Cambridge Assessment International Education

Cambridge IGCSE™

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

0796500410

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/42**

Paper 4 (Extended) **February/March 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.

© UCLES 2021
[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. $\quad A = \pi rl$

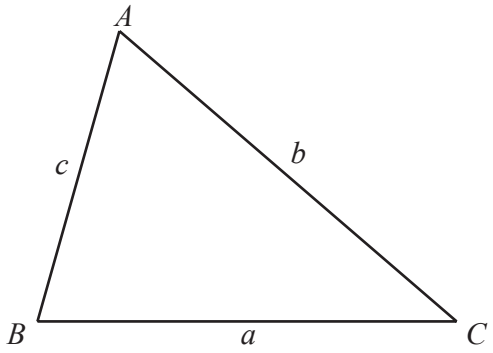
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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



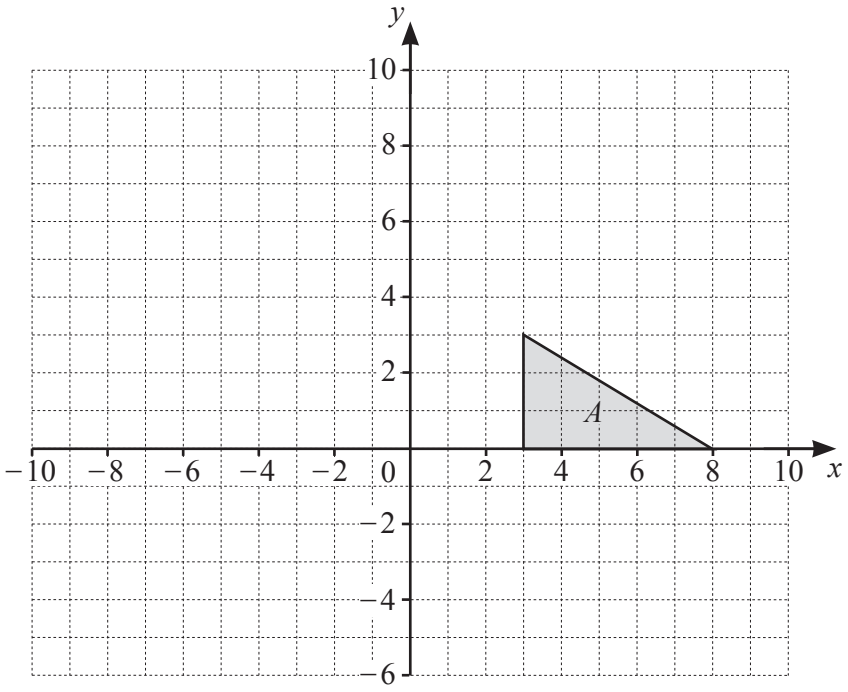
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1 (a)



(i) Rotate triangle *A* through 90° anticlockwise about (0, 0). Label the image *B*. [2]

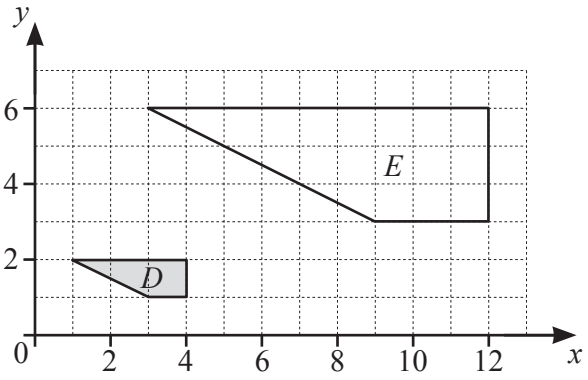
(ii) Reflect triangle *A* in the *y*-axis. Label the image *C*. [1]

(iii) Describe fully the **single** transformation that maps triangle *B* onto triangle *C*.

.....

..... [2]

(b)



Describe fully the **single** transformation that maps trapezium *D* onto trapezium *E*.

.....

..... [3]

2 **(a)** Write $260\,512$ correct to 3 significant figures.

..... [1]

(b) Write $0.000\,000\,576$ in standard form.

