Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

0410226176

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **October/November 2021**

2 hours 15 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 120.
- The number of marks for each question or part question is shown in brackets [ ].

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

Formula List

For the equation $ax^2 + bx + c = 0$ $\quad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A, of cylinder of radius r, height h. $\quad A = 2\pi rh$

Curved surface area, A, of cone of radius r, sloping edge l. $\quad A = \pi rl$

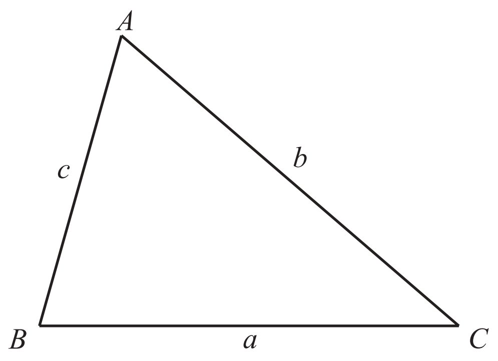
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

Volume, V, of pyramid, base area A, height h. $\quad V = \frac{1}{3}Ah$

Volume, V, of cylinder of radius r, height h. $\quad V = \pi r^2 h$

Volume, V, of cone of radius r, height h. $\quad V = \frac{1}{3}\pi r^2 h$

Volume, V, of sphere of radius r. $\quad V = \frac{4}{3}\pi r^3$



$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

$$\text{Area} = \frac{1}{2}bc\sin A$$

Answer **all** the questions.

1 The table shows the marks scored by 180 students in an examination.

Mark	0	1	2	3	4	5	6	7	8	9	10
Number of students	3	7	16	11	7	32	20	26	28	19	11

(a) **(i)** Write down the mode.

.... [1]

(ii) Write down the range.

.... [1]

(iii) Find the median.

.... [1]

(iv) Find the interquartile range.

.... [2]

(v) Calculate the mean.

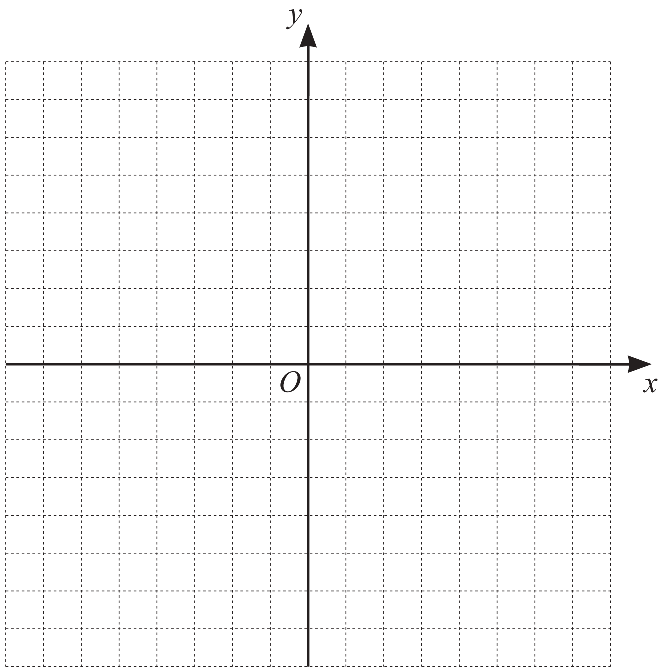
.... [2]

(b) A different group of 140 students take the same examination.
The marks of the two groups are combined and the mean mark of the 320 students is 6.5 .

Find the mean mark of the 140 students.

.... [2]

2 You may use this grid to help you answer this question.



Transformation P is a rotation of 180° about the origin.

Transformation Q is a reflection in the line $y = x$.

(a) Find the coordinates of the image of the point (5, 2) under transformation P.

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

(b) Find the coordinates of the image of the point (5, 2) under transformation Q.

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

(c) Find the coordinates of the image of the point (x, y) under transformation P followed by transformation Q.

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

(d) Describe fully the **single** transformation that is equivalent to transformation Q followed by transformation P.

....

.... [2]

3 Anna flies by plane from Manchester (UK) to Goa (India).
The plane flies a distance of 7650 km.

(a) The flight takes 8.5 hours.

