

16

(b) Express  $x^2 - 10x + 40$  in the form  $(x + a)^2 + b$ , where  $a$  and  $b$  are integers.

..... (2)

**(Total for Question 16 is 5 marks)**

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17

(c) Express  $4x^2 - 8x + 7$  in the form  $a(x + b)^2 + c$  where  $a$ ,  $b$  and  $c$  are integers.

.....

(3)

**(Total for Question 17 is 8 marks)**

20



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19

Given that  $a$ ,  $b$  and  $c$  are integers,

(b) express  $3x^2 + 12x + 19$  in the form  $a(x + b)^2 + c$

.....  
(2)

**(Total for Question 19 is 3 marks)**



P 6 8 7 2 7 A 0 2 3 3 2

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**19** Express  $3x^2 - 6x + 5$  in the form  $a(x - b)^2 + c$

**(Total for Question 19 is 3 marks)**



P 7 2 8 2 8 A 0 1 9 2 8

20 (a) Write  $3x^2 - 12x + 7$  in the form  $a(x + b)^2 + c$

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.....  
(3)

The line **L** is the line of symmetry of the curve with equation  $y = 3x^2 - 12x + 7$

(b) Using your answer to part (a) or otherwise, write down an equation of **L**.

.....  
(1)

**(Total for Question 20 is 4 marks)**



**20** (a) Express  $2x^2 - 11x + 9$  in the form  $a(x - b)^2 - c$  where  $a$ ,  $b$  and  $c$  are numbers to be found.

.....  
(3)

The curve **C** has equation  $y = 2(x - 3)^2 - 11(x - 3) + 9$

The point  $P$  is the minimum point on **C**

(b) Find the coordinates of  $P$

(....., .....)  
(2)

**(Total for Question 20 is 5 marks)**



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21 The function  $f$  is such that  $f(x) = 5 + 6x - x^2$  for  $x \leq 3$

(a) Express  $5 + 6x - x^2$  in the form  $p - (x - q)^2$  where  $p$  and  $q$  are constants.

.....  
(2)

(b) Using your answer to part (a), find the range of values of  $x$  for which  $f^{-1}(x)$  is positive.

.....  
(5)

**(Total for Question 21 is 7 marks)**



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**22** Write  $5 + 12x - 2x^2$  in the form  $a + b(x + c)^2$  where  $a$ ,  $b$  and  $c$  are integers.

**(Total for Question 22 is 4 marks)**



22 The curve **S** has equation  $y = f(x)$  where  $f(x) = x^2$   
The curve **T** has equation  $y = g(x)$  where  $g(x) = 2x^2 - 12x + 13$

By writing  $g(x)$  in the form  $a(x - b)^2 - c$ , where  $a$ ,  $b$  and  $c$  are constants,  
describe fully a series of transformations that map the curve **S** onto the curve **T**.

(Total for Question 22 is 4 marks)



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23 Express  $7 - 12x - 2x^2$  in the form  $a + b(x + c)^2$  where  $a$ ,  $b$  and  $c$  are integers.

.....  

---

**(Total for Question 23 is 3 marks)**



P 5 9 8 1 7 R A 0 2 3 2 8

23 (a) Express  $2x^2 - 12x + 3$  in the form  $a(x + b)^2 + c$  where  $a$ ,  $b$  and  $c$  are integers.

.....  
(3)

The curve **C** has equation  $y = 2(x + 4)^2 - 12(x + 4) + 3$

The point  $M$  is the minimum point on **C**

(b) Find the coordinates of  $M$

(....., .....)  
(2)

**(Total for Question 23 is 5 marks)**



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24 (a) Write  $7 + 12x - 3x^2$  in the form  $a + b(x + c)^2$  where  $a$ ,  $b$  and  $c$  are integers.

.....  
(4)

The curve **C** has equation  $y = 7 + 12x - 3x^2$

The point **A** is the turning point on **C**.

(b) Using your answer to part (a), write down the coordinates of **A**.

(....., .....)  
(1)

**(Total for Question 24 is 5 marks)**



24 Express each of  $a$ ,  $b$  and  $c$  in terms of  $q$  so that

$$q + 12x - qx^2$$

can be written as  $a - b(x - c)^2$

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$$a = \dots$$

$$b = \dots$$

$$c = \dots$$

**(Total for Question 24 is 4 marks)**



24 (a) Express  $7 - 4x - x^2$  in the form  $p - (x + q)^2$  where  $p$  and  $q$  are constants.

(2)

(b) Use your answer to part (a) to solve the equation  $7 - 4(y + 3) - (y + 3)^2 = 0$

Give your solutions in the form  $e \pm \sqrt{f}$  where  $e$  and  $f$  are integers.

(3)

The curve **C** has equation  $y = 3 - 5(x + 1)^2$

The point **A** is the maximum point on **C**.

(c) Write down the coordinates of **A**.

(....., .....(1)

**(Total for Question 24 is 6 marks)**



**25**  $f(x) = 17 - 3x^2 + 12x$

Write  $f(x)$  in the form  $a - b(x - c)^2$  where  $a$ ,  $b$  and  $c$  are constants.

$f(x) = \dots$

**(Total for Question 25 is 4 marks)**

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