Surname	
Other Names	
Candidate Signature	

Centre Number						Candidate Number				

Examiner Comments	

Total Marks

MATHEMATICS

A LEVEL QUESTION COMPILATION

CM

Questions on: The Modulus Function

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 may 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 5 questions in this question paper. The total mark for this paper is 28.

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.

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1 5 3 3 2 2 2 1 8 0 0 0 4

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1 Suppose $|x| = 2$.

(a) Write down the possible values of x. **(1)**

Suppose $|y| < 5$.

(b) Write down the range of possible values of y. **(1)**

Suppose $|z - 1| < 2$.

(c) Write down the range of possible values of z. **(2)**

Do not write outside the box

Question 1 continued

TOTAL 4 MARKS

Do not write outside the box

2 (a) Sketch the graph of $y = |x - 1|$. **(2)**

(b) Hence, or otherwise, solve the equation

$$|x - 1| = 5$$

(3)

Do not write outside the box

Question 2 continued

TOTAL 5 MARKS

Do not write outside the box

3 (a) Sketch the graph of $y = |3x + a|$, $a > 0$, showing the coordinates of all the points where the graph meets the coordinate axes. **(2)**

(b) On the same axes, sketch the curve with equation $y = \frac{1}{x}$. **(1)**

(c) Use your sketches to explain why there is only one real solution to the equation

$$x|3x + a| - 1 = 0$$

(1)

(d) Find, using algebra, the value of x for which $x|3x + 2| - 1 = 0$. **(3)**

Do not write outside the box

Question 3 continued

TOTAL 7 MARKS

Do not write outside the box

4 Using algebra, solve the equation

$$3\left|5^x - 1\right| = 5^x$$

giving your answer(s) to three significant figures. **(4)**

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Question 4 continued

TOTAL 4 MARKS

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5

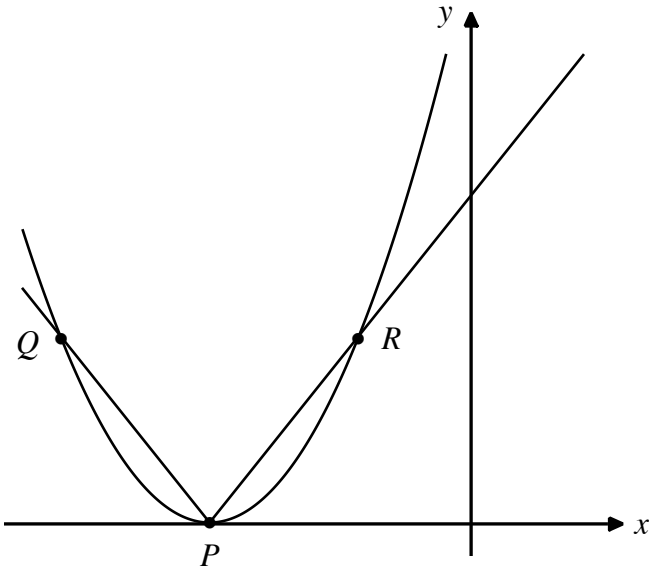

Figure 1

Figure 1 above shows a sketch of the curves with equation $y = |2x + 7|$ and $y = (x + k)^2$, where k is a constant.

The two curves intersect at the points P, Q and R, where P lies on the x axis.

(a) (i) Find the coordinates of P.

(ii) Hence, write down the value of k. **(3)**

(b) Use algebra to find the coordinates of Q and R. **(4)**

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Question 5 continued

TOTAL 7 MARKS