Cambridge Assessment International Education

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0931684579

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.

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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. $\quad A = \pi rl$

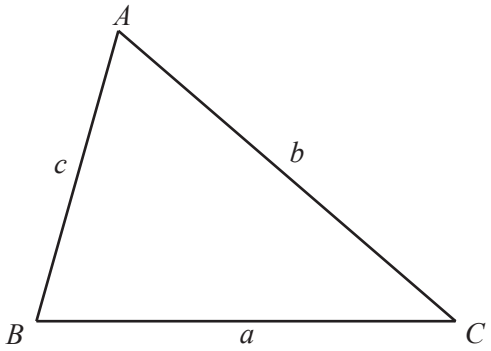
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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



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

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

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

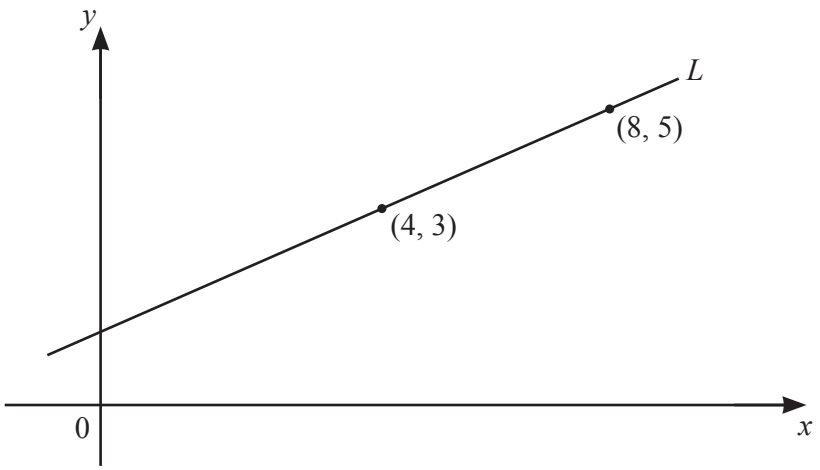
Answer **all** the questions.

1 **(a)** 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 = ... [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)	$100 < h \leqslant 110$	$110 < h \leqslant 115$	$115 < h \leqslant 130$
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)	$0 < t \leqslant 10$	$10 < t \leqslant 20$	$20 < t \leqslant 30$	$30 < t \leqslant 40$
Frequency	3	11	n	19

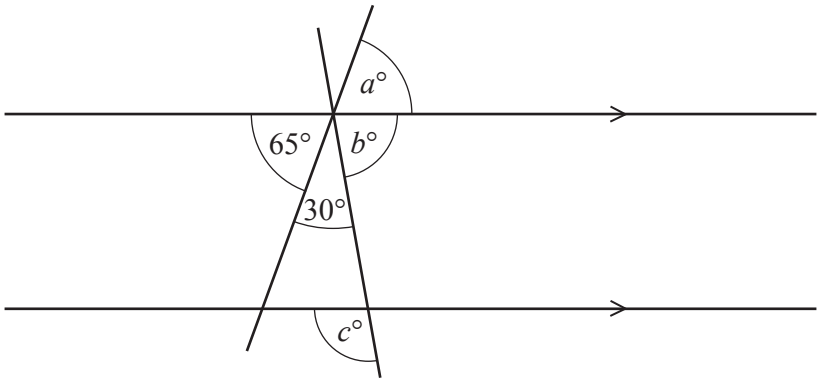
When using mid-interval values, an estimate of the mean value of t is 25.4 .

Find the value of n.

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

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4 (a)



NOT TO SCALE

The diagram shows two straight lines crossing two parallel lines.

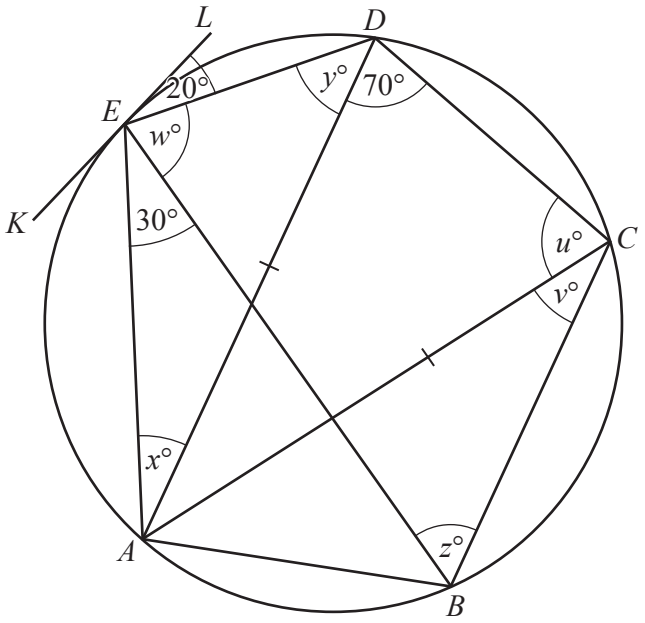
Find the values of a, b and c.

