Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

ADDITIONAL MATHEMATICS **0606/11**

Paper 1 **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 [ ].

© UCLES 2020

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

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

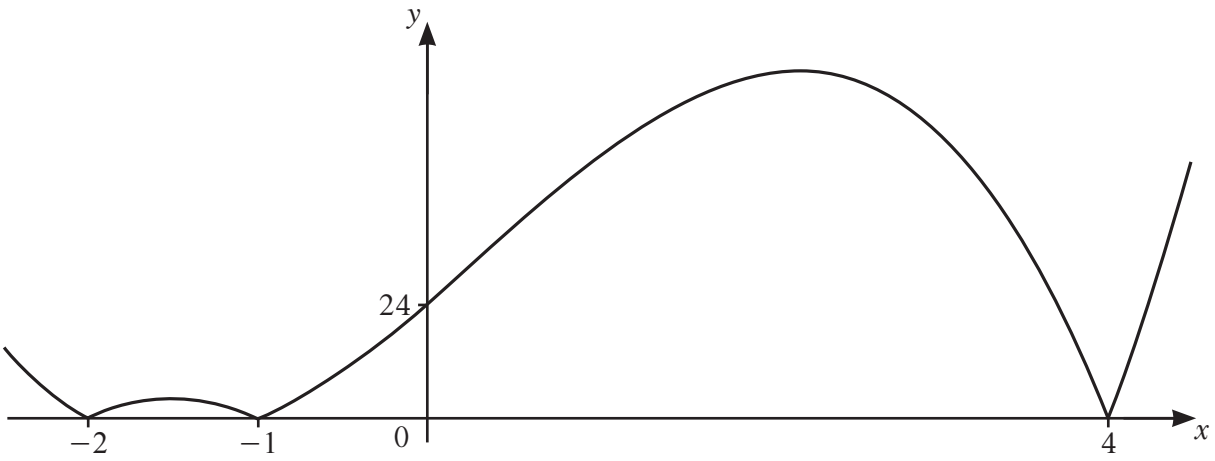
$$a^2 = b^2 + c^2 - 2bc\cos A$$

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

© UCLES 2020

1

View solution



The diagram shows the graph of $y = |\mathrm{p}(x)|$, where $\mathrm{p}(x)$ is a cubic function. Find the two possible expressions for $\mathrm{p}(x)$. [3]

2 **(a)** Write down the amplitude of $1 + 4\cos\left(\frac{x}{3}\right)$. [1]

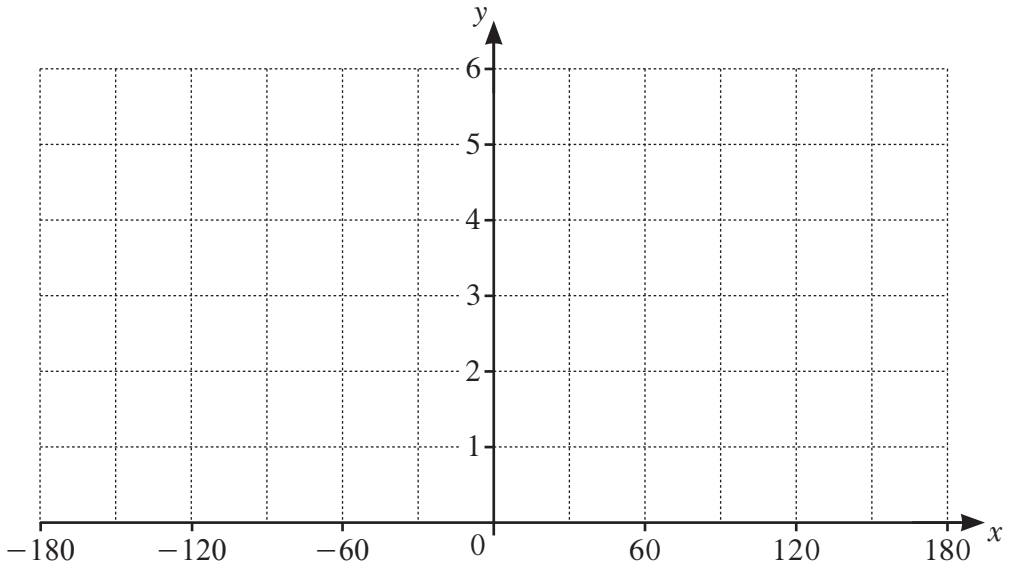
View solution

(b) Write down the period of $1 + 4\cos\left(\frac{x}{3}\right)$. [1]

View solution

(c) On the axes below, sketch the graph of $y = 1 + 4\cos\left(\frac{x}{3}\right)$ for $-180° \leqslant x° \leqslant 180°$.

