Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **May/June 2016**

2 hours 15 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical Instruments
Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, glue or correction fluid.
You may use an HB pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 120.

This document consists of **16** printed pages.

DC (LK/SG) 114972/2

CAMBRIDGE International Examinations

[Turn over

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. $\quad A = \pi rl$

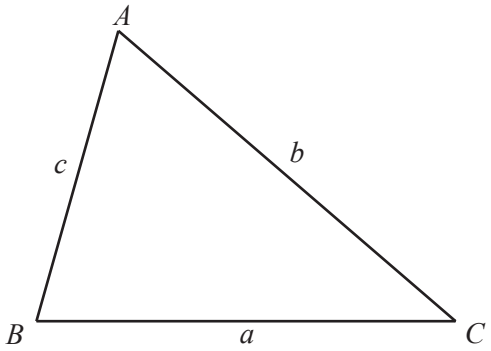
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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



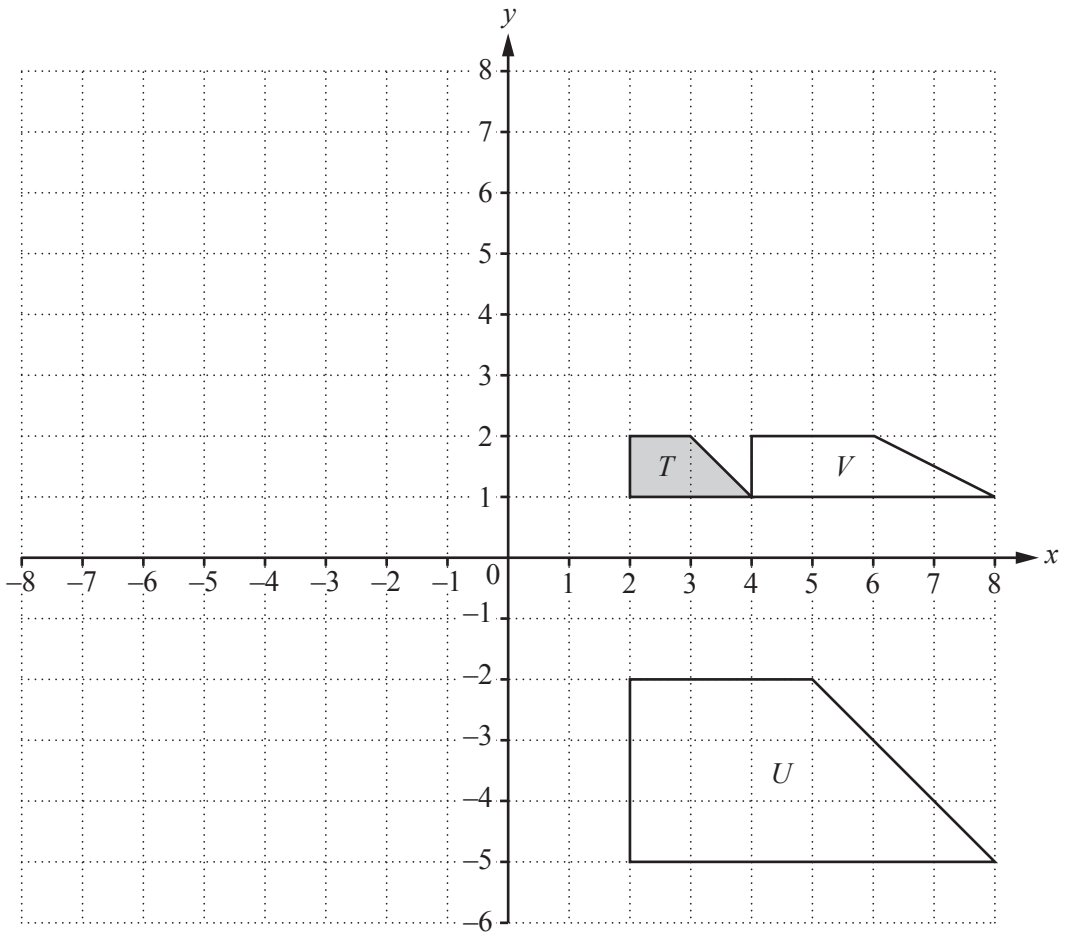
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



(a) Translate shape T by the vector $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$. [2]

(b) Reflect shape T in the line $y = -x$. [2]

(c) Rotate shape T by 90° anticlockwise about (–2, 1). [3]

(d) Describe fully the **single** transformation that maps

(i) shape T onto shape U,

.....

