Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2016**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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CAMBRIDGE International Examinations

1 Mr Chan flies from London to Los Angeles, a distance of 8800 km.
The flight takes 11 hours and 10 minutes.

(a) (i) His plane leaves London at 09 35 local time.
The local time in Los Angeles is 8 hours behind the time in London.

View solution

Calculate the local time when the plane arrives in Los Angeles.

..... [2]

(ii) Work out the average speed of the plane in km/h.

View solution

.....km/h [2]

(b) There are three types of tickets, economy, business and first class.
The price of these tickets is in the ratio economy : business : first class = 2 : 5 : 9.

View solution

(i) The price of a business ticket is $2350.

Calculate the price of a first class ticket.

$..... [2]

(ii) Work out the price of an economy ticket as a percentage of the price of a first class ticket.

View solution

.....% [1]

(c) The price of a business ticket for the same journey with another airline is $2240.

View solution

(i) The price of a first class ticket is 70% more than a business ticket.

Calculate the price of this first class ticket.

$..... [2]

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(ii) The price of a business ticket is 180% **more** than an economy ticket.

View solution

Calculate the price of this economy ticket.

$..... [3]

View solution

(d) Mr Chan hires a car in Los Angeles.
The charges are shown below.

Car Hire

$28.00 per day plus $6.50 per day insurance.

$1.25 for every kilometre travelled after the first 800 km.
The first 800 km are included in the price.

Mr Chan hired the car for 12 days and paid $826.50 .

(i) Find the number of kilometres Mr Chan travelled in this car.

..... km [4]

(ii) The car used fuel at an average rate of 1 litre for every 10 km travelled.
Fuel costs $1.30 per litre.

View solution

Calculate the cost of the fuel used by the car during the 12 days.

$..... [2]

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2 **(a)** Work out the value of x in each of the following.

View solution

(i) $3^x = 243$

$x =$ ..... [1]

View solution

(ii) $16^x = 4$

$x =$ ..... [1]

View solution

(iii) $8^x = 32$

$x =$ ..... [2]

View solution

(iv) $27^x = \frac{1}{9}$

$x =$ ..... [2]

View solution

(b) Solve by factorisation.

