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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

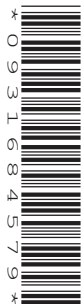
INSTRUCTIONS

- 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 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.



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



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

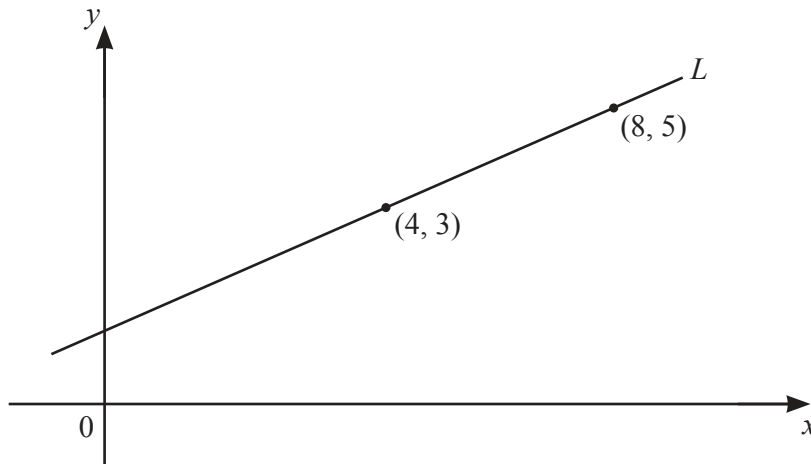
$$a^2 = b^2 + c^2 - 2bc \cos A$$

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

3Answer **all** the questions.

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

Gradient =

 y -intercept = [3]**(b)**NOT TO
SCALE

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]

4

- 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]

5

- (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]

6

- 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.

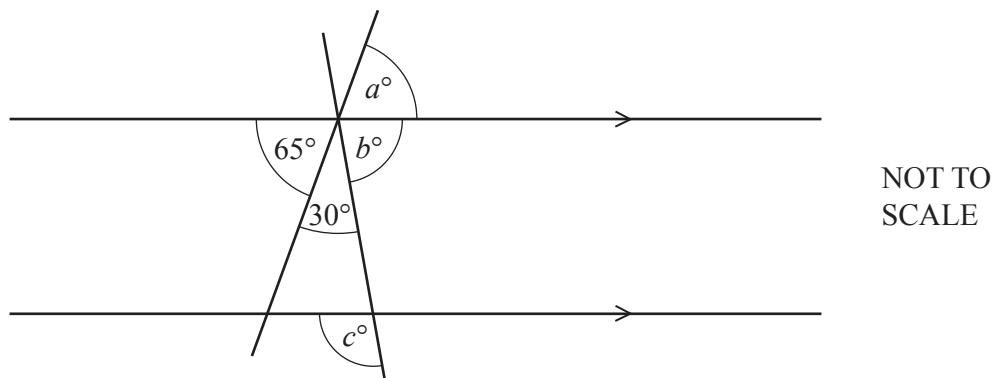
Time (t minutes)	$0 < t \leq 10$	$10 < t \leq 20$	$20 < t \leq 30$	$30 < t \leq 40$
Frequency	3	11	n	19

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)



The diagram shows two straight lines crossing two parallel lines.

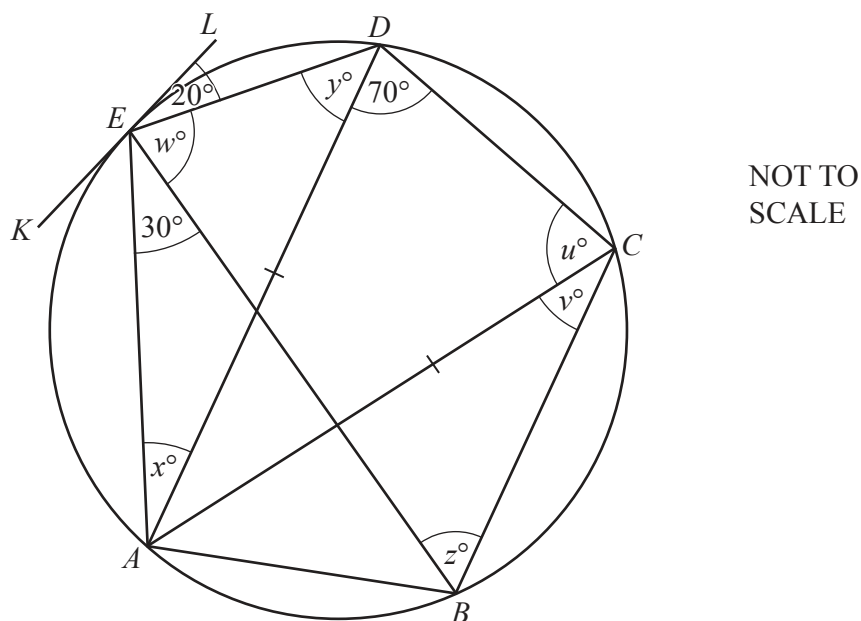
Find the values of a , b and c .

