Cambridge Assessment International Education

Cambridge O Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3032604045

MATHEMATICS (SYLLABUS D) **4024/21**

Paper 2 Calculator **October/November 2025**

2 hours

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 scientific calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- 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 either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 100.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **20** pages. Any blank pages are indicated.

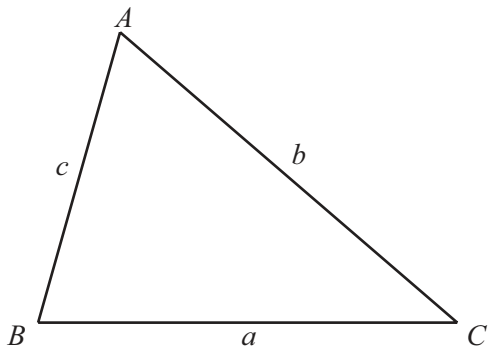
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List of formulas

Area, A, of triangle, base b, height h.	$A = \frac{1}{2}bh$
Area, A, of circle of radius r.	$A = \pi r^2$
Circumference, C, of circle of radius r.	$C = 2\pi r$
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.	$A = \pi rl$
Surface area, A, of sphere of radius r.	$A = 4\pi r^2$
Volume, V, of prism, cross-sectional area A, length l.	$V = Al$
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.	$V = \frac{4}{3}\pi r^3$
For the equation $ax^2 + bx + c = 0$, where $a \neq 0$,	$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

For the triangle shown,



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

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

$$\text{Area} = \frac{1}{2}ab\sin C$$

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52	$\sqrt{169}$	27	$\sqrt{8}$	$\frac{12}{23}$	49

From the list, write down

(a) a square number

..... [1]

(b) a cube number

..... [1]

(c) a factor of 26

..... [1]

(d) an irrational number.

..... [1]

2 **(a)** Insert **one** set of brackets to make the calculation correct.

$$4.2 - 3 \times 5 + 1.2 = 7.2$$

[1]

(b) Insert **one** set of brackets to make the calculation correct.

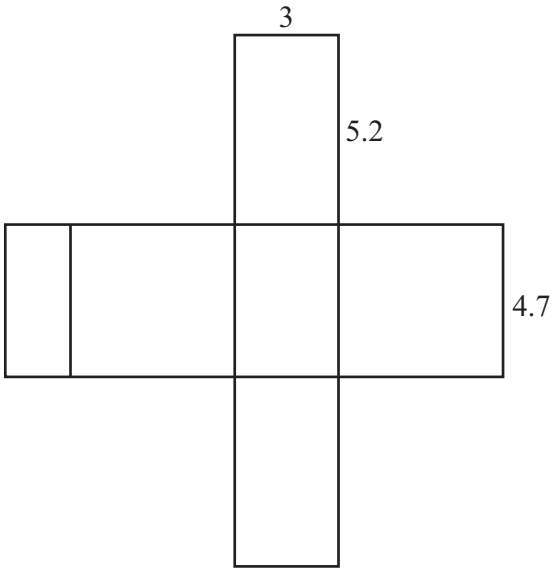
$$5 - 3^2 - \sqrt[3]{64} + 2 = -10$$

[1]

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3 In this question, all lengths are in centimetres.
The diagram shows the net of a cuboid.



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(a) Find the total surface area of the cuboid.

..... cm^2 [2]

(b) Write down the number of planes of symmetry of the cuboid.

