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1686102984

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/41**

Paper 4 (Extended) **May/June 2024**

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. $\quad A = \pi rl$

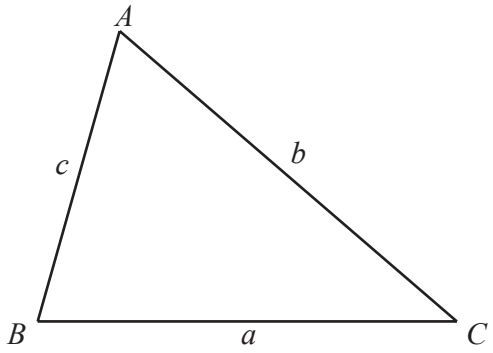
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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 **(a)** Solve the equations.

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

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

(ii) $7x + 11 = 26 - 3x$

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

(b) Solve the simultaneous equations.
You must show all your working.

$$5x + 3y = -15$$
$$3x + 5y = -17$$

$x =$ .....

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

(c) Solve the inequality.

$$|2x + 1| > 9$$

..... [4]

2 **(a)** The heights, x cm, of 100 plants are shown in the table.

Height (x cm)	$0 < x \leqslant 20$	$20 < x \leqslant 35$	$35 < x \leqslant 40$	$40 < x \leqslant 60$	$60 < x \leqslant 80$
Frequency	7	13	20	32	28

(i) Calculate an estimate of the mean height of the plants.

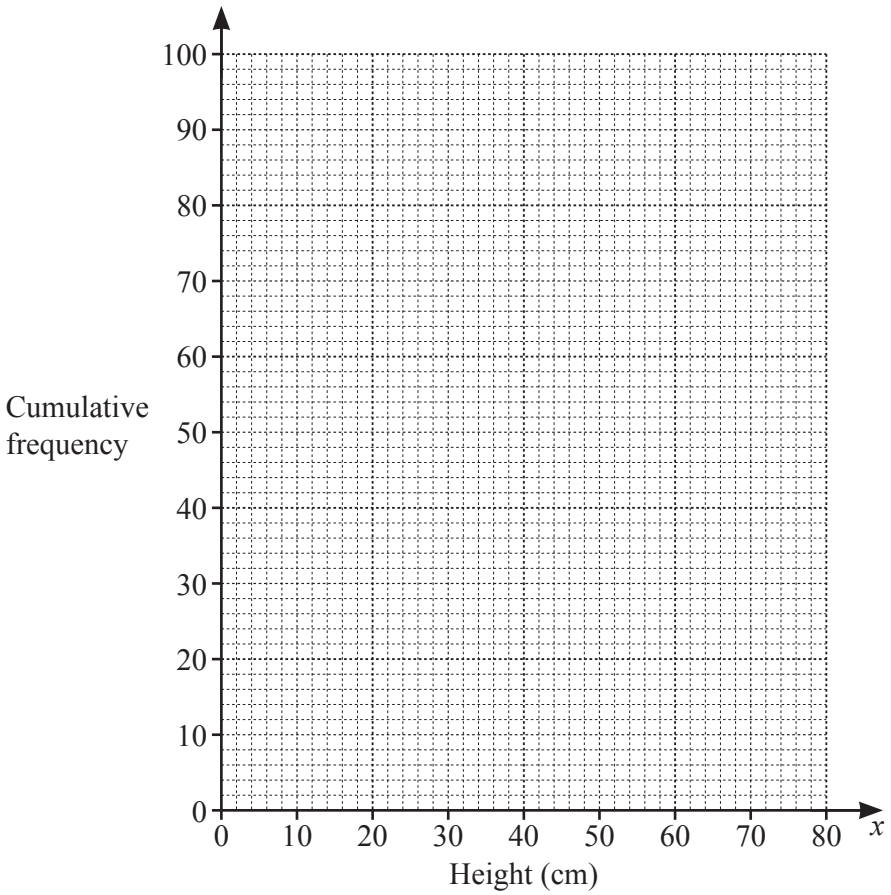
..... cm [2]

(ii) **(a)** Complete the cumulative frequency table for the plants.

