Cambridge Assessment International Education

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5275932732

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **May/June 2023**

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.

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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. $\quad A = \pi rl$

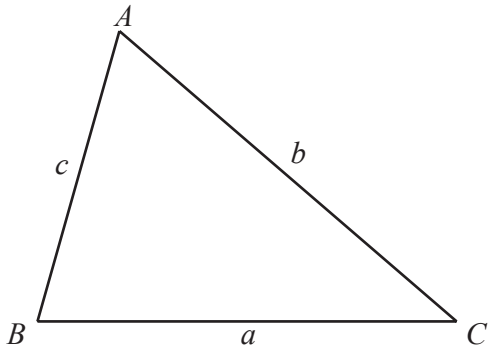
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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 25 students each record the number of logic problems they solve in one hour.
The table shows the results.

Number of logic problems solved	3	4	5	6	7	8
Frequency	1	3	8	7	5	1

(a) Find

(i) the range

..... [1]

(ii) the mode

..... [1]

(iii) the median

..... [1]

(iv) the interquartile range

..... [2]

(v) the mean.

..... [2]

(b) Nabile draws a pie chart.

Calculate the angle that represents 7 logic problems solved.

..... [2]

(c) Shabana draws a bar chart using these results.
The bar that represents 4 logic problems solved has a height of 4.5 cm.

Calculate the height of the bar that represents 5 logic problems solved.

..... cm [2]

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2 **(a)** Calculate the volume of each shape.

(i) A cuboid with a square base of side 5 cm and height 3 cm.

..... cm^3 [2]

(ii) A sphere with radius 4 cm.

..... cm^3 [2]

(b) A cylinder has volume 120 cm^3 and height 6 cm.

Calculate its radius.

..... cm [2]

(c) A cone has volume 120 cm^3 and height 6 cm.

Calculate the length of its sloping edge.

..... cm [3]

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3



$f(x) = |\cos x°|$ for $0 \leqslant x \leqslant 360$

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

(b) Find the zeros of $f(x)$.

..... [2]

(c) **(i)** Solve the equation $f(x) = 0.5$.

..... [2]

(ii) Solve the inequality $f(x) < 0.5$.

..... [2]

(iii) On the diagram, shade the regions that satisfy the inequalities $y < 0.5$ and $y > f(x)$. [1]

(d) The equation $f(x) = k$ has four solutions.

Complete the statement to show the range of possible values of k.

..... $<$ k $<$ ..... [1]

4 **(a)** Alex invests \$650 at a rate of 2% per year compound interest.

(i) Calculate the value of this investment at the end of 10 years.

\$ ..... [2]

(ii) Calculate the number of complete years it takes for the value of this investment of \$650 to be first greater than \$1000.

..... [4]

(b) 2 years ago Chris invested \$$x$ at a rate of 3% per year compound interest.
The value of this investment is now \$607.90 correct to the nearest cent.

Calculate the value of x.

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

(c) Sam invested \$200 at a rate of r% per year compound interest.
At the end of 18 years, the value of this investment is \$247.90 correct to the nearest cent.

Find the value of r.

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

5 **(a)** The equation of line L is $y = 4x + 7$.

(i) Write down the gradient of line L.

..... [1]

(ii) Write down the coordinates of the point where line L cuts the y-axis.

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

(b) A is the point (3, 1) and B is the point (11, 5).

(i) Calculate the length of AB.

..... [3]

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

$y =$ ..... [5]

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6 $f(x) = 3 - 2x$ $g(x) = x + 1$ $h(x) = (x+1)^2$ $j(x) = \tan x°$ for $0 < x < 180$

(a) Find $f(-1.5)$.

..... [1]

(b) Find h(h(2)).

..... [2]

(c) Find g(f(x)), giving your answer in its simplest form.

..... [2]

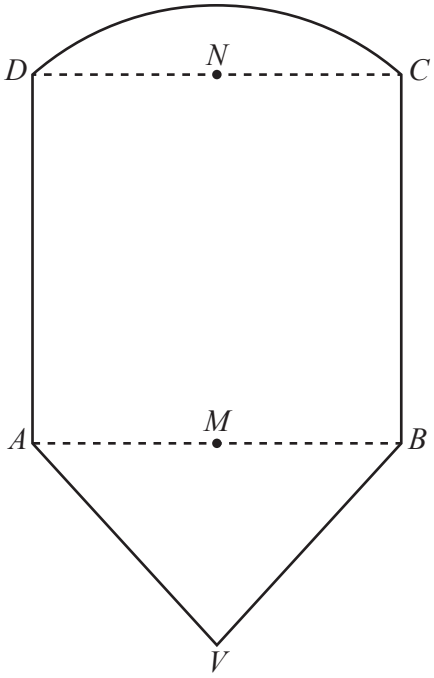
(d) Find $f^{-1}(x)$.

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

(e) Find x when $j^{-1}(x) = 75$.

..... [2]

7 (a)



NOT TO SCALE

The diagram shows a shape *AVBCD*.
ABCD is a square of side 12 cm.
M is the mid-point of *AB* and *N* is the mid-point of *DC*.
Triangle *AVB* is isosceles with $AV = VB = 10$ cm.
The arc *CD* is part of a circle with centre *M*.

(i) Calculate angle *CMN*.

Angle *CMN* = ... [2]

(ii) Calculate the length of *CM*.

CM = ... cm [2]

(iii) Calculate the perimeter of the shape *AVBCD*.

