Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

2345105103

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/31**

Paper 3 (Core) **October/November 2023**

1 hour 45 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 graphic display calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
- 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 your calculator value.

INFORMATION

- The total mark for this paper is 96.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages.

© UCLES 2023

Formula List

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle, radius r.	$A = \pi r^2$
Circumference, C, of circle, radius r.	$C = 2\pi r$
Curved surface area, A, of cylinder of radius r, height h.	$A = 2\pi rh$
Curved surface area, A, of cone of radius r, sloping edge l.	$A = \pi rl$
Curved surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
Volume, V, of pyramid, base area A, height h.	$V = \frac{1}{3}Ah$
Volume, V, of cylinder of radius r, height h.	$V = \pi r^2 h$
Volume, V, of cone of radius r, height h.	$V = \frac{1}{3}\pi r^2 h$
Volume, V, of sphere of radius r.	$V = \frac{4}{3}\pi r^3$

© UCLES 2023

Answer **all** the questions.

1 **(a)** Write eighty thousand five hundred and two in figures.

..... [1]

(b) Write 0.63 as a fraction.

..... [1]

(c) Work out 7.1^3 .

Give your answer correct to the nearest 10.

..... [2]

(d) Work out $\frac{9.84}{2.16 \times 4.12}$.

Give your answer correct to 4 significant figures.

..... [2]

(e) Find the next two terms in this sequence.

8 15 22 29

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

(f) Ahmed buys 8 roses each costing \$2.20 .

(i) Work out how much he pays for the 8 roses.

\$ ..... [1]

(ii) Work out how much change he receives from \$20.

\$ ..... [1]

(g) Find the lowest common multiple (LCM) and the highest common factor (HCF) of 14 and 21.

LCM = ...

HCF = ... [3]

© UCLES 2023

2 The ages, in years, of 15 teachers are shown below.

38	62	51	42	49	24	31	46
60	58	29	36	38	48	54	

(a) Draw a stem-and-leaf diagram for the 15 ages.

Key .....|..... = ...

[3]

(b) Find

(i) the mode

..... years [1]

(ii) the median

..... years [1]

(iii) the interquartile range

..... years [2]

(iv) the mean.

..... years [1]

© UCLES 2023

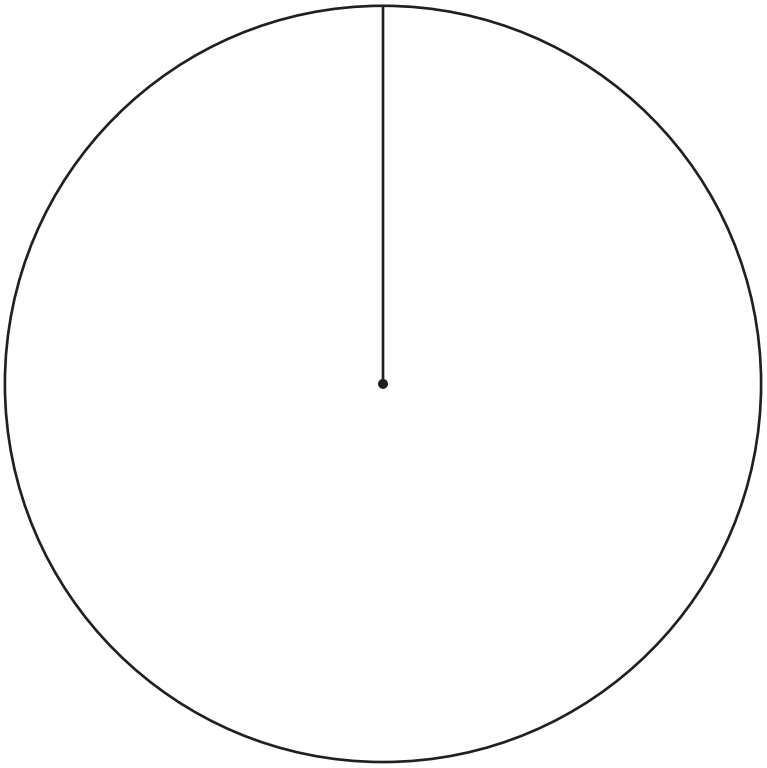
3 **(a)** Bettica invests \$12 000 at a rate of 1.8% per year simple interest.

Calculate the value of Bettica's investment at the end of 4 years.

\$ ..... [3]

(b) Melanie has \$240.
She spends \$50 on books, \$110 on food and \$80 on clothes.

Draw and label a pie chart to show this information.



[4]

4 **(a)** The Monaco Grand Prix is a car race.
The cars race around a circuit.
The length of one circuit is 3.337 kilometres.
The drivers each complete 78 circuits in the race.

