Cambridge Assessment International Education

# Cambridge IGCSE™

CANDIDATE NAME

CENTRE NUMBER | CANDIDATE NUMBER

*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 $\pi$, 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.

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## Formula List

For the equation $ax^2 + bx + c = 0$ $\qquad x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

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

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

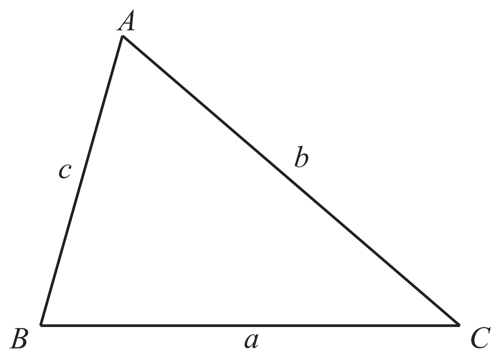
Curved surface area, $A$, of sphere of radius $r$. $\qquad A = 4\pi r^2$

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

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

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

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



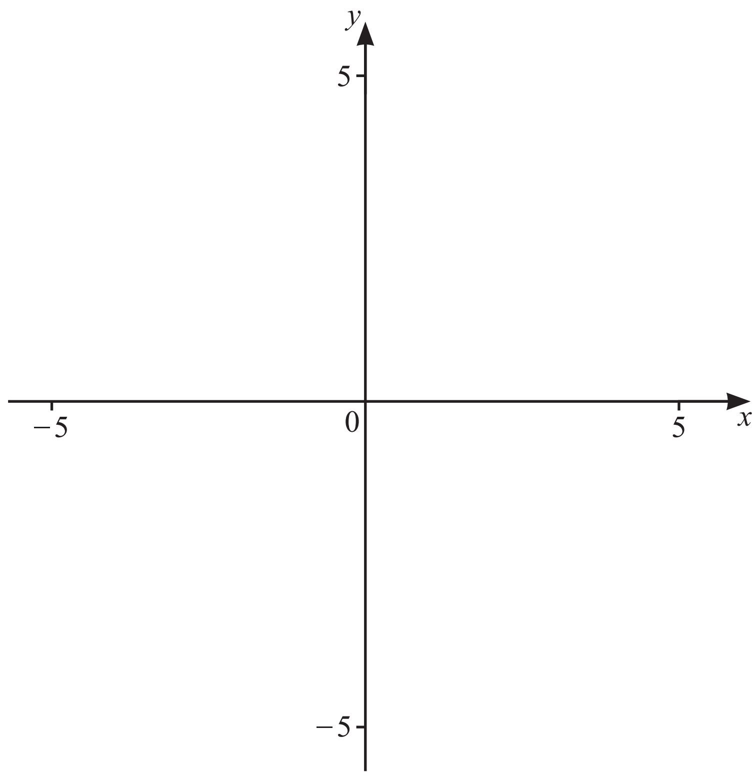

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

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]

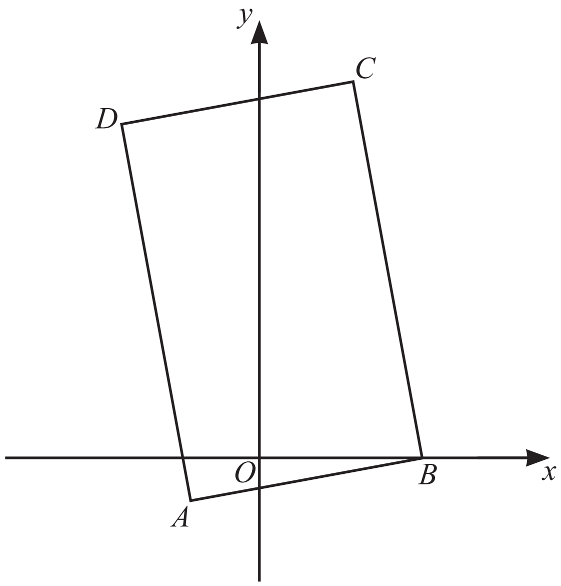
**(d)** Each year the value of Fred's car reduces by 15% of its value at the start of that year.
The value of the car is now \$5158.65 .

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

\$ ................................................ [3]

**3**




*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 $D$.