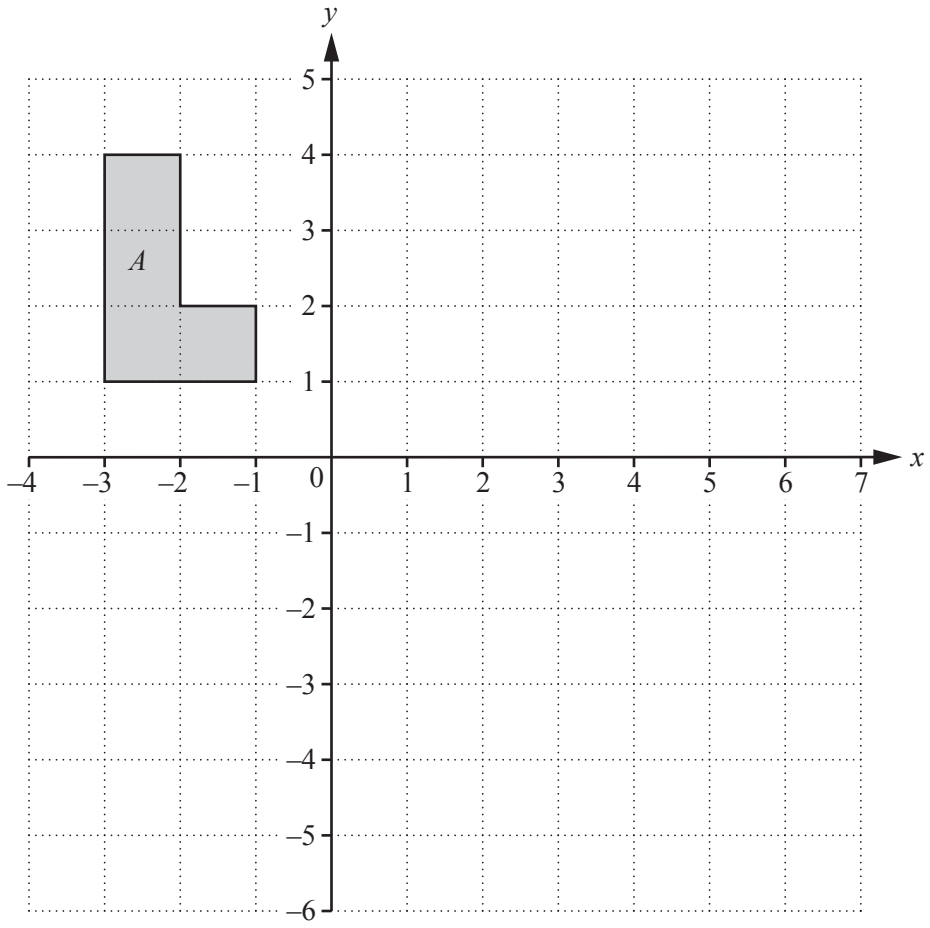
$$y^2 - 7y - 30 = 0$$

Show your working.

$y =$ ..... or $y =$ ..... [3]

3 (a)

View solution



On the grid, draw the image of

(i) shape A after a reflection in the line $x = 1$, [2]

(ii) shape A after an enlargement with scale factor -2, centre $(0, 1)$, [2]

(iii) shape A after the transformation represented by the matrix $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$. [3]

(b) Describe fully the **single** transformation represented by the matrix $\begin{pmatrix} 3 & 0 \\ 0 & 3 \end{pmatrix}$.

View solution

.....

..... [3]

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4 $f(x) = x^2 - \frac{1}{x} - 4\,,\ x \neq 0$

View solution

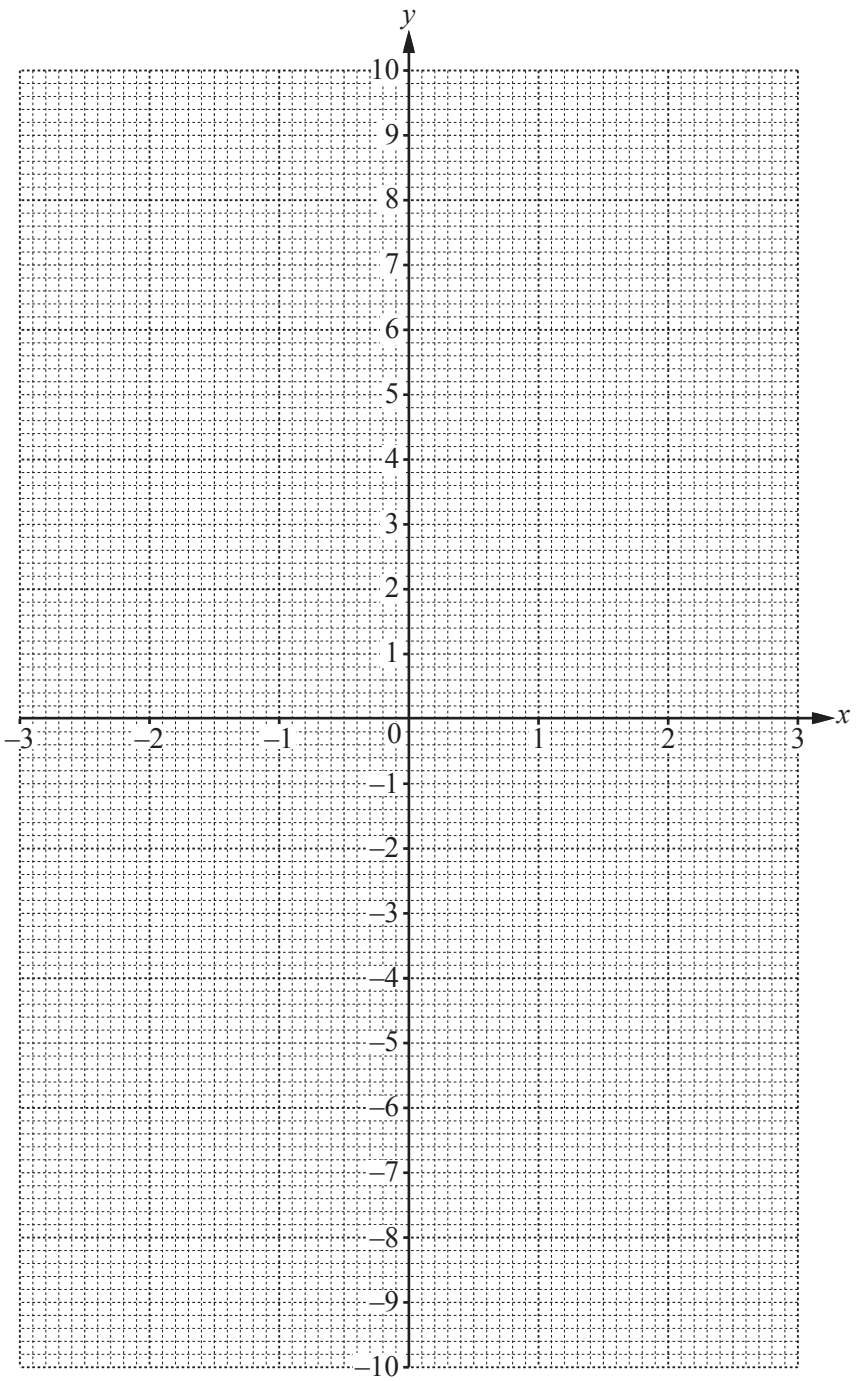
(a) (i) Complete the table.