..... cm [3]

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(iv) Calculate the area of the shape *AVBCD*.

..... cm^2 [5]

(b) Two solids are mathematically similar with volumes 240 cm^3 and 810 cm^3.
The surface area of the larger solid is 558 cm^2.

Calculate the surface area of the smaller solid.

..... cm^2 [3]

8 **(a)** The cost of a television is \$$t$ and the cost of a computer is \$$c$.
The total cost of 2 televisions and 1 computer is \$1470.
The total cost of 3 televisions and 2 computers is \$2480.

Use simultaneous equations to find the cost of a television.
You must show all your working.

\$ ..... [4]

(b) Jono spends \$9.69 on bags of potatoes.
When the cost of a bag is x cents he can buy 2 more bags than when the cost of a bag is $(x+6)$ cents.

(i) Show that $x^2 + 6x - 2907 = 0$.

[3]

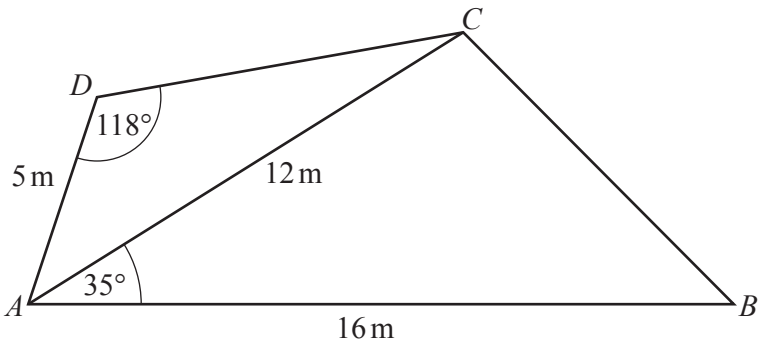
(ii) Solve the equation $x^2 + 6x - 2907 = 0$.

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

(iii) Find the number of bags Jono can buy for \$9.69 when the cost of one bag is x cents.

..... [1]

9



NOT TO SCALE

(a) B is due east of A.

Find the bearing of A from C.

..... [2]

(b) Calculate the area of triangle ABC.

..... m^2 [2]

(c) Calculate angle CAD.

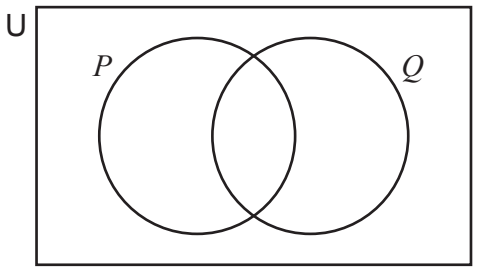
Angle CAD = ... [4]

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(d) Calculate the length of the straight line *BD*.

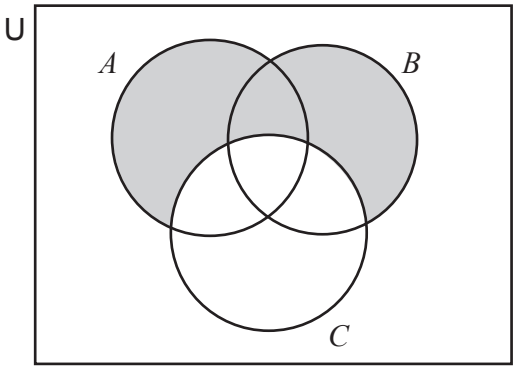
..... m [3]

10 (a) (i) In the Venn diagram, shade the region $P \cup Q'$.



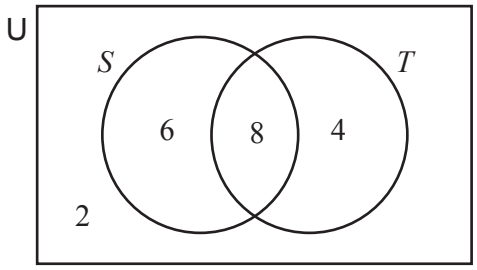
[1]

(ii) Use set notation to describe the shaded region in the Venn diagram.



..... [1]

(b) 20 students are asked if they like swimming (S) and if they like tennis (T).
The Venn diagram shows the results.



(i) How many students like swimming or tennis but not both?

..... [1]

(ii) Find $\mathrm{n}(S \cup T)$.

..... [1]

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(iii) One of the 20 students is chosen at random.

Find the probability that this student likes swimming and tennis.

..... [1]

(iv) Two of the 20 students are chosen at random.

Find the probability that they both like tennis.

..... [2]

(v) Two of the students who like swimming are chosen at random.

Find the probability that

(a) they both like tennis

..... [2]

(b) one likes swimming only and one likes swimming and tennis.

..... [3]

11 (a) (i) Write 0.000 021 in standard form.

..... [1]

(ii) Calculate $\left(7.3\times10^{-11}\right)\times\left(4.7\times10^{-7}\right)$, giving your answer in standard form.

..... [1]

(iii) Calculate $\left(3.2\times10^{-200}\right)\div\left(4\times10^{-100}\right)$, giving your answer in standard form.

..... [2]

(iv) Simplify $\left(5\times10^{p}\right)^{2}$, giving your answer in standard form.

..... [2]

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(b) $y = 10^x$

Write x in terms of y.

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

(c) Solve $7^x = 14$.

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

(d) $\log y = 1 + 3\log x - \frac{1}{2}\log w$

Find y in terms of x and w.

$y =$ ..... [4]

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