..... [1]

(c) Calculate $\sqrt{27^2 - 6 \times 31^{0.3}}$.
Give your answer correct to 1 decimal place.

..... [2]

(d) **(i)** Work out 37% of \$820.

\$ ..... [2]

(ii) Work out \$36 as a percentage of \$150.

..... % [1]

(e) An amount of money is shared between Alan, Bjorn and Carlo in the ratio 3 : 7 : 5.
Carlo receives \$695.

(i) Find the total amount of money shared.

\$ ..... [3]

(ii) Carlo invests 40% of his \$695 at a rate of 1.2% per year compound interest.

Calculate the value of his investment at the end of 5 years.

\$ ..... [3]

© UCLES 2021

(f) Dana invests \$2100 for 12 years at a rate of x% per year compound interest.
At the end of the 12 years, the value of her investment is \$2663.31 .

Calculate the value of x.

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

3 **(a)** **(i)** Write down the coordinates of the point where the line $y = -2x + 3$ crosses the y-axis.

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

(ii) Write down the gradient of the line $y = -2x + 3$.

..... [1]

(b) The line $x + y = 6$ crosses the line $x = -2$ at point A.

Find the y-coordinate of A.

..... [1]

(c) Find the equation of the straight line that passes through the points $(3, -1)$ and $(12, 5)$.

..... [3]

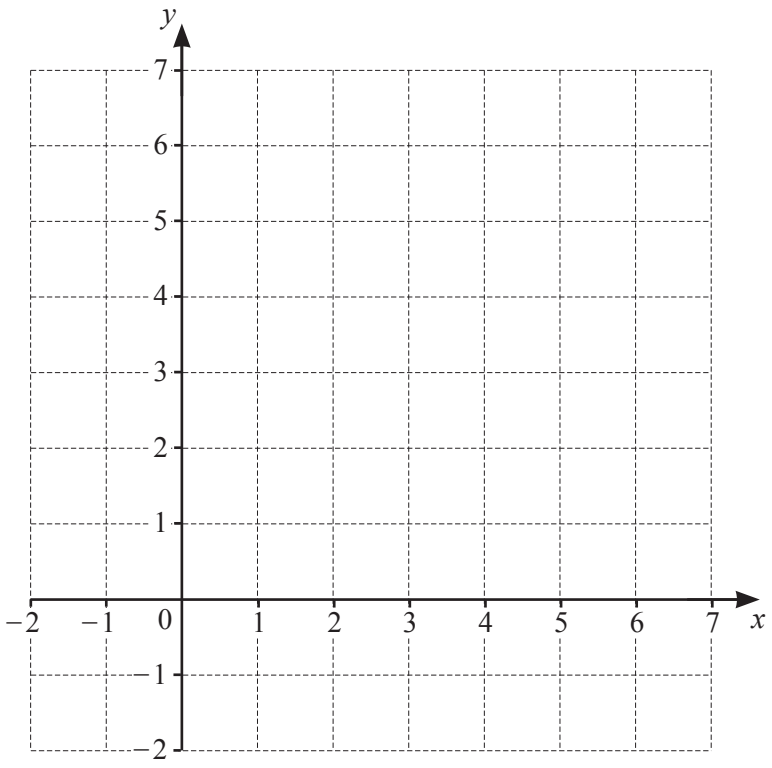
(d) The line L passes through the point $(3, 4)$.
Line L is perpendicular to the line $2y = 5x + 6$.

Find the equation of line L.

..... [4]

© UCLES 2021

(e)



(i) On the grid, draw the lines $y = 4$, $x + y = 3$ and $y = x - 1$. [3]

(ii) By shading the unwanted regions, find and label the region R that satisfies these three inequalities.

$y \leqslant 4$
$x + y \geqslant 3$
$y \geqslant x - 1$ [1]

4 **(a)** The mass, m grams, of each of 50 apples is found.
The results are shown in the table.

Mass (m grams)	Frequency
$70 < m \leqslant 90$	2
$90 < m \leqslant 110$	7
$110 < m \leqslant 130$	14
$130 < m \leqslant 150$	10
$150 < m \leqslant 170$	12
$170 < m \leqslant 190$	5

(i) Write down the modal class.