Height (x cm)	$x \leqslant 20$	$x \leqslant 35$	$x \leqslant 40$	$x \leqslant 60$	$x \leqslant 80$
Cumulative frequency	7				100

[1]

(b) On the grid, draw the cumulative frequency curve.



[3]

(c) Use your cumulative frequency curve to find an estimate for the interquartile range.

..... cm [2]

(b) The heights, h cm, of 50 different plants are shown in the table, where k is an integer.

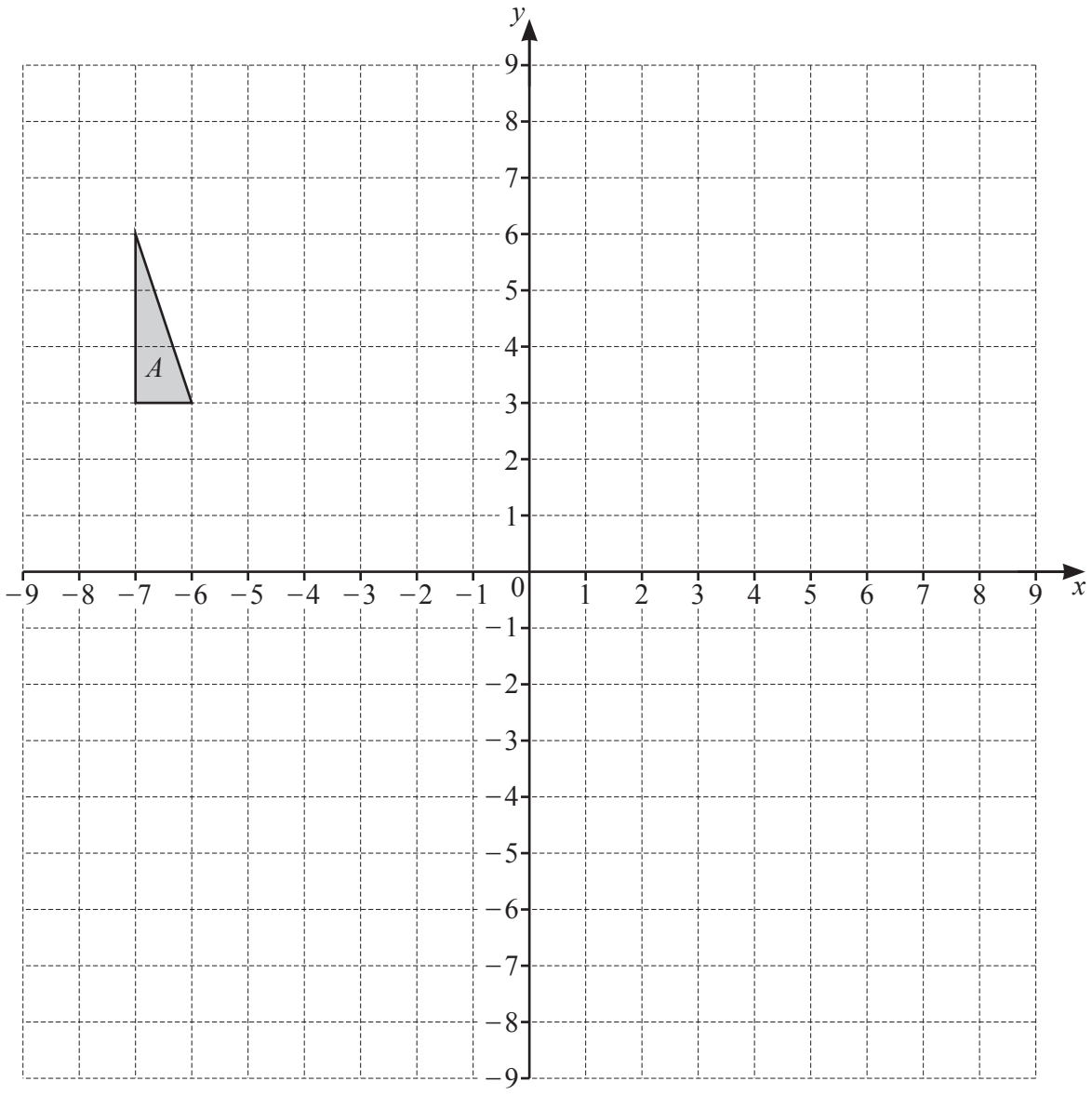
Height (h cm)	Frequency
$0 < h \leqslant 20$	25
$20 < h \leqslant k$	15
$k < h \leqslant 80$	10

