* 0000800000001 *

Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

5372399680

MATHEMATICS **0580/43**

Paper 4 (Extended) **October/November 2024**

2 hours 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

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 may use tracing paper.
- You must show all necessary working clearly.
- 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.
- For π, use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

DC (DE/SW) 337639/3
© UCLES 2024

1 Dinari sells fruit and vegetables.

(a) One day the mass of fruit and vegetables he sells is in the ratio fruit : vegetables = 9 : 8.
He sells 48 kg of vegetables.

Find the mass of the fruit he sells.

..... kg [2]

(b) On another day he receives \$280 for the fruit and vegetables he sells.
The \$280 is in the ratio fruit : vegetables = $(c+3) : (c-1)$.

Find the amount he receives from selling the fruit.

\$ ..... [3]

(c) In one week Dinari buys fruit and vegetables for \$1620.
He sells the fruit and vegetables for \$1750.

Calculate his percentage profit.

..... % [2]

(d) In another week Dinari sells fruit and vegetables for \$1738.
He makes a profit of 10%.

Calculate the amount he paid for the fruit and vegetables in that week.

\$ ..... [2]

DO NOT WRITE IN THIS MARGIN

2 **(a)** A is the point $(3, 7)$ and B is the point $(-1, 5)$.

(i) Find the coordinates of the midpoint of the line AB.

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

(ii) Write $\overrightarrow{AB}$ as a column vector.

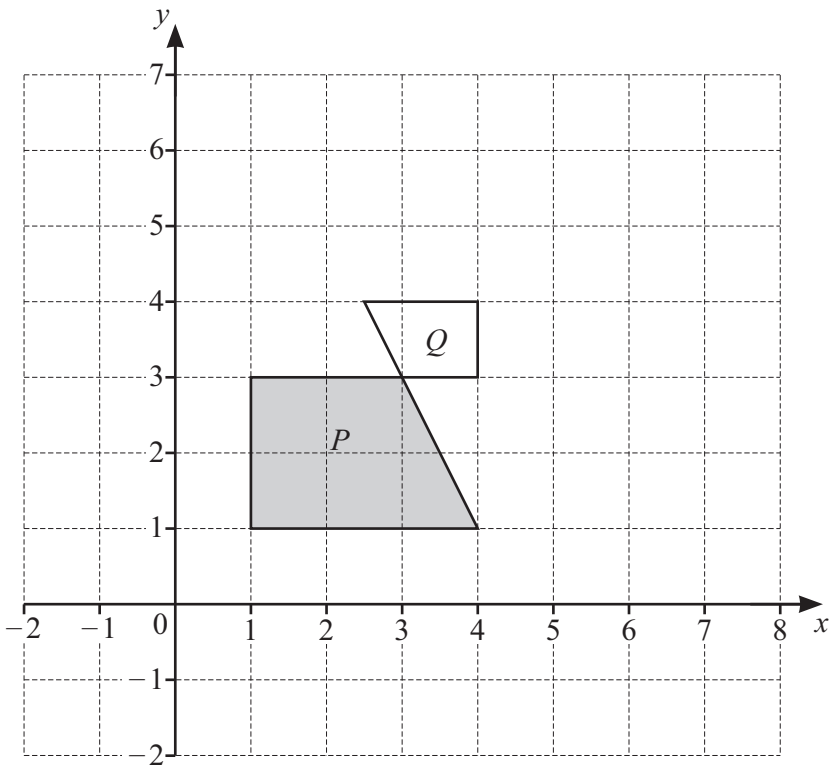
$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(iii) $\overrightarrow{AC} = 3\overrightarrow{BA}$

Find the coordinates of C.

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

(b)



(i) Rotate shape P through 180° about the point $(4, 1)$. [2]

(ii) Reflect shape P in the line $y = x + 2$. [2]

(iii) Describe fully the **single** transformation that maps shape P onto shape Q.

.....

..... [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

3 **(a)** Ed invests \$500 in an account paying r% per year simple interest.
At the end of 14 years the total amount in Ed's account is \$675.

Find the value of r.

$r =$ ..... [3]

(b) Eva invests \$400 at a rate of 2.2% per year compound interest.

Calculate the total interest earned at the end of 11 years.

\$ ..... [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

(c) Erin invests \$700 at a rate of p% per **month** compound interest.
At the end of 21 years the value of Erin's investment is \$1074, correct to the nearest dollar.

Calculate the value of p.

$p =$ ..... [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

4 **(a)** A box contains 50 cuboids.
Each cuboid has a mass of 135 g.
The total mass of the cuboids and the box is 7 kg.

Calculate the mass of the box.
Give your answer in grams.