x	–3	–2	–1	–0.5	–0.1		0.2	0.5	1	2	3
$f(x)$	5.3	0.5		–1.8	6.0		–9.0	–5.8	–4		4.7

[2]

View solution

(ii) On the grid, draw the graph of $y = f(x)$ for $-3 \leqslant x \leqslant -0.1$ and $0.2 \leqslant x \leqslant 3$.



[5]

(b) Use your graph to solve the equation f(x) = 0.

View solution

x = ... or x = ... or x = ... [3]

(c) Find an integer k, for which f(x) = k has one solution.

View solution

k = ... [1]

(d) **(i)** By drawing a suitable straight line, solve the equation f(x) + 2 = $-5x$.

View solution

x = ... or x = ... [4]

(ii) f(x) + 2 = $-5x$ can be written as $x^3 + ax^2 + bx - 1 = 0$.

Find the value of a and the value of b.

View solution

a = ...

b = ... [2]

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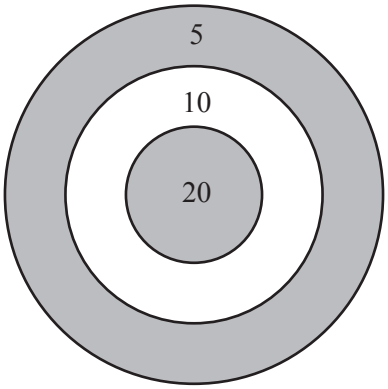
5 Kiah plays a game.
The game involves throwing a coin onto a circular board.
Points are scored for where the coin lands on the board.



If the coin lands on part of a line or misses the board then 0 points are scored.
The table shows the probabilities of Kiah scoring points on the board with one throw.

Points scored	20	10	5	0
Probability	x	0.2	0.3	0.45

(a) Find the value of x.

View solution

$x =$ ..... [2]

(b) Kiah throws a coin fifty times.

View solution

Work out the expected number of times she scores 5 points.

..... [1]

(c) Kiah throws a coin two times.

View solution

Calculate the probability that

(i) she scores either 5 or 0 with her first throw,

..... [2]

(ii) she scores 0 with her first throw and 5 with her second throw,

View solution

..... [2]

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(iii) she scores a total of 15 points with her two throws.

View solution

..... [3]

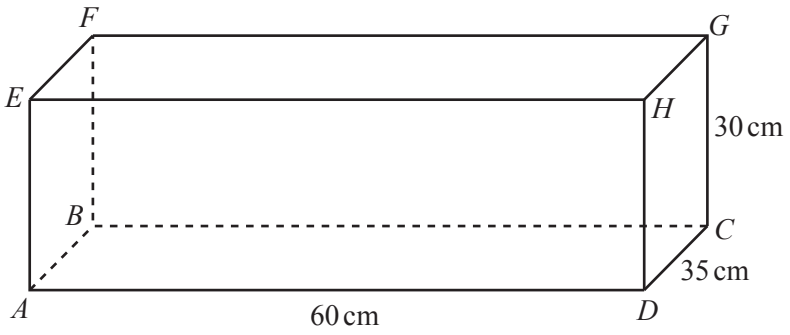
(d) Kiah throws a coin three times.

