



# Cambridge IGCSE™

CANDIDATE  
NAME

CENTRE  
NUMBER

--	--	--	--	--

CANDIDATE  
NUMBER

--	--	--	--

**CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/31**

Paper 3 (Core)

**May/June 2021**

**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  $\pi$ , 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.

**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  $r$ .  $V = \frac{4}{3}\pi r^3$

Answer **all** the questions.

1 (a) Work out.

(i)  $\sqrt{36}$

..... [1]

(ii)  $7^3$

..... [1]

(b) (i)  $4 \times 4 \times 4 \times 4 \times 4 \times 4 = 4^n$

Write down the value of  $n$ .

$n =$  ..... [1]

(ii) Write down the value of  $4^0$ .

..... [1]

(c) Work out.

$$\frac{1}{2^2 + \sqrt{17}}$$

Give your answer correct to 3 decimal places.

..... [2]

(d) (i) Write 0.000 082 in standard form.

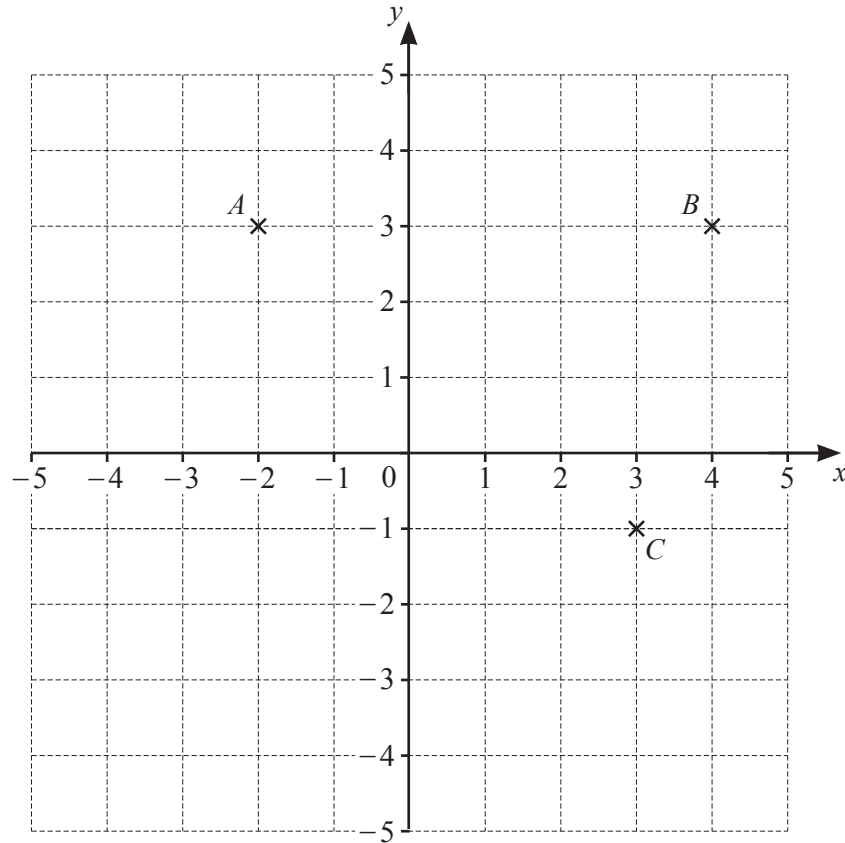
..... [1]

(ii) Work out.

$$(7.3 \times 10^9) \times (1.8 \times 10^{-4})$$

Give your answer in standard form.

..... [2]



Points  $A$ ,  $B$  and  $C$  are plotted on a  $1\text{ cm}^2$  grid.

(a) Write down the coordinates of

(i) point  $B$ ,

(....., .....) [1]

(ii) point  $A$ .

(....., .....) [1]

(b) On the grid, plot the point  $(-3, -1)$  and label it  $D$ . [1]

(c) Join  $A$ ,  $B$ ,  $C$  and  $D$  to form a quadrilateral.

Write down the mathematical name of quadrilateral  $ABCD$ .

..... [1]

(d) Work out the area of quadrilateral  $ABCD$ .

.....  $\text{cm}^2$  [2]

(e) On the grid, draw the reflection of quadrilateral  $ABCD$  in the  $x$ -axis. [2]

- 3 Ralf records the number of people in each car entering the school car park. The results are shown in the table.