(i) Work out the total distance of the race.

..... km [1]

(ii) One driver completes one circuit at an average speed of 162 km/h.

Find the time taken.
Give your answer in minutes and seconds.

..... min ..... s [3]

(b) One car reaches a speed of 290 km/h.

Change 290 km/h to m/s.

..... m/s [2]

(c) The cost of entry to watch the race was $450.
The total amount collected was $90 million.

Work out the number of people who paid to watch the race.

..... [2]

© UCLES 2023

5 Marius, Silvia and Greta each roll fair six-sided dice numbered 1 to 6.

(a) Marius rolls one die.

Find the probability that he rolls a 4.

..... [1]

(b) Silvia rolls two dice.

Find the probability that she rolls a 6 on both dice.

..... [2]

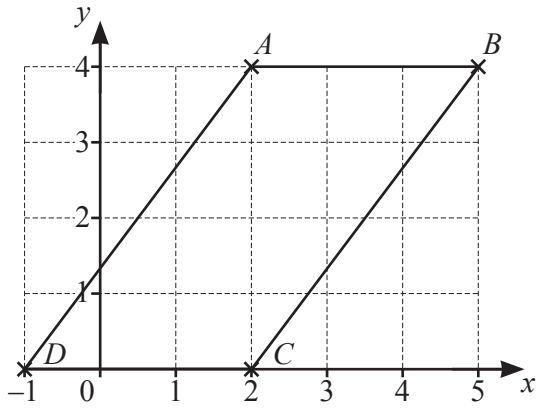
(c) Greta rolls one die 300 times.

Find the expected number of times that she rolls a 5.

..... [2]

© UCLES 2023

6



The diagram shows quadrilateral $ABCD$ drawn on a 1 cm^2 grid.

(a) Write down the coordinates of point B and point C.

B (..... , ...)

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

(b) Write down the mathematical name for the quadrilateral.

..... [1]

(c) Work out the area of the quadrilateral.

..... cm^2 [2]

(d) Write down the number of lines of symmetry of the quadrilateral.

..... [1]

(e) Write down the order of rotational symmetry of the quadrilateral.

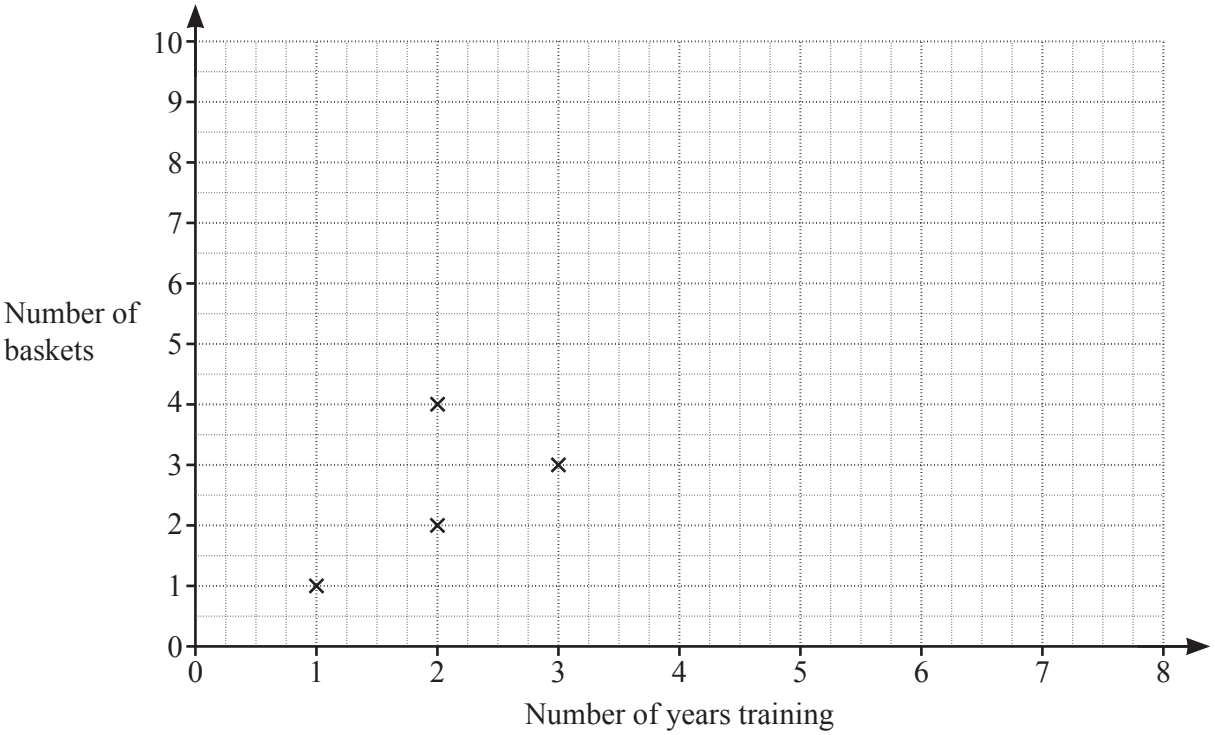
..... [1]

© UCLES 2023

7 Eight students play basketball.
They each have ten attempts to score a basket.
The number of years training and the number of baskets scored are shown in the table.

