



## Cambridge IGCSE™

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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  $\pi$ , 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  $ax^2 + bx + c = 0$   $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

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

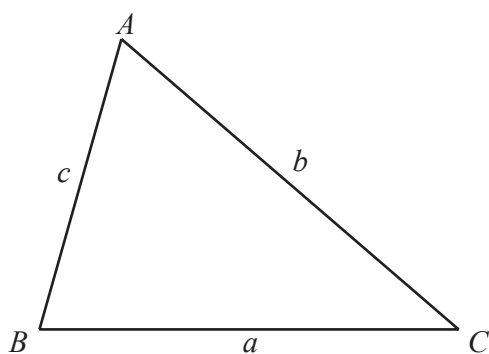
Curved surface area,  $A$ , of sphere of radius  $r$ .  $A = 4\pi r^2$

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

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

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

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



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

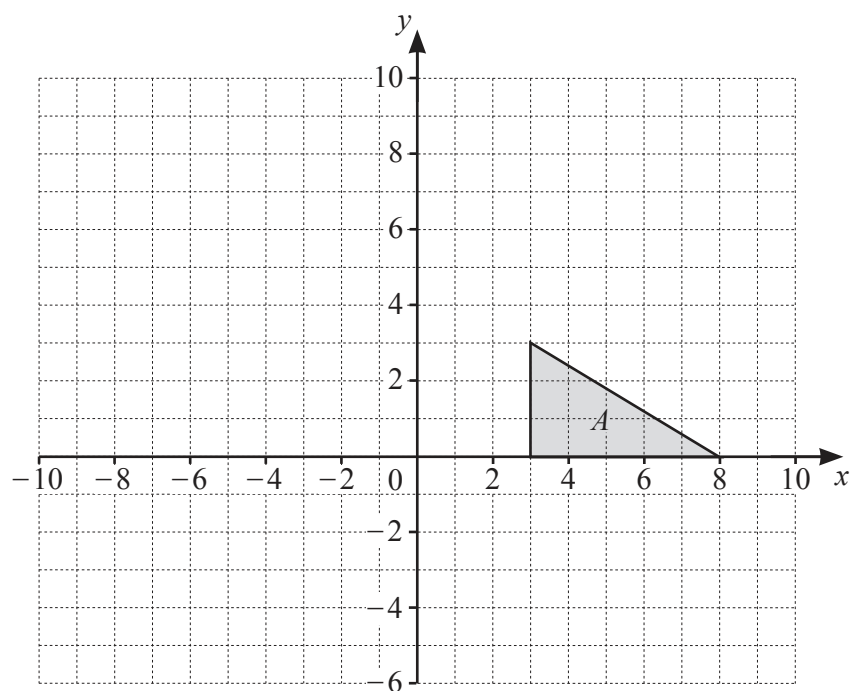
$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

3

Answer **all** the questions.

1 (a)

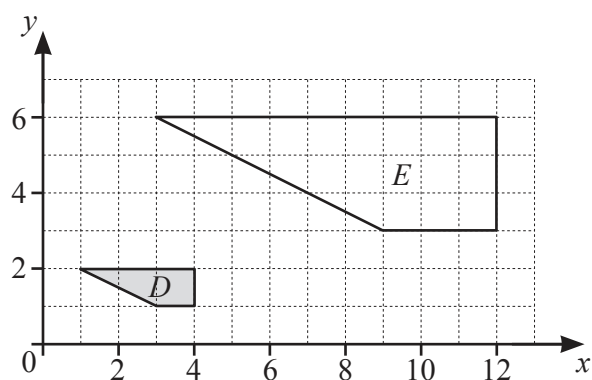


- (i) Rotate triangle  $A$  through  $90^\circ$  anticlockwise about  $(0, 0)$ . Label the image  $B$ . [2]
- (ii) Reflect triangle  $A$  in the  $y$ -axis. Label the image  $C$ . [1]
- (iii) Describe fully the **single** transformation that maps triangle  $B$  onto triangle  $C$ .

..... [2]

.....

(b)



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

..... [3]

.....

4

- 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]

**5**

- (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]

**6**

- 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  $(12, 5)$ .

