



# Cambridge IGCSE™

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**CAMBRIDGE INTERNATIONAL MATHEMATICS**

**0607/42**

Paper 4 (Extended)

**February/March 2022**

**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  $l$ .  $A = \pi rl$

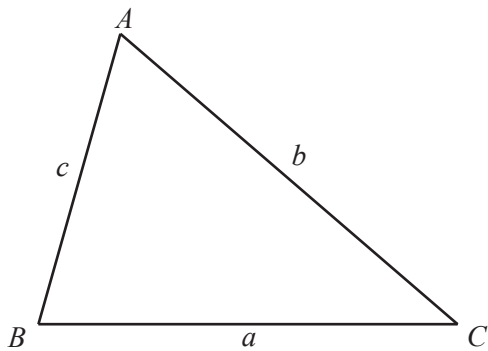
Curved surface area,  $A$ , of sphere of radius  $r$ .  $A = 4\pi r^2$

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



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

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

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

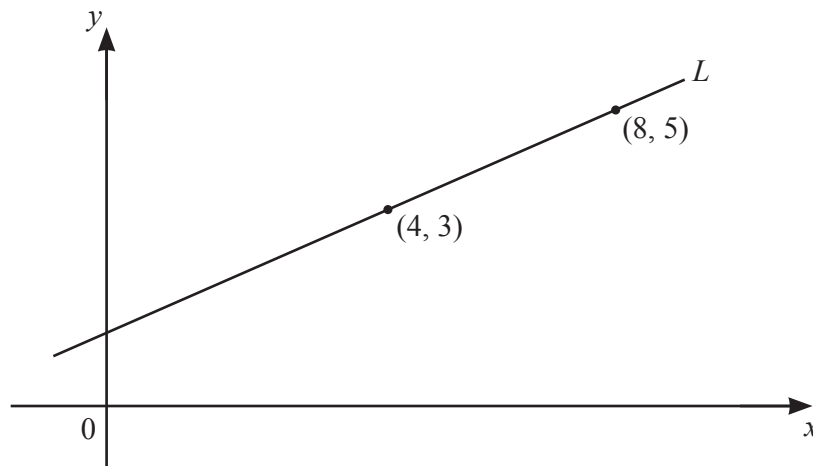
Answer **all** the questions.

- 1 (a) Find the gradient and  $y$ -intercept of the line with equation  $3x + 4y = 24$ .

Gradient = .....

$y$ -intercept = ..... [3]

(b)



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The diagram shows line  $L$  and the coordinates of two points on the line.

- (i) Show that the equation of line  $L$  is  $2y - x = 2$ .

[3]

- (ii) Find the equation of the line parallel to  $L$  that passes through the point  $(0, 7)$ .  
Give your answer in the form  $y = mx + c$ .

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

2 (a) Find 12 kg as a percentage of 80 kg.

.....% [1]

(b) Find 19% of \$250.

\$ ..... [2]

(c) Xavier invests \$500 at a rate of 1.5% per year simple interest.  
At the end of  $y$  years, the value of Xavier's investment is \$612.50 .

Find the value of  $y$ .

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

(d) Each year the value of a car decreases by 12% of its value at the beginning of that year. The original value of the car is \$20 000.

- (i) Calculate the value of the car at the end of 3 years.  
Give your answer correct to the nearest dollar.

\$ ..... [3]

- (ii) Find the number of complete years for the value of \$20 000 to decrease until it is first below \$1000.

..... [4]

(e) Each year the value of another car decreases by  $r\%$  of its value at the beginning of that year. At the end of 10 years, the value has decreased from \$12 000 to \$4673.

Find the value of  $r$ .

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

- 3 (a) The table shows the coursework grades for 20 students.

Grade	3	4	5	6	7
Frequency	1	3	6	2	8

Find

- (i) the mode, ..... [1]
- (ii) the range, ..... [1]
- (iii) the median, ..... [1]
- (iv) the lower quartile. .... [1]

- (b) The table shows some information about the heights,  $h$  cm, of 100 bushes.