(i) Calculate the average speed of the plane.

.... km/h [1]

(ii) The plane leaves Manchester at 2045.
The local time in Goa is 5 hours 30 minutes ahead of the local time in Manchester.

Find the local time in Goa when the plane lands.

.... [2]

(b) The exchange rate is 1 pound (£) = 90 Indian rupees (INR).

(i) The cost of the flight is £299.

Calculate the cost of the flight in Indian rupees.

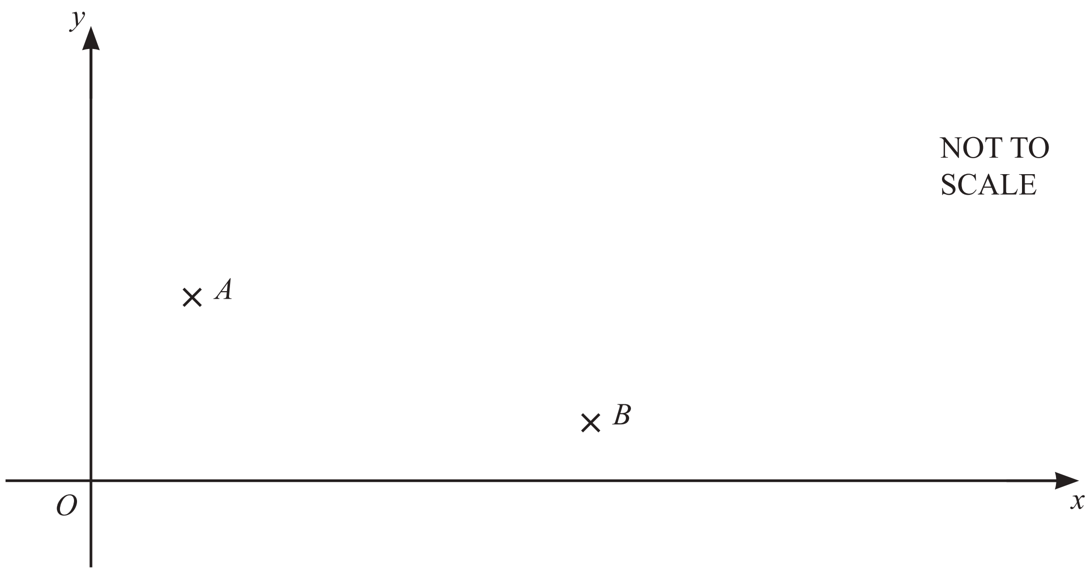
INR .... [1]

(ii) Anna returns to Manchester with 4014 Indian rupees.
She changes this money into pounds.

Calculate this amount in pounds.

£ .... [1]

4



The points A (2, 5) and B (10, 1) are shown on the diagram.

(a) Find the gradient of the line AB.

.... [2]

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

$y =$ .... [2]

(c) The point C has coordinates $(6, k)$ where $k > 0$.
The line CA is perpendicular to the line AB and $AC = AB$.

Find k.

$k =$ .... [3]

(d) The point D is such that $ABDC$ is a square.

Find the coordinates of D.

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

(e) Find the area of triangle BCD.

.... [3]

5 **(a)** Alana and Beau share \$200 in the ratio $x : y$.

An expression for the amount of money Alana receives is $\frac{200x}{x+y}$.

(i) Write down an expression for the amount of money Beau receives.

.... [1]

(ii) Alana and Beau are each given an extra \$50.
The ratio of the total amount of money that each person now has is $3 : 1$.

Find the value of $\frac{x}{y}$.

$\frac{x}{y}$ = ... [5]

(b) **(i)** On 1 January **each year** Bruno invests $1000 in Bank A.
Bank A pays simple interest at a rate of 4% per year.

Show that the total value of Bruno's investment in Bank A at the end of 4 years is $4400.