..... [3]

(ii) shape T onto shape V.

.....

..... [3]

[Turn over

2 Nikhil and Padma share \$630 in the ratio 5 : 4.

(a) Show that Nikhil receives \$350 and that Padma receives \$280.

[2]

(b) **(i)** In a sale, prices are reduced by 18%.
Padma buys a jacket for \$98.40 in this sale.

Calculate the original price of the jacket.

\$ ..... [3]

(ii) Padma decides that she does not like the jacket and sells it for \$30.

Calculate the percentage loss made by Padma.

..... % [3]

(iii) Calculate how much of the \$280 Padma now has.

\$ ..... [1]

(iv) Padma invests $150 at a rate of 2% per year compound interest.

Calculate the total value of this investment after 10 years.
Give your answer correct to the nearest dollar.

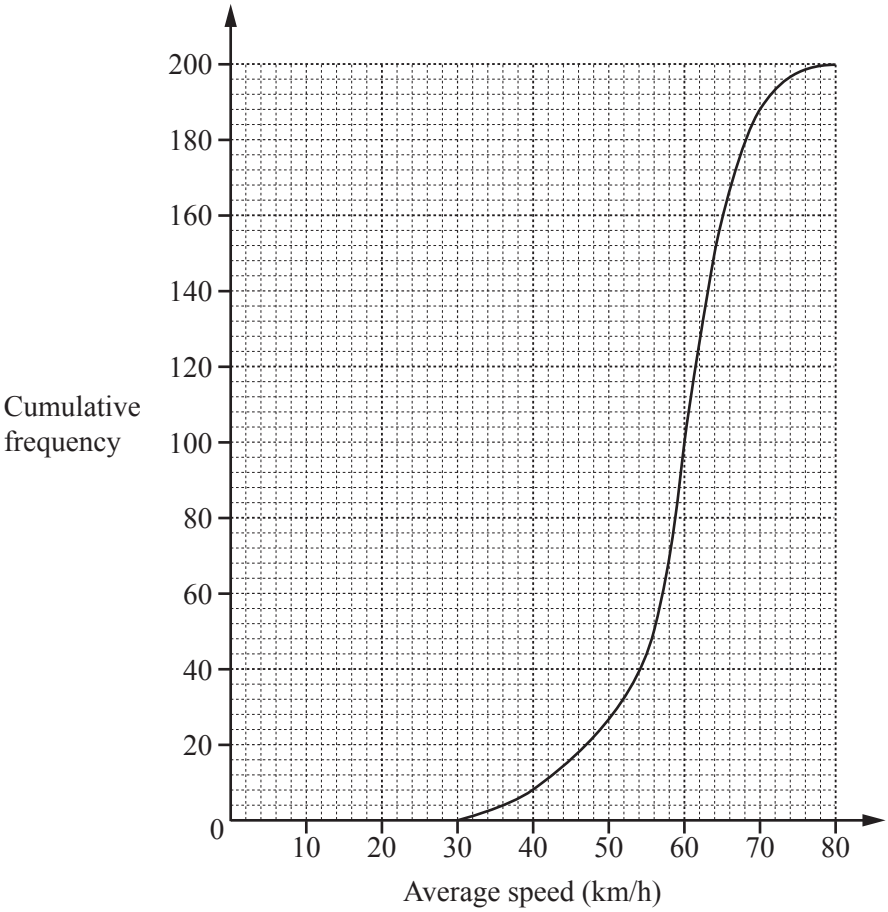
$ ..... [4]

(c) On January 1st 2016, Nikhil invested all of his $350 at a rate of 0.15% per **month** compound interest.

Find in which month and in which year Nikhil's investment will first have a total value of at least $500.

month ..... year ..... [5]

3 **(a)** The cumulative frequency curve shows information about the average speeds of 200 cars on the same journey.