View solution

Calculate the probability that she scores a total of 10 points with her three throws.

..... [5]

6 The diagram shows a cuboid.



NOT TO SCALE

$AD = 60$ cm, $CD = 35$ cm and $CG = 30$ cm.

(a) Write down the number of planes of symmetry of this cuboid.

View solution

..... [1]

(b) **(i)** Work out the surface area of the cuboid.

View solution

..... cm^2 [3]

(ii) Write your answer to **part (b)(i)** in square metres.

View solution

..... m^2 [1]

(c) Calculate

View solution

(i) the length AG,

$AG =$ ..... cm [4]

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(ii) the angle between AG and the base $ABCD$.

View solution

..... [3]

(d) (i) Show that the volume of the cuboid is $63\,000\,cm^3$.

View solution

[1]

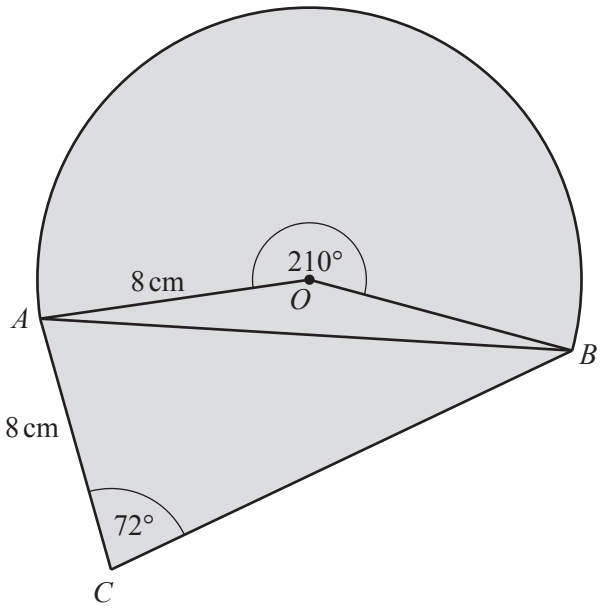
(ii) A cylinder of height 40 cm has the same volume as the cuboid.

Calculate the radius of the cylinder.

View solution

..... cm [3]

7



NOT TO SCALE

The diagram shows a design for a logo made from a sector and two triangles.
The sector, centre O, has radius 8 cm and sector angle 210°.
AC = 8 cm and angle ACB = 72°.

(a) Show that angle OAB = 15°.

View solution

[2]

(b) Calculate the length of the straight line AB.

View solution

AB = ... cm [4]

(c) Calculate angle *ABC*.

View solution

Angle *ABC* = ... [3]

(d) Calculate the total area of the logo design.

View solution

.....cm^2 [6]

(e) The logo design is an enlargement with scale factor 4 of the actual logo.

View solution

Calculate the area of the actual logo.

.....cm^2 [2]

8 $f(x) = 5x + 7$ $\quad g(x) = \dfrac{4}{x-3}$, $x \neq 3$

(a) Find

(i) $fg(1)$,

View solution

..... [2]

(ii) $gf(x)$,

View solution

..... [2]

(iii) $g^{-1}(x)$,

View solution

$g^{-1}(x) =$ ..... [3]

(iv) $f^{-1}f(2)$.

View solution

..... [1]

(b) $f(x) = g(x)$

View solution

(i) Show that $5x^2 - 8x - 25 = 0$.

[3]

View solution

(ii) Solve $5x^2 - 8x - 25 = 0$.
Show all your working and give your answers correct to 2 decimal places.

$x =$ ..... or $x =$ ..... [4]

Question 9 is printed on the next page.

9 A line joins the points A (–2, –5) and B (4, 13).

(a) Calculate the length AB.

View solution

$AB =$ ..... [3]

(b) Find the equation of the line through A and B.
Give your answer in the form $y = mx + c$.

View solution

$y =$ ..... [3]

(c) Another line is parallel to AB and passes through the point (0, –5).

View solution

Write down the equation of this line.

..... [2]

(d) Find the equation of the perpendicular bisector of AB.

View solution

..... [5]

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