An estimate of the mean height of these plants is 27 cm.

Find the value of k.

$k =$ ..... [3]

3



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(a) Translate triangle A with vector $\begin{pmatrix} 2 \\ -6 \end{pmatrix}$. Label the image B. [2]

(b) Describe fully the **single** transformation that maps triangle B onto triangle A.

.....

..... [2]

(c) Rotate triangle A through 90° clockwise about (0, 0). Label the image C. [2]

(d) Reflect triangle A in the line $y = x$. Label the image D. [2]

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

.....

..... [3]

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4 **(a)** The price of a coat is \$84.
The price is reduced by 12%.

Find the new price of the coat.

\$ ..... [2]

(b) The price of a table is reduced by 25%.
The price is now \$960.

Find the original price of the table.

\$ ..... [2]

(c) Samir invests \$600 in a bank that pays compound interest at a rate of 5.1% each year.

(i) Find the value of Samir's investment after 4 complete years.

\$ ..... [2]

(ii) Find the number of complete years for the value of Samir's investment to be first worth more than \$1000.

..... [4]

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(d) Amir and Bob work together and share their earnings in the ratio 3 : 5.

(i) Find the amount Bob receives when their earnings are $120.

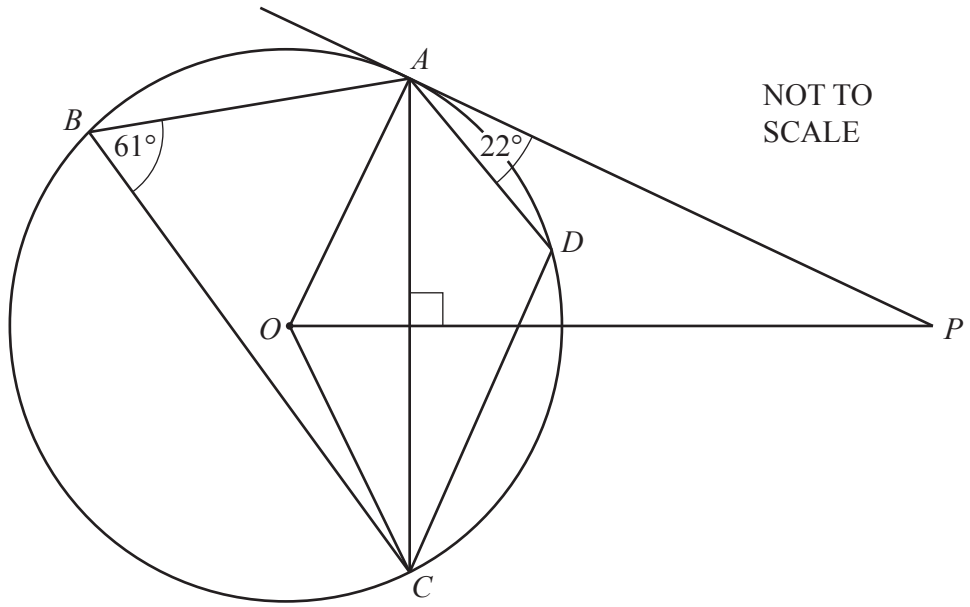
$ ..... [2]

(ii) They decide to change the ratio for all further earnings.
Amir's share of the earnings is increased by 20% of his original share.
Bob's share of the earnings is decreased by 20% of his original share.