$a =$

$b =$

$c =$ [3]

(b)



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 .

$u =$ $x =$

$v =$ $y =$

$w =$ $z =$ [6]

8

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]

9

- (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 $w = 3.25$.

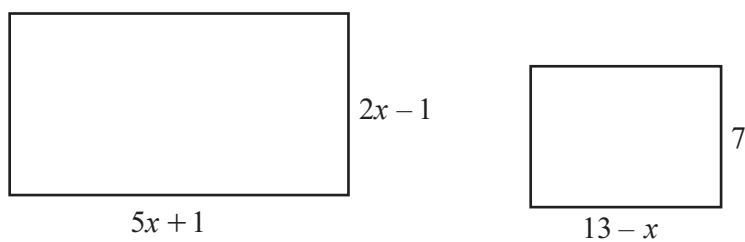
$$x = \dots\dots\dots [1]$$

- (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 cm^2 greater than the area of the smaller rectangle.

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

[4]

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

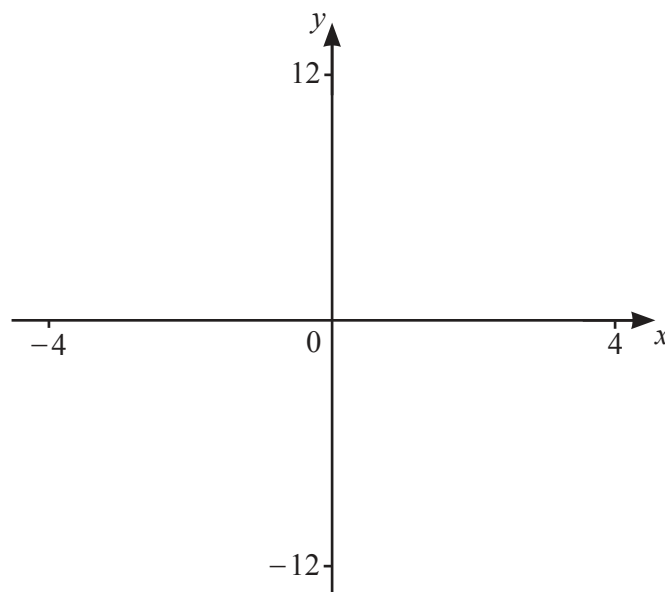
..... [2]

- (c)** Find the area of the smaller rectangle.

..... cm^2 [2]

11

7



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

(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]

13

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

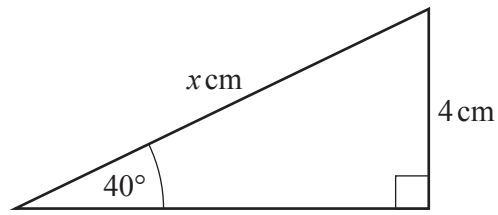
$x = \dots\dots\dots$ [2]

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

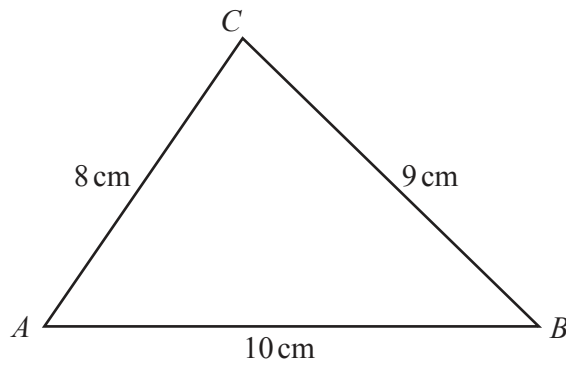
$h^{-1}(x) = \dots\dots\dots$ [2]

14

9 (a)

NOT TO
SCALECalculate the value of x . $x = \dots\dots\dots$ [3]

(b)

NOT TO
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15

- (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]