$a =$ .....

$b =$ .....

$c =$ ..... [3]

(b)



NOT TO SCALE

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]

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]

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

(i) Find x in terms of w.

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

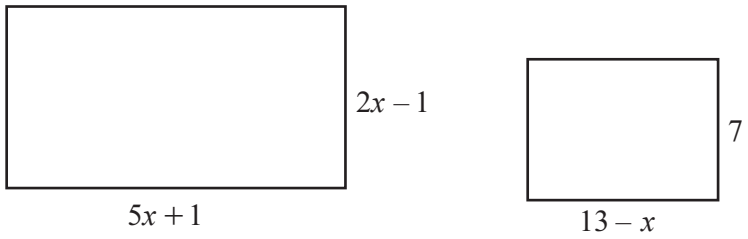
(ii) Find x when $w = 3.25$.

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

(iii) Find w in terms of x.

$w =$ ..... [3]

6 In this question all lengths are in centimetres.



NOT TO SCALE

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]

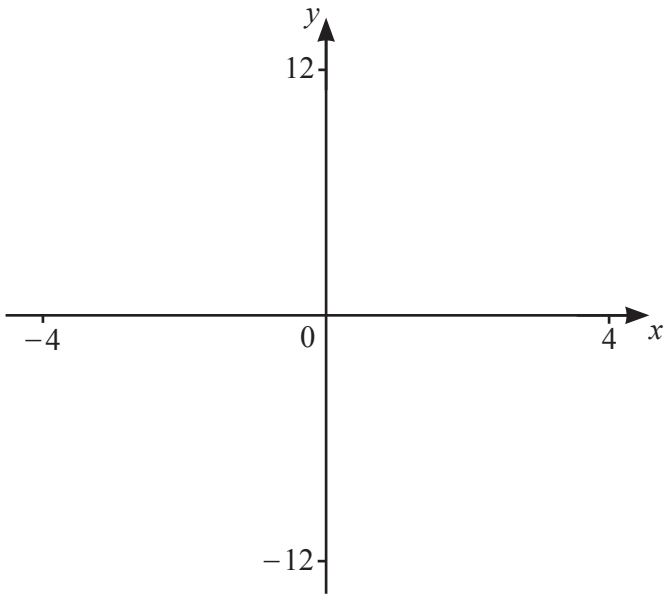
(b) Factorise $5x^2 + 2x - 88$.

..... [2]

(c) Find the area of the smaller rectangle.

..... cm^2 [2]

7



$f(x) = |4 - x^2|$ for $-4 \leqslant x \leqslant 4$

(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 $y \geqslant 0$, $y \leqslant 2x$ and $y \leqslant |4 - x^2|$. [2]

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]

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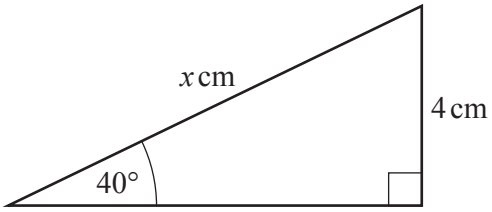
(e) Find x when $\mathrm{h}(x) = \mathrm{f}(0.5)$.

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

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

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

9 **(a)**

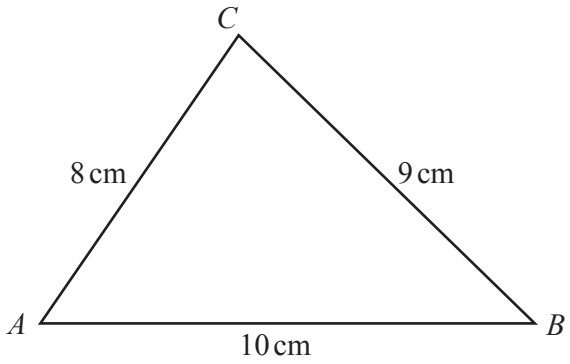


NOT TO SCALE

Calculate the value of x.

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

(b)



NOT TO SCALE

(i) Calculate angle ABC.

Angle $ABC =$ ..... [3]

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

Calculate BT.

$BT =$ ..... cm [3]

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(c) Another triangle PQR has $QR = 12\,\text{cm}$, $PR = 7\,\text{cm}$ and angle $PQR = 35°$.