Show that the ratio of their earnings is now 9 : 10.

[3]

5



A, B, C and D lie on a circle, centre O.
AP is a tangent to the circle at A.
OP is perpendicular to AC and AD is parallel to BC.
Angle $ABC = 61°$ and angle $PAD = 22°$.

(a) Write down the mathematical name of the cyclic quadrilateral $ABCD$.

..... [1]

(b) Complete the statement.

Angle $OAP = 90°$ because .....

..... [1]

(c) Find

(i) angle ADC

Angle $ADC =$ ..... [1]

(ii) angle ACD

Angle $ACD =$ ..... [1]

(iii) angle ACB

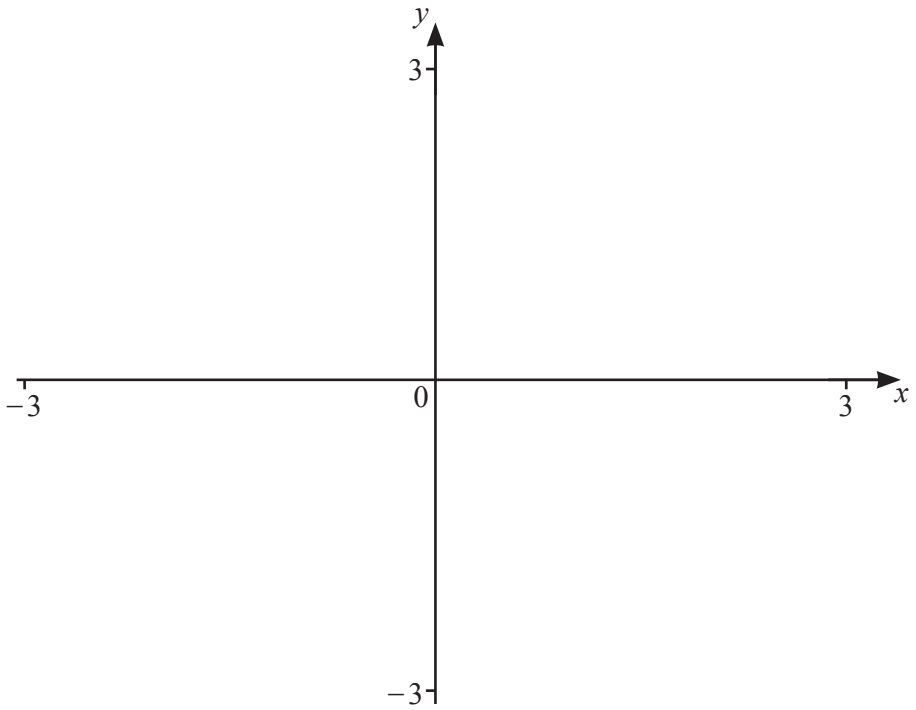
Angle $ACB =$ ..... [2]

(iv) angle OCA.

Angle $OCA =$ ..... [2]

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6



$f(x) = 2 - |1 - 0.5x^2|$

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

(b) The graph cuts the x-axis at points A and B.

Work out the length AB.

$AB =$ ..... [2]

(c) Solve $f(x) = 0.5$.

..... [2]

(d) Write down the coordinates of the minimum point of the graph.

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

(e) The equation $f(x) = k$ has two solutions.

Find the range of values of k.

..... [2]

7 **(a)** Spinner A and spinner B are each fair 5-sided spinners.
Spinner A is numbered 1, 2, 2, 3, 4.
Spinner B is numbered 1, 2, 3, 4, 4.

The two spinners are each spun once and the number on each spinner is recorded.