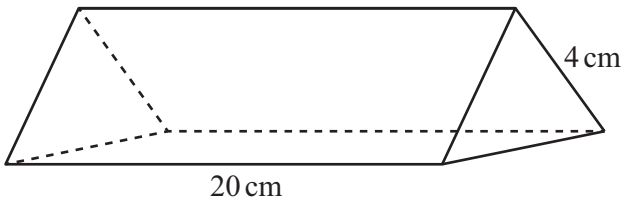
..... g [2]

(b) A solid cube of side 4 cm is fixed to the base inside an empty cube of side 6 cm.
Water is poured into the larger cube until it reaches the top of the smaller cube.

Calculate the amount of water poured into the larger cube.

..... cm^3 [2]

(c)



NOT TO SCALE

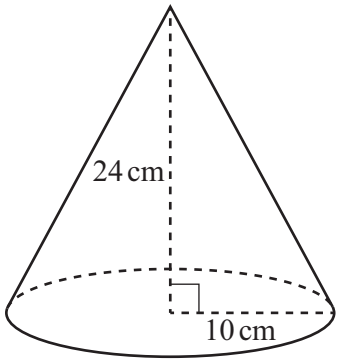
The diagram shows a solid triangular prism of length 20 cm.
The cross-section is an equilateral triangle with side length 4 cm.
The prism is made of wood with a density of 0.85 g/cm^3.

Calculate the mass of the prism.
[Density = mass ÷ volume]

..... g [4]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

(d)



NOT TO SCALE

The diagram shows a solid cone with base radius 10 cm and height 24 cm.

(i) Show that the **total** surface area of the cone is 1131 cm^2, correct to the nearest cm^2.
[The curved surface area of a cone with base radius r and slant height l is $A = \pi rl$.]

[4]

(ii) The total surface area of the cone is painted.

(a) The cost to paint the cone is \$1.71 .

Calculate the cost to paint 1 cm^2 of the cone.
Give your answer in cents.

..... cents [1]

(b) One tin of paint has enough paint to cover 2.5 m^2.

Calculate the number of these cones that can be painted completely using one tin of paint.

..... [2]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

5 **(a)** Naomi runs 100 m in 15 seconds.

Calculate Naomi's average speed in kilometres per hour.

..... km/h [2]

(b) Olav runs for 45 minutes at a speed of 9.5 km/h.
He then runs 8.1 km at a speed of 7.5 km/h.

Calculate Olav's average speed for the whole run.

..... km/h [3]

(c) A train has length p metres.
The train passes through a station of length q metres.
The speed of the train is v kilometres per hour.

Find an expression for the time the train takes to completely pass through the station.
Give your answer in seconds, in terms of p, q and v.

..... s [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

6 **(a)** Simplify $\frac{24u}{5y} \times \frac{10}{3u}$.

..... [2]

(b) Expand and simplify $(x-1)(x+2)(x+3)$.

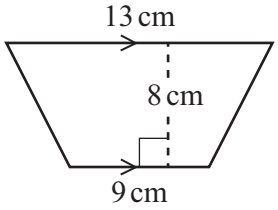
..... [3]

(c) Solve the equation $2x^2 + x - 5 = 0$.
You must show all your working and give your answers correct to 2 decimal places.

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

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

7 (a) (i)

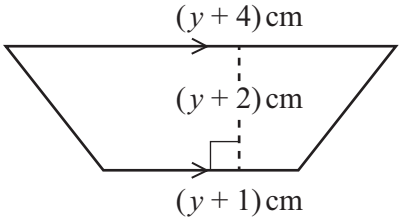


NOT TO SCALE

Calculate the area of the trapezium.

..... cm^2 [2]

(ii)



NOT TO SCALE

The area of this trapezium is 264 cm^2.

(a) Show that $2y^2 + 9y - 518 = 0$.

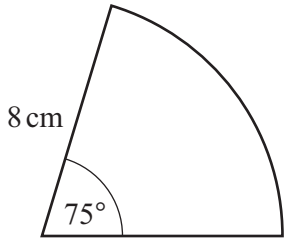
[3]

(b) Solve $2y^2 + 9y - 518 = 0$ by factorisation to find the value of y.

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

DO NOT WRITE IN THIS MARGIN

(b)



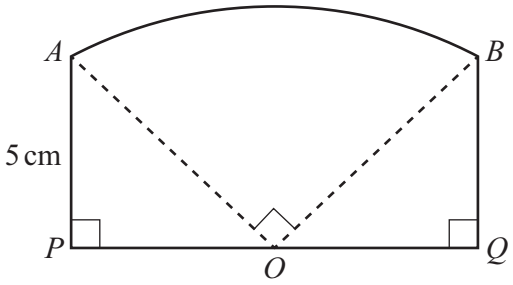
NOT TO SCALE

The diagram shows a sector of a circle with radius 8 cm and angle 75°.

