Cambridge Assessment International Education

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3271308107

CAMBRIDGE INTERNATIONAL MATHEMATICS **0607/43**

Paper 4 (Extended) **May/June 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 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. $\quad A = \pi rl$

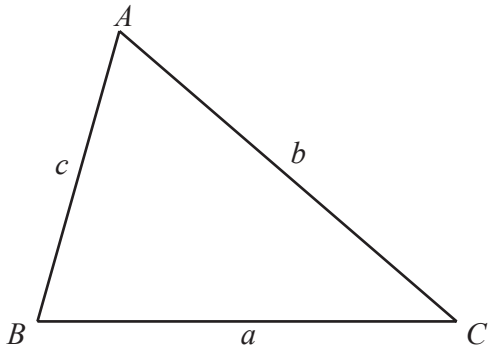
Curved surface area, A, of sphere of radius r. $\quad A = 4\pi r^2$

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



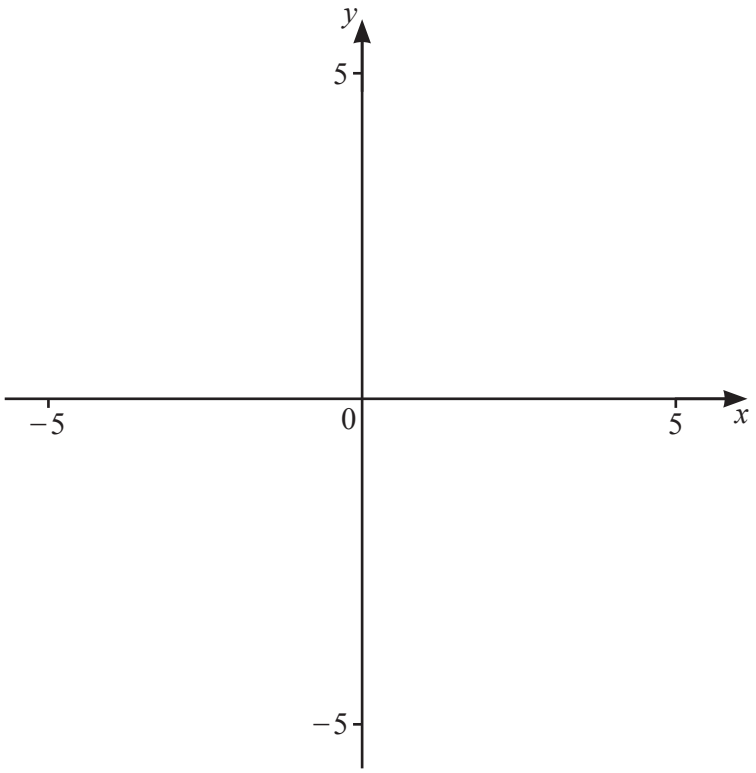
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

Answer **all** the questions.

1



$f(x) = x - \frac{4}{x}$

(a) On the diagram, sketch the graph of $y = f(x)$ for values of x between -5 and 5. [2]

(b) Find the zeros of $f(x)$.

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

(c) Solve the equation $f(x) = 2$.

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

(d) $g(x) = f(x + 2)$

(i) On the same diagram, sketch the graph of $y = g(x)$ for values of x between -5 and 5. [2]

(ii) Describe fully the **single** transformation that maps the graph of $y = f(x)$ onto the graph of $y = g(x)$.

.....

..... [2]

2 **(a)** Increase \$55 by 250%.

\$ ..... [2]

(b) **(i)** Beatrice invests \$500 at a rate of 1.5% per year simple interest.

Find the amount Beatrice has at the end of 12 years.

\$ ..... [3]

(ii) Dan invests \$500 at a rate of 1.5% per year compound interest.

Find the difference between Dan's amount and Beatrice's amount at the end of 12 years.

\$ ..... [3]

(c) Eva invests an amount of money at a rate of 2.1% per year compound interest.

Find the number of complete years it takes for Eva's investment to double in value.