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

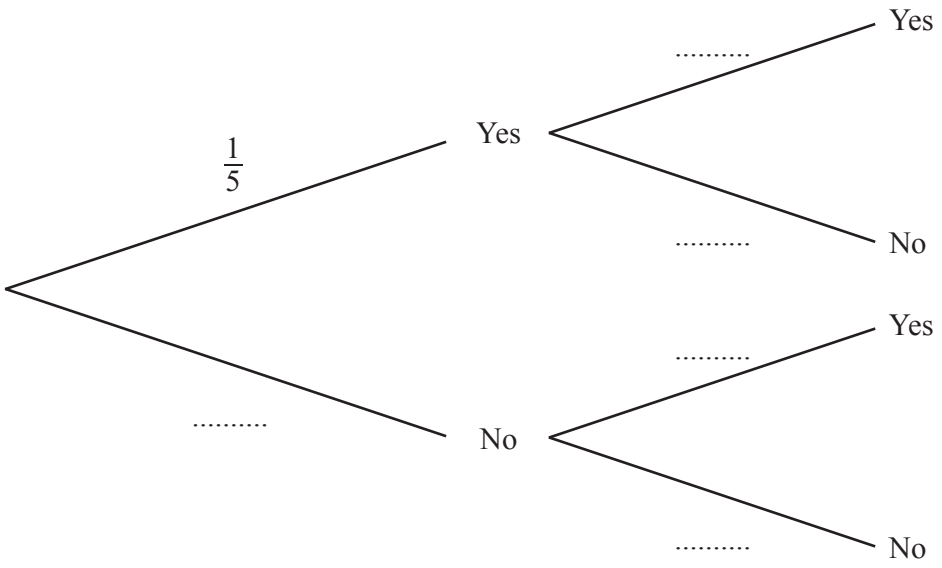
..... [5]

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]

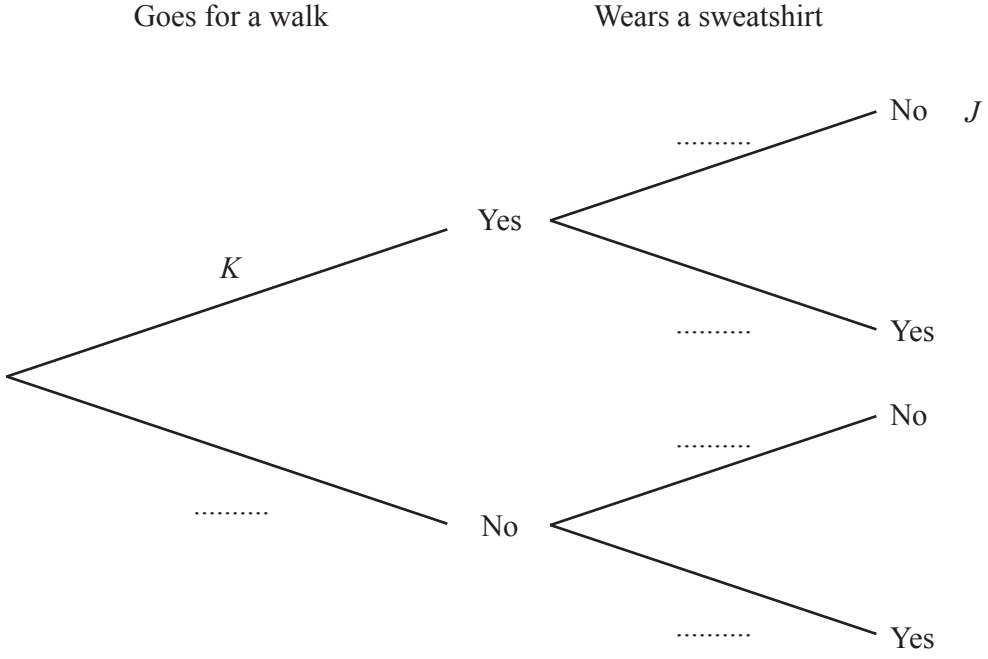
(b) (i) Find the probability that on one day Zena does not wear a sweatshirt and she goes for a walk.

..... [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)**.



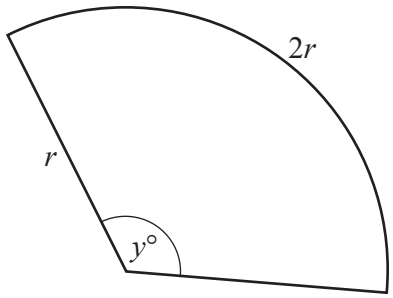
(i) Find the probability that Zena does not wear a sweatshirt when she goes for a walk.

..... [2]

(ii) Complete the tree diagram above.

[3]

11 (a)



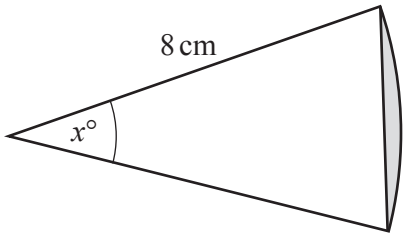
NOT TO SCALE

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.

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

(b)



NOT TO SCALE

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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