Practice Paper B -

## CORETWO

## crashMATHS

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Duration	1 HOUR & 30 MINUTES
Total Marks Available	75 MARKS

	For examiner's use only

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1	Given that	
	$f(x) = 5x^2 + 6x - 9 - 2x^3$	
	(a) Show that $x = 1$ is a factor of $f(x)$ .	(2)
	(b) Express $f(x)$ as a product of three linear factors.	(4)
	(c) Sketch the curve with equation $y = f(x)$ .	
	On your sketch, you should show clearly the coordinates at which the curve crosses or	
	meets the coordinate axis.	(3)
	(d) Hence, state the range of values of $x$ for which $f(x) > 0$ .	(1)
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2	(a) Show that	
	$2\cos^2 x = 5\sin x + 5$	
	can be written in the form	
	$a\sin^2 x + b\sin x + c = 0$	
		2)
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	(b) Hence, for $-\pi < x < \pi$ , solve	
	$2\cos^2 2x = 5\sin 2x + 5$	
	You should give all your solutions to one decimal place.	5)
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3 A circle C has the equation	
$2x^2 + 2y^2 - 3 = 4x - y$	
(a) Find	
(i) the coordinates of the centre of $C$ .	
(ii) the radius of $C$ .	(5)
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(b) Find the shortest distance from the circle to the origin $O$ .	(4)
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4 Two graphs $C_1$ and $C_2$ are defined such that		
$C_1: y=3x^2$		
$C_2: y=2$		
Find the values of c such that the area bounded by $C_1$ , the x axis and the line $x = c$ is half the		
area bounded by $C_2$ , the x axis and the line $x = c$ .	(5)	





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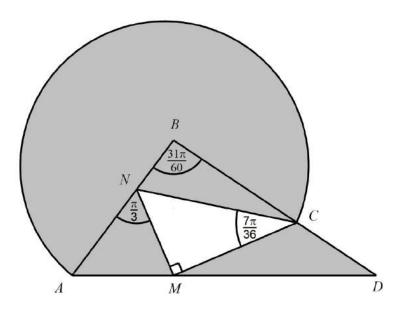


Figure 1

The triangle MNC has NM = 3.44 cm and  $\angle NCM = \frac{7\pi}{36}$  radians, as shown in Figure 1.

The point C lies on the straight line BCD and BD = 12 cm.

The circular arc AC in Figure 1 is a major arc of the circle with centre B and radius x cm.

(a) Show that 
$$NC = 6.00$$
 to three significant figures. (1)

(b) Find 
$$x$$
.

The region enclosed by the major arc AC of the circle and the triangles BNC, ANM and CMD is shown shaded in Figure 1.

- (c) Calculate, to three significant figures, the area of the major sector ACBA. (2)
- (d) Find the area of the shaded region. (5)
- (e) Show that the perimeter of ACDMA is 45.4 cm. (4)

Question 5 continued		





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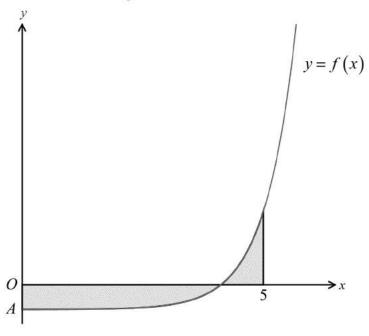
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6 The curve y = f(x) is defined such that

$$y = 5^{x-4} - 1$$

A sketch of the curve is shown in the diagram below.



(a) State the coordinates of A. (1)

(b) Show that the curve crosses the x axis when x = 4. (2)

(c) Use the trapezium rule with five equally spaced strips to find an approximation for the area of the shaded region. (6)

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7 A geometric series has first term $a$ and common ratio $(a-1)$ .	
(a) <b>Prove</b> that the sum of the first $n$ terms of the series $S_n$ can be given by	
$S_n = -\left(1 - \left(a - 1\right)^n\right)$	(3)
(b) Given that the sum of the first 6 terms of the geometric series is $\frac{189}{64}$ , find a.	(3)
(c) Find the range of values for $n$ such that	
$S_{\infty} > S_n$	
where $S_{\infty}$ denotes the sum to infinity of the geometric series.	(3)
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8	(a) In the expansion of	
	$(1+x)^n$	
	the coefficient of $x^2$ is 3.	
	Given that $n > 0$ , find the value of $n$ .	(2)
	(b) It is also given that	
	$(1+ax)^m = 1+6x+16x^2+$	
	where $m > n$ .	
	Find the value of $\frac{m}{n}$ , giving your answer as an <b>unsimplified</b> fraction.	(3)
	(c) The function $p(x)$ is defined such that	
	$p(x) = (1+ax)^m (1+x)^{-n}$	
	State the highest power of $x$ in the quotient of $p(x)$ .	(1)
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<b>9</b> The curve C has the equation	
$x^2 - 3xy - 4y^2 + 64 = 0$	
Given that the gradient function of the curve is defined such that	
$2x - 3x\frac{dy}{dx} = 3y + 8y\frac{dy}{dx}$	
Find the coordinates of the stationary points on $C$ .	(6)
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