Height ( $h$ cm)	$100 < h \leq 110$	$110 < h \leq 115$	$115 < h \leq 130$
Frequency	18	37	45

Calculate an estimate of the mean height.

..... cm [2]

- (c) The table shows some information about the times,  $t$  minutes, taken by some students to read a magazine.

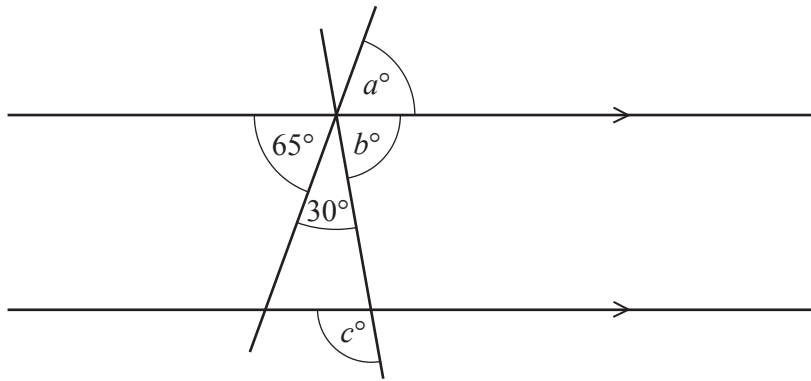
Time ( $t$ minutes)	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$
Frequency	3	11	$n$	19

When using mid-interval values, an estimate of the mean value of  $t$  is 25.4 .

Find the value of  $n$ .

$n =$  ..... [4]

4 (a)



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The diagram shows two straight lines crossing two parallel lines.

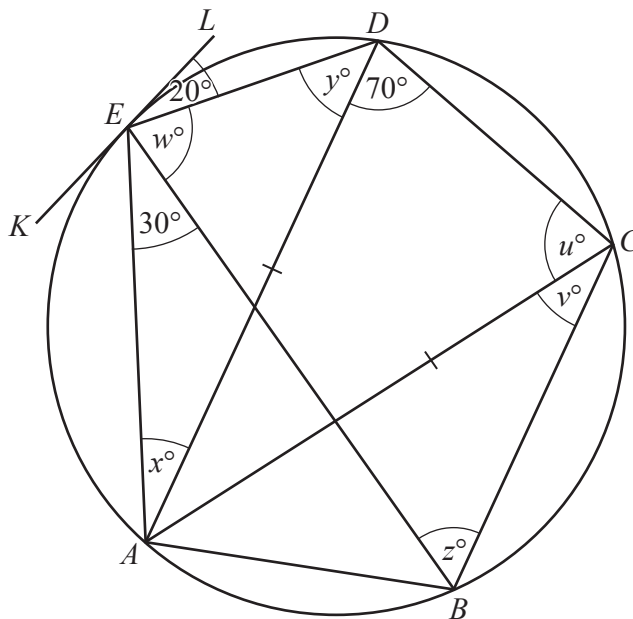
Find the values of  $a$ ,  $b$  and  $c$ .

$a = \dots\dots\dots$

$b = \dots\dots\dots$

$c = \dots\dots\dots$  [3]

(b)



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$A, B, C, D$  and  $E$  are points on the circle.  
 $KL$  is a tangent to the circle at  $E$ .  
 $AC = AD$ .

Find the values of  $u$ ,  $v$ ,  $w$ ,  $x$ ,  $y$  and  $z$ .

$u = \dots\dots\dots$        $x = \dots\dots\dots$

$v = \dots\dots\dots$        $y = \dots\dots\dots$

$w = \dots\dots\dots$        $z = \dots\dots\dots$  [6]

5 (a) (i) Expand and simplify  $(2x+3)^2$ .

..... [2]

(ii) The equation  $4x^2 + 12x + 5 = 0$  can be written as  $(2x+3)^2 = k$ .

Find the value of  $k$ .

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

(iii) Use your answer to **part(ii)** to solve the equation  $4x^2 + 12x + 5 = 0$ .