View solution



[3]

3 **(a)** Write $\dfrac{\sqrt{p}\left(qr^2\right)^{\frac{1}{3}}}{\left(q^3p\right)^{-1}r^3}$ in the form $p^aq^br^c$, where a, b and c are constants. [3]

View solution

(b) Solve $6x^{\frac{2}{3}} - 5x^{\frac{1}{3}} + 1 = 0$. [3]

View solution

4 It is given that $y = \dfrac{\tan 3x}{\sin x}$.

(a) Find the exact value of $\dfrac{\mathrm{d}y}{\mathrm{d}x}$ when $x = \dfrac{\pi}{3}$. [4]

View solution

(b) Hence find the approximate change in y as x increases from $\dfrac{\pi}{3}$ to $\dfrac{\pi}{3} + h$, where h is small. [1]

View solution

(c) Given that x is increasing at the rate of 3 units per second, find the corresponding rate of change in y when $x = \dfrac{\pi}{3}$, giving your answer in its simplest surd form. [2]

View solution

© UCLES 2020

5 **(a)** **(i)** Find how many different 4-digit numbers can be formed using the digits 1, 3, 4, 6, 7 and 9. Each digit may be used once only in any 4-digit number. [1]

View solution

(ii) How many of these 4-digit numbers are even and greater than 6000? [3]

View solution

(b) A committee of 5 people is to be formed from 6 doctors, 4 dentists and 3 nurses. Find the number of different committees that could be formed if

(i) there are no restrictions, [1]

View solution

(ii) the committee contains at least one doctor, [2]

View solution

(iii) the committee contains all the nurses. [1]

View solution

6 A particle P is initially at the point with position vector $\begin{pmatrix}30\\10\end{pmatrix}$ and moves with a constant speed of $10\,\text{ms}^{-1}$ in the same direction as $\begin{pmatrix}-4\\3\end{pmatrix}$.

(a) Find the position vector of P after t s. [3]


View solution

As P starts moving, a particle Q starts to move such that its position vector after t s is given by $\begin{pmatrix}-80\\90\end{pmatrix}+t\begin{pmatrix}5\\12\end{pmatrix}$.

(b) Write down the speed of Q. [1]


View solution

(c) Find the exact distance between P and Q when $t = 10$, giving your answer in its simplest surd form. [3]


View solution

© UCLES 2020

7 It is given that $\mathrm{f}(x) = 5\ln(2x+3)$ for $x > -\frac{3}{2}$.

(a) Write down the range of f. [1]