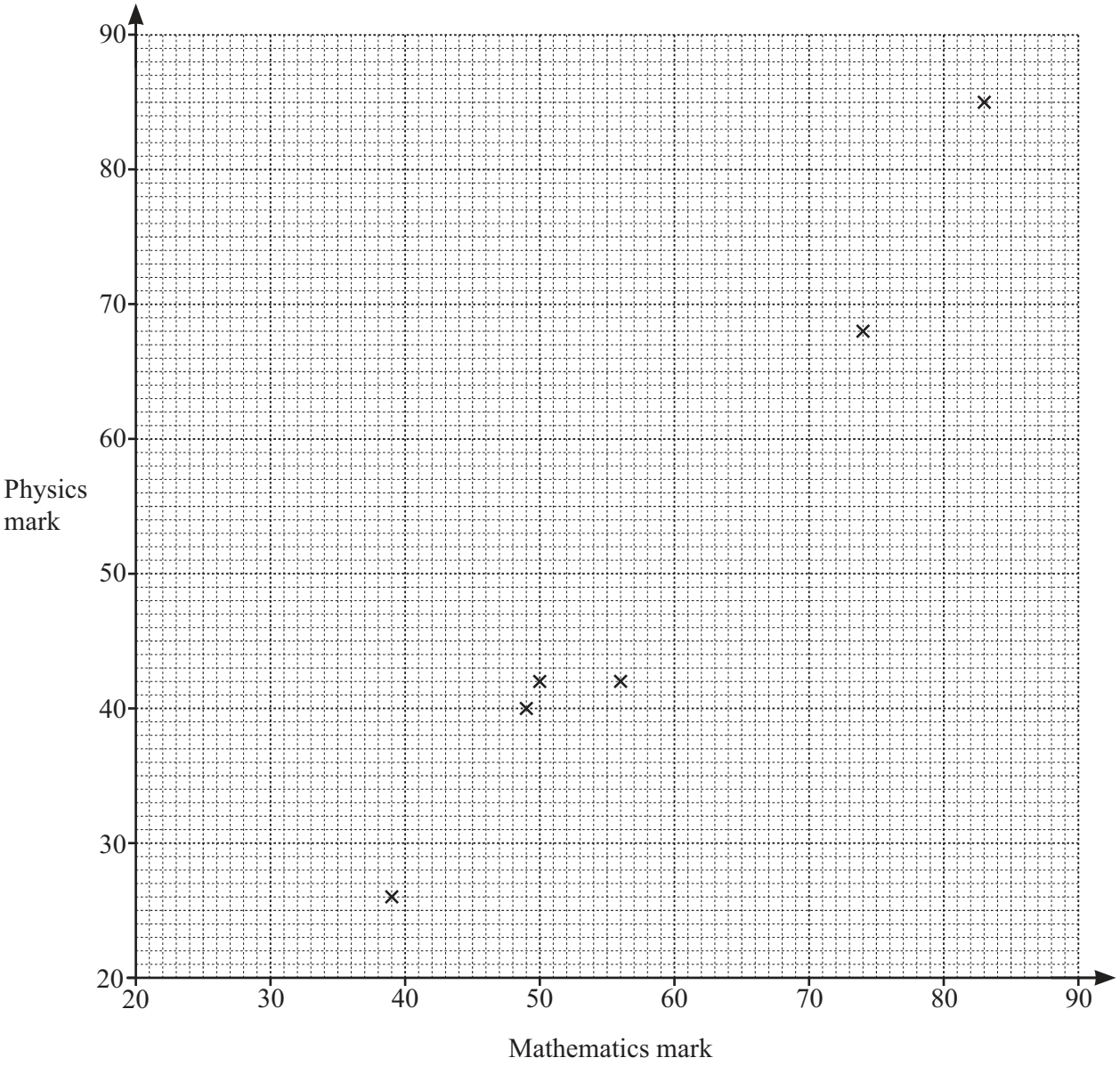
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4 The table shows the examination marks for mathematics and physics for each of 9 students.

Mathematics mark	56	39	83	49	50	74	60	45	78
Physics mark	42	26	85	40	42	68	55	37	71



(a) Complete the scatter diagram.
The first 6 points have been plotted for you. [2]

(b) On the grid, draw a line of best fit. [1]

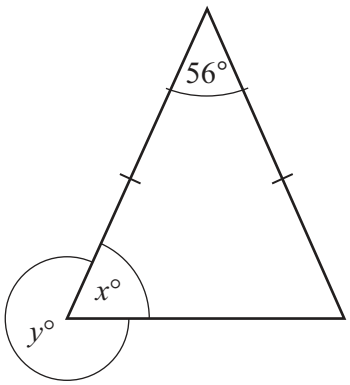
(c) Xavier scored 75 marks in the physics exam but was absent for the mathematics exam.

Use your line of best fit to find an estimate of his mathematics mark.

..... [1]

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NOT TO SCALE

The diagram shows an isosceles triangle.

(a) Work out the value of x.

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

(b) Work out the value of y.