..... $< m \leqslant$ ..... [1]

(ii) Calculate an estimate of the mean.

..... g [2]

(b) The mass, x grams, of each of 120 different apples is found.
The results are shown in Table 1.

(i) Complete the cumulative frequency column in Table 2.

Mass (x grams)	Frequency
$70 < x \leqslant 90$	8
$90 < x \leqslant 110$	8
$110 < x \leqslant 120$	22
$120 < x \leqslant 130$	39
$130 < x \leqslant 140$	27
$140 < x \leqslant 150$	9
$150 < x \leqslant 170$	7

Table 1

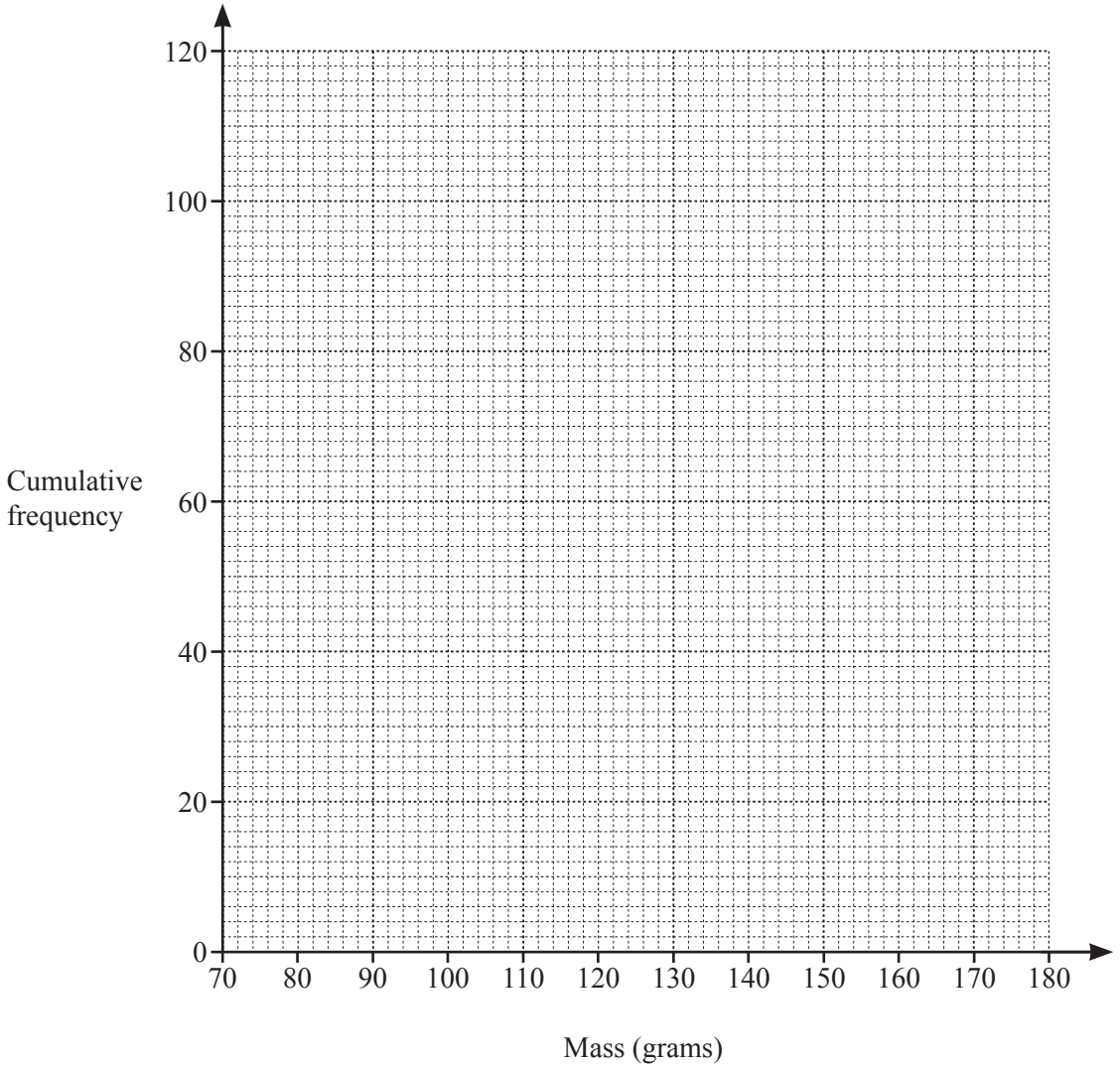
Mass (x grams)	Cumulative Frequency
$x \leqslant 90$	8
$x \leqslant 110$	
$x \leqslant 120$	
$x \leqslant 130$	
$x \leqslant 140$	
$x \leqslant 150$	
$x \leqslant 170$	