Find the probability that

(i) the number on spinner A is 6

..... [1]

(ii) the number on spinner B is not 4

..... [1]

(iii) the number on spinner A is the same as the number on spinner B

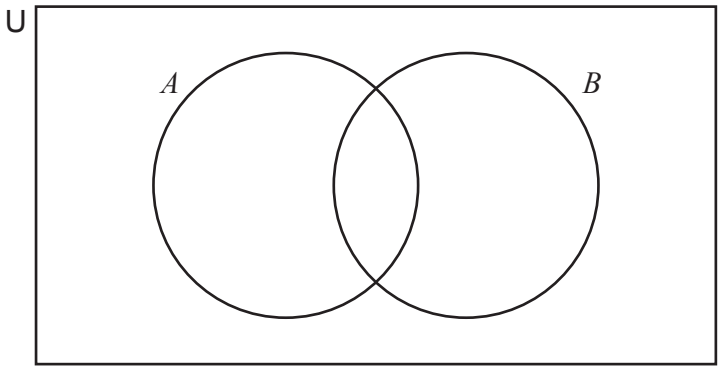
..... [3]

(iv) the sum of the two numbers is 6.

..... [3]

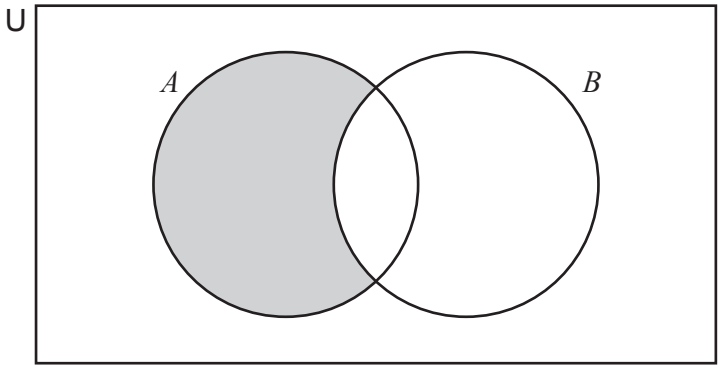
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(b) (i) On the Venn diagram, shade $A \cup B$.



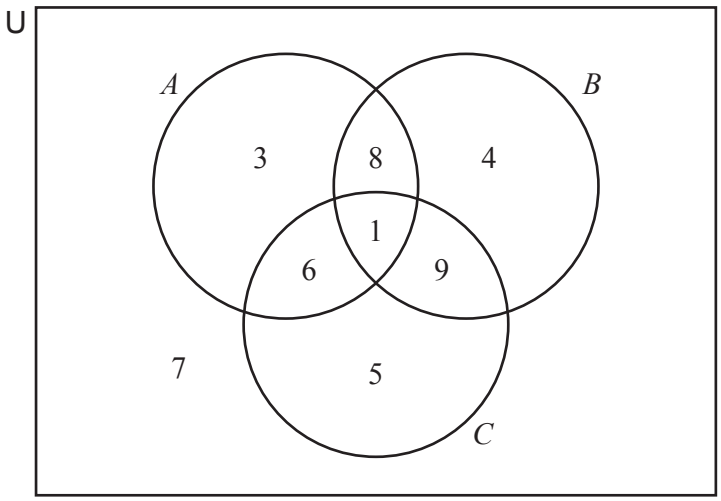
[1]

(ii) Describe the shaded region using set notation.



