Practice Paper A

CORE TWO

crashMATHS

Name	

Duration	**1 HOUR & 30 MINUTES**
Total Marks Available	**75 MARKS**

Targets

For examiner's use only

Question Number	*Leave Blank*
1	
2	
3	
4	
5	
6	
7	
8	
/	
Total marks	

crashmathspracticepapers

1 Given that $\cos\theta = \frac{3}{5}$, find the **exact** value of

(a) $\sin\theta$ **(2)**

(b) $\tan\theta$ **(2)**

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Question 1 continued

TOTAL 4 MARKS

2 (a) In ascending powers of a, find the first four terms in the binomial expansion of

$$(2a+b)^8$$ **(5)**

(b) Show that $\left(a+\frac{b}{2}\right)^8 = k(2a+b)^8$, where k is a constant to be found. **(1)**

(c) Hence, show that

$$\frac{\left(a+\frac{b}{2}\right)^8}{4ab} = \frac{1}{4}a^7b^{-1} + a^6 + \frac{7}{4}a^5b + \frac{7}{4}a^4b^2 + \ldots$$ **(3)**

Question 2 continued

TOTAL 9 MARKS

3 The curve C has the equation

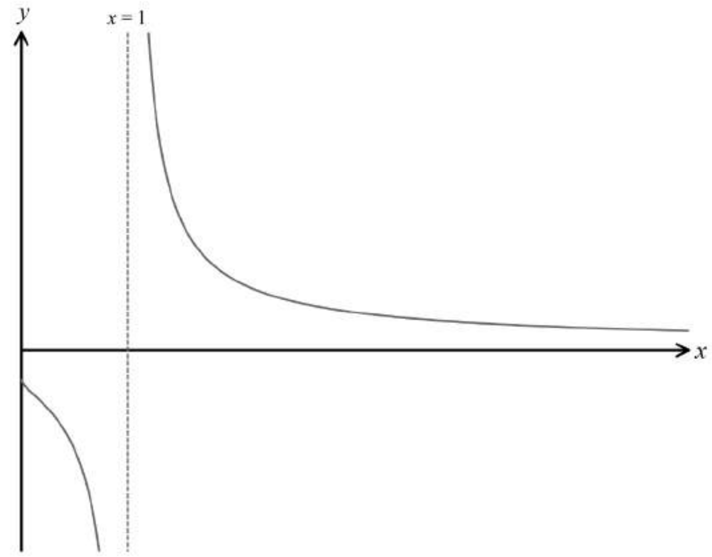
$$y = \frac{1+\sqrt{x}}{x-1}$$

(a) Use the trapezium rule with three **equally spaced** intervals to find an approximation for

$$\int_2^5 y \, dx$$

(6)

The diagram below shows a sketch of the curve C for $x > 0$.



(b) Using the graph, does your approximation in part (a) overestimate or underestimate the value of

$$\int_2^5 y \, dx$$

Explain your answer.

(2)

