

ADVANCED SUBSIDIARY (AS) General Certificate of Education 2022

Mathematics

Assessment Unit AS 1 assessing Pure Mathematics

Centre Number

Candidate Number

SMT11

[SMT11] THURSDAY 19 MAY, AFTERNOON

TIME

1 hour 45 minutes.

INSTRUCTIONS TO CANDIDATES

Write your Centre Number and Candidate Number in the spaces provided at the top of this page.

You must answer all nine questions in the spaces provided.

Do not write outside the boxed area on each page or on blank pages.

Complete in black ink only. Do not write with a gel pen.

Questions which require drawing or sketching should be completed using an HB pencil. All working should be clearly shown in the spaces provided. Marks may be awarded for partially correct solutions. Answers without working may not gain full credit.

Answers should be given to three significant figures unless otherwise stated.

You are permitted to use a graphic or scientific calculator in this paper.

INFORMATION FOR CANDIDATES

The total mark for this paper is 100.

Figures in brackets printed down the right-hand side of pages indicate the marks awarded to each question or part question.

A copy of the Mathematical Formulae and Tables booklet is provided.

Throughout the paper the logarithmic notation used is $\ln z$ where it is noted that $\ln z \equiv \log_e z$ 12955.05 R

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x + 3y = 10	
2x - y + 4z = 2	
3x + 2y - 3z = 19	

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2 (a) ((i)	Write	$2x^2 + 4x - 5$	in the form	$2[(x+p)^2-q]$	[2]
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(Hence sta it occurs.		n value of $2x^2 +$	4x - 5 and the value of	x at which [2]
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	$N = 500 e^{2t}$	
(i)	Find the initial value of N.	[1]
(ii)	Find, in whole minutes, the time for N to increase by 48%	[4]
	·····	
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28SMT1105

3 (a) Solve	$\sin\left(2x-60^\circ\right)=-0.5$	$0^{\circ} \leq x \leq 360^{\circ}$	[:
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(b) Show that

$\tan x \cos x$	=	1
$\overline{\left(1-\cos^2 x\right)^{\frac{1}{2}}}$	_	1

[4]

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(i)	Find the equation of the normal to the curve at the point where $x = 2$
	Leave your answer in the form $ax + by + c = 0$, where a, b and c are integers. [

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Find the values of k for which the line $y = kx - 4$ is a tangent to the curve $y = x^2 + x$ [7]

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(b) Given that

 $\int_{-1}^{2} (x^2 - px + 3) \, \mathrm{d}x = 8$

find the value of <i>p</i> .	[6]
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6	f(x	$= qx^3 - 7x^2 + r$ where q and r are constants.
	f(x) has a factor $(x + 1)$
	Wł	then $f(x)$ is divided by $(2x + 1)$ the remainder is 7
	(i)	Find the values of q and r . [7]
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(ii)	Factorise fully the expression $f(x)$	[3]
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<u>, III)</u>	Hence solve $2(2^{3y}) - 7(2^{2y}) + 9 = 0$

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	$(2-x)^8$	
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(a)	Solve $0.7^x < 5$	[

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$y = 8 - x^{3}$ y y (x, y) $(y, $	
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$()) \\ R \\ ()) \\ P(1, 1) \\ ()) \\ Fig. 2$	
The tangent to the circle at the point $Q(4, 3)$ cuts the y-axis at point R.	
The tangent to the circle at the point $Q(4, 3)$ cuts the <i>y</i> -axis at point R. Find the area of triangle PQR.	
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Find the area of triangle PQR.	



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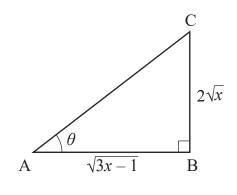
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(b)	Fig. 3	below	shows a	a sketch	of a	right-a	ingled	triangle ABC.	
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AB has length $\sqrt{3x-1}$ BC has length $2\sqrt{x}$ $B\hat{A}C = \theta$ Given that $\cos^2 \theta = \frac{1}{x}$, find the value of *x*. [8]

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Question Number	Marks		
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