(i) Find the median.

..... km/h [1]

(ii) Find the inter-quartile range.

..... km/h [2]

(iii) Find the number of cars with an average speed of more than 70 km/h.

..... [2]

(b) A bus completes a journey in 2 h 24 min at an average speed of 50 km/h.
A car completes the same journey in 1 h 45 min.

Calculate the average speed of the car.

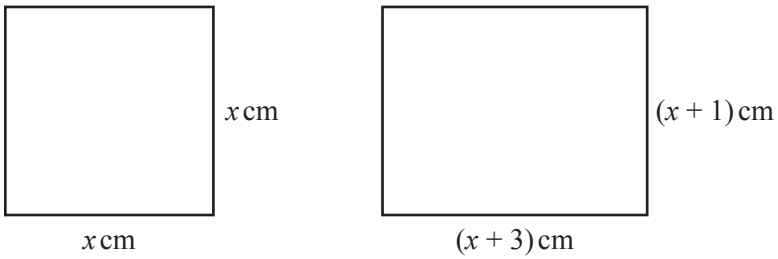
..... km/h [3]

4 **(a)** The cost of a drink of water is w cents.
The cost of a drink of juice is $(w + 30)$ cents.
The total cost of 6 drinks of water and 5 drinks of juice is \$4.14 .

Find the value of w.

$w =$ ..... [3]

(b)



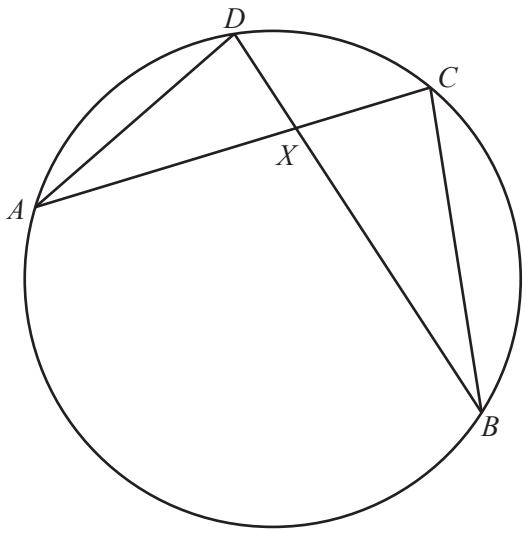
The total area of the square and the rectangle is $10\,cm^2$.

Find the perimeter of the square.
Give your answer correct to 2 decimal places.

..... cm [5]

[Turn over

5



NOT TO SCALE

A, B, C and D lie on the circle.
The chords AC and BD intersect at X.

(a) Show that triangles ADX and BCX are similar.
Give a reason for each statement that you make.

[2]

(b) $AX = 5$ cm, $DX = 2$ cm and $CX = 3$ cm.

Calculate BX.

$BX =$ ..... cm [2]

(c) $AD = 4.61$ cm.

Calculate angle AXD.

Angle $AXD =$ ..... [3]

6

$f(x) = \sin(x^2)$ where x^2 is in degrees.

(a) On the diagram, sketch the graph of $y = f(x)$ for $0 \leqslant x \leqslant 20$. [2]

(b) One solution of the equation $f(x) = 0$, for $0 \leqslant x \leqslant 20$ is $x = 0$.

Find the other two solutions.

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

(c) Find the co-ordinates of the local maximum point.

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

(d) There is a local minimum point at (0, 0).

Find the co-ordinates of the other local minimum point when $0 \leqslant x \leqslant 20$.

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

(e) Write down the range of $f(x)$.

..... [1]

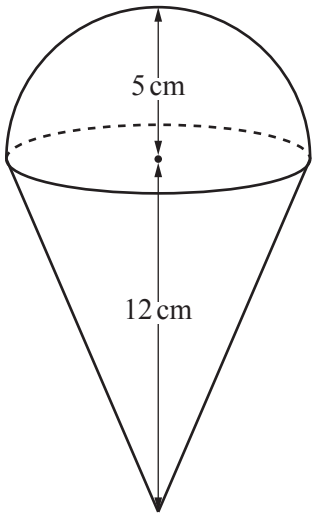
(f) By sketching another graph on the diagram, solve this equation.

$$\sin(x^2) = \frac{x^2}{20} - 1$$

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

[Turn over

7 (a)



NOT TO SCALE

The diagram shows a plastic solid made by joining a hemisphere to a cone.
The radius of the hemisphere is 5 cm and the height of the cone is 12 cm.

