Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

ADDITIONAL MATHEMATICS **0606/11**

Paper 1 **May/June 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.

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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

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

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

Arithmetic series

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

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

Geometric series

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

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

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

2. TRIGONOMETRY

Identities

$$\sin^2 A + \cos^2 A = 1$$
$$\sec^2 A = 1 + \tan^2 A$$
$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

Formulae for ΔABC

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\Delta = \frac{1}{2}bc\sin A$$

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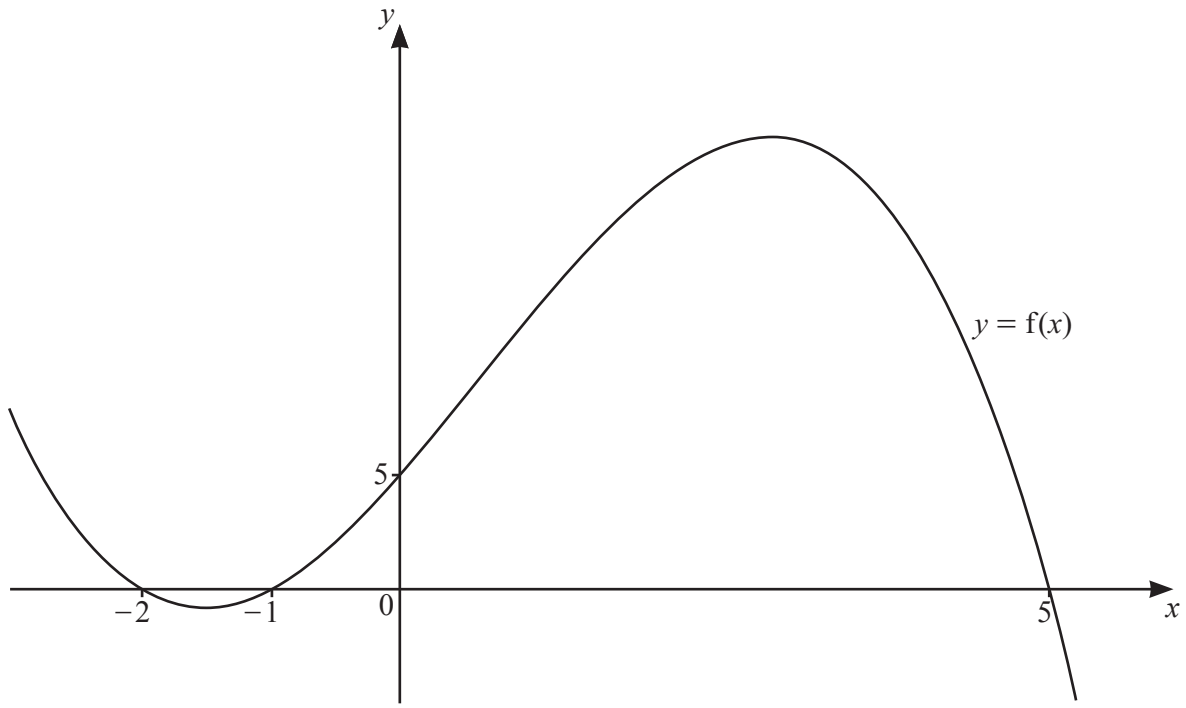
1 The diagram shows the graph of a cubic curve $y = \mathrm{f}(x)$.



(a) Find an expression for $\mathrm{f}(x)$. [2]

View solution

(b) Solve $\mathrm{f}(x) \leqslant 0$. [2]