$y =$ ..... [1]

6 Work out.

$$\frac{12 - \sqrt[3]{6}}{0.3^2}$$

Give your answer correct to 2 decimal places.

..... [2]

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7 Work out the size of the interior angle of a regular decagon.

..... [2]

8 John invests $240 in an account that pays simple interest at a rate of 2.35% per year.

Calculate the total amount of interest he receives at the end of 5 years.

$ ..... [2]

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9 The exchange rate between euros (€) and pounds (£) is €1 = £0.88 .
The exchange rate between dollars ($) and pounds (£) is $1 = £$x$.

Ling changes €500 into dollars.
She receives $536.58 .

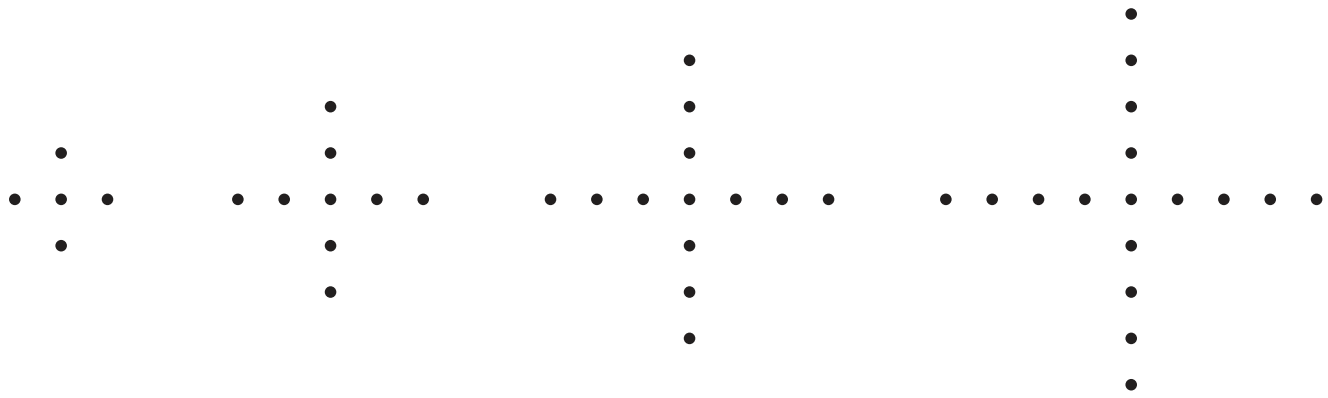
Work out the value of x.

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

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10 Here are the first four patterns in a sequence using dots.



Pattern 1 Pattern 2 Pattern 3 Pattern 4

(a) Complete the table.

Pattern number	1	2	3	4	5
Number of dots	5	9	13		

[1]

(b) Find an expression for the number of dots in Pattern n.

..... [2]

(c) Nada needs 1105 dots to make Pattern p.

Find the value of p.

$p =$ ..... [2]

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11 **(a)** A is the point $(-4, 3)$ and B is the point $(2, -7)$.

(i) Find $\overrightarrow{AB}$.

( ) [1]

(ii) Find the coordinates of the midpoint of the line AB.

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

(b) $\overrightarrow{CD} = \begin{pmatrix} -5 \\ 11 \end{pmatrix}$

Find $\left|\overrightarrow{CD}\right|$.

..... [2]

12 **(a)** Write 0.0142 in standard form.

..... [1]

(b) The numbers in the calculation are written in standard form.

$$(3.2 \times 10^{-4}) \times (x \times 10^{y}) = 2.6 \times 10^{3}$$

Find the value of x and the value of y.

$x =$ .....

$y =$ .....

[2]

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13 Solve the simultaneous equations.
You must show all your working.

$$2a + 5b = 1.5$$
$$3a - 10b = 42.5$$

$a =$ .....

$b =$ .....
[3]

14 The population of a country increases exponentially at a rate of 3.6% per year.
On 1st January 2024 the population of the country is 5.4 million.

Calculate the number of **complete** years it will take for the population to reach 8 million.

..... years [3]

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15 $x = 2^2 \times 3^{n+1} \times 7$

$y = 2^n \times 3^n \times 7^4$

n is a positive integer greater than 2.

Find the highest common factor (HCF) of x and y.
Write your answer as the product of prime factors in terms of n.