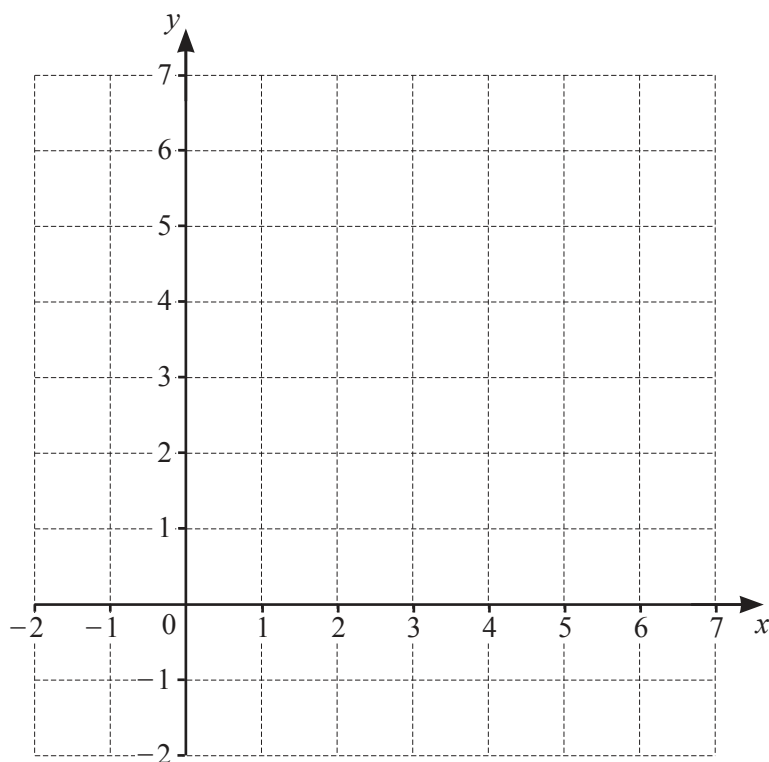
..... [3]

- (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]

(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.

$$\begin{aligned} y &\leq 4 \\ x + y &\geq 3 \\ y &\geq x - 1 \end{aligned}$$

[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 |
|--------------------|-----------|
| $70 < m \leq 90$   | 2         |
| $90 < m \leq 110$  | 7         |
| $110 < m \leq 130$ | 14        |
| $130 < m \leq 150$ | 10        |
| $150 < m \leq 170$ | 12        |
| $170 < m \leq 190$ | 5         |

- (i) Write down the modal class.

.....  $< m \leq$  ..... [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 |
|--------------------|-----------|
| $70 < x \leq 90$   | 8         |
| $90 < x \leq 110$  | 8         |
| $110 < x \leq 120$ | 22        |
| $120 < x \leq 130$ | 39        |
| $130 < x \leq 140$ | 27        |
| $140 < x \leq 150$ | 9         |
| $150 < x \leq 170$ | 7         |

