

Cambridge IGCSE[™]

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

ADDITIONAL MATHEMATICS

0606/21

Paper 2 October/November 2020

2 hours

You must answer on the question paper.

No additional materials are needed.

INSTRUCTIONS

- Answer all questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do not use an erasable pen or correction fluid.
- Do not write on any bar codes.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [].

This document has 16 pages. Blank pages are indicated.

Mathematical Formulae

1. ALGEBRA

Quadratic Equation

For the equation $ax^2 + bx + c = 0$,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Binomial Theorem

$$(a+b)^{n} = a^{n} + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^{2} + \dots + \binom{n}{r}a^{n-r}b^{r} + \dots + b^{n}$$

where *n* is a positive integer and $\binom{n}{r} = \frac{n!}{(n-r)!r!}$

Arithmetic series $u_n = a + (n-1)d$

$$S_n = \frac{1}{2}n(a+l) = \frac{1}{2}n\left\{2a + (n-1)d\right\}$$

Geometric series

$$u_n = ar^{n-1}$$

 $S_n = \frac{a(1-r^n)}{1-r} \ (r \neq 1)$

$$S_{\infty} = \frac{a}{1-r} \ (|r| < 1)$$

2. TRIGONOMETRY

Identities

$$\sin^2 A + \cos^2 A = 1$$
$$\sec^2 A = 1 + \tan^2 A$$
$$\csc^2 A = 1 + \cot^2 A$$

Formulae for $\triangle ABC$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$
$$a^2 = b^2 + c^2 - 2bc \cos A$$
$$\Delta = \frac{1}{2}bc \sin A$$

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1 Solve the inequality |3x+2| > 8+x.

2 Find the coordinates of the points of intersection of the curve $x^2 + xy = 9$ and the line $y = \frac{2}{3}x - 2$.

Write $3 \lg x + 2 - \lg y$ as a single logarithm. 3



It is given that $y = \ln(\sin x + 3\cos x)$ for $0 < x < \frac{\pi}{2}$. (a) Find $\frac{dy}{dx}$.

(a) Find
$$\frac{dy}{dx}$$
.

[3]

(b) Find the value of x for which
$$\frac{dy}{dx} = -\frac{1}{2}$$
.

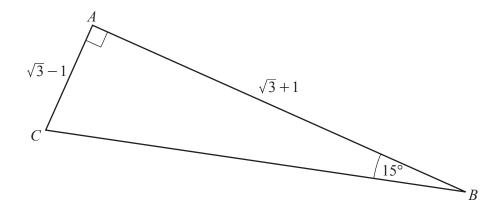
[3]

alue on 177

The first three terms in the expansion of $(a+bx)^5(1+x)$ are $32-208x+cx^2$. Find the value of each of the integers a, b and c.

6 DO NOT USE A CALCULATOR IN THIS QUESTION.

In this question all lengths are in centimetres.



In the diagram above $AC = \sqrt{3} - 1$, $AB = \sqrt{3} + 1$, angle $ABC = 15^{\circ}$ and angle $CAB = 90^{\circ}$.

(a) Show that
$$\tan 15^{\circ} = 2 - \sqrt{3}$$
. [3]

(b) Find the exact length of
$$BC$$
. [2]

7 DO NOT USE A CALCULATOR IN THIS QUESTION.

$$p(x) = 2x^3 - 3x^2 - 23x + 12$$

(a) Find the value of $p(\frac{1}{2})$.

[1]

- **(b)** Write p(x) as the product of three linear factors and hence solve p(x) = 0.
- [5]

of year had

8	afte	population P , in millions, of a country is given by $P = A \times b^t$, where t is the number of year January 2000 and A and b are constants. In January 2010 the population was 40 million and have eased to 45 million by January 2013.	7
	(a)	Show that $b = 1.04$ to 2 decimal places and find A to the nearest integer. [4]]

(b) Find the population in January 2020, giving your answer to the nearest million. [1]

(c) In January of which year will the population be over 100 million for the first time? [3]

	9	mathscloud.com
9	A particle moves in a straight line such that, t seconds after passing a fixed point O , its displacer from O is s m, where $s = e^{2t} - 10e^t - 12t + 9$.	nei. Scholidico
	(a) Find expressions for the velocity and acceleration at time t.	[3]
	(b) Find the time when the particle is instantaneously at rest.	[3]

[2] (c) Find the acceleration at this time.

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- 10 The gradient of the normal to a curve at the point (x, y) is given by $\frac{x}{x+1}$.
 - (a) Given that the curve passes through the point (1, 4), show that its equation is $y = 5 \ln x x$.

= 3. [3]

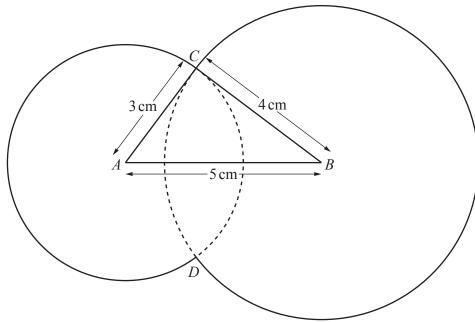
(b) Find, in the form y = mx + c, the equation of the tangent to the curve at the point where x = 3.

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- 11 The equation of a curve is $y = x\sqrt{16-x^2}$ for $0 \le x \le 4$.
 - (a) Find the exact coordinates of the stationary point of the curve.

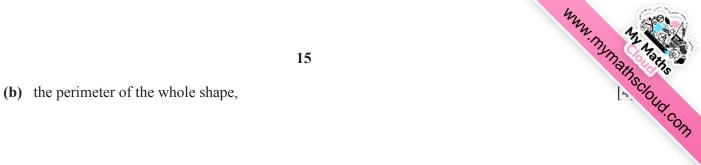
www.mymathscloud.com **(b)** Find $\frac{d}{dx}(16-x^2)^{\frac{3}{2}}$ and hence evaluate the area enclosed by the curve $y = x\sqrt{16-x^2}$ and the lines y = 0, x = 1 and x = 3.





The diagram shows a shape consisting of two circles of radius 3 cm and 4 cm with centres A and B which are 5 cm apart. The circles intersect at C and D as shown. The lines AC and BC are tangents to the circles, centres B and A respectively. Find

(a) the angle *CAB* in radians, [2]



(c) the area of the whole shape.

[4]

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