..... [2]

16 A is the point $(3, -2)$ and B is the point $(5, 4)$.

(a) Find the equation of the line AB.
Give your answer in the form $y = mx + c$.

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

(b) Write down the gradient of a line that is perpendicular to the line AB.

..... [1]

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17 The table shows the times taken by 80 people to complete a race.

Time (t minutes)	$20 < t \leqslant 30$	$30 < t \leqslant 50$	$50 < t \leqslant 60$	$60 < t \leqslant 90$
Frequency	20	26	29	5

(a) Calculate an estimate of the mean time taken to complete the race.

..... minutes [4]

(b) Two of the 80 people are selected at random.

Find the probability that one takes 30 minutes or less and the other takes more than 60 minutes to complete the race.

..... [3]

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18 Write as a single fraction in its simplest form.

(a) $\frac{2x}{3y} \div \frac{8x}{9}$

..... [3]

(b) $\frac{2x^2 + 15x - 50}{4x^2 - 25}$

..... [4]

19 A car travels 320 km, correct to the nearest 10 kilometres.
This journey takes 5.2 hours, correct to the nearest 0.1 hour.

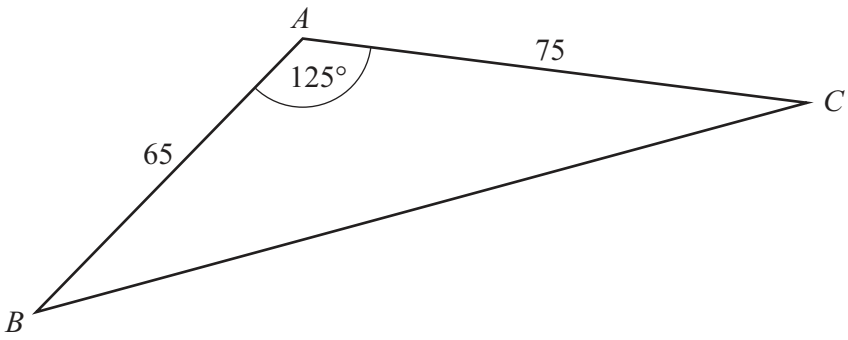
Calculate the lower bound for the average speed of the car.

..... km/h [3]

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20



NOT TO SCALE

The diagram shows a triangular field, ABC.
$AB = 65$ m, $AC = 75$ m and angle $CAB = 125°$.

(a) Show that $BC = 124.3$ m, correct to 1 decimal place.

[3]

(b) Calculate angle ABC.

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

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

..... m [3]

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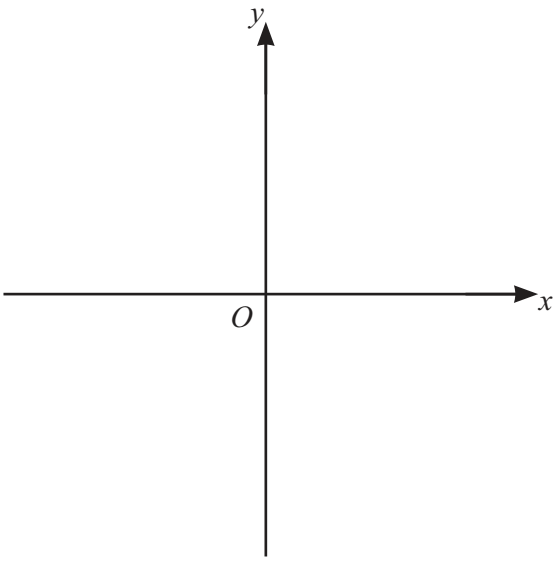
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21 Rearrange the formula to make a the subject.

$$w = \frac{2a+5}{3a-1}$$

$a =$ ..... [4]

22 **(a)** Sketch the graph of $y = 2 - 3x$.