Number of people in the car	Number of cars
1	8
2	13
3	6
4	3
5	2

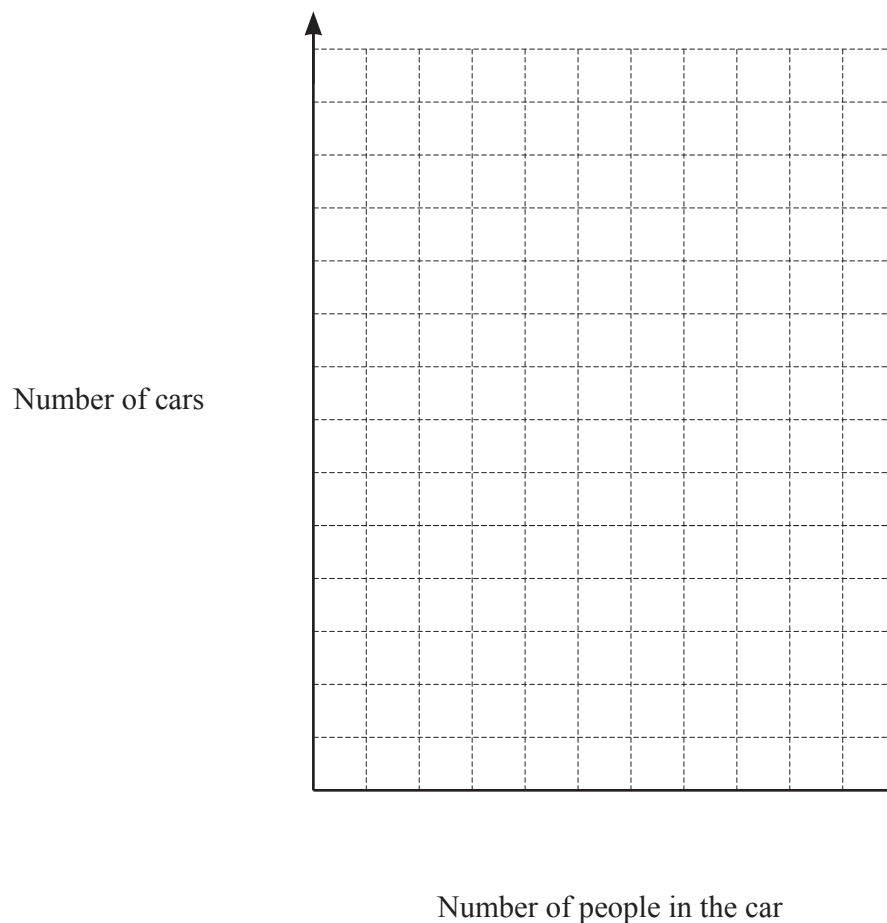
- (a) Work out the total number of cars that Ralf records.

..... [1]

- (b) Work out the total number of people in these cars.

..... [2]

- (c) On the grid, draw and label a bar chart to show the information in the table.



[4]

- 4 (a) Ana is 28 years 3 months old.

Change 28 years 3 months into months.

..... months [2]

- (b) Ana has three children.  
The ages of the children are

7 years 11 months

5 years 4 months

2 years 6 months.

For these three ages, work out

- (i) the range,

..... years ..... months [1]

- (ii) the mean.

..... years ..... months [3]

- (c) Jon has a watch that records the number of calories he uses when he goes for a walk.  
He uses 0.05 calories for each step he takes.  
He takes 1250 steps for every kilometre he walks.  
One day he uses 300 calories on a walk.

Work out how far he has walked.

..... km [2]

- 5 (a) Complete this sequence of patterns by drawing Pattern 1 and Pattern 5.

Pattern 1	Pattern 2	Pattern 3	Pattern 4	Pattern 5
	x	x	x	
	x	x	x	
	x	x	x x	
	x	x x x		
	x x x x			

[2]

- (b) These are the first four terms of a sequence.

4    7    10    13

For this sequence, write down

- (i) the next term,

..... [1]

- (ii) the rule for continuing the sequence.

..... [1]

- (c) The  $n$ th term of another sequence is  $3n^2$ .

Work out the first two terms of this sequence.

..... and ..... [2]

- (d) These are the first five terms of a different sequence.

7    15    23    31    39

Find the  $n$ th term of this sequence.

..... [2]



6 (a) Simplify.

$$3y + 4y - y$$

..... [1]

(b) Solve.