Student	A	B	C	D	E	F	G	H
Number of years training	1	2	2	3	3	4	7	8
Number of baskets	1	2	4	3	5	7	8	10

(a) Complete the scatter diagram.
The first 4 points have been plotted for you.



[2]

(b) What type of correlation is shown in the scatter diagram?

..... [1]

(c) The mean number of years training is 3.75 and the mean number of baskets scored is 5.

On the diagram, draw a line of best fit. [2]

(d) Use your line of best fit to estimate the number of baskets scored by a student with 5 years training.

..... [1]

8 Adil is an electrician.
He works out the total amount that he charges his customers using this formula.

Total amount = hourly rate × number of hours worked + fixed call-out fee

(a) Adil's hourly rate is \$50 and the fixed call-out fee is \$85.

(i) He works for one customer for 6 hours.

Find the total amount he charges that customer.

\$ ..... [2]

(ii) Adil works in Sahdna's house.
He charges Sahdna \$460.

Work out how many hours Adil worked for Sahdna.

..... h [2]

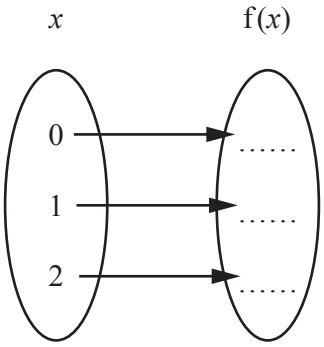
(b) $T = rn + F$

Rearrange the formula to make r the subject.

$r =$ ..... [2]

© UCLES 2023

9 **(a)** Complete the mapping diagram for $\mathrm{f}(x) = 3x - 1$.



[2]

(b) Solve.

(i) $\frac{x}{3} = 6$

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

(ii) $6x - 4 = 12 - 2x$

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

(c) Complete this statement using one of $>$ or $<$ or $=$.

$(-2)^3$ ..... $(-2)^4$ [1]

(d) Factorise completely.

$6y^2 - 3y$

..... [2]

(e) Find each value of x.

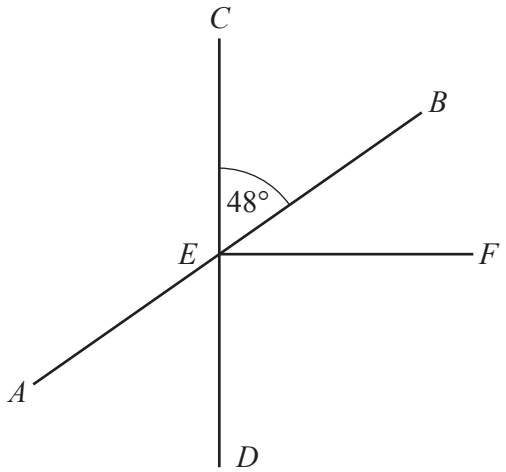
(i) $2^x \times 2^5 = 2^{10}$

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

(ii) $\frac{a^6}{a^x} = a^2$

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

10 (a)



NOT TO SCALE

AB and *CD* are straight lines that intersect at *E*.
EF is perpendicular to *CD* and angle *CEB* = 48°.

Find

(i) angle *DEF*

Angle *DEF* = ... [1]

(ii) angle *AED*

Angle *AED* = ... [1]

(iii) angle *BEF*

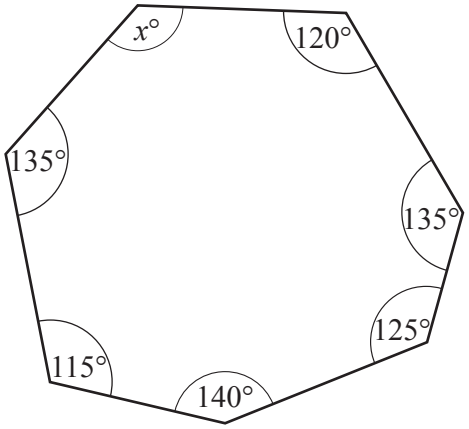
Angle *BEF* = ... [1]

(iv) angle *CEA*.

