Cambridge IGCSE

Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

MATHEMATICS **0580/43**

Paper 4 (Extended) **May/June 2019**

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.

This document consists of **16** printed pages.

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1 Here is part of a train timetable for a journey from London to Marseille.
All times given are in local time.
The local time in Marseille is 1 hour ahead of the local time in London.

London	07 19
Ashford	07 55
Lyon	13 00
Avignon	14 08
Marseille	14 46

(a) (i) Work out the total journey time from London to Marseille.
Give your answer in hours and minutes.

View solution

..... h ..... min [2]

(ii) The distance from London to Ashford is 90 km.
The local time in London is the same as the local time in Ashford.

View solution

Work out the average speed, in km/h, of the train between London and Ashford.

..... km/h [3]

(iii) During the journey, the train takes 35 seconds to completely cross a bridge.
The average speed of the train during this crossing is 90 km/h.
The length of the train is 95 metres.

View solution

Calculate the length, in metres, of this bridge.

..... m [4]

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(b) The fares for the train journey are shown in the table below.

View solution

From London to Marseille	Standard fare	Premier fare
Adult	\$84	\$140
Child	\$60	\$96

(i) For the **standard fare**, write the ratio adult fare : child fare in its simplest form.

..... : ..... [1]

(ii) For an **adult**, find the percentage increase in the cost of the standard fare to the premier fare.

View solution

..... % [3]

(iii) For one journey from London to Marseille, the ratio

View solution

number of adults : number of children = 11 : 2.

There were 220 adults in total on this journey.
All of the children and 70% of the adults paid the standard fare.
The remaining adults paid the premier fare.

Calculate the total of the fares paid by the adults and the children.

\$ ..... [5]

(c) There were 3.08×10^5 passengers that made this journey in 2018.
This was a 12% decrease in the number of passengers that made this journey in 2017.

View solution

Find the number of passengers that made this journey in 2017.
Give your answer in standard form.

..... [3]

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2 **(a)** Solve.

$$5x - 17 = 7x + 3$$

View solution

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

(b) Find the integer values of n that satisfy this inequality.

View solution

$$-7 < 4n \leqslant 8$$

..... [3]

(c) Simplify.

View solution

(i) $a^3 \times a^6$

..... [1]

(ii) $(5xy^2)^3$

View solution

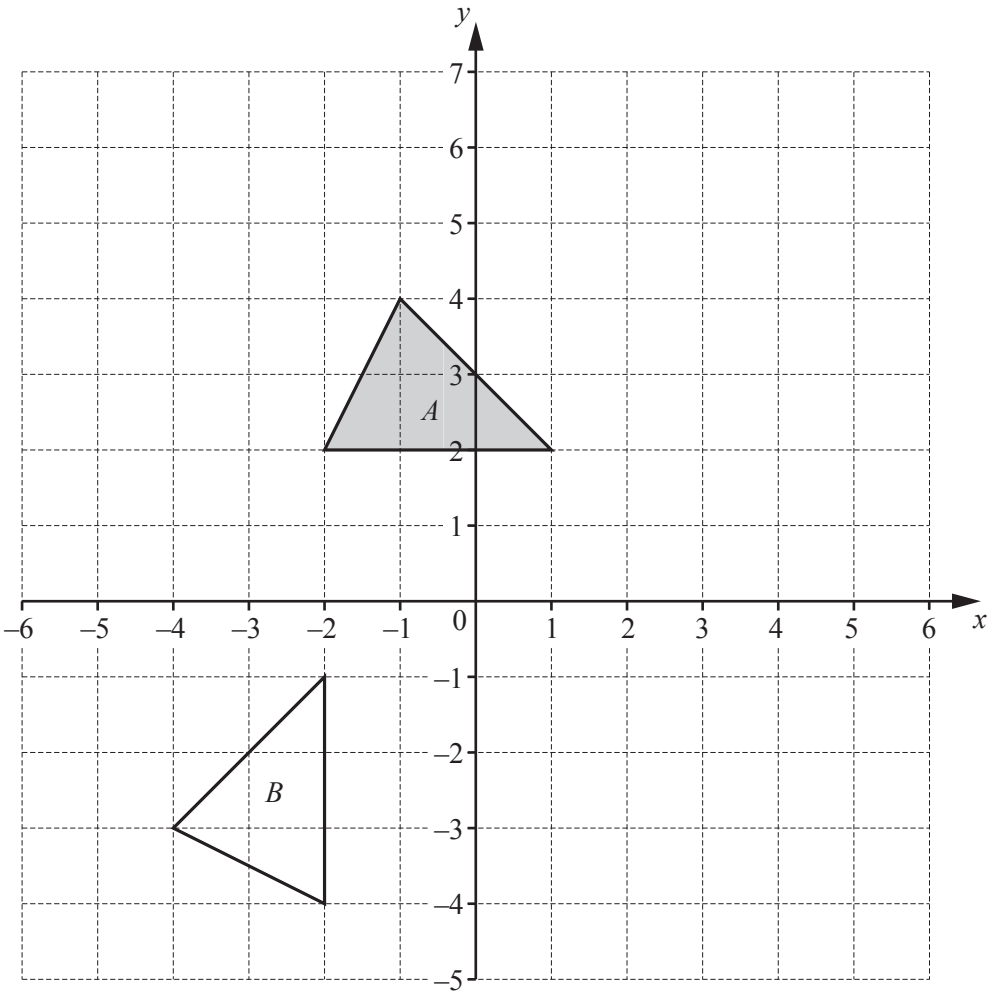
..... [2]