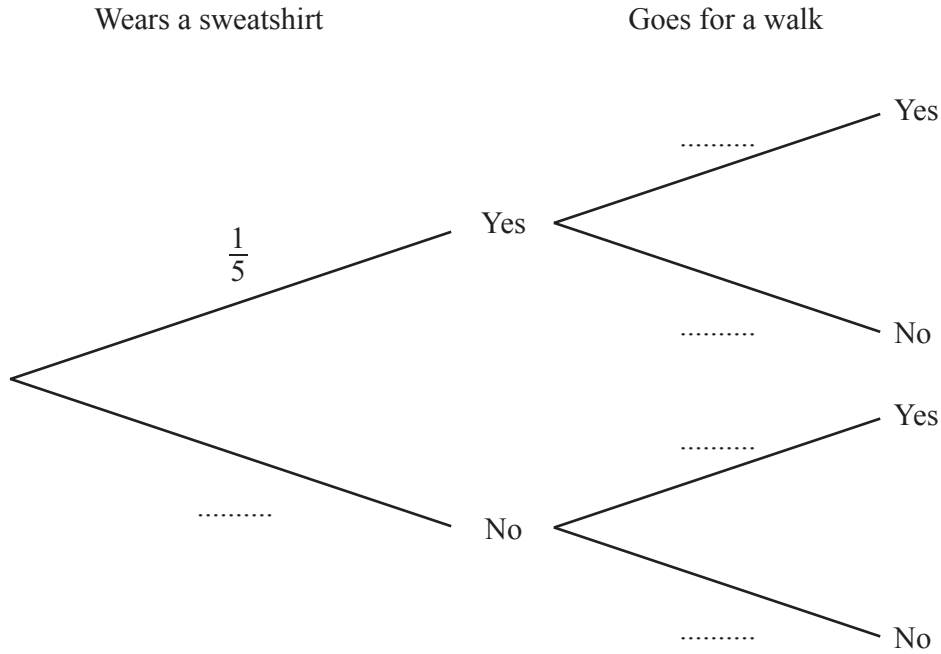
16

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.

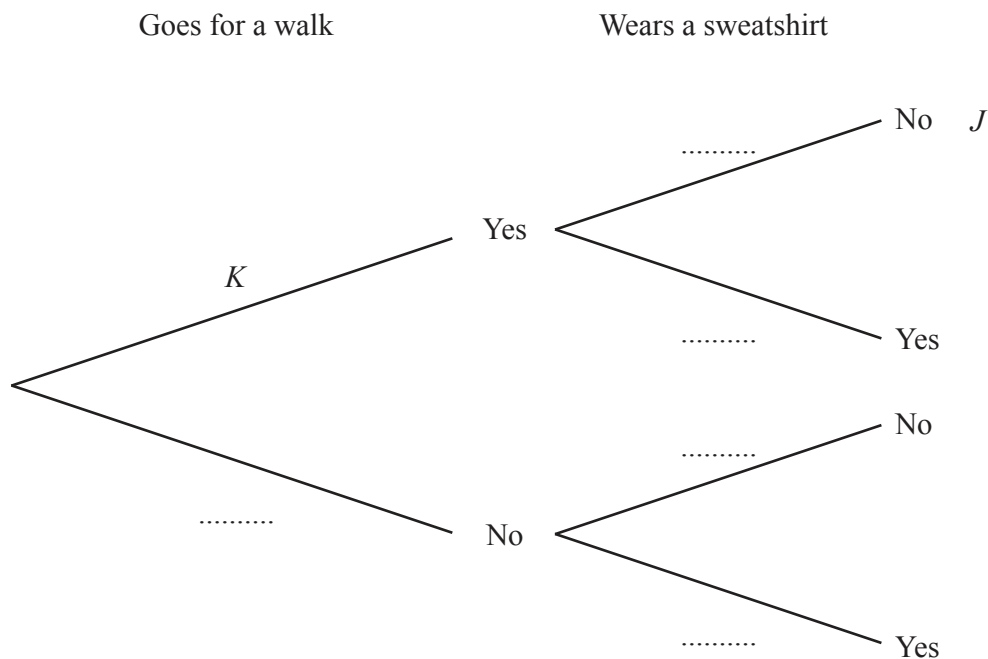
..... [2]

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

..... [2]

17

- (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.

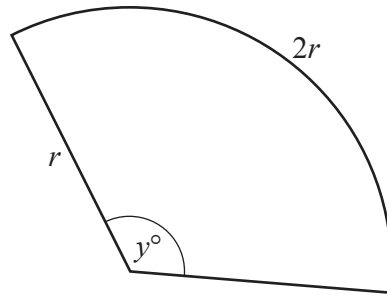
..... [2]

- (ii) Complete the tree diagram above.

[3]

18

11 (a)

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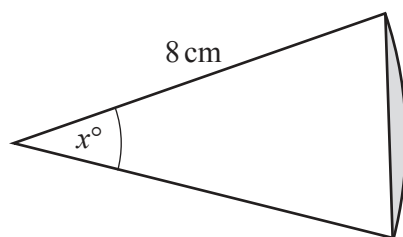
The diagram shows a sector of a circle with radius r and angle y° .
The length of the arc of the sector is $2r$.

Calculate the value of y .

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

19

(b)

NOT TO
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The diagram shows a sector of a circle with radius 8 cm and angle x° .
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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