..... [4]

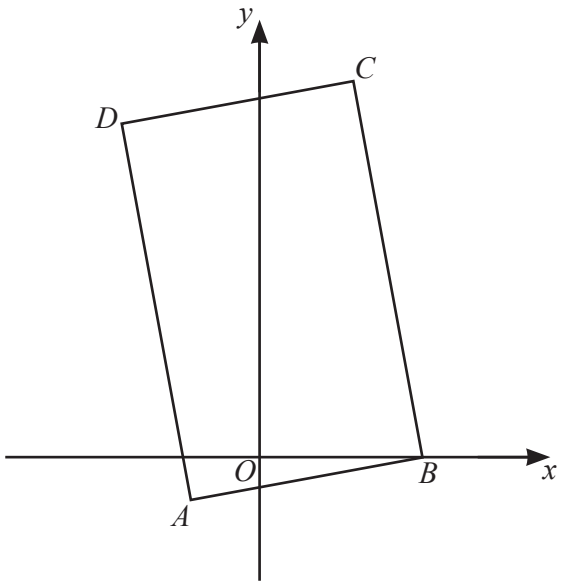
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(d) Each year the value of Fred's car reduces by 15% of its value at the start of that year. The value of the car is now \$5158.65 .

Find the value of Fred's car 3 years ago.

\$ ..... [3]

3



NOT TO SCALE

ABCD is a rectangle.
A is the point (−2, −1) and *B* is the point (5, 0).

(a) Find the equation of *BC*.

..... [4]

(b) *C* is the point (*p*, 14).

Find the value of *p*.

p = ... [2]

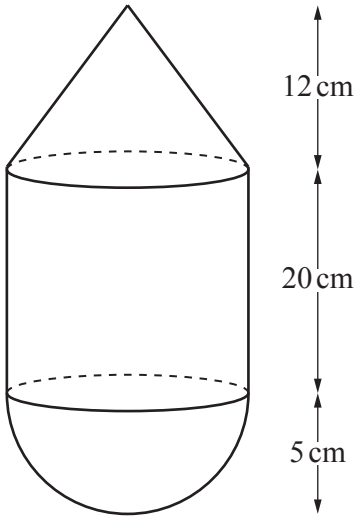
(c) Find the coordinates of point D.

(..... , ...) [2]

(d) Find the area of rectangle $ABCD$.

..... [4]

4



NOT TO SCALE

The diagram shows a solid made by joining a cone and a hemisphere to a cylinder.
The radius of each of the three shapes is 5 cm.
The height of the cylinder is 20 cm and the height of the cone is 12 cm.

(a) Calculate the total surface area of the solid.

..... cm^2 [5]

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(b) The total volume of the solid is $\frac{2050\pi}{3}$ cm^3.

It is melted down and made into spheres of radius 1.2 cm.

(i) Find the greatest number of spheres that can be made.

..... [3]

(ii) Work out the percentage of the $\frac{2050\pi}{3}$ cm^3 that remains after the spheres have been made.

..... % [3]

5 **(a)** There are 200 students in a school.
The table shows information about their heights, h cm.

Height, h cm	$150 < h \leqslant 165$	$165 < h \leqslant 170$	$170 < h \leqslant 175$	$175 < h \leqslant 180$	$180 < h \leqslant 190$	$190 < h \leqslant 200$
Frequency	7	17	43	64	49	20

Calculate an estimate of the mean height.

..... cm [2]

(b) A biased die in the shape of a cube is numbered 0, 1, 1, 2, 3 and 3.
It is rolled 100 times.
The table shows the results.

Score	0	1	2	3
Frequency	x	y	30	45

The mean score is 2.13 .

Find the value of x and the value of y.

$x =$ .....

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

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6 **(a)** Ten students compare their test marks in Physics (x) and Chemistry (y).
The table shows the results.

