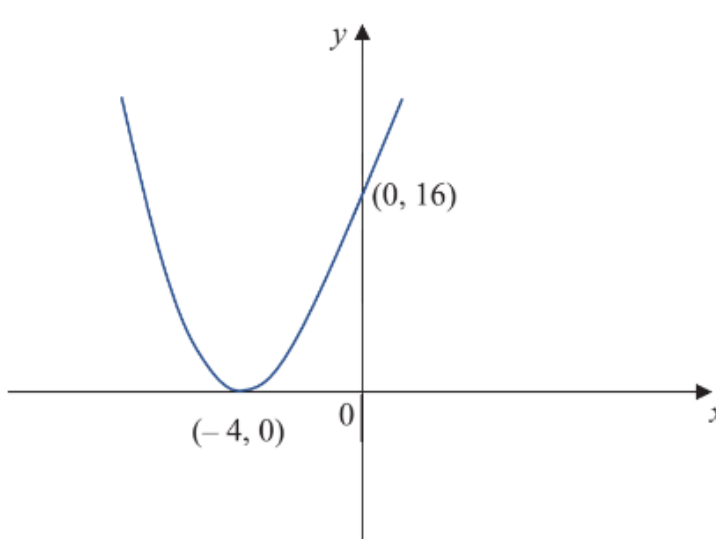(a) Find the values of a, b and c.

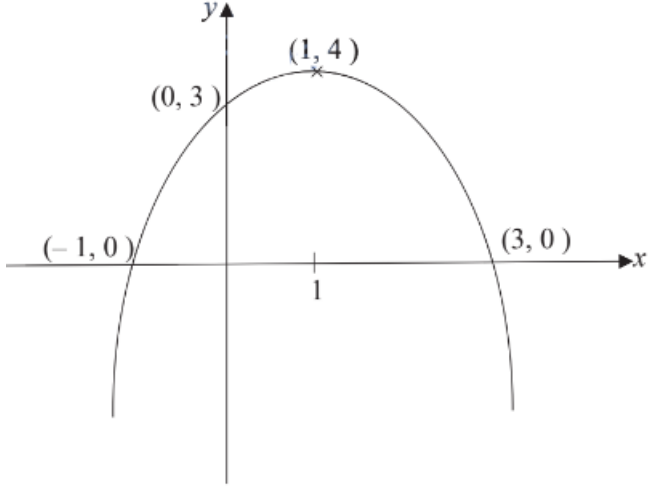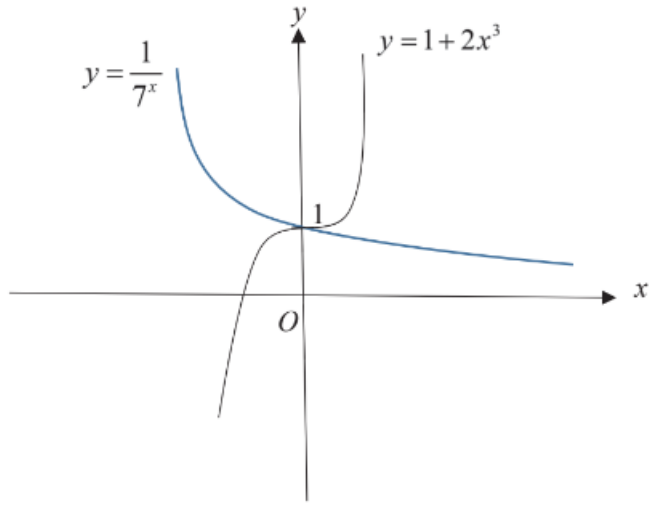*Answer* (a) $a =$ _____ , $b =$ _____ , $c =$ _____ [4]