Table 2

[2]

© UCLES 2021

(ii) On the grid, draw the cumulative frequency curve to show the results in Table 2.



[3]

(iii) Use your cumulative frequency curve to estimate

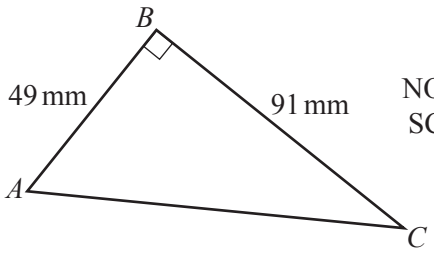
(a) the median,

..... g [1]

(b) the interquartile range.

..... g [2]

5 **(a)**

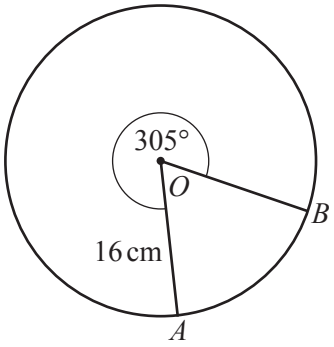


NOT TO SCALE

Calculate the length of AC.

$AC =$ ..... mm [2]

(b)



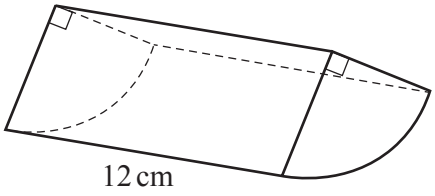
NOT TO SCALE

The diagram shows a circle with centre O and radius 16 cm.

Calculate the length of the major arc AB.

..... cm [2]

(c)



NOT TO SCALE

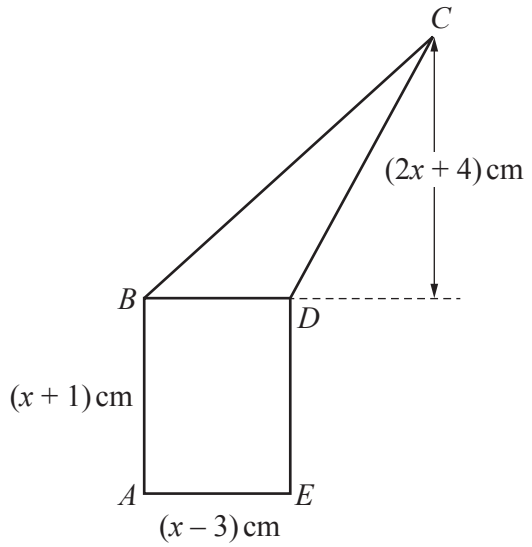
The diagram shows a prism with length 12 cm.
The cross-section of the prism is a quarter of a circle.
The radius of the circle is 6 cm.

Calculate the volume of the prism.

..... cm^3 [2]

© UCLES 2021

(d)



NOT TO SCALE

Shape *ABCDE* is made by joining rectangle *ABDE* and triangle *BCD*.
The perpendicular height of triangle *BCD* is $(2x + 4)$ cm.
The total area of *ABCDE* is 11 cm^2.

(i) Show that $2x^2 - 3x - 20 = 0$.

[3]

(ii) Factorise $2x^2 - 3x - 20$.

..... [2]

(iii) Use your answer to **part (ii)** to solve the equation $2x^2 - 3x - 20 = 0$.

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

(iv) Find the perpendicular height of triangle *BCD*.