Student	A	B	C	D	E	F	G	H	I	J
Physics (x)	50	48	31	80	65	85	27	30	45	53
Chemistry (y)	55	56	30	83	63	90	30	32	45	55

(i) Write down the type of correlation between the Physics and Chemistry marks.

..... [1]

(ii) Find the equation of the line of regression, giving y in terms of x.

$y =$ ..... [2]

(iii) Student K scores 70 in the Physics test.

Use your answer to **part (a)(ii)** to estimate this student's mark in Chemistry.

..... [1]

(b) The stem-and-leaf diagram shows information about the speeds of cars passing a school.

4	2 2 3 4 5 8
5	1 3 3 4 4 5 7 9
6	0 0 1 1 2 5

Key : 4 | 5 = 45 km/h

Find

(i) the range,

..... km/h [1]

(ii) the median,

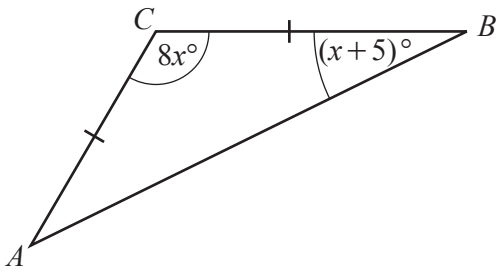
..... km/h [1]

(iii) the lower quartile.

..... km/h [1]

7 In this question all lengths are in centimetres.

(a)



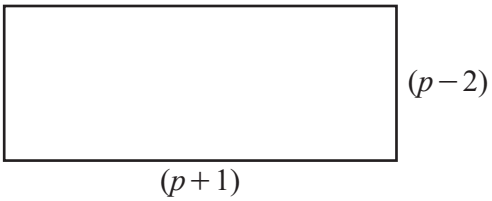
NOT TO SCALE

In triangle ABC, $AC = BC$, angle $ABC = (x + 5)°$ and angle $ACB = 8x°$.

Find the value of x.

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

(b)



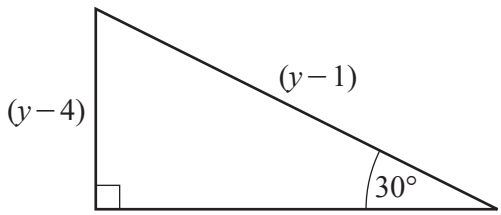
NOT TO SCALE

The diagram shows a rectangle with sides of length $(p + 1)$ and $(p - 2)$.
The area of the rectangle is $90\,\text{cm}^2$.

Find the value of p.

$p =$ ..... [4]

(c)



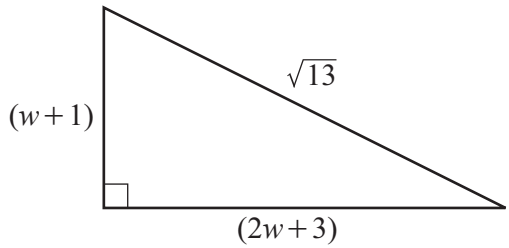
NOT TO SCALE

The diagram shows a right-angled triangle.

Find the value of y.

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

(d)



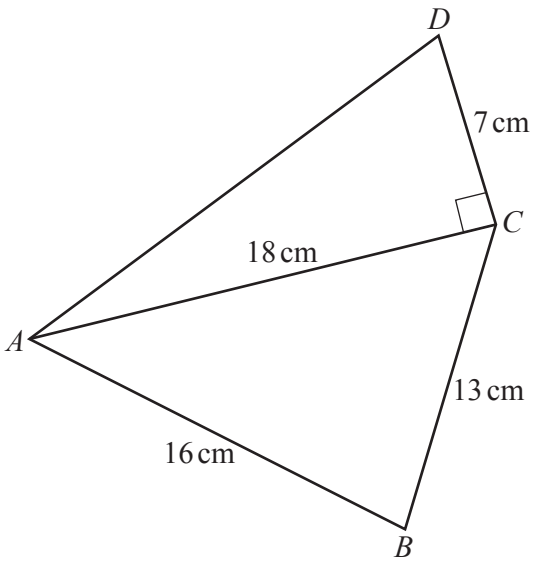
NOT TO SCALE

The diagram shows a right-angled triangle with sides of length $(w+1)$, $(2w+3)$ and $\sqrt{13}$.