Table 1

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

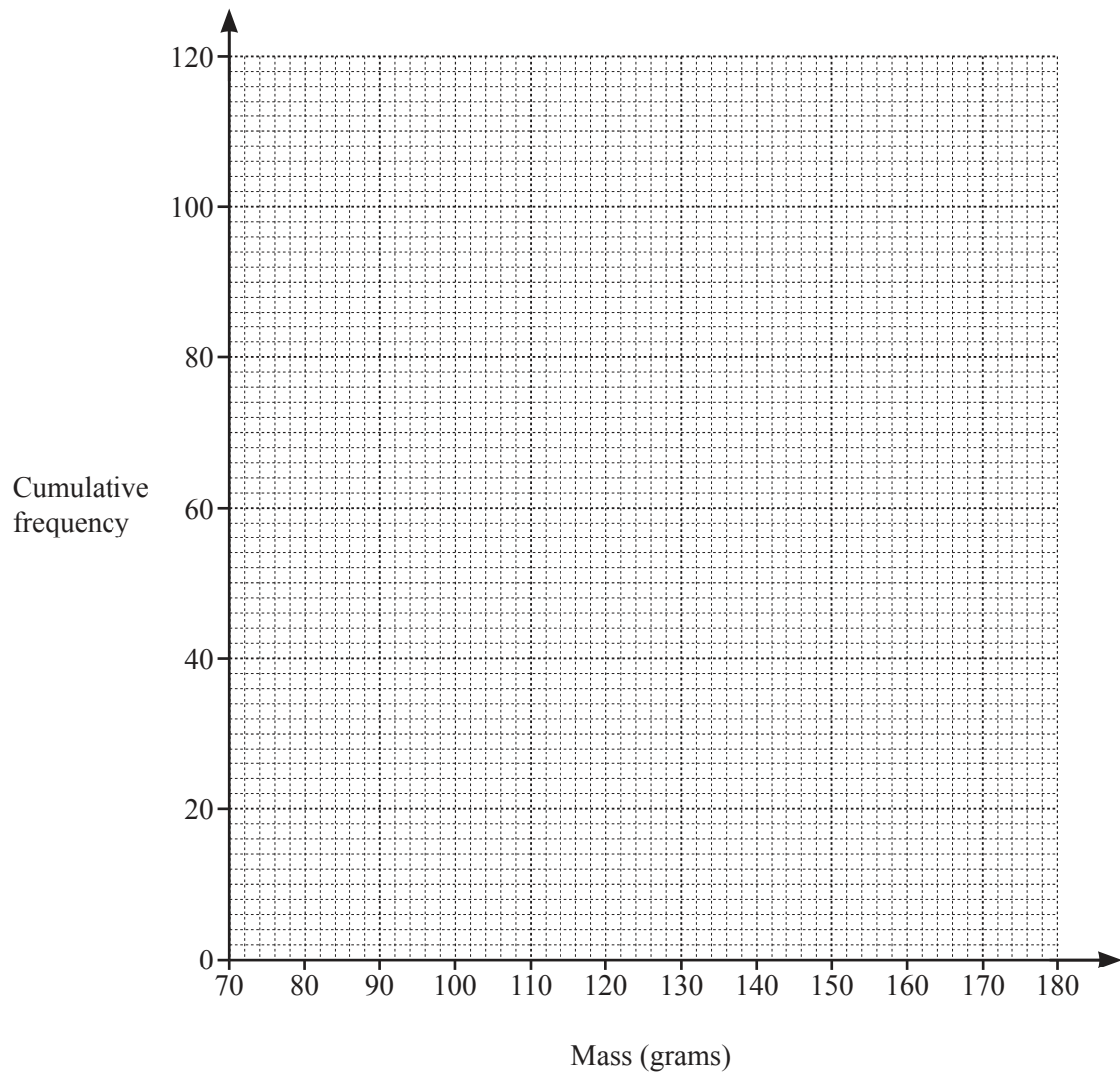
Table 2

[2]



9

(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,

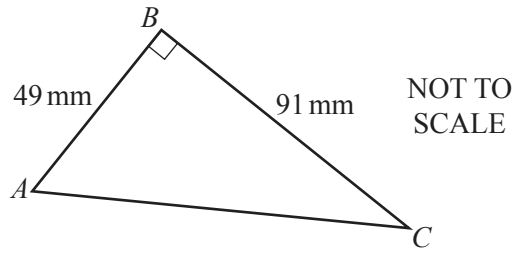
..... g [1]

(b) the interquartile range.

..... g [2]

10

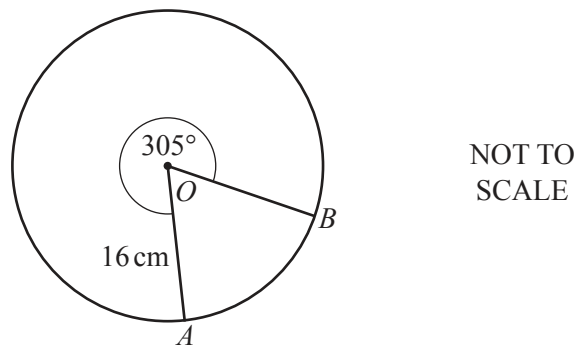
5 (a)



Calculate the length of  $AC$ .

$AC = \dots\dots\dots$  mm [2]

(b)

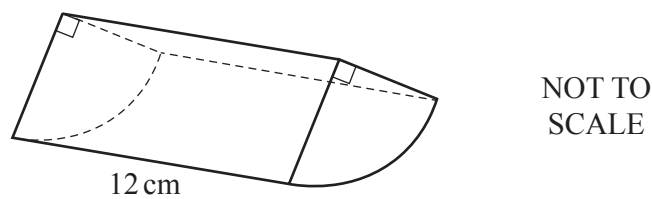


The diagram shows a circle with centre  $O$  and radius 16 cm.

Calculate the length of the major arc  $AB$ .

