



Cambridge IGCSE™

CANDIDATE
NAME

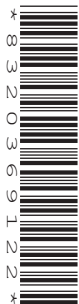
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CENTRE
NUMBER

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CANDIDATE
NUMBER

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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.

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

[3]



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

[5]



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

[3]



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



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

[3]

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

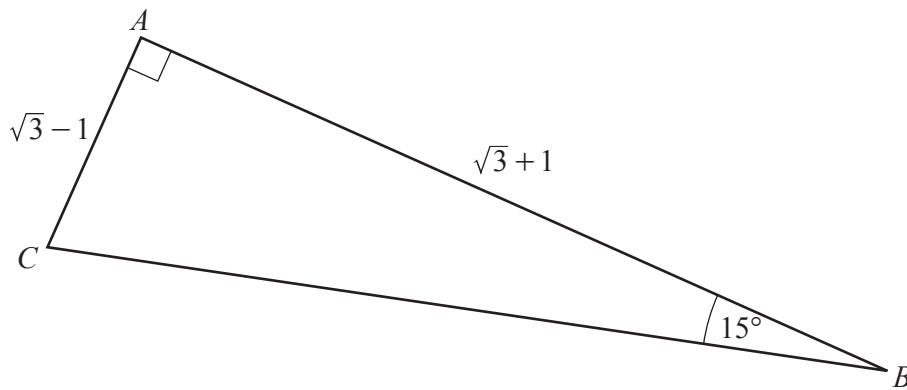
[3]

- 5 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 . [7]

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 $p\left(\frac{1}{2}\right)$. [1]

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

8 The population P , in millions, of a country is given by $P = A \times b^t$, where t is the number of years after January 2000 and A and b are constants. In January 2010 the population was 40 million and had increased to 45 million by January 2013.



(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 A particle moves in a straight line such that, t seconds after passing a fixed point O , its displacement from O is s m, where $s = e^{2t} - 10e^t - 12t + 9$.




(a) Find expressions for the velocity and acceleration at time t . [3]

(b) Find the time when the particle is instantaneously at rest. [3]

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

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 $y = 5 - \ln x - x$. [5]

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

11 The equation of a curve is $y = x\sqrt{16-x^2}$ for $0 \leq x \leq 4$.

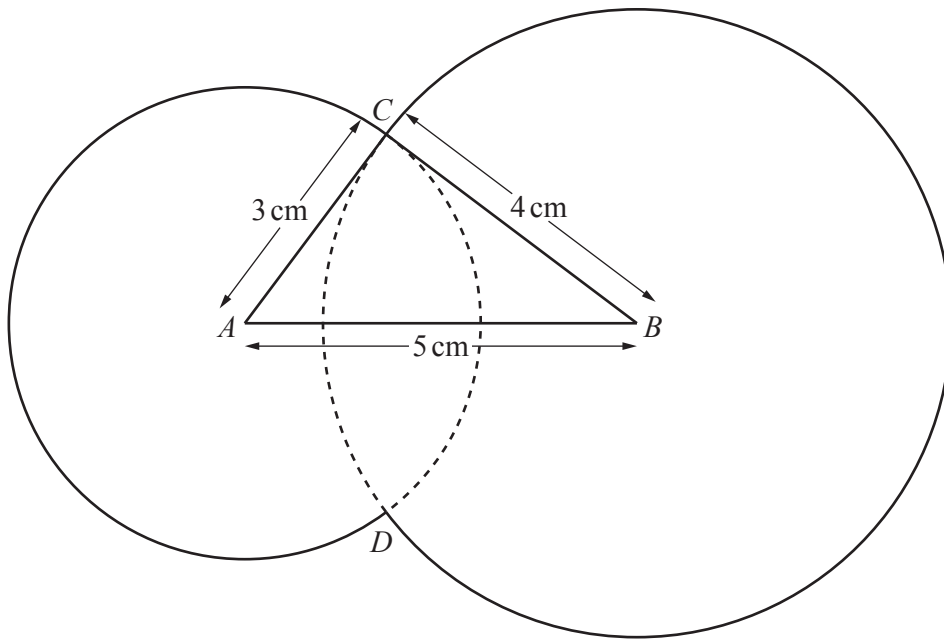


(a) Find the exact coordinates of the stationary point of the curve.

[6]

(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 $x = 3$.

[5]



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]

(b) the perimeter of the whole shape,

[4]

(c) the area of the whole shape.

[4]