(i)  $x + 6 = 20$

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

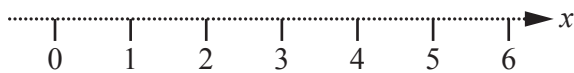
(ii)  $\frac{x}{4} = 8$

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

(iii)  $2(x - 3) = 14$

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

(c) On the number line, show the inequality  $x \geq 4$ .



[1]

(d) Factorise.

$$5x + 20$$

..... [1]

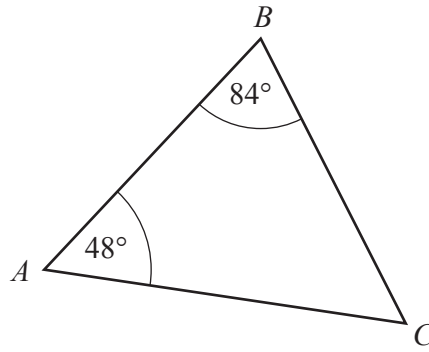
(e) Multiply out the brackets and simplify.

$$(6x + 5)(x - 3)$$

..... [2]

10

7 (a)

NOT TO  
SCALE

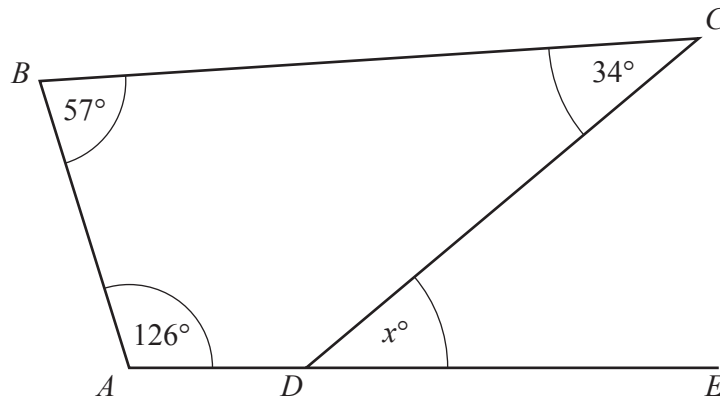
What type of triangle is  $ABC$ ?  
Show how you decide.

[2]

(b) Work out the size of one exterior angle of a regular pentagon.

..... [2]

(c)

NOT TO  
SCALE

In the diagram,  $ADE$  is a straight line.

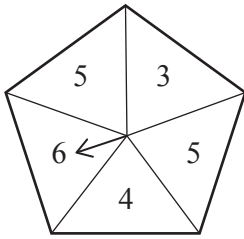
(i) Find the value of  $x$ .

$x = \dots\dots\dots$  [2]

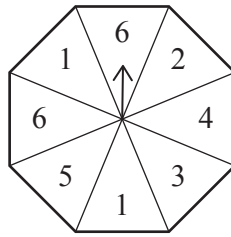
(ii) Show that  $ABCD$  is **not** a trapezium.

[2]

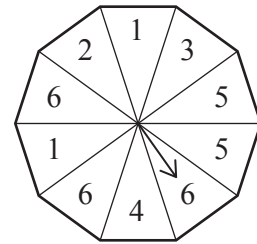
8 Here are three unbiased spinners made from regular polygons.



Spinner A



Spinner B



Spinner C

(a) (i) For **Spinner A** work out the probability of getting 6.

..... [1]

(ii) **Spinner A** is spun twice.  
Work out the probability of getting 6 each time.

..... [2]

(b) Show that, of the three spinners, **Spinner C** has the greatest probability of getting 6 on one spin.

[4]

- 9 (a) Amir has car insurance, home insurance and health insurance.  
In one year he spends a total of \$5775 on insurance in the ratio  
car : home : health = 2 : 3 : 6.

Work out how much he spends on each type of insurance.

Car        \$ .....

Home      \$ .....

Health    \$ ..... [3]

- (b) A company offers Samal health insurance for \$850 when it is **not** bought online.  
The company offers a 15% reduction when this insurance is bought online.

Work out how much this insurance will cost Samal if she buys it online.

\$ ..... [2]

- (c) Terry's car insurance increases from \$900 to \$1100.

Work out the percentage increase.