(iii) $\left(\frac{27x^{12}}{64y^3}\right)^{-\frac{1}{3}}$

View solution

..... [3]

3



(a) On the grid, draw the image of

(i) triangle A after a translation by the vector $\begin{pmatrix} -3 \\ 2 \end{pmatrix}$, [2]

(ii) triangle A after a reflection in the line $y = x$. [2]

(b) Describe fully the **single** transformation that maps triangle A onto triangle B.

.....

..... [3]

(c) **(i)** Find the matrix that represents an enlargement, scale factor -2, centre (0, 0).

$\begin{pmatrix} & \\ & \end{pmatrix}$ [2]

(ii) Calculate the determinant of the matrix in **part (c)(i)**.

..... [1]

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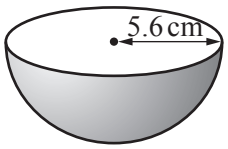
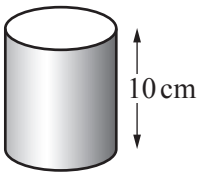
4 (a)





NOT TO SCALE

View solution

The diagram shows a hemispherical bowl of radius 5.6 cm and a cylindrical tin of height 10 cm.

(i) Show that the volume of the bowl is 368 cm^3, correct to the nearest cm^3.
[The volume, V, of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

[2]

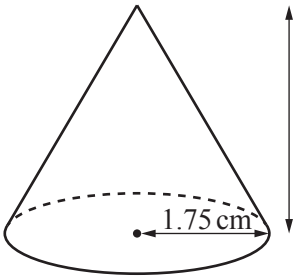
(ii) The tin is completely full of soup.
When all the soup is poured into the empty bowl, 80% of the volume of the bowl is filled.

View solution

Calculate the radius of the tin.

..... cm [4]

(b)



NOT TO SCALE

View solution

The diagram shows a cone with radius 1.75 cm and height 6 cm.

(i) Calculate the total surface area of the cone.
[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]

..... cm^2 [5]

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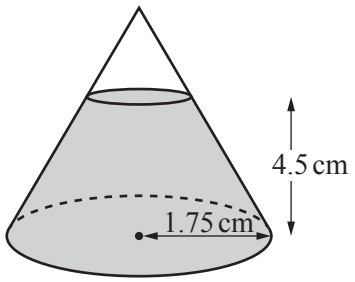
View solution

(ii)



The cone contains salt to a depth of 4.5 cm.
The top layer of the salt forms a circle that is parallel to the base of the cone.

(a) Show that the volume of the salt inside the cone is 18.9 cm^3, correct to 1 decimal place.
[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

[4]

(b) The salt is removed from the cone at a constant rate of 200 mm^3 per second.

Calculate the time taken for the cone to be completely emptied.
Give your answer in seconds, correct to the nearest second.