(i) Calculate the volume of the solid.

..... cm^3 [3]

(ii) One cubic centimetre of the plastic has a mass of 0.95 g.

Calculate the mass of the solid.
Give your answer in kilograms.

..... kg [2]

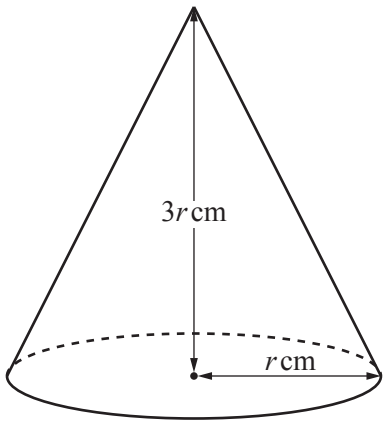
(iii) Find the number of these solids that can be made from 1 tonne of plastic.

..... [2]

(iv) Calculate the total surface area of the solid.

..... cm^2 [4]

(b)



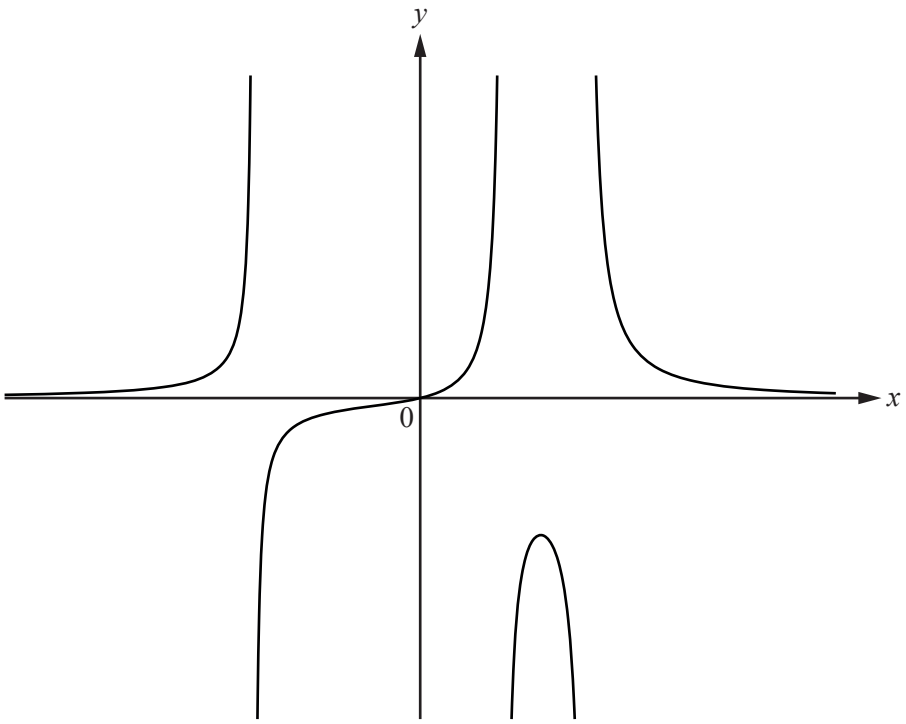
NOT TO SCALE

A solid cone has radius r cm and height $3r$ cm.
The **total** surface area of the cone is 377 cm^2.

Find the value of r.

r = ... [5]

8 The diagram shows the graph of $y = f(x)$ where $f(x) = \dfrac{x}{(x+2)(x-1)(x-2)}$.



(a) The equations of the asymptotes to the graph are $x = a$, $x = b$, $x = c$ and $y = d$.

Find the values of a, b, c and d.

$a =$ .....

$b =$ .....

$c =$ .....

$d =$ ..... [4]

(b) $f(x) = k$ has only one solution, where k is an integer and $k \neq 0$.