..... cm [1]

© UCLES 2021

6 **(a)** y is inversely proportional to the square of x.

(i) When $x = 2$, $y = 8$.

Find y in terms of x.

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

(ii) Find the value of y when $x = 4$.

$y =$ ..... [1]

(iii) Find the value of x when $y = 128$.

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

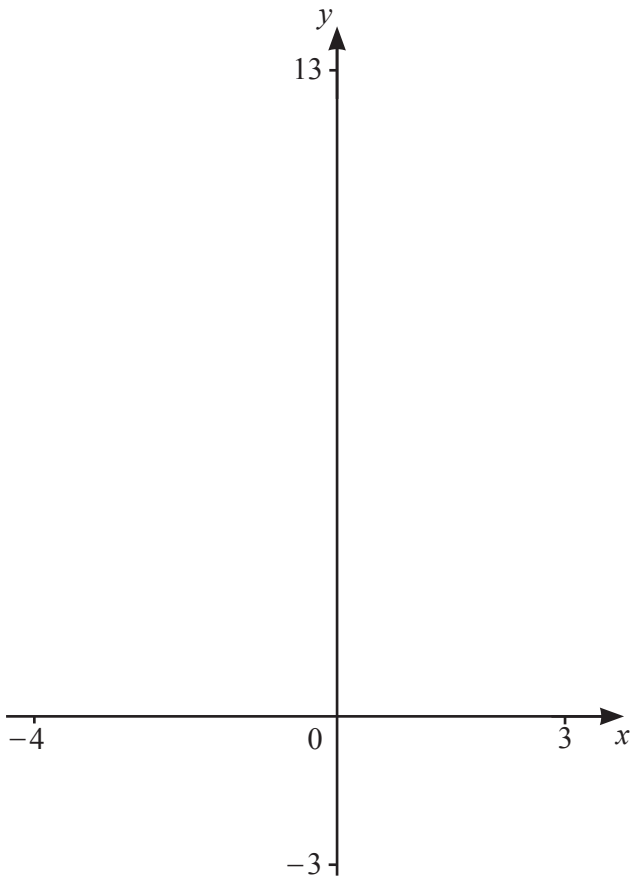
(b) r is directly proportional to the cube of $(p + 1)$.
When $p = 1$, $r = 16$.

Find the value of r when $p = 4$.

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

© UCLES 2021

7



$g(x) = \frac{1}{x-2}$, $x \neq 2$

(a) On the diagram, sketch the graph of $y = g(x)$ for values of x between -4 and 3. [3]

(b) Write down the equations of the asymptotes of the graph of $y = g(x)$.

.....

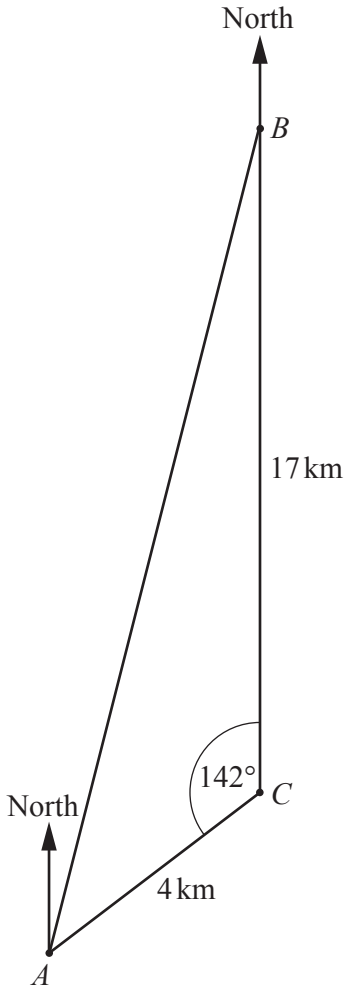
..... [2]

(c) $h(x) = (x+1)^2 - 3$

Solve the inequality $g(x) > h(x)$.

..... [4]

8



NOT TO SCALE

Rani sails in a boat race around a triangular course.
She sails from A to B to C and then directly back to A.
B is due north of C.

(a) Find the bearing Rani sails on from C to A.