..... s [3]

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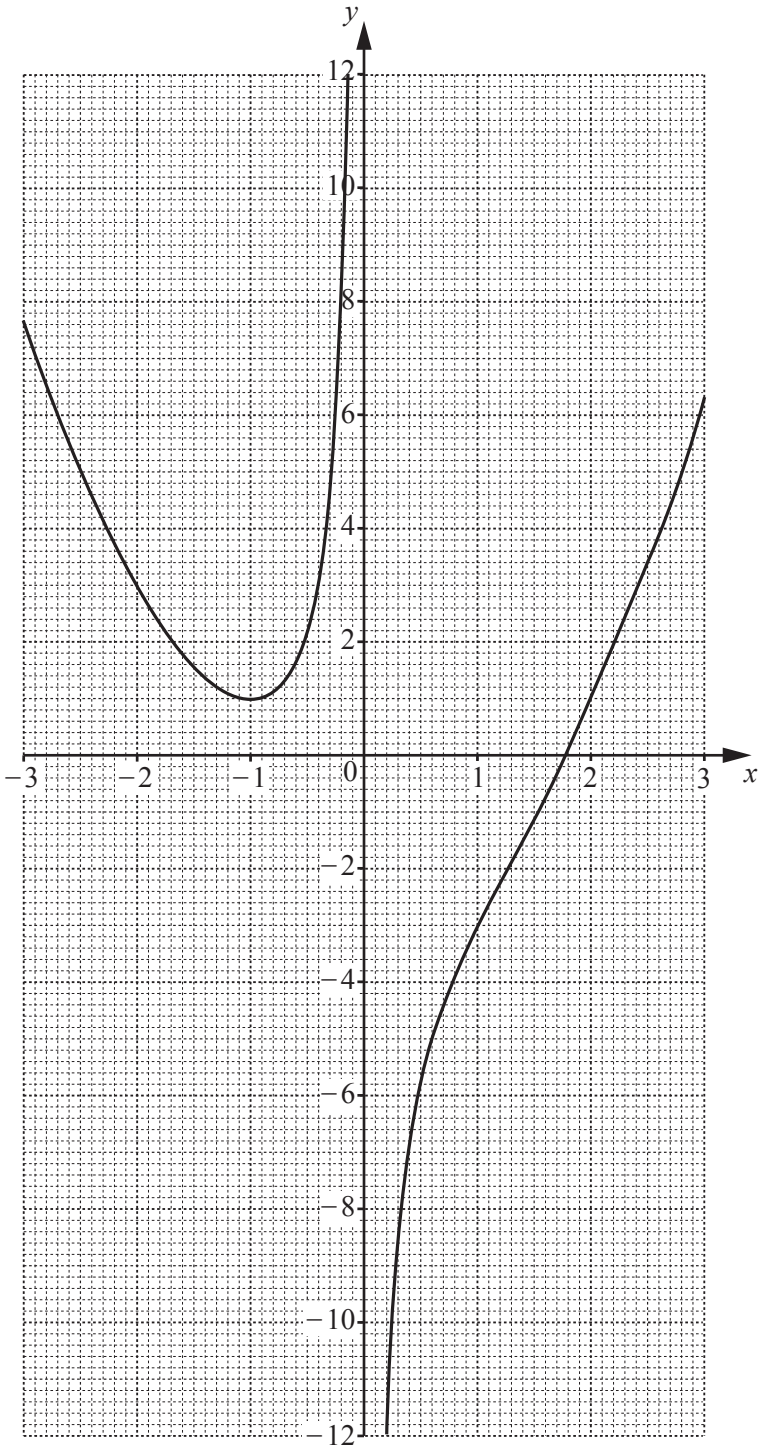
5 The diagram shows the graph of $y = \mathrm{f}(x)$ where $\mathrm{f}(x) = x^2 - \frac{2}{x} - 2, x \neq 0$.



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(a) Use the graph to find

(i) f(1),

View solution

..... [1]

(ii) ff(−2).

View solution

..... [2]

(b) On the grid opposite, draw a suitable straight line to solve the equation $x^2 - \frac{2}{x} - 7 = -3x$ for $-3 \leqslant x \leqslant 3$.