Angle *CEA* = ... [1]

© UCLES 2023

(b)



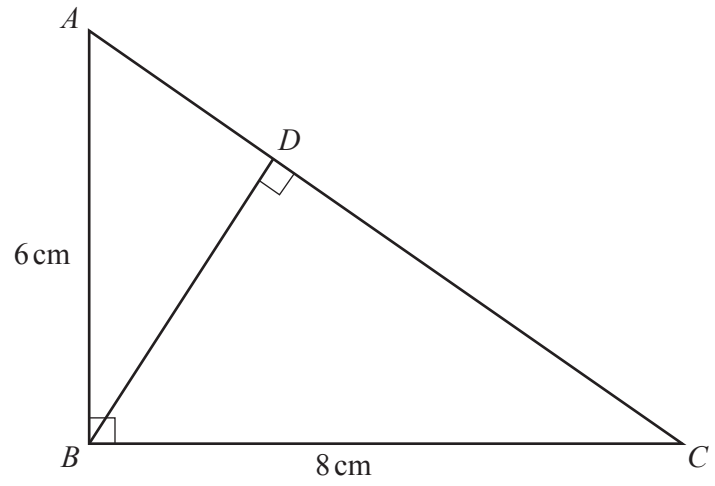
NOT TO SCALE

The diagram shows a seven-sided polygon.

Work out the value of x.

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

11



NOT TO SCALE

ABC is a right-angled triangle.
BDC is a right angle.

(a) Work out the area of triangle *ABC*.

..... cm^2 [1]

(b) Use Pythagoras' Theorem to work out the length of *AC*.

AC = ... cm [2]

(c) Use your answers to **part (a)** and **part (b)** to work out the length of *BD*.

BD = ... cm [2]

© UCLES 2023

12 A solid sphere has a surface area of 581 cm^2.

(a) Show that the radius of the sphere is 6.8 cm, correct to 1 decimal place.

[2]

(b) Work out the volume of the sphere.

..... cm^3 [2]

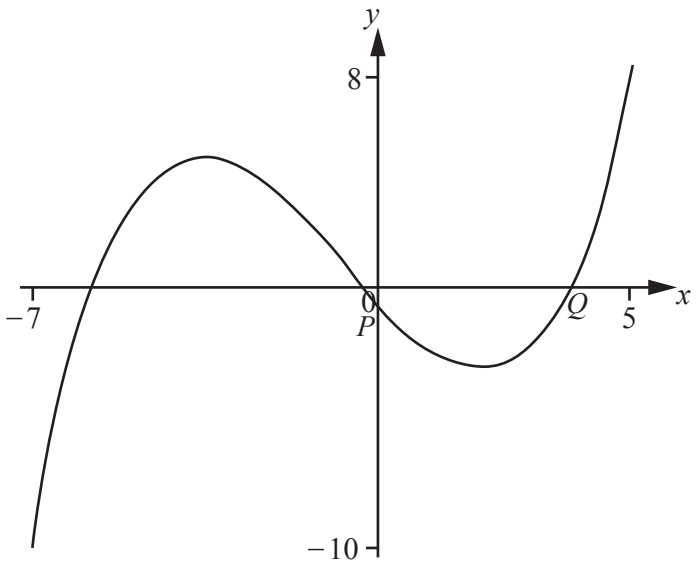
(c) A solid cube has the same volume as this sphere.

Find the length of one edge of this cube.

..... cm [2]

Question 13 is printed on the next page.

13



NOT TO SCALE

The diagram shows a sketch of the graph of $y = 0.1x^3 + 0.25x^2 - 2x - 1$ for $-7 \leqslant x \leqslant 5$.
Two points, P and Q, are also marked.

Draw the graph of $y = 0.1x^3 + 0.25x^2 - 2x - 1$ on your calculator and use it to answer the following questions.

(a) Find the coordinates of point P and point Q.

$P = (\ldots\ldots\ldots\ldots, \ldots\ldots\ldots\ldots)$

$Q = (\ldots\ldots\ldots\ldots, \ldots\ldots\ldots\ldots)$ [2]

(b) Find the coordinates of

(i) the local maximum point

$(\ldots\ldots\ldots\ldots, \ldots\ldots\ldots\ldots)$ [2]

(ii) the local minimum point.

$(\ldots\ldots\ldots\ldots, \ldots\ldots\ldots\ldots)$ [2]

(c) The line $y = a$ intercepts the graph of $y = 0.1x^3 + 0.25x^2 - 2x - 1$ at 3 points.

Complete the range of values for a.

$\ldots\ldots\ldots\ldots < a < \ldots\ldots\ldots\ldots$ [2]

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.

© UCLES 2023