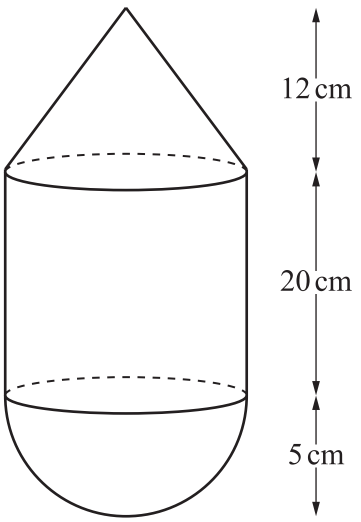
( .................... , .................... ) [2]

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

............................................. [4]

4




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]

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

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 $\frac{2050\pi}{3}\,\text{cm}^3$ 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]

**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,

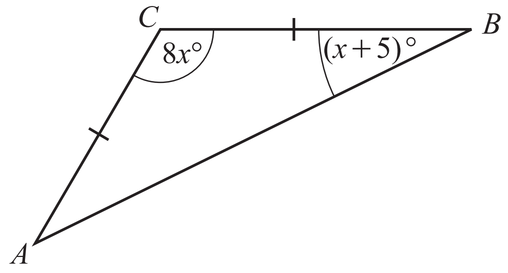
........................................ km/h [1]

**(iii)** the lower quartile.

........................................ km/h [1]

**7** In this question all lengths are in centimetres.

**(a)**



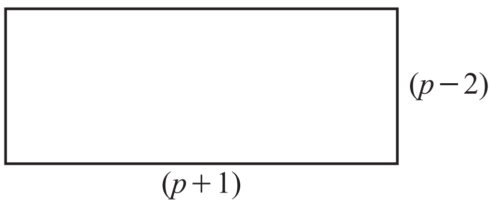

NOT TO SCALE

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

Find the value of $x$.

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

**(b)**



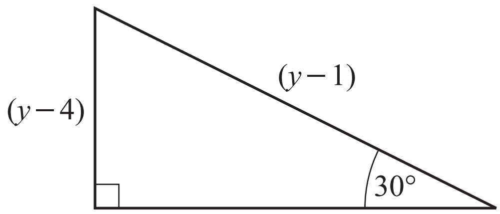

NOT TO SCALE

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)**



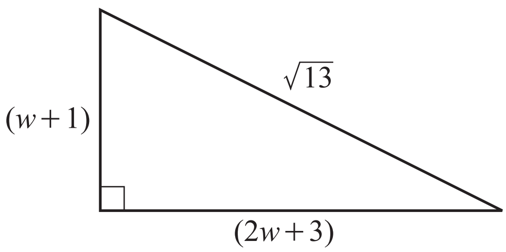

NOT TO SCALE

The diagram shows a right-angled triangle.

Find the value of $y$.

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

**(d)**



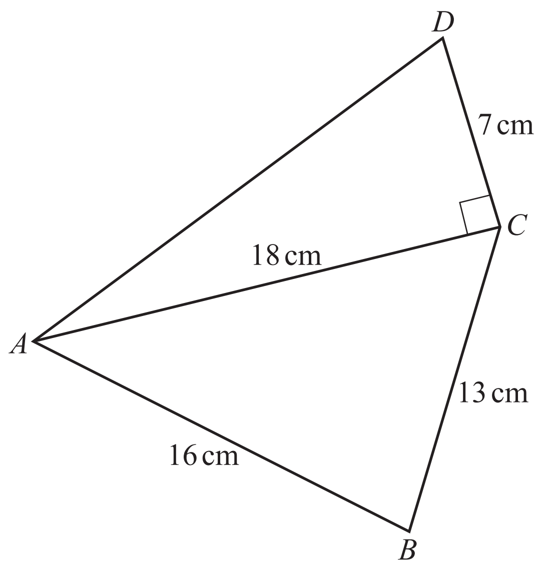

NOT TO SCALE

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]

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

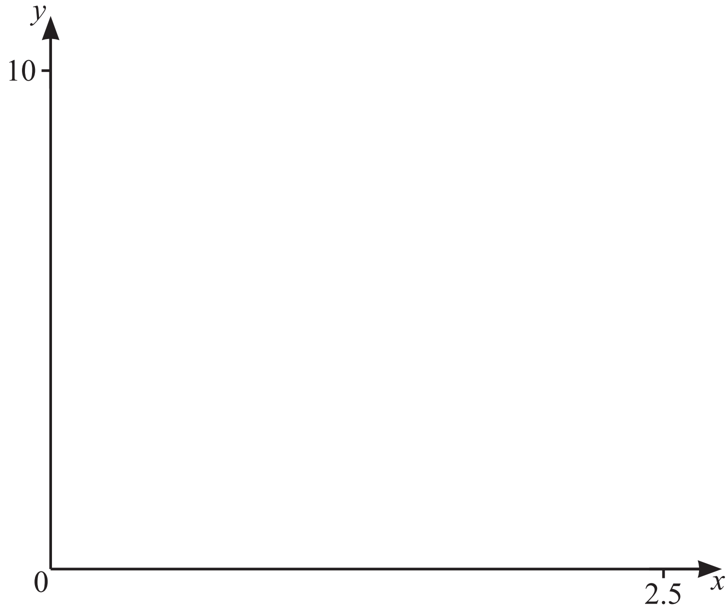
............................................ cm [2]

**(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]

**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]

**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]

**(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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