Find the perimeter of the sector.

..... cm [3]

(c)



NOT TO SCALE

The diagram shows a shape $ABQP$ made from three straight lines and an arc of a sector of a circle.
The sector has centre O and angle 90°.
POQ is a straight line and $AP = PO = OQ = QB = 5$ cm.

Find the area of $ABQP$.
Give your answer in the form $a + k\pi$.

..... cm^2 [4]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

8 Guillaume measures the speed of each of 100 cars.
The results are shown in the table.

Speed (v km/h)	$30 < v \leqslant 40$	$40 < v \leqslant 45$	$45 < v \leqslant 50$	$50 < v \leqslant 70$
Frequency	15	20	35	30

(a) Guillaume draws a pie chart for this data.

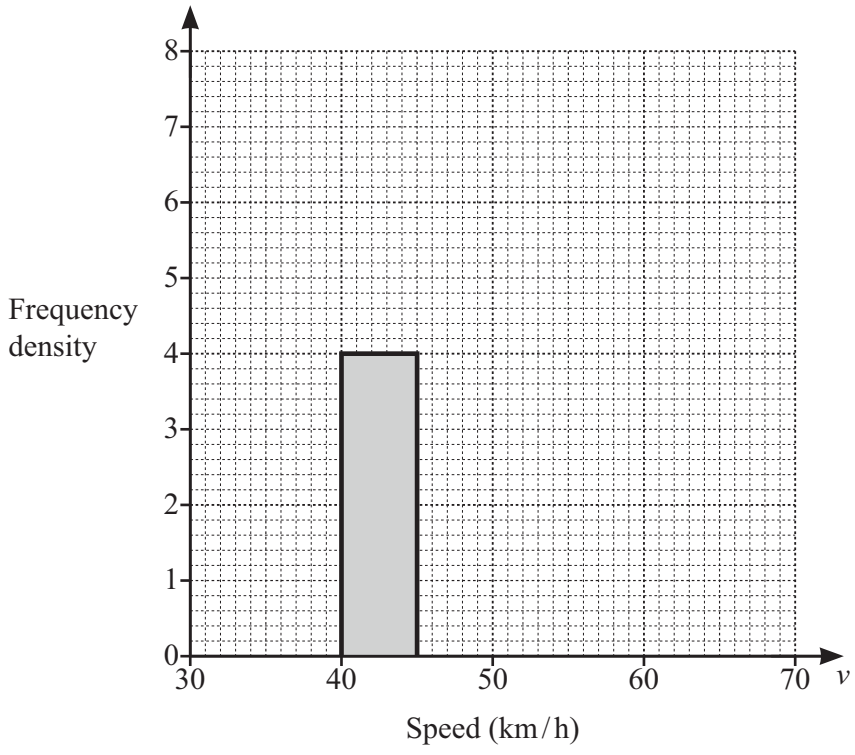
Calculate the angle for the interval $45 < v \leqslant 50$.

..... [2]

(b) Calculate an estimate of the mean speed.

..... km/h [4]

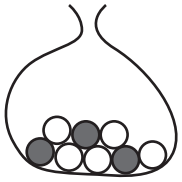
(c) Complete the histogram to show the data in the table.



[3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

9



A bag contains 5 white balls and 3 black balls.

(a) (i) Marwan picks a ball from the bag at random and then replaces it.

Find the probability that the ball is white.

..... [1]

(ii) Naomi picks a ball from the bag at random and then replaces it.
She repeats this 120 times.

Find the number of times the ball is expected to be white.

..... [1]

(b) Oscar picks a ball from the bag at random.
He replaces it and then picks a second ball from the bag at random.

(i) Find the probability that the balls are the same colour.

..... [3]

(ii) Find the probability that the balls are not the same colour.

..... [1]

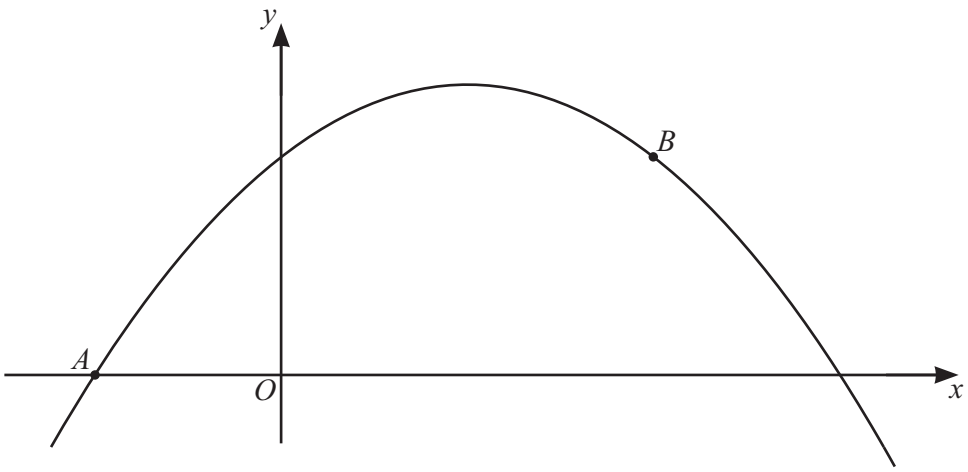
(c) Priya picks 3 of the 8 balls from the bag at random without replacement.