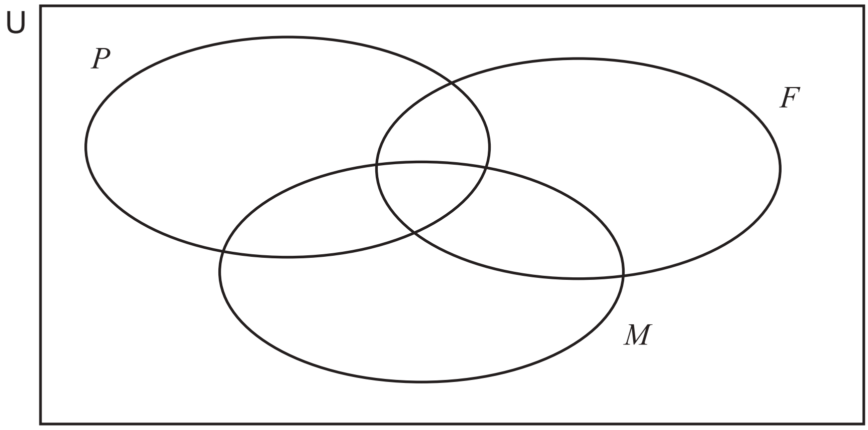
[3]

(ii) On 1 January **each year** Bruno also invests $1000 in Bank B.
Bank B pays compound interest at a rate of 3.5% per year.

Find the total value of Bruno's investment in Bank B at the end of 4 years.

$ .... [3]

6 The Venn diagram shows the sets P, F and M.



U = {integer values of x | $2 \leqslant x \leqslant 12$}
P = {prime numbers}
F = {factors of 12}
M = {multiples of 3}

(a) List the elements of set P and the elements of set F.

P = ...

F = ... [2]

(b) Write each element of U in the correct region of the Venn diagram.

[2]

(c) List the elements of

(i) $F \cup M$,

.... [1]

(ii) $P' \cap M$,

.... [1]

(iii) $(P \cup F \cup M)'$.

.... [1]

(d) Find $\mathrm{n}((P \cap F)' \cap M)$.

.... [1]

7 y varies inversely as the square of x.
$y = 5$ when $x = 3$.

(a) **(i)** Find y in terms of x.

$y =$ .... [2]

(ii) Find the value of x when $y = 20$.

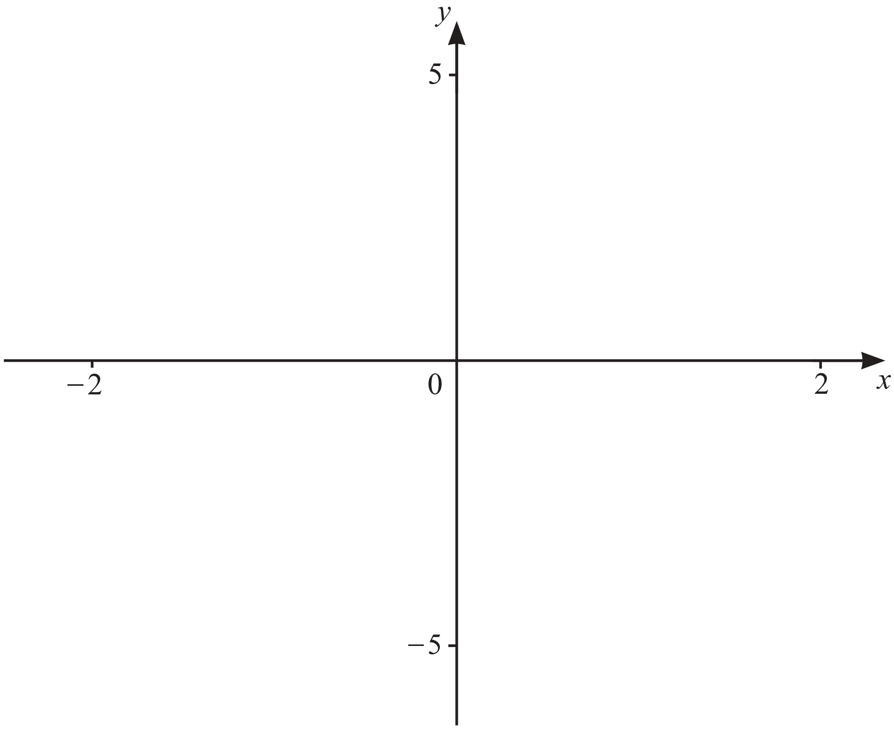
$x =$ .... [2]

(b) z varies directly as the square root of y.
$z = 12$ when $y = 9$.