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



- (b)  $x$  varies inversely as the square root of  $(w - 1)$ .  
When  $w = 10$ ,  $x = 2$ .

(i) Find  $x$  in terms of  $w$ .

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

(ii) Find  $x$  when  $w = 3.25$ .

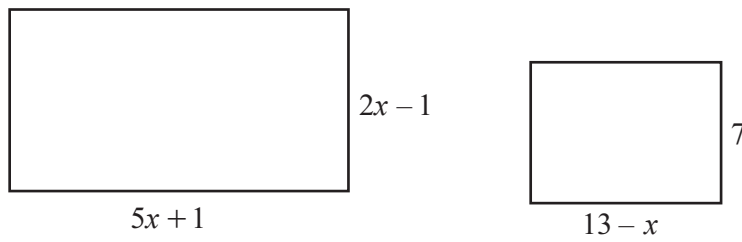
$$x = \dots\dots\dots [1]$$

(iii) Find  $w$  in terms of  $x$ .

$$w = \dots\dots\dots [3]$$

10

6 In this question all lengths are in centimetres.



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The area of the larger rectangle is  $84 \text{ cm}^2$  greater than the area of the smaller rectangle.

(a) Show that  $5x^2 + 2x - 88 = 0$ .

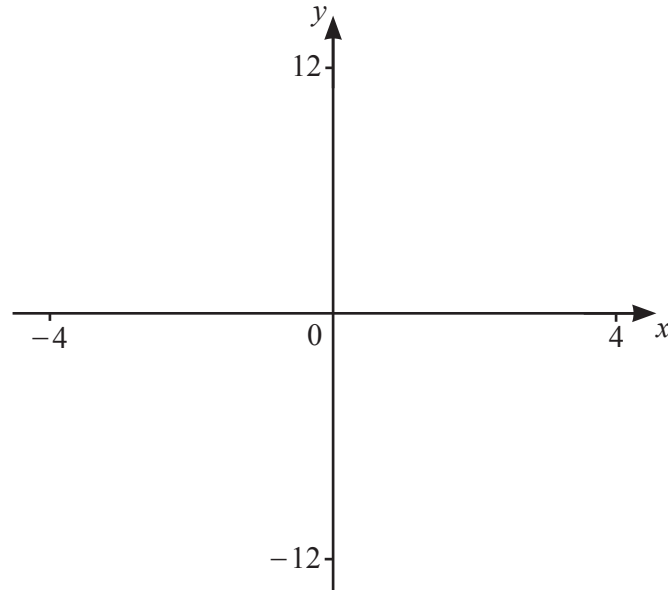
[4]

(b) Factorise  $5x^2 + 2x - 88$ .

..... [2]

(c) Find the area of the smaller rectangle.

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



$$f(x) = |4 - x^2| \text{ for } -4 \leq x \leq 4$$

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

(b) Write down the zeros of  $f(x)$ .

..... [2]

(c) Write down the coordinates of the local maximum.

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

(d) The equation  $|4 - x^2| = k$  has 4 solutions and  $k$  is an integer.

Write down a possible value of  $k$ .

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

(e) (i) On the diagram, sketch the graph of  $y = 2x$ . [1]

(ii) Solve the equation  $|4 - x^2| = 2x$ .

..... [2]

(iii) On the diagram, shade the regions where  $y \geq 0$ ,  $y \leq 2x$  and  $y \leq |4 - x^2|$ . [2]

12

8       $f(x) = 2x + 1$        $g(x) = 3 - 2x$        $h(x) = \log(x + 1)$

(a) Find the value of

(i)  $f(12)$ ,

..... [1]

(ii)  $g(f(12))$ .

..... [1]

(b) Find the value of  $x$  when  $f(x) = g(x)$ .

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

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

..... [2]

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

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

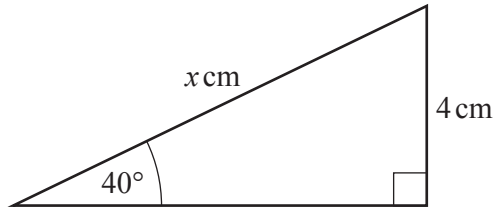
(e) Find  $x$  when  $h(x) = f(0.5)$ .

