Surname	
Other Names	
Candidate Signature	

Centre Number						Candidate Number				

Examiner Comments	

Total Marks

Quadratics

GCSE MATHEMATICS

CM

End of Topic Test | Non-calculator | Time allowed: 1 hour

Instructions to candidates:

• In the boxes above, write your centre number, candidate number, your surname, other names and signature.

• Answer ALL of the questions.

• You must write your answer for each question in the spaces provided.

• You must **not** use a calculator.

Information to candidates:

• Full marks may only be obtained for answers to ALL of the questions.

• The marks for individual questions and parts of the questions are shown in round brackets.

• There are 10 questions in this question paper. The total mark for this paper is 60.

Advice to candidates:

• You should ensure your answers to parts of the question are clearly labelled.

• You should show sufficient working to make your workings clear to the Examiner.

• Answers without working may not gain full credit.

1 (a) Factorise fully the following expressions

(i) $4xy - 2y$

.....

(1)

(ii) $x^2 + 4x + 3$

.....

(2)

(iii) $2x^2 - 18x + 28$

.....

(2)

(Total for Question 1 is 5 marks)

---

2 Solve the equation $x^2 + 6x - 40 = 0$.

.....

(Total for Question 2 is 3 marks)

---

3 (a) Verify that $y = -2$ is a solution to the equation $y^2 - 4y - 12 = 0$.

(2)

(b) Find the other solution to the equation $y^2 - 4y - 12 = 0$.

.....

(2)

(Total for Question 3 is 4 marks)

---

4 Solve the equation $2x^2 - 6x + 1 = 0$, giving your answers to two decimal places.

.....

(3)

(Total for Question 4 is 3 marks)

---

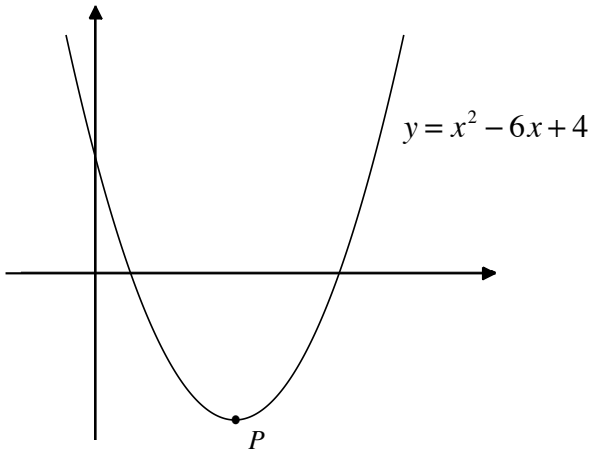
5 (a) Express $x^2 - 6x + 4 = 0$ in the form $(x + a)^2 + b$, where a and b are constants to be found.

a = ...

b = ...

(3)

The diagram below shows a sketch of the curve with equation $y = x^2 - 6x + 4$.



The point P lies on the curve and is a minimum point.

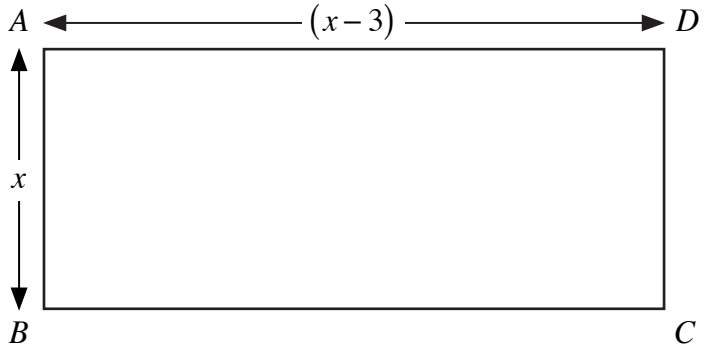
(b) Write down the coordinates of P.

.....

(1)

(Total for Question 5 is 4 marks)

6



The rectangle *ABCD* is shown in the diagram above.

All dimensions are in centimetres.

The rectangle has area 28 cm^2.

(a) Find the value of x.

.....

(5)

(b) Find the length of the line segment AC.

.....

(2)

(c) Write down the length of the line segment BD.

.....

(1)

(Total for Question 6 is 8 marks)

7 The curve C has the equation $y = f(x)$, where

$$f(x) = 3x^2 + (x-1)(2-x) + 4$$

(a) Express $f(x)$ in the form $ax^2 + bx + c$, where a, b and c are constants to be found.

$f(x) =$ .....

(3)

(b) Find the coordinates of the minimum point on C.

.....

(4)

(c) **Using your answer to part (b)**, explain why the curve C does not intersect the x axis.

.....

.....

.....

(1)

(Total for Question 7 is 8 marks)

8 The quadratic equation $ax^2 + bx + c = 0$ has solutions

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(a) State the name given to this formula.

.....

(1)

(b) Use the formula above to solve the equation $(2x-1)(3x+3)=1$.

.....

(5)

Adam has the equation $2x^2 + px + q = 0$.

He uses the above formula to solve it and obtains the following expression

$$x = \frac{81 \pm \sqrt{57}}{4}$$

(c) Find the values of the constants p and q.

p = ... , q = ...

(3)

(Total for Question 8 is 9 marks)

9 (a) By completing the square, or otherwise, prove that the equation $a^2 + 2a + 10 = 0$ has no real solutions.

(4)

(b) Find the range of values of k such that the equation $a^2 + 2a + k = 0$ has real solutions.

.....

(3)

(Total for Question 9 is 7 marks)

10 (a) State Pythagoras' Theorem and explain it using a suitable diagram.

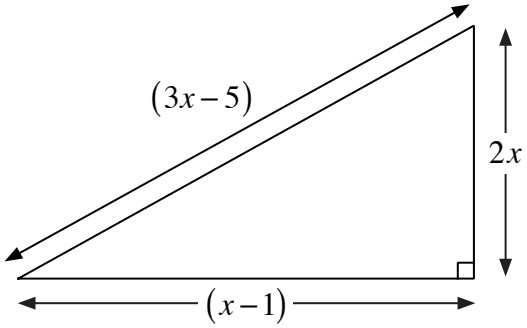
.....

.....

.....

(2)

The triangle T is shown below and all measurements are given in centimetres.



(b) Show that $x^2 - 7x + 6 = 0$.

(4)

(c) Find the length of the longest side of the triangle T.

.....cm

(3)

(Total for Question 10 is 9 marks)

TOTAL FOR PAPER = 60 MARKS