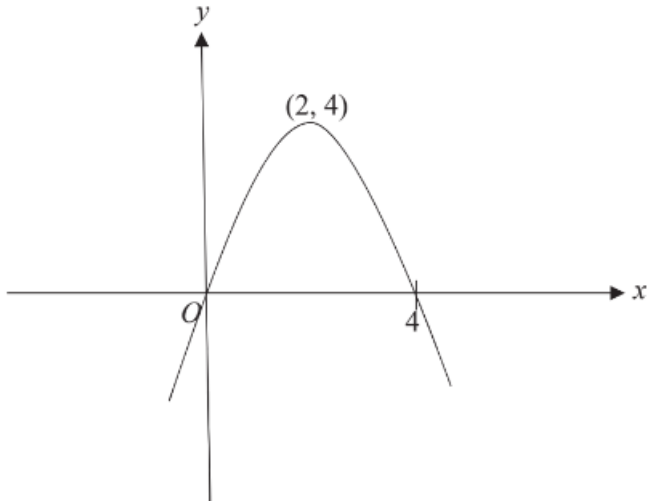(b) Find the coordinates of the turning point of the graph by completing the square.
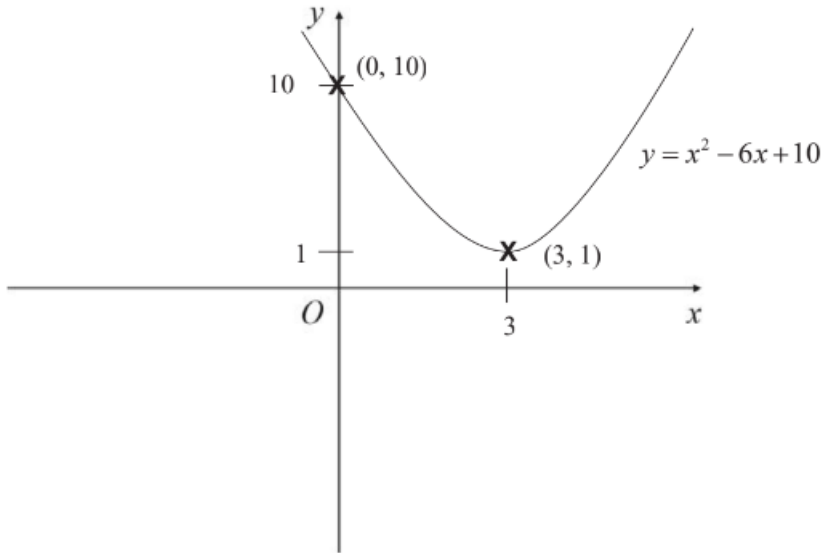
Answer (b) (_____ , _____) [2]

ANSWERS

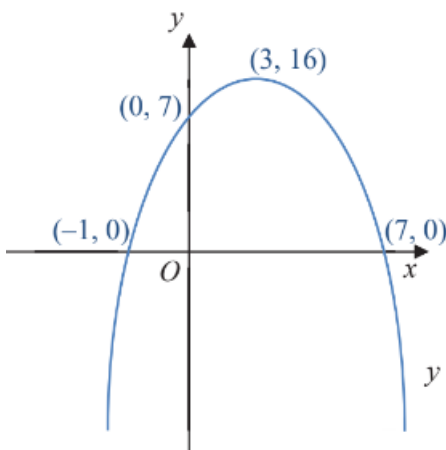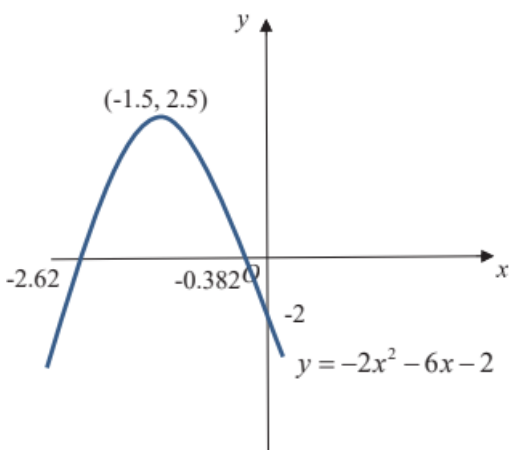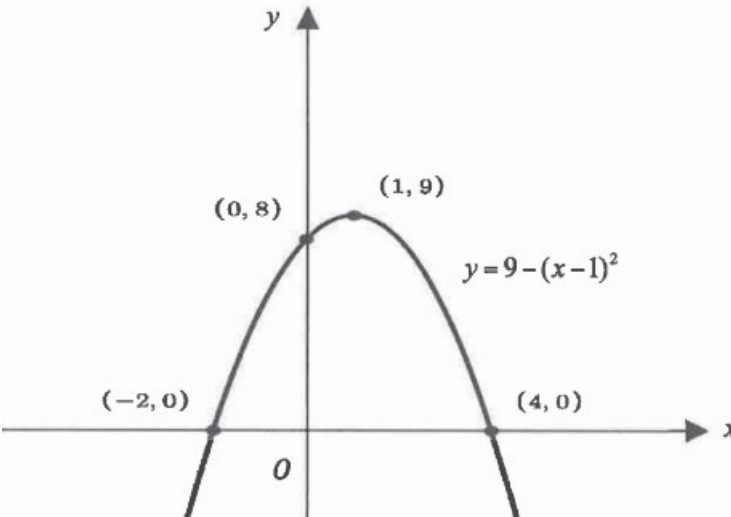| Qn	Solution	Marks	Total Marks
1a	$x^2 - 2x + 3 = x^2 - 2x + 3 + (-1)^2 - (-1)^2$ $\qquad = (x-1)^2 + 2$	M1 A1	2
1b	Minimum value = 2	B1	1
1c	$x = 1$	B1	1