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

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

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

9 (a)

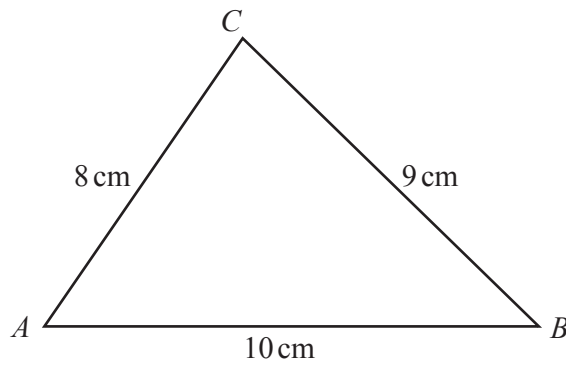


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Calculate the value of  $x$ .

$x = \dots\dots\dots$  [3]

(b)



NOT TO SCALE

(i) Calculate angle  $ABC$ .

Angle  $ABC = \dots\dots\dots$  [3]

(ii)  $T$  is the point on  $AB$  that is the shortest distance from  $C$ .

Calculate  $BT$ .

$BT = \dots\dots\dots$  cm [3]

(c) Another triangle  $PQR$  has  $QR = 12$  cm,  $PR = 7$  cm and angle  $PQR = 35^\circ$ .

Calculate the difference between the two possible values of angle  $QPR$ .

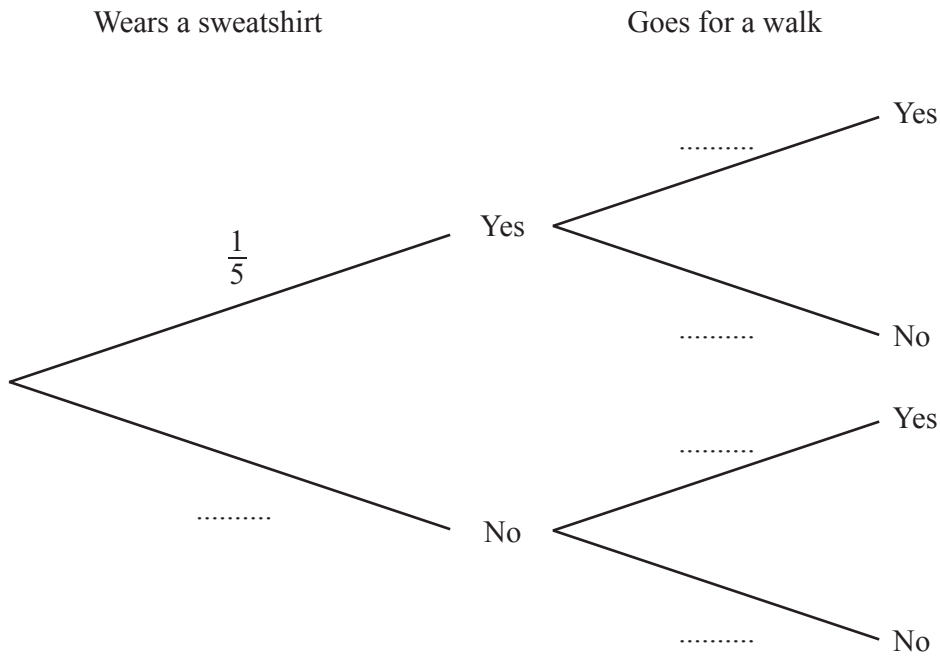
..... [5]

10 When Zena wears a sweatshirt, the probability that she goes for a walk is  $\frac{7}{10}$ .

When Zena does not wear a sweatshirt, the probability that she goes for a walk is  $\frac{9}{10}$ .

On any day, the probability that she wears a sweatshirt is  $\frac{1}{5}$ .

(a) Complete the tree diagram.



[3]

(b) (i) Find the probability that on one day Zena does not wear a sweatshirt and she goes for a walk.