[1]

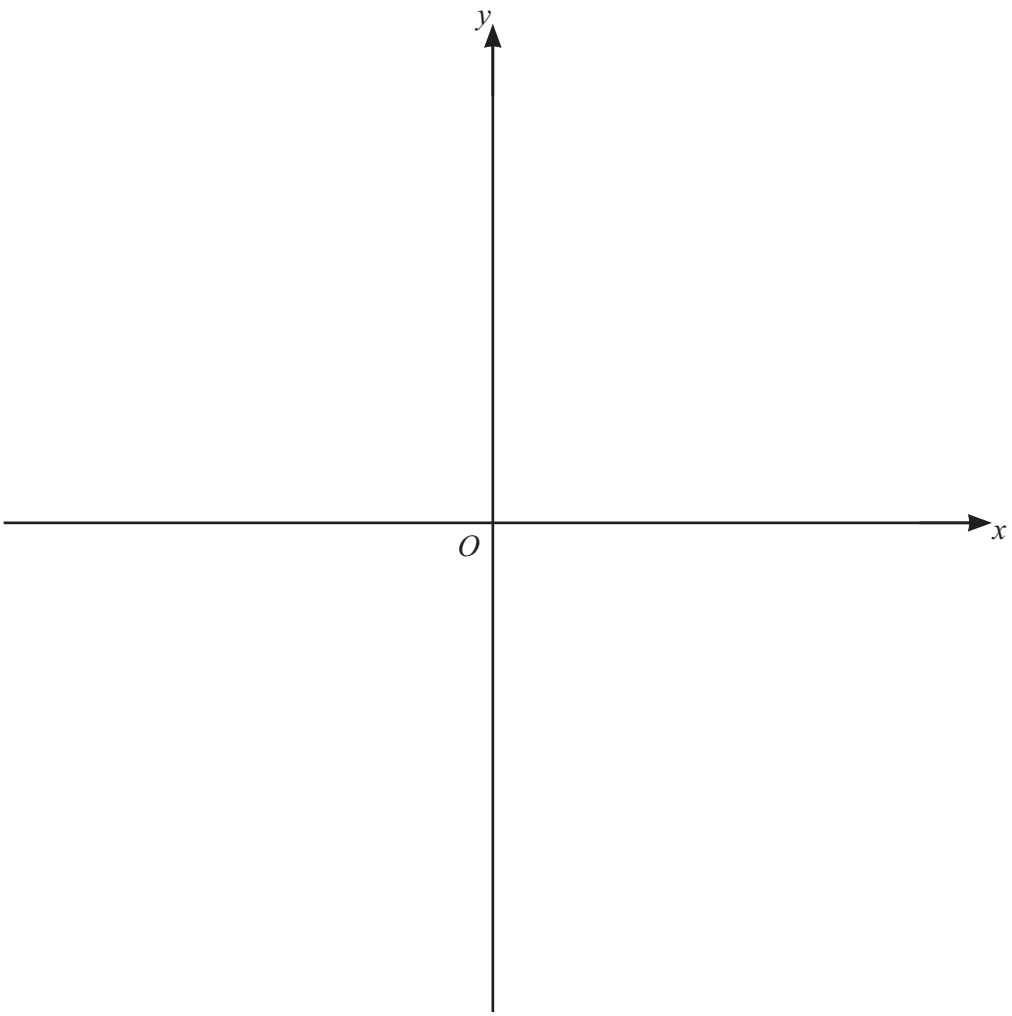
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(b) **(i)** Write $2x^2 - 4x - 3$ in the form $a(x-b)^2 + c$.

..... [3]

(ii) Sketch the graph of $y = 2x^2 - 4x - 3$.
On your sketch, label the y-intercept and the coordinates of the turning point.



[3]

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23 Solve.

$$\frac{x}{x+3} - \frac{4}{x-5} = 1$$

$x =$ ..... [4]

24 Expand and simplify.

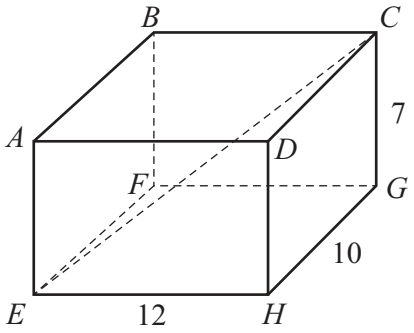
$$(x-1)(x+3)(3x-4)$$

..... [3]

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25 The diagram shows a cuboid.



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$EH = 12$ cm, $HG = 10$ cm and $GC = 7$ cm.

(a) Show that $CE = 17.1$ cm, correct to 1 decimal place.

[3]

(b) Calculate the angle between the line CE and the base $EFGH$.

..... [3]

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