

Write your name here	
Surname	Other names
<b>Pearson Edexcel</b>	Centre Number
<b>International GCSE</b>	Candidate Number
<b>Further Pure Mathematics</b>	
<b>Paper 1</b>	
Tuesday 13 June 2017 – Morning	Paper Reference
<b>Time: 2 hours</b>	<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.

Turn over ►

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**Pearson**



**Question 1 continued**

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



- 2 Sand is poured onto horizontal ground at a rate of  $50 \text{ cm}^3/\text{s}$ . The sand forms a right circular cone with its base on the ground. The volume of the cone increases in such a way that the radius of the base is always three times the height of the cone. Find the rate of change, in  $\text{cm/s}$  to 3 significant figures, of the radius of the cone when the radius is  $10 \text{ cm}$ .

(5)

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**Question 2 continued**

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**(Total for Question 2 is 5 marks)**





**Question 3 continued**

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**(Total for Question 3 is 6 marks)**



4 Solve, for  $0 \leq \theta < \pi$ , to 4 significant figures,

(a)  $(\tan \theta - 3)(\tan \theta + 2) = 0$

(3)

(b)  $6 \cos^2 \theta - \sin \theta = 5$

(4)

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**Question 4 continued**

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



5 In triangle  $ABC$ ,  $AB = 10$  cm,  $BC = 7$  cm and angle  $BAC = 40^\circ$

(a) Find, in degrees to the nearest  $0.1^\circ$ , the two possible sizes of angle  $ACB$ . (4)

(b) Find, in cm to 3 significant figures, the difference between the two possible lengths of  $AC$ . (4)

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**Question 5 continued**

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**(Total for Question 5 is 8 marks)**



6 The sum of the first term and the third term of a geometric series is 250

The sum of the second term and the third term of the series is 150

The common ratio of the series is  $r$ .

(a) Find the two possible values of  $r$ .

(5)

The sum of the first  $n$  terms of the series is  $S_n$

Given that  $r > 0$  and that  $S_n > 399.99$

(b) find the least value of  $n$ .

(6)

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**Question 6 continued**

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**Question 6 continued**

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**Question 6 continued**

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**(Total for Question 6 is 11 marks)**



7 (a) Solve  $\log_a 1024 = 5$  (1)

(b) Solve  $\log_3(6c + 9) = 4$  (2)

(c) Solve  $2(\log_b 25 + \log_b 125) = 5$  (4)

(d) Solve the equations, giving the values of  $x$  and  $y$  to 3 significant figures,

$$3 \log_2 x + 4 \log_3 y = 10$$

$$\log_2 x - 2 \log_3 y = 1$$

(6)

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**Question 7 continued**

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**Question 7 continued**

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**Question 7 continued**

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**(Total for Question 7 is 13 marks)**



8 The points  $A$  and  $B$  have coordinates  $(1, 7)$  and  $(13, 1)$  respectively.

(a) Find the exact length of  $AB$ .

(2)

The point  $C$  divides  $AB$  in the ratio  $1:2$

(b) Find the coordinates of  $C$ .

(2)

The line  $l$  passes through  $C$  and is perpendicular to  $AB$ .

(c) Find an equation of  $l$ , giving your answer in the form  $y = ax + b$  where  $a$  and  $b$  are integers.

(4)

The point  $D$  with coordinates  $(9, d)$  lies on  $l$ .

(d) Find the value of  $d$ .

(1)

The point  $E$  is the midpoint of  $CD$ .

(e) Find the exact value of the area of the quadrilateral  $ADBE$ .

(5)

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**Question 8 continued**

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**Question 8 continued**

Area with horizontal dotted lines for writing answers.

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**Question 8 continued**

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**(Total for Question 8 is 14 marks)**



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

(a) show that  $\cos^2 \theta = \frac{1}{2}(\cos 2\theta + 1)$  (2)

$$f(\theta) = 8 \cos^4 \theta + 4 \cos^2 \theta - 5$$

(b) show that  $f(\theta) = \cos 4\theta + 6 \cos 2\theta$  (4)

Hence

(c) solve, for  $0^\circ \leq x < 180^\circ$ , the equation

$$8 \cos^4 x + 4 \cos^2 x - 6 \cos 2x = 4.5$$
 (4)

(d) find

(i)  $\int f(\theta) \, d\theta$

(ii) the exact value of  $\int_0^{\frac{\pi}{3}} f(\theta) \, d\theta$  (5)

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**Question 9 continued**

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**Question 9 continued**

Area with horizontal dotted lines for writing answers.

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**Question 9 continued**

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





**Question 10 continued**

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**Question 10 continued**

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**Question 10 continued**

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