2	(a)(i)	$y = x^2 + 8x + 16$ $y = (x+4)^2 - 4^2 + 16$ $y = (x+4)^2$	B1	
	(a)(ii)		G2	G1 for correct shape G1 for both correct coordinates or label on axes
	(b)	$x = 0$	B1	
	(c)	(-2, 0)	B1	
3	(a)	$\dfrac{1}{x-3} - \dfrac{6}{x^2-9}$ $= \dfrac{1}{x-3} - \dfrac{6}{(x-3)(x+3)}$ $= \dfrac{(x+3)-6}{(x-3)(x+3)}$ [M1] $= \dfrac{(x-3)}{(x-3)(x+3)}$ $= \dfrac{1}{(x+3)}$ [A1]		

	(b)(i)	$y = x^2 + 4x - 5$ $= (x+2)^2 - 4 - 5$ $= (x+2)^2 - 9$	[M1,A1] method mark for complete square Or [B1, B1] for getting a and b right		
	(ii)	x = -2			
4					
5	(a)	Answer .... $x = 0$			

	(b)(i)			
	(b)(ii)	Max pt. (2 , 4) maximum value of 15^{4x-x^2} $= 15^4$ $= 50625$		
6	(i)	$x^2 - 6x + 10 = x^2 - 6x + \left(\dfrac{-6}{2}\right)^2 - \left(\dfrac{-6}{2}\right)^2 + 10$ $\qquad\qquad\qquad = (x-3)^2 - (-3)^2 + 10$ $\qquad\qquad\qquad = (x-3)^2 + 1$		
	(ii)	3,1		
	(iii)			
	(iv)	**Since the graph will not intersect the line $y = k$ when $k < 1$, there are no solutions when $k < 1$.** **OR** **As $x^2 - 6x + 10$ will not go below its minimum value of 1, it will not have solutions for $k < 1$.**		

7					
		$y = 16 - (x-3)^2$ points: $(3, 16)$, $(0, 7)$, $(-1, 0)$, $(7, 0)$	B1 for shape and turning point and symmetry of curve B1 for x- and y- intercepts		
8	(a)	$6a - 2bc = 2ac - 5b$ M1 $2ac + 2bc = 6a + 5b$ $c(2a + 2b) = 6a + 5b$ M1 $c = \dfrac{6a + 5b}{2a + 2b}$ A1			
	(b)	$c = \dfrac{6(-3) + 5(2)}{2(-3 + 2)}$ $= 4$ A1			
9	(a)	$-(x+4)^2 + 6$			
	(b)	$x = -1.55$ or -6.45			
10	(a)	$A(-3, 0), B(4, 0), C(0, -12)$			
	(b)	12.4 units			
	(c)	$y = 3x - 12$			
11	(a)	$-2x^2 - 6x - 2 = -2(x^2 + 3x + 1)$ $= -2\left[x^2 + 3x + \left(\dfrac{3}{2}\right)^2 - \left(\dfrac{3}{2}\right)^2 + 1\right]$ $= -2\left[\left(x + \dfrac{3}{2}\right)^2 - \dfrac{5}{4}\right]$ $= -2\left(x + \dfrac{3}{2}\right)^2 + \dfrac{5}{2}$			

(b)

Graph showing curve with maximum point $(-1.5, 2.5)$, crossing x-axis at -2.62 and -0.382, with label -2 and equation $y = -2x^2 - 6x - 2$.

(c)

$$x = -\frac{3}{2} \quad \text{(o.e)}$$

12

Graph of $y = 9 - (x-1)^2$ showing turning point $(1, 9)$, y-intercept $(0, 8)$, and x-intercepts $(-2, 0)$ and $(4, 0)$.

13 (a) sub (0, −2), c= −2

   a =1 , b = 1

  (b) $y = (x + \frac{1}{2})^2 - 2\frac{1}{4}$

   Turning point $\left(-\frac{1}{2}, -2\frac{1}{4}\right)$