

Write your name here	
Surname	Other names
Centre Number	Candidate Number
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<b>Edexcel IGCSE</b>	
<h1 style="margin: 0;">Further Pure Mathematics</h1> <h2 style="margin: 0;">Paper 1</h2>	
Monday 13 June 2011 – Afternoon <b>Time: 2 hours</b>	Paper Reference <b>4PM0/01</b>
<b>Calculators may be used.</b>	Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

### Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

### Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

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**Answer all TEN questions**

**Write your answers in the spaces provided**

**You must write down all stages in your working**

**1** Solve the equations

$$y = x^2 - 3x + 2$$

$$y - x = 7$$

**(5)**

**(Total for Question 1 is 5 marks)**





## This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(Total for Question 2 is 7 marks)



**3** Given that  $y = e^{2x} \sin 3x$

(a) find  $\frac{dy}{dx}$

(3)

(b) show that  $\frac{d^2y}{dx^2} = 2\frac{dy}{dx} - 9y + 6e^{2x} \cos 3x$

(4)

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(Total for Question 3 is 7 marks)



$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$

- (1)

- (2)

- (4)

[illegible]



[illegible]

**(Total for Question 4 is 7 marks)**



The curve  $C$ , with equation  $y^2 = 5x$  and the line  $l$  intersect at the point  $A$  with coordinates  $(a, a)$ ,  $a \neq 0$ , as shown in **Figure 1**.

(2)

(b) Find the  $x$ -coordinate of  $B$ .

(3)

(c) Find, in terms of  $\pi$ , the volume of the solid generated.

(5)

[illegible]

[illegible]

(Total for Question 3 is 10 marks)



- (4)

(6)

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[illegible]

**(Total for Question 6 is 10 marks)**



**7 (a) Solve**

$$5p^2 - 11p + 2 = 0$$

(2)

(b) Hence solve  $5(3^{2x}) - 11(3^x) + 2 = 0$  giving your answers to 3 significant figures.

(4)

The curve with equation  $y = 5(3^{2x}) - 6(3^x)$  intersects the curve with equation  $y = 5(3^x) - 2$  at two points.

(c) Find the coordinates of each of these two points, giving your answers to 3 significant figures where appropriate.

(4)

[illegible]

[illegible]

(Total for Question 7 is 10 marks)



8 The points  $A$  and  $B$  have coordinates  $(1,5)$  and  $(9,7)$  respectively.

- (a) Find an equation of  $AB$ , giving your answer in the form  $y = ax + b$ , where  $a$  and  $b$  are rational numbers.

(3)

The line  $l$  is the perpendicular bisector of  $AB$ .

- (b) Find an equation of  $l$ .

(4)

The point  $C$  has coordinates  $(3,q)$ . Given that  $C$  lies on  $l$

- (c) find the value of  $q$ .

(2)

The line  $l$  meets the  $x$ -axis at the point  $D$ .

- (d) Find the exact area of the kite  $ACBD$ .

(4)





**Question 8 continued**

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**(Total for Question 8 is 13 marks)**



$$y = \frac{2x^2 - 6}{3x - 6} \quad x \neq 2$$

- (b) Find the coordinates of the stationary points on the curve. (7)

(c) Find an equation of the normal to the curve at  $A$ . (3)

(d) Find the  $x$ -coordinate of  $B$ . (4)

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[illegible]

[illegible]

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**(Total for Question 9 is 15 marks)**



10

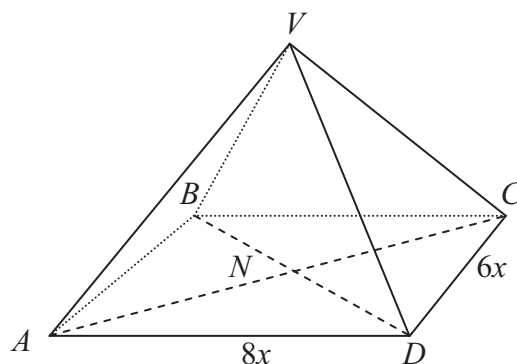
**Figure 2**

Figure 2 shows the pyramid  $VABCD$ . The base  $ABCD$  is a rectangle with  $CD = 6x$  cm and  $AD = 8x$  cm. The diagonals of the base intersect at the point  $N$ . The edges  $VA$ ,  $VB$ ,  $VC$  and  $VD$  are all of equal length. The angle between  $VA$  and the base  $ABCD$  is  $60^\circ$ .

Find, in terms of  $x$ ,

(a) the height,  $VN$ , of the pyramid,

(4)

(b) the length of  $VA$ .

(3)

Find, in degrees to the nearest  $0.1^\circ$ ,

(c) the size of the angle between the planes  $AVB$  and  $ABCD$ ,

(3)

(d) the size of the angle between the planes  $BVD$  and  $AVC$ .

(3)

The volume of the pyramid is  $1110 \text{ cm}^3$ .

(e) Find, to the nearest whole number, the value of  $x$ .

(3)





**Question 10 continued**

[illegible]

[illegible]

[illegible]

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**TOTAL FOR PAPER IS 100 MARKS**