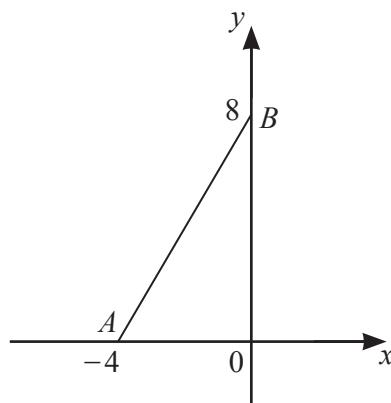
..... % [3]

- 10 (a) The line with equation  $y = mx + 1$  passes through the point (3, 19).

Work out the value of  $m$ .

$m = \dots\dots\dots$  [3]

(b)



NOT TO  
SCALE

In the diagram, the line meets the  $x$ -axis at  $A (-4, 0)$  and the  $y$ -axis at  $B (0, 8)$ .

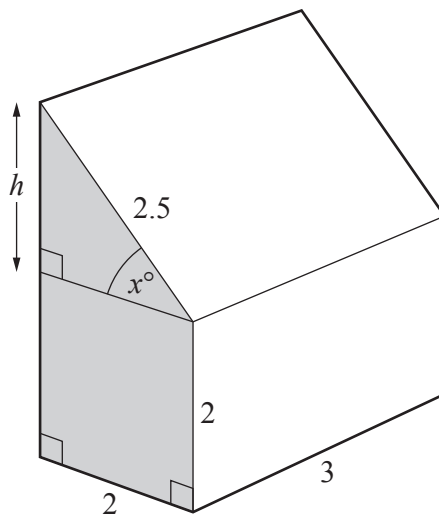
- (i) Find the coordinates of the mid-point of  $AB$ .

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

- (ii) Find the equation of the line  $AB$ .

$\dots\dots\dots$  [3]

11 In this question, all lengths are in metres.



NOT TO SCALE

The diagram shows a shed in the shape of a prism.

(a) Use Pythagoras' Theorem to show that  $h = 1.5$ .

[2]

(b) Use trigonometry to find the value of  $x$ .

$x = \dots\dots\dots$  [2]

(c) (i) The end of the shed is shaded.

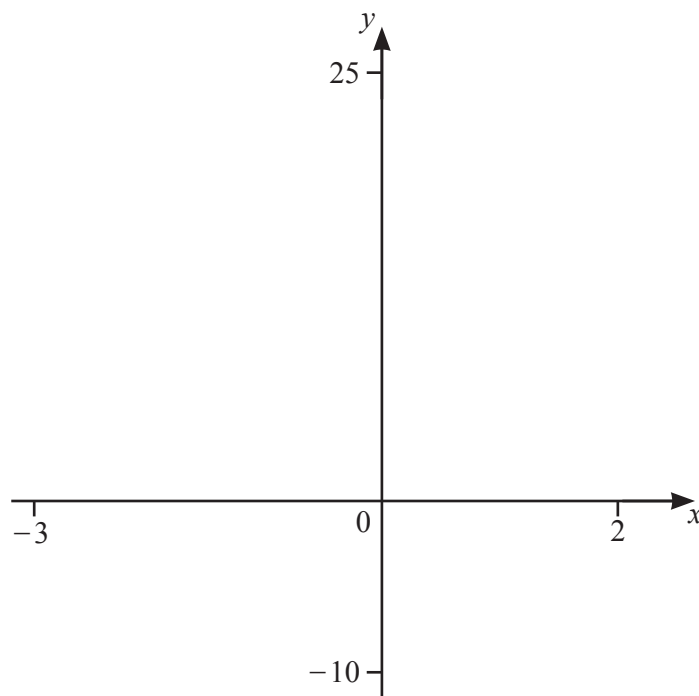
Calculate this area.

$\dots\dots\dots \text{m}^2$  [2]

(ii) Work out the volume of the shed.  
Give the units of your answer.

$\dots\dots\dots$  [2]

**Question 12 is printed on the next page.**



(a) (i) On the diagram, sketch the graph of  $y = x^3 + 3x^2$  for  $-3 \leq x \leq 2$ . [2]

(ii) Find the coordinates of the local minimum.

(..... , .....) [1]

(iii) Find the coordinates of the local maximum.

(..... , .....) [1]

(b) On the diagram, sketch the graph of  $y = 3x^2 - 5$  for  $-3 \leq x \leq 2$ . [2]

(c) Find the coordinates of the point of intersection of the graphs of  $y = x^3 + 3x^2$  and  $y = 3x^2 - 5$ .

(..... , .....) [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](http://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.