Work out the area of the triangle.

..... cm^2 [6]

8



NOT TO SCALE

(a) Calculate angle *BCA* and show that it rounds to 59.57°, correct to 2 decimal places.

[3]

(b) Find the area of quadrilateral *ABCD*.

..... cm^2 [3]

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(c) Find the shortest distance from A to BC.

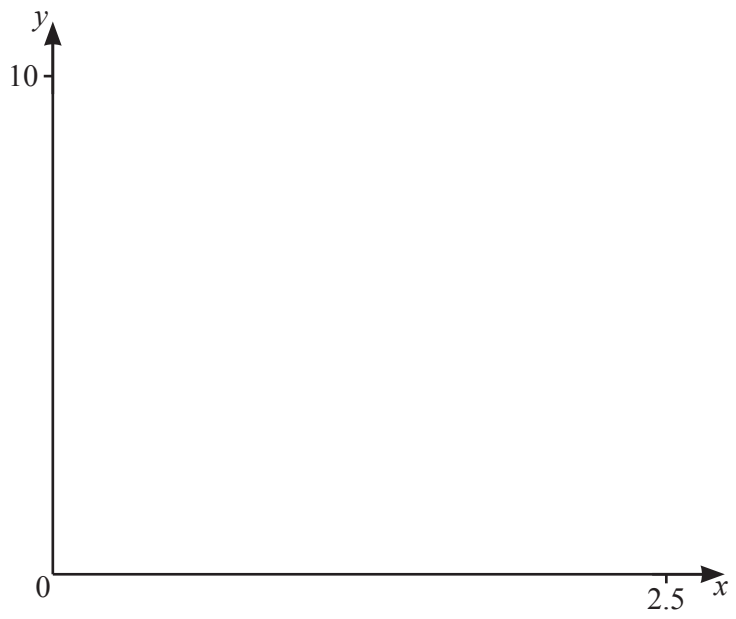
..... cm [2]

(d) D is due north of B.

Find the bearing of B from C.

..... [6]

9



$f(x) = x^x$, $x > 0$

(a) On the diagram, sketch the graph of $y = f(x)$ for $0 < x \leqslant 2.5$. [2]

(b) Find the coordinates of the local minimum point.

(..... , ...) [2]

(c) **(i)** Find x when $f(x) = 3x$.

..... [3]

(ii) Solve $f(x) \geqslant 3x$.

..... [2]

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10 **(a)** Kris can go to school by bus or by taxi.
On any day the probability that Kris goes by bus is 0.9 .

When Kris goes by bus, the probability that she is late for school is 0.06 .
When she goes by taxi, the probability that she is late for school is 0.01 .

(i) Find the probability that, on any day, Kris is late for school.

..... [3]

(ii) Find the probability that, on any day, Kris is not late for school.

..... [1]

(iii) In one year, Kris attends school on 200 days.

Find the number of days Kris is expected not to be late.

..... [1]

(b) Alex also goes to school by bus or by taxi.
The probability that Alex goes by bus is 0.8 .

The probability that Alex goes by bus **and** is late is 0.12 .

Find the probability that Alex is late when he goes by bus.

..... [2]

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11 **(a)** $f(x) = 3x + 2$ $g(x) = x^2$ $h(x) = 2^x$

(i) Find f(2).

..... [1]

(ii) Find f(g(3)).

..... [2]

(iii) Find the value of $\dfrac{h(g(3))}{g(h(3))}$.

..... [3]

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

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

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

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

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(b) (i) Find the value of $\log_3 81 - \log_9\left(\frac{1}{3}\right)$.

..... [2]

(ii) $\log_b 25 = \frac{2}{3}$

Find the value of b.

$b =$ ..... [2]

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