Find the value of k.

$k =$ ..... [1]

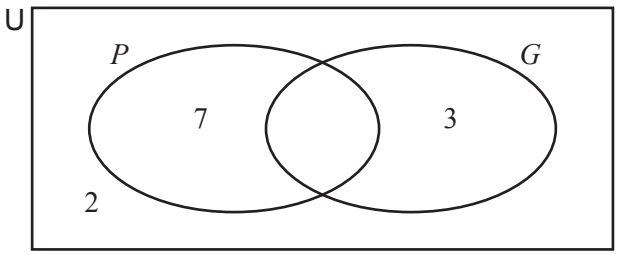
(c) Find the integer value of x such that $f(x) < 0$.

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

(d) $g(x) = x^2 - p$

On the diagram, sketch a possible graph of $y = g(x)$ so that $f(x) = g(x)$ has 5 solutions. [2]

9



The Venn diagram shows the following information.

U = {students in a music group} P = {students who play the piano} G = {students who play the guitar}

$$\mathrm{n}(P \cup G)' = 2 \qquad \mathrm{n}(P \cap G') = 7 \qquad \mathrm{n}(G \cap P') = 3.$$

(a) $\mathrm{n}(\mathrm{U}) = 23$

Find $\mathrm{n}(P \cap G)$.

..... [1]

(b) A student is chosen at random from the music group.

Find the probability that this student plays the piano but does not play the guitar.

..... [1]

(c) Two students who play the guitar are chosen at random.

Find the probability that they both also play the piano.

..... [3]

(d) On the Venn diagram, shade the region $P \cup G'$. [1]

[Turn over

10 $f(x) = x^2 - x - 30$ $g(x) = x^2 - 36$ $h(x) = 2x + 7$

(a) Find h(f(7)).

..... [2]

(b) Find $h^{-1}(x)$.

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

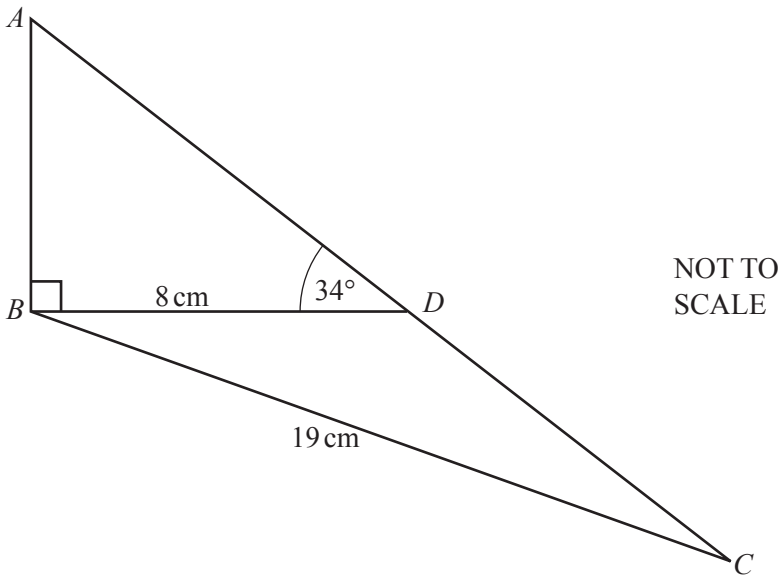
(c) Find g(h(x)) in its simplest factorised form.

..... [3]

(d) Simplify $\frac{f(x)}{g(x)}$.

..... [4]

11



In the diagram, *ADC* is a straight line.

(a) Calculate *AB*.

AB = ... cm [2]

(b) Calculate angle *DBC*.

Angle *DBC* = ... [5]

(c) Calculate the area of triangle *ABC*.

..... cm^2 [2]

Question 12 is printed on the next page.

12 **(a)** Find the nth term of the sequence.

1, 8, 27, 64, 125, …

..... [1]

(b) **(i)** Find the next term in the sequence.

2, 12, 36, 80, 150, 252, …

..... [2]

(ii) Find the nth term of the sequence.

2, 12, 36, 80, 150, 252, …

..... [2]