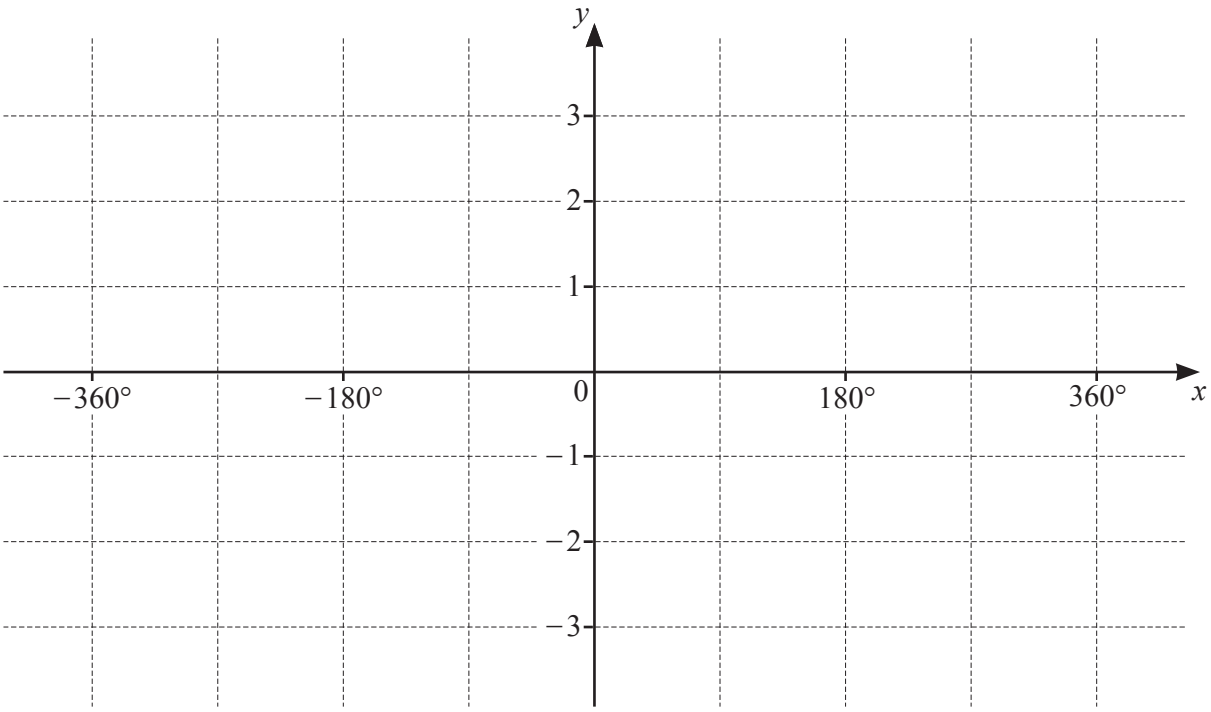
View solution

2 **(a)** Write down the period of $2\cos\frac{x}{3}-1$. [1]

View solution

(b) On the axes below, sketch the graph of $y=2\cos\frac{x}{3}-1$ for $-360° \leqslant x \leqslant 360°$. [3]

View solution



3 The radius, r cm, of a circle is increasing at the rate of $5\,\text{cms}^{-1}$. Find, in terms of π, the rate at which the area of the circle is increasing when $r = 3$. [4]

View solution

4 DO NOT USE A CALCULATOR IN THIS QUESTION.

Find the positive solution of the equation $\left(5+4\sqrt{7}\right)x^2+\left(4-2\sqrt{7}\right)x-1=0,$ giving your answer in the form $a+b\sqrt{7}$, where a and b are fractions in their simplest form. [5]

View solution

5 Find the equation of the tangent to the curve $y = \dfrac{\ln\left(3x^2 - 1\right)}{x + 2}$ at the point where $x = 1$. Give your answer in the form $y = mx + c$, where m and c are constants correct to 3 decimal places. [6]

View solution

6 The line $y = 5x + 6$ meets the curve $xy = 8$ at the points A and B.

(a) Find the coordinates of A and of B. [3]

View solution

(b) Find the coordinates of the point where the perpendicular bisector of the line AB meets the line $y = x$. [5]

View solution

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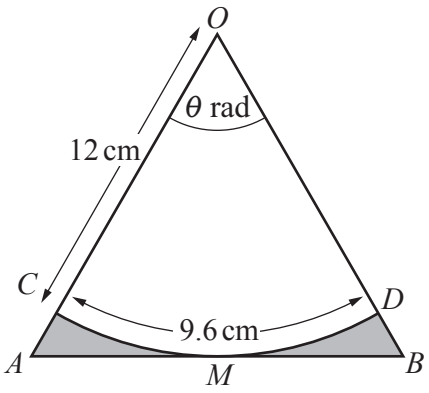

The diagram shows an isosceles triangle OAB such that $OA = OB$ and angle $AOB = \theta$ radians. The points C and D lie on OA and OB respectively. CD is an arc of length 9.6 cm of the circle, centre O, radius 12 cm. The arc CD touches the line AB at the point M.

(a) Find the value of θ. [1]

View solution

(b) Find the total area of the shaded regions. [4]

View solution

(c) Find the total perimeter of the shaded regions. [3]

View solution

8 **(a)** Show that $\frac{3}{2x-3}+\frac{3}{2x+3}$ can be written as $\frac{12x}{4x^2-9}$. [2]

View solution

(b) Hence find $\int \frac{12x}{4x^2-9}\mathrm{d}x$, giving your answer as a single logarithm and an arbitrary constant. [3]

View solution

(c) Given that $\int_2^a \frac{12x}{4x^2-9}\mathrm{d}x = \ln 5\sqrt{5}$, where $a > 2$, find the exact value of a. [4]

View solution

9 **(a)** An arithmetic progression has a second term of -14 and a sum to 21 terms of 84. Find the first term and the 21st term of this progression. [5]

View solution

(b) A geometric progression has a second term of $27p^2$ and a fifth term of p^5. The common ratio, r, is such that $0 < r < 1$.

(i) Find r in terms of p. [2]

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(ii) Hence find, in terms of p, the sum to infinity of the progression. [3]

View solution

(iii) Given that the sum to infinity is 81, find the value of p. [2]

View solution

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10 (a) (i) Show that $\frac{1}{\sec\theta - 1} - \frac{1}{\sec\theta + 1} = 2\cot^2\theta$. [3]

View solution

(ii) Hence solve $\frac{1}{\sec 2x - 1} - \frac{1}{\sec 2x + 1} = 6$ for $-90° < x < 90°$. [5]

View solution

(b) Solve $\operatorname{cosec}\left(y+\frac{\pi}{3}\right)=2$ for $0 \leqslant y \leqslant 2\pi$ radians, giving your answers in terms of π. [4]

View solution

Question 11 is printed on the next page.

11 A curve is such that $\frac{d^2y}{dx^2} = 5\cos 2x$. This curve has a gradient of $\frac{3}{4}$ at the point $\left(-\frac{\pi}{12}, \frac{5\pi}{4}\right)$. Find the equation of this curve. [8]

View solution

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