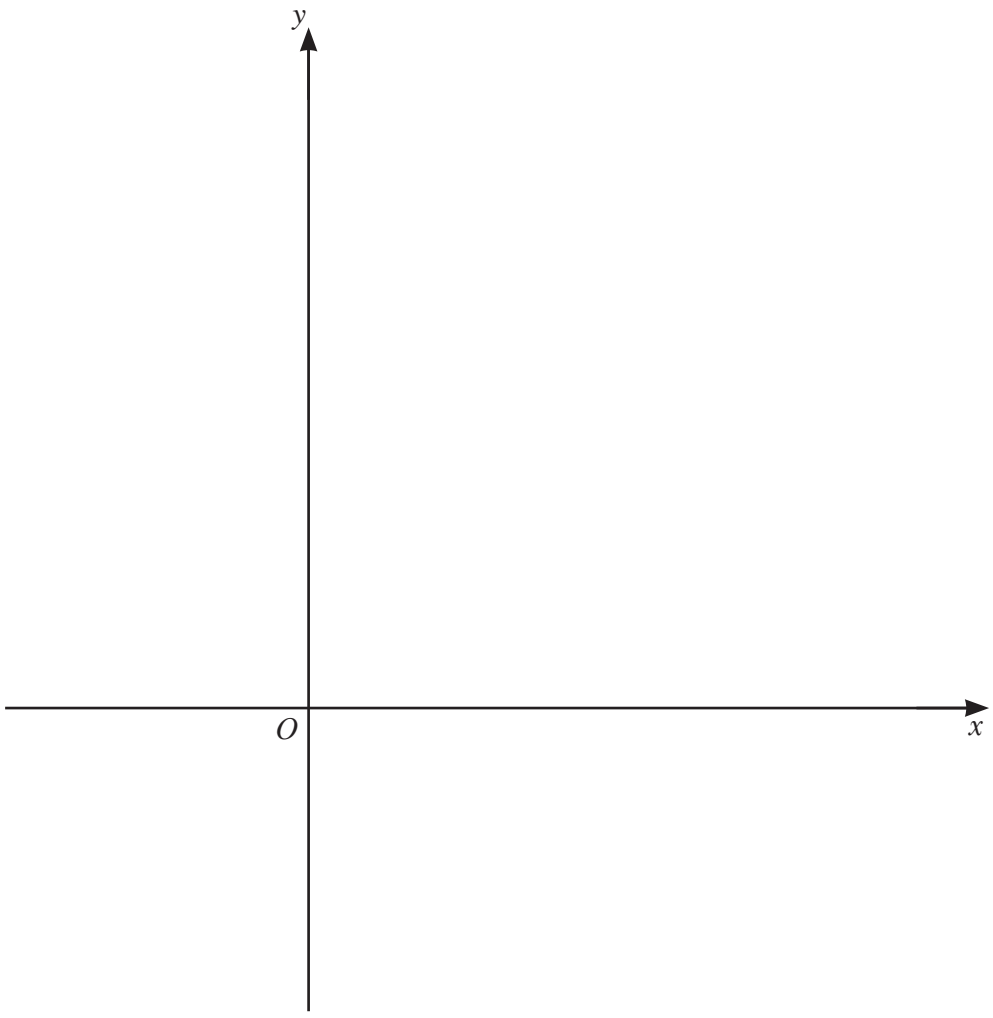
View solution

(b) Find f^{-1} and state its domain. [3]

View solution

(c) On the axes below, sketch the graph of $y = \mathrm{f}(x)$ and the graph of $y = \mathrm{f}^{-1}(x)$. Label each curve and state the intercepts on the coordinate axes.

View solution



[5]

© UCLES 2020

8 **(a)** **(i)** Show that $\dfrac{1}{(1+\operatorname{cosec}\theta)(\sin\theta-\sin^2\theta)} = \sec^2\theta$. [4]

View solution

(ii) Hence solve $(1+\operatorname{cosec}\theta)(\sin\theta-\sin^2\theta) = \dfrac{3}{4}$ for $-180° \leqslant \theta \leqslant 180°$. [4]

View solution

© UCLES 2020

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

View solution

9 **(a)** Given that $\int_1^a \left(\frac{1}{x} - \frac{1}{2x+3}\right) \mathrm{d}x = \ln 3$, where $a > 0$, find the exact value of a, giving your answer in simplest surd form. [6]

View solution

(b) Find the exact value of $\int_0^{\frac{\pi}{3}} \left(\sin\left(2x + \frac{\pi}{3}\right) - 1 + \cos 2x \right) \mathrm{d}x$. [5]

View solution

10 (a) An arithmetic progression has a second term of 8 and a fourth term of 18. Find the least number of terms for which the sum of this progression is greater than 1560. [6]

View solution

(b) A geometric progression has a sum to infinity of 72. The sum of the first 3 terms of this progression is $\frac{333}{8}$.

(i) Find the value of the common ratio. [5]

View solution

(ii) Hence find the value of the first term. [1]

View solution

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which itself is a department of the University of Cambridge.

© UCLES 2020