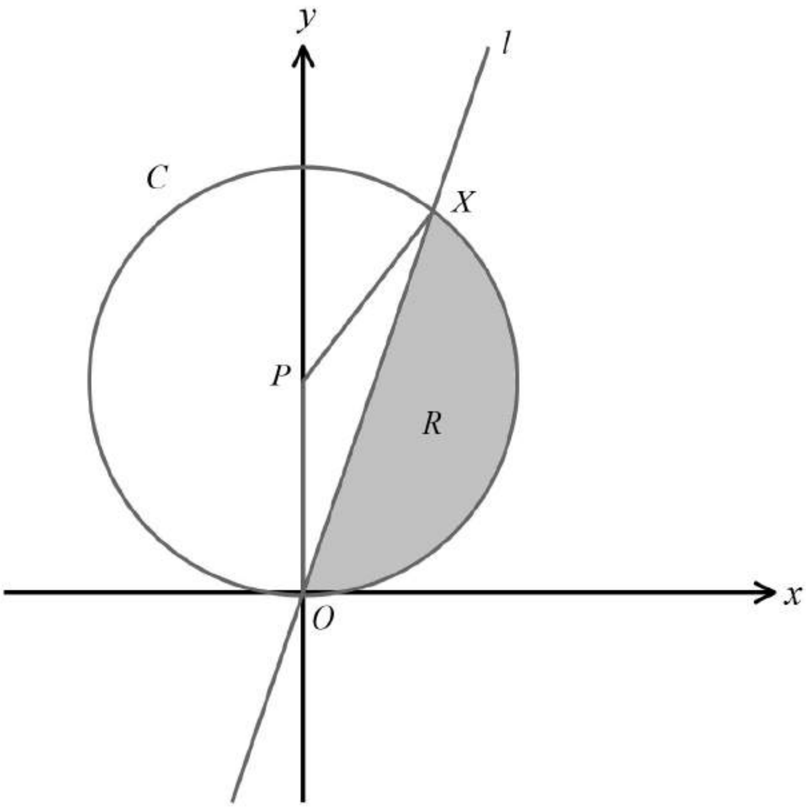
Question 3 continued

Question 3 continued

Question 3 continued

TOTAL 8 MARKS

4 The diagram below shows a sketch of the circle C and the line l.



The circle C has centre $P(0,5)$ and l has equation $y = 3x$.

C and l intersect at the point X.

(a) Find the equation of C. **(2)**

(b) Find the coordinates of the point X. **(4)**

Given that the angle $OPX = \theta^\circ$,

(c) Find the value of $\cos\theta$. **(2)**

(d) Calculate the area of the triangle OPX. **(2)**

(e) Work out the area of the shaded region R. **(4)**

Question 4 continued

Question 4 continued

Question 4 continued

TOTAL 14 MARKS

5 The price of a car depreciates by 1.2% each year, such that the decrease in its price follows a geometric progression. The car is initially priced at £34 000.

(a) State the common ratio of this geometric progression. **(1)**

(b) Work out the price of the car after four years. **(2)**

The company will stop reducing the price of the car in the Year N so that it does not fall below £30 000.

(c) Find N. **(3)**

Given that 150 individuals purchase the car in Year 1, 250 in Year 2, 350 in Year 3 and so on, work out

(d) (i) the number of individuals that purchase the car in the Year N. **(2)**

(ii) if the company had more takings in Year 1 or Year N. **(4)**

(e) Hence, comment on the effectiveness of the company reducing the price of car. **(1)**

Question 5 continued

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Question 5 continued

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Question 6 continued

TOTAL 13 MARKS

6 Given that a and b are positive constants, solve the simultaneous equations

$$a = 3b$$

$$\log_3 a + \log_9 b = 2$$

Give your answers as **exact** values. **(7)**

Question 6 continued

TOTAL 7 MARKS

7 (a) Find the derivative of $y = x^3 - 3x^2 + 27x - 3$ **(2)**

(b) Show that the curve is an increasing function for all x. **(3)**

(c) Show also that the curve has no stationary points. **(3)**

(d) Hence, sketch the curve $y = x^3 - 3x^2 + 27x - 3$.

On your sketch, you should show clearly any coordinates at which the curve crosses or meets the y axis. **(2)**

Question 7 continued

Question 7 continued

Question 7 continued

TOTAL 10 MARKS

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8 (a) Show that

$$\sin\theta - \frac{1}{\sin\theta} \equiv -\frac{\cos\theta}{\tan\theta}$$

(3)

(b) Hence, or otherwise, solve for $0 \leq x \leq 2\pi$,

$$\sin^2 2x\left(\cos^2 2x\right)^{-1} = \frac{2}{\cos 2x}\left(\sin 2x - \frac{1}{\sin 2x}\right) + \tan^2 2x \ -4$$

(7)

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Question 8 continued

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Question 8 continued

Question 8 continued

TOTAL 10 MARKS