$\dots\dots\dots$  cm [2]

(c)



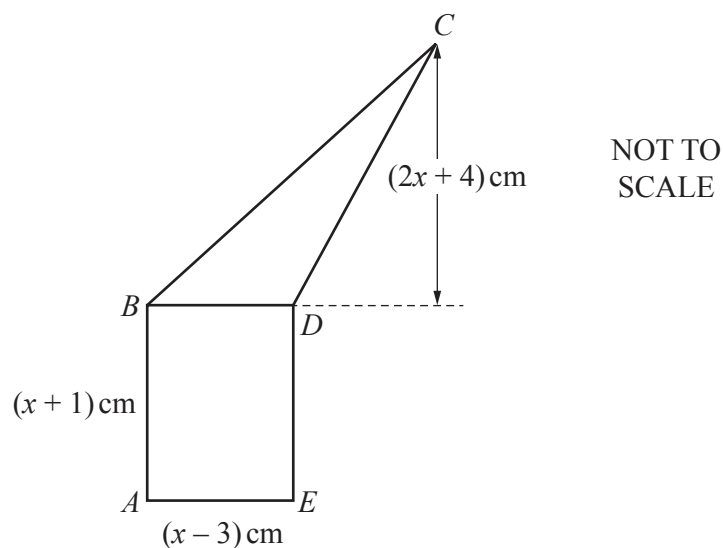
The diagram shows a prism with length 12 cm.  
The cross-section of the prism is a quarter of a circle.  
The radius of the circle is 6 cm.

Calculate the volume of the prism.

$\dots\dots\dots$  cm<sup>3</sup> [2]

11

(d)



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  $11 \text{ cm}^2$ .

(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  $2x^2 - 3x - 20 = 0$ .

$x = \dots\dots\dots$  or  $x = \dots\dots\dots$  [1]

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

..... cm [1]

**12****6 (a)**  $y$  is inversely proportional to the square of  $x$ .**(i)** When  $x = 2$ ,  $y = 8$ .Find  $y$  in terms of  $x$ .

$$y = \dots\dots\dots [2]$$

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

$$y = \dots\dots\dots [1]$$

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

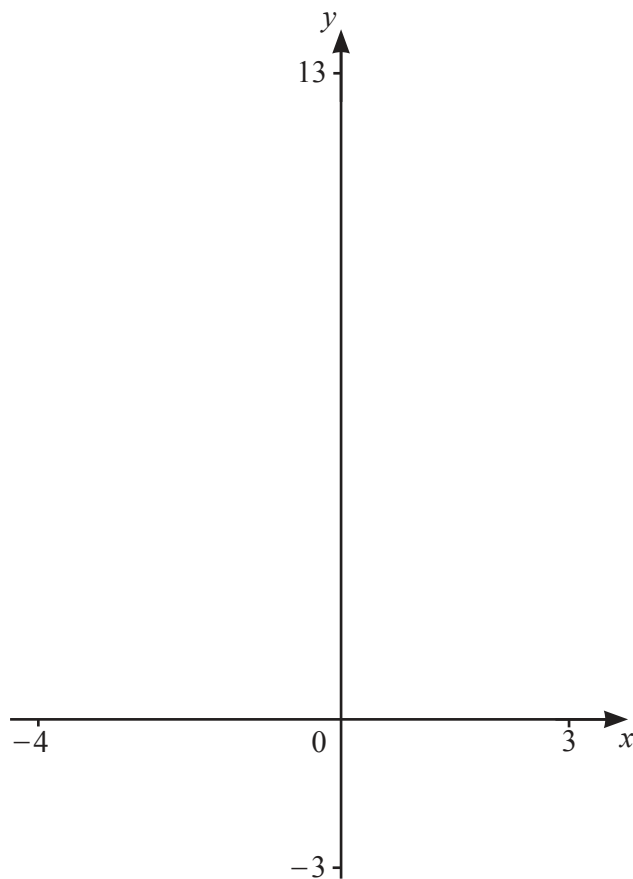
$$x = \dots\dots\dots [2]$$

**(b)**  $r$  is directly proportional to the cube of  $(p + 1)$ .  
When  $p = 1$ ,  $r = 16$ .Find the value of  $r$  when  $p = 4$ .

$$r = \dots\dots\dots [3]$$

13

7



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

(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]