Use your answer to **part (a)(i)** to find z in terms of x.

$z =$ .... [3]

8



$f(x) = 3x - x^3$ for $-2 \leqslant x \leqslant 2$

(a) On the diagram, sketch the graph of $y = f(x)$. [2]

(b) Find the coordinates of the local maximum.

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

(c) Write down the x-coordinates of the points where the curve meets the x-axis.

x = ... , x = ... , x = ... [2]

(d) **(i)** Describe fully the **single** transformation that maps $y = f(x)$ onto $y = f(x+1)$.

....

.... [2]

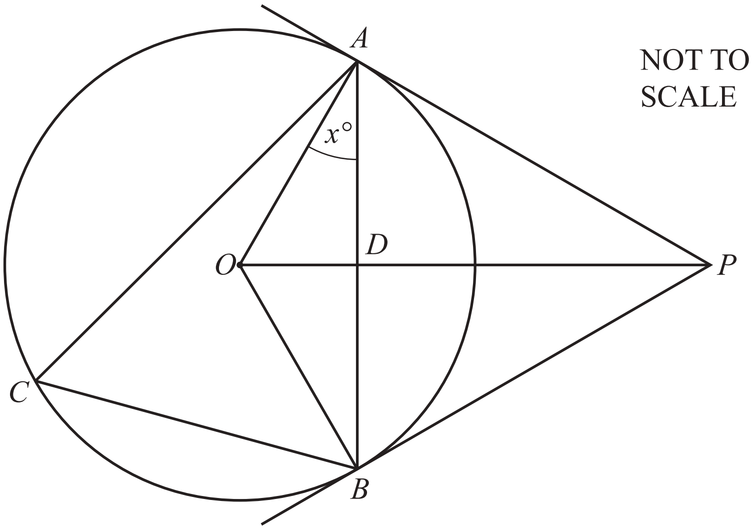
(ii) Solve $f(x) = f(x+1)$ for $-2 \leqslant x \leqslant 2$.

.... [2]

(iii) Solve $f(x) \geqslant f(x+1)$ for $-2 \leqslant x \leqslant 2$.

.... [2]

9



A, B and C lie on a circle, centre O.
AP and BP are tangents to the circle.
AB intersects OP at D and angle $OAB = x°$.

(a) Write down the size of angle OBP.

Angle OBP = ... [1]

(b) Find, in terms of x,

(i) angle AOD,

Angle AOD = ... [1]

(ii) angle ACB,

Angle ACB = ... [1]

(iii) angle APB.

Angle APB = ... [1]

(c) Write down the mathematical name of quadrilateral $AOBP$.

.... [1]

(d) Write down

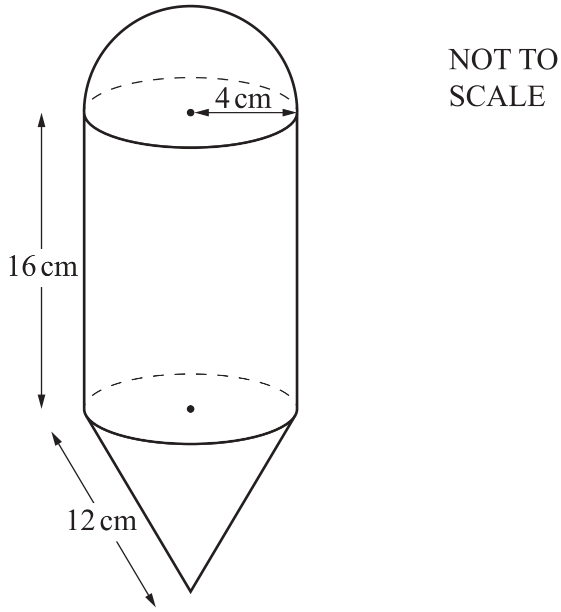
(i) two triangles that are congruent,

.... [1]

(ii) two triangles that are similar but not congruent.

.... [1]

10



The diagram shows a solid made from a cylinder, a hemisphere and a cone, each with radius 4 cm.
The cylinder has length 16 cm.
The slant height of the cone is 12 cm.

(a) Find the volume of the solid.

.... cm^3 [5]

(b) Show that the total surface area of the solid is $208\pi\,\text{cm}^2$.