Find the probability that she picks two white balls and one black ball.

..... [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

10



NOT TO SCALE

The diagram shows a sketch of the graph of $y = 3 + 2x - x^2$.
A is the point $(-1, 0)$ and B is the point $(2, 3)$.

(a) Find the derivative of $3 + 2x - x^2$.

..... [2]

(b) (i) Show that the equation of the tangent at A is $y = 4x + 4$.

[3]

(ii) The line L is perpendicular to the line $y = 4x + 4$.
The line L passes through the point B.

Find the equation of the line L.
Give your answer in the form $y = mx + c$.

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

DO NOT WRITE IN THIS MARGIN

(c) Find the coordinates of the maximum point on the graph of $y = 3 + 2x - x^2$.

(..... , ...) [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

11 $f(x) = 2x + 5$ $g(x) = 1 - 2x$ $h(x) = \frac{1}{x+1}, x \neq -1$ $j(x) = 2^x$

(a) Find $g(-3)$.

..... [1]

(b) Find $f(x)g(x) + fg(x) + 1$.
Give your answer in its simplest form.

..... [4]

(c) Find $g^{-1}(x)$.

$g^{-1}(x) =$ ..... [2]

(d) Find $hh(1)$.

..... [2]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

(e) Simplify $\frac{1}{\mathrm{f}(x)} - \mathrm{h}(x)$.

Give your answer as a single fraction in its simplest form.

..... [3]

(f) Find x when $\mathrm{j}(x) = \frac{1}{32}$.

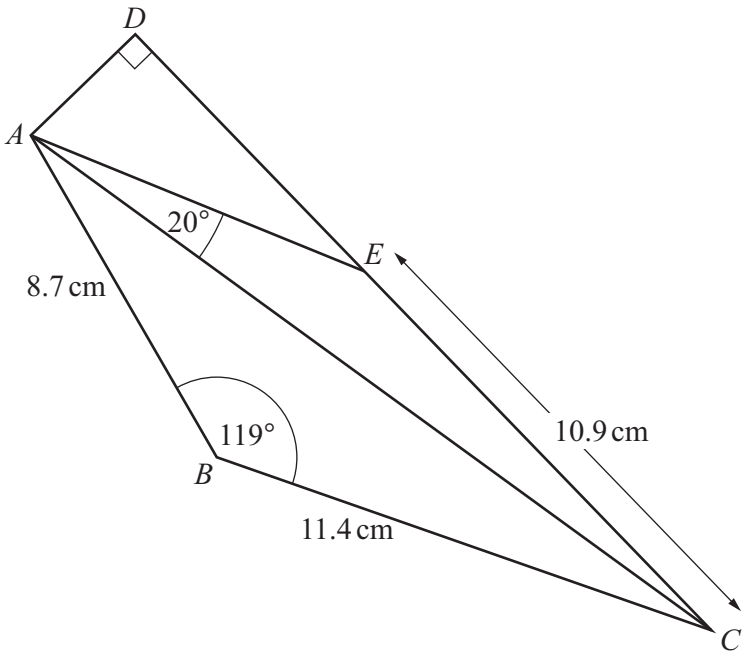
$x =$ ..... [1]

(g) Find x when $\mathrm{j}^{-1}(x) = 0$.

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

DO NOT WRITE IN THIS MARGIN

12



NOT TO SCALE

ABCD is a quadrilateral and *E* is a point on *CD*.
AB = 8.7 cm, *BC* = 11.4 cm and *CE* = 10.9 cm.
Angle *ADE* = 90°, angle *ABC* = 119° and angle *CAE* = 20°.

(a) Show that *AC* = 17.37 cm, correct to 2 decimal places.

[3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

(b) Angle AEC is obtuse.

Calculate angle ACE.

Angle ACE = ... [4]

(c) Calculate the perimeter of quadrilateral $ABCD$.

..... cm [3]

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

BLANK PAGE

DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN
DO NOT WRITE IN THIS MARGIN

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 Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.