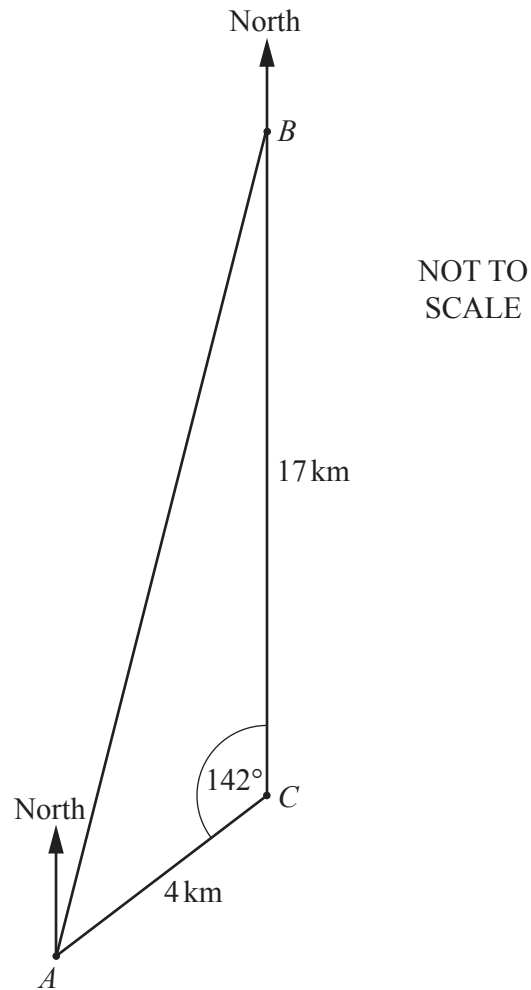
(c)  $h(x) = (x+1)^2 - 3$

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

..... [4]

14

8



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]

**15**

- (c) Calculate the bearing of  $B$  from  $A$ .

..... [3]

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

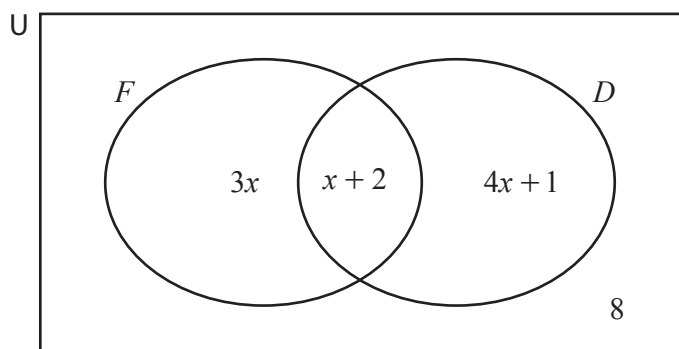
Calculate the average speed of her boat in km/h.

..... km/h [3]

16

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

$F = \{\text{people who play the flute}\}$   
 $D = \{\text{people who play the drums}\}$



- (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]



**17**

**(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.

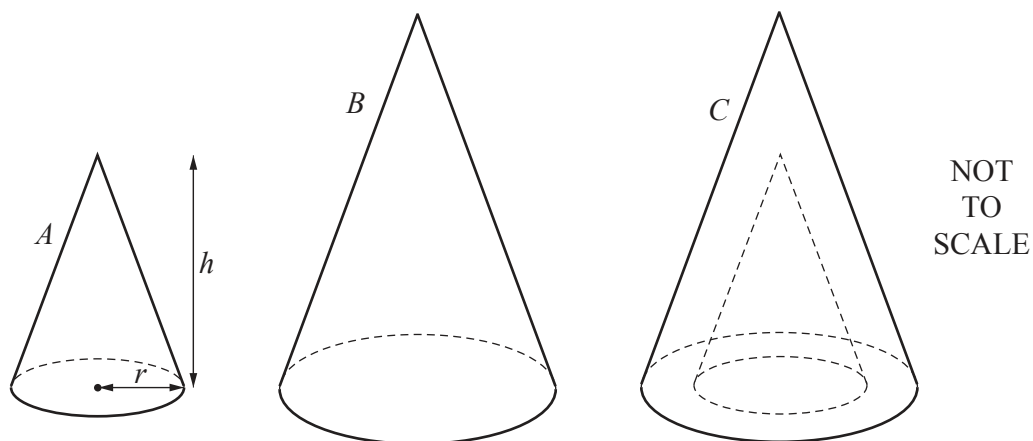
She now picks two socks at random, without replacement.

Calculate the probability that the two socks are different colours.

..... [4]

18

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]

**19**

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

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

.....  $\text{cm}^2$  [8]

**Question 11 is printed on the next page.**

**20**

**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]

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