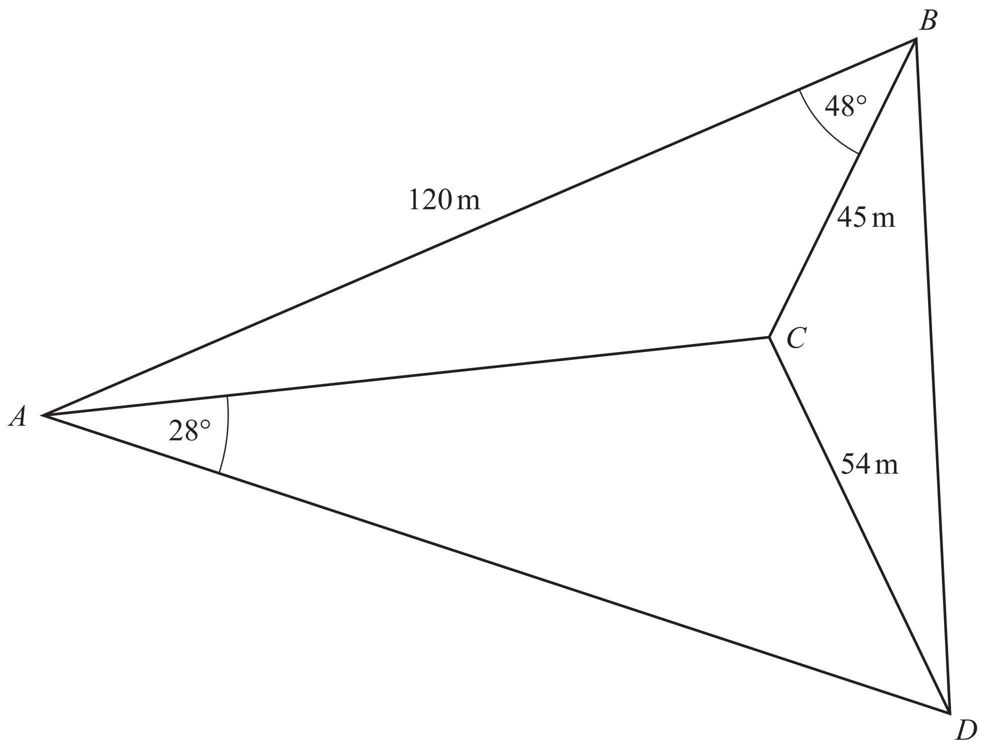
[4]

(c) A mathematically similar solid has a total surface area of $468\pi\,\text{cm}^2$.

Find the radius of the cylinder in this solid.

.... cm [3]

11



NOT TO SCALE

Angles *ACB* and *ACD* are obtuse.

(a) Show that $AC = 95.9$ m correct to the nearest 0.1 metre.

[3]

(b) Find angle *ACD*.

Angle *ACD* = ... [4]

(c) The area of triangle *ABD* is 5137 m^2.

Calculate the area of triangle *BCD*.

.... m^2 [4]

12 **(a)** Solve.

(i) $9 = 5 - \frac{2}{x}$

$x =$ .... [3]

(ii) $\frac{6}{x-4} > 3$

.... [3]

(b) **(i)** Solve the equation, giving your answers correct to 3 significant figures.

$$2x^2 - 5x + 1 = 0$$

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

(ii) Use your answers to **part (b)(i)** to solve

$$2(\tan y)^2 - 5(\tan y) + 1 = 0 \qquad \text{for } 0° \leqslant y \leqslant 180°.$$

$y =$ .... or $y =$ .... [2]

13 Two bags each contain only blue balls and red balls.
Bag 1 contains 7 blue balls and 3 red balls.
Bag 2 contains 3 blue balls and 7 red balls.

Maria chooses a ball at random from Bag 1 and puts it into Bag 2.

(a) Find the probability that the ball chosen is blue.

.... [1]

(b) Maria now chooses a ball at random from Bag 2 and puts it into Bag 1.

(i) Find the probability that both balls chosen are red.

.... [2]

(ii) Find the probability that one of the balls chosen is red and the other is blue.

.... [3]

(iii) Find the probability that there are now exactly 7 blue balls in Bag 1.

.... [3]