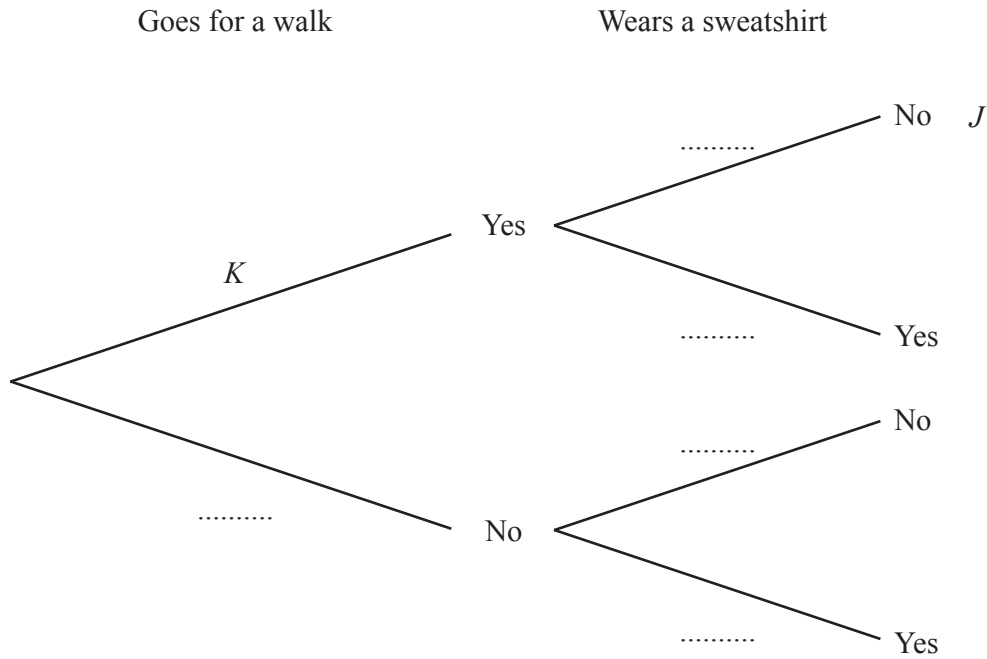
..... [2]

(ii) Find the probability that on one day Zena goes for a walk.

..... [2]



- (c) In the tree diagram below, the value of  $J$  is the answer to **part (b)(i)** and the value of  $K$  is the answer to **part (b)(ii)**.



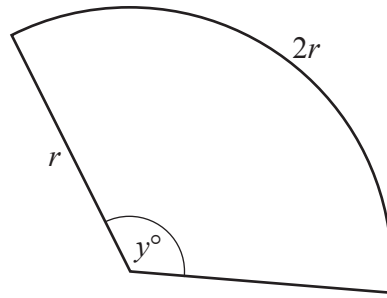
- (i) Find the probability that Zena does not wear a sweatshirt when she goes for a walk.

..... [2]

- (ii) Complete the tree diagram above.

[3]

11 (a)

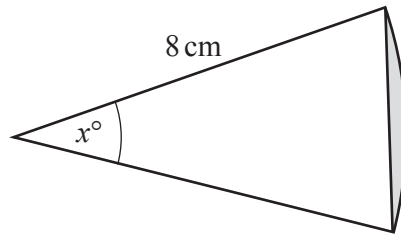
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The diagram shows a sector of a circle with radius  $r$  and angle  $y^\circ$ .  
The length of the arc of the sector is  $2r$ .

Calculate the value of  $y$ .

$y = \dots\dots\dots$  [3]

(b)



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The diagram shows a sector of a circle with radius 8 cm and angle  $x^\circ$ . The area of the shaded segment is  $A \text{ cm}^2$ .

(i) Show that  $A = \frac{8x}{45}\pi - 32 \sin x$ .

[2]

(ii) Find the value of  $A$  when  $x = 90$ .

..... [1]

(iii) By sketching the graph of  $A = \frac{8x}{45}\pi - 32 \sin x$ , find the value of  $x$  when  $A = 5.5$ .



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

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