..... [1]

(b) Show that $AB = 20.3$ km, correct to 1 decimal place.

[3]

© UCLES 2021

(c) Calculate the bearing of B from A.

..... [3]

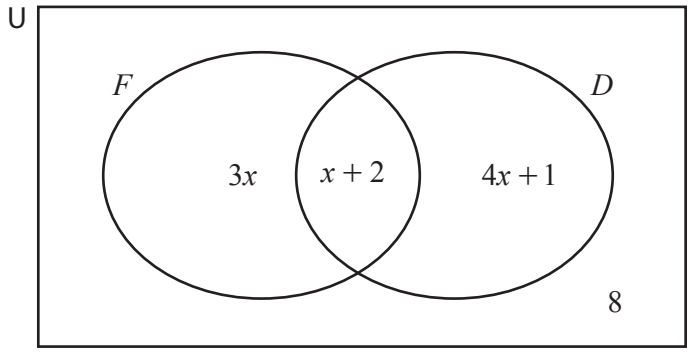
(d) Rani starts the race at 08 57 and returns to A at 12 33.

Calculate the average speed of her boat in km/h.

..... km/h [3]

9 **(a)** The Venn diagram shows information about 115 people who play musical instruments.

F = {people who play the flute}
D = {people who play the drums}



(i) Calculate the number of people who play both the flute and the drums.

..... [3]

(ii) On the Venn diagram, shade $F' \cap D$. [1]

(iii) Briony plays both the flute and the drums.

Use set notation to complete the statement.

Briony ..... $(F \cap D)$ [1]

© UCLES 2021

(b) Briony has 6 red socks, 4 green socks and 8 white socks.

(i) She picks a sock at random.

Find the probability that the sock is green.

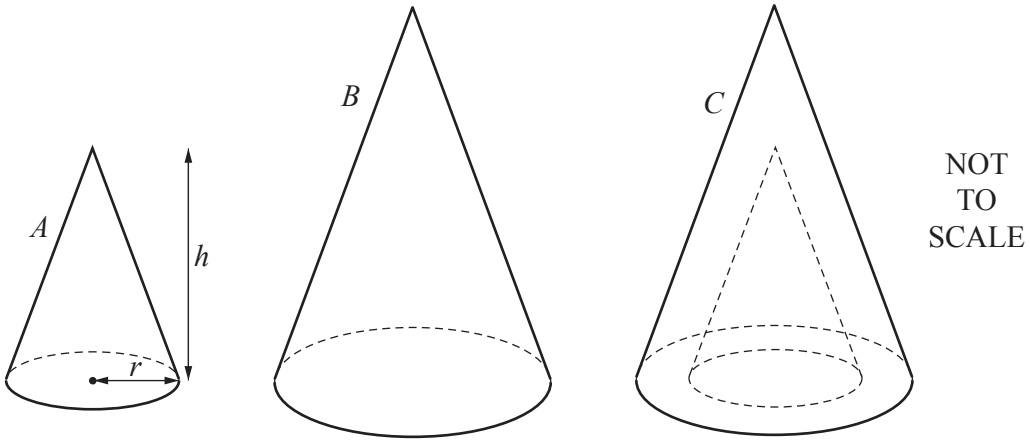
..... [1]

(ii) Briony replaces the sock.
She now picks two socks at random, without replacement.

Calculate the probability that the two socks are different colours.

..... [4]

10



Cone A has radius r and perpendicular height h.
Cone B is mathematically similar to cone A.
Solid C is formed by removing cone A from cone B.

The ratio height of cone A : height of cone B = 2 : 3.

(a) Find the ratio volume of cone A : volume of solid C.

..... : ..... [3]

(b) Cone A has radius 4 cm and height 10 cm.

Calculate the **total** surface area of solid C.

..... cm^2 [8]

Question 11 is printed on the next page.

11 $f(x) = 3x + 1$ $g(x) = x^2 - 5$ $h(x) = 3^x$

(a) Find g(3).

..... [1]

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

..... [2]

(c) Find the value of r when $f(r) = r$.

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

(d) Solve $g(f(x)) = 20$.

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

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

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

© UCLES 2021