..... [1]

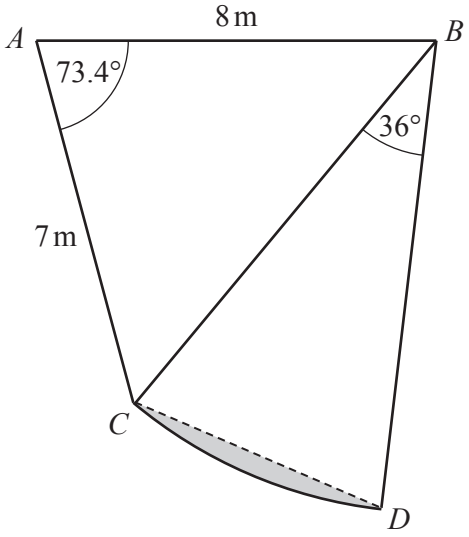
(iii) The Venn diagram below shows the number of elements in each subset.



Find $\mathrm{n}\big((A \cap B) \cap C'\big)$.

..... [1]

8



NOT TO SCALE

The diagram shows a shape *ABDC* formed from triangle *ABC* and a sector of a circle *BCD*, centre *B*.

(a) Show that $BC = 9.0\,\text{m}$, correct to 1 decimal place.

[3]

(b) Use the sine rule to find angle *BCA*.

Angle *BCA* = ... [3]

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

..... m^2 [2]

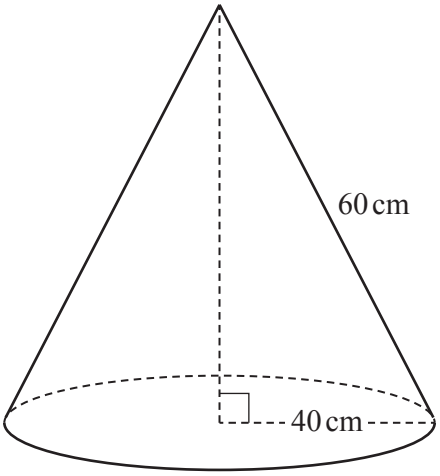
(d) Find the area of the shaded region.

..... m^2 [3]

(e) Find the perimeter of the shape *ABDC*.

..... m [2]

9



NOT TO SCALE

The diagram shows a solid cone with base radius 40 cm and slant height 60 cm.

(a) Find the volume of the cone.

..... cm^3 [3]

(b) Show that the total surface area of the cone is $4000\pi\,cm^2$.

[2]

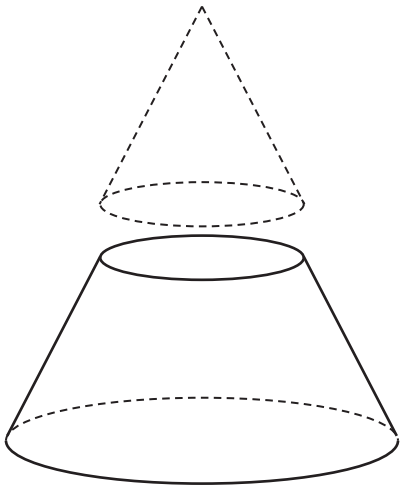
(c) A mathematically similar cone has a surface area of $1000\pi\,cm^2$.

Show that the radius of this cone is 20 cm.

[2]

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(d)



A cone with radius 20 cm is removed from the top of the cone with radius 40 cm to leave a solid.

Calculate the surface area of the remaining solid.

..... cm^2 [3]

10 y varies inversely as the square root of $(x+1)$.
$y = 18$ when $x = 3$.

(a) (i) Find the value of y when $x = 8$.

$y =$ ..... [3]

(ii) Find the value of x when $y = 1.5$.

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

(b) w varies directly as the square root of $(x+1)$.
$w = 18$ when $x = 3$.

Find the value of $\sqrt{wy}$.

$\sqrt{wy} =$ ..... [3]

11 $f(x) = 3x - 1$ $g(x) = 5 - 2x$ $h(x) = \frac{1}{2x-3}$, $x \neq 1.5$

(a) Find $f(4)$.

..... [1]

(b) Solve $f(x) = -7$.

..... [2]

(c) Find $g^{-1}(x)$.

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

(d) Solve $g(x) = 7h(f(x))$.
You must show all your working.

$x =$ ..... [6]

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