View solution

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

(c) By drawing a suitable tangent, find an estimate of the gradient of the curve at $x = -2$.

View solution

..... [3]

(d) **(i)** Complete the table for $y = g(x)$ where $g(x) = 2^{-x}$ for $-3 \leqslant x \leqslant 3$.

View solution

x	−3	−2	−1	0	1	2	3
y			2	1	0.5		0.125

[3]

(ii) On the grid opposite, draw the graph of $y = g(x)$. [3]

(iii) Use your graph to find the **positive** solution to the equation $f(x) = g(x)$.

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

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6 The table shows the time, t seconds, taken by each of 120 boys to solve a puzzle.

Time (t seconds)	$20 < t \leqslant 30$	$30 < t \leqslant 35$	$35 < t \leqslant 40$	$40 < t \leqslant 60$	$60 < t \leqslant 100$
Frequency	38	27	21	16	18

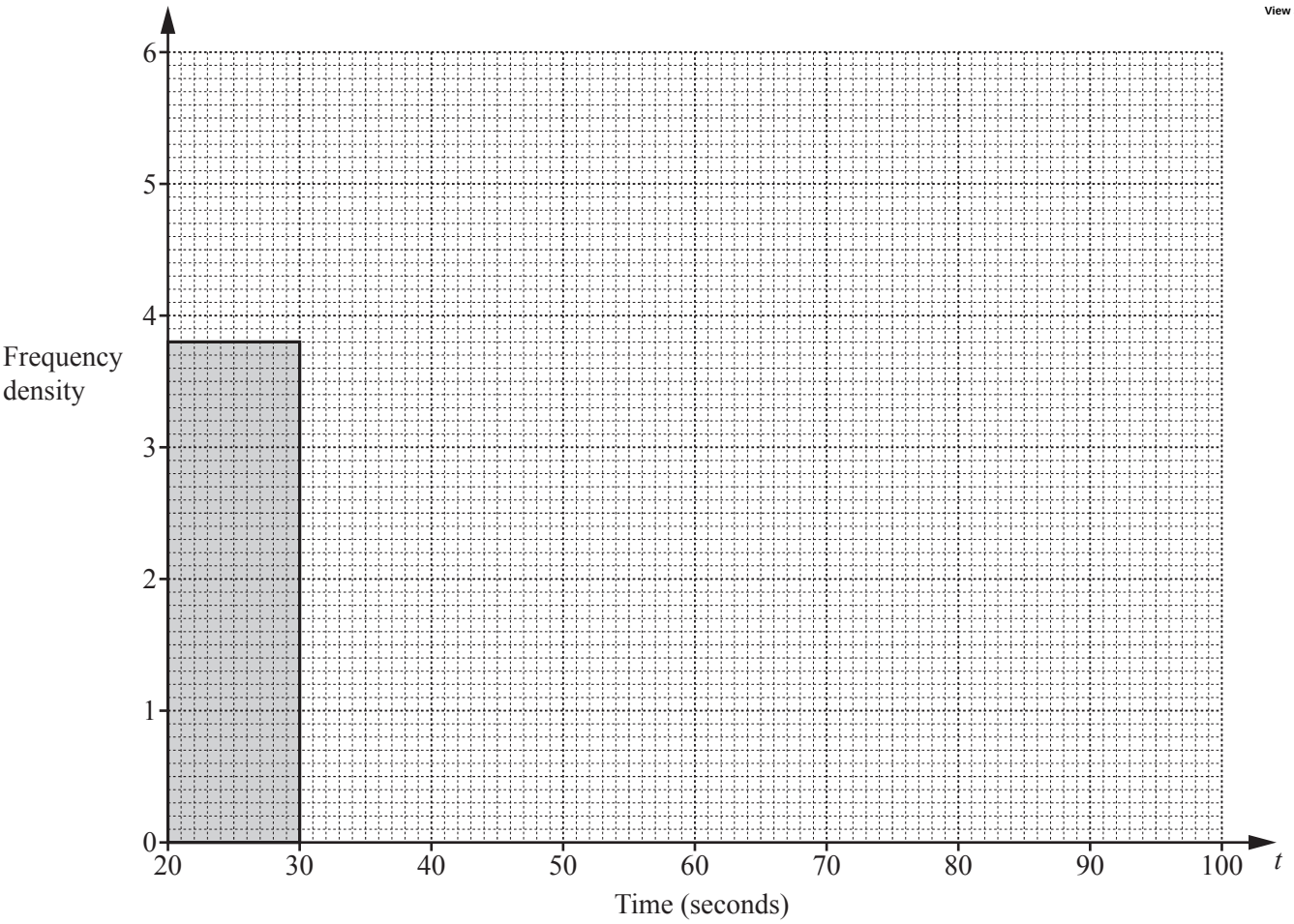
(a) Calculate an estimate of the mean time.

View solution

..... s [4]

(b) On the grid, complete the histogram to show the information in the frequency table.

View solution



[4]

7 A straight line joins the points A $(-2, -3)$ and C $(1, 9)$.

(a) Find the equation of the line AC in the form $y = mx + c$.

View solution

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

(b) Calculate the acute angle between AC and the x-axis.

View solution

..... [2]

(c) $ABCD$ is a kite, where AC is the longer diagonal of the kite.
B is the point (3.5, 2).

View solution

(i) Find the equation of the line BD in the form $y = mx + c$.

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

(ii) The diagonals AC and BD intersect at $(-0.5, 3)$.

Work out the co-ordinates of D.

View solution

(..... , ...) [2]

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8 **(a)** Angelo has a bag containing 3 white counters and x black counters.
He takes two counters at random from the bag, without replacement.

View solution

(i) Complete the following statement.

The probability that Angelo takes two black counters is

$$\frac{x}{x+3} \times \frac{\text{.....}}{\text{.....}}.$$

[2]

View solution

(ii) The probability that Angelo takes two black counters is $\frac{7}{15}$.

(a) Show that $4x^2 - 25x - 21 = 0$.

[4]

(b) Solve by factorisation.

$$4x^2 - 25x - 21 = 0$$

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

(c) Write down the number of black counters in the bag.

..... [1]

(b) Esme has a bag with 5 green counters and 4 red counters.
She takes three counters at random from the bag without replacement.

View solution

Work out the probability that the three counters are all the same colour.

..... [4]

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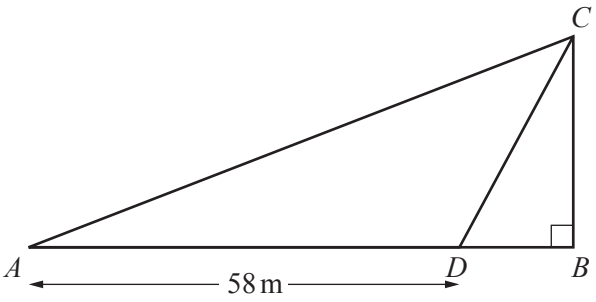
9 (a)

View solution



NOT TO SCALE

In the diagram, BC is a vertical wall standing on horizontal ground AB.
D is the point on AB where $AD = 58$ m.
The angle of elevation of C from A is 26°.
The angle of elevation of C from D is 72°.

(i) Show that $AC = 76.7$ m, correct to 1 decimal place.

[5]

View solution

(ii) Calculate BD.

$BD =$ ..... m [3]

(b) Triangle EFG has an area of $70\,m^2$.
$EF : FG = 1 : 2$ and angle $EFG = 40°$.

View solution

(i) Calculate EF.

$EF =$ ..... m [4]

(ii) A **different** triangle PQR also has an area of $70\,m^2$.
$PQ : QR = 1 : 2$ and $PQ = EF$.

View solution

Find angle PQR.

Angle $PQR =$ ..... [1]

Question 10 is printed on the next page.

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10 (a) 19, 15, 11, 7, ...

View solution

(i) Write down the next two terms of the sequence.

..... , ... [2]

(ii) Find the nth term of this sequence.

View solution

..... [2]

(iii) Find the value of n when the nth term is -65.

View solution

$n =$ ..... [2]

(b) Another sequence has nth term $2n^2 + 5n - 15$.

View solution

Find the difference between the 4th term and the 5th term of this sequence.

..... [2]

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