CANDIDATE
NAME

CENTRE
NUMBER

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NUMBER

CAMBRIDGE INTERNATIONAL MATHEMATICS   **0607/03**

Paper 3 (Core)   **May/June 2010**

1 hour 45 minutes

Candidates answer on the Question Paper

Additional Materials: Geometrical Instruments
                        Graphics Calculator

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
Do not use staples, paper clips, highlighters, glue or correction fluid.
You may use a pencil for any diagrams or graphs.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** the questions.
Unless instructed otherwise, give your answers exactly or correct to three significant figures as appropriate.
Answers in degrees should be given to one decimal place.
For π, use your calculator value.
You must show all the relevant working to gain full marks and you will be given marks for correct methods, including sketches, even if your answer is incorrect.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 96.

For Examiner's Use

This document consists of **17** printed pages and **3** blank pages.

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Formula List

Area, *A*, of triangle, base *b*, height *h*. $\qquad\qquad A = \dfrac{1}{2}bh$

Area, *A*, of circle, radius *r*. $\qquad\qquad A = \pi r^2$

Circumference, *C*, of circle, radius *r*. $\qquad\qquad C = 2\pi r$

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

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

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

Volume, *V*, of prism, cross-sectional area *A*, length *l*. $\qquad\qquad V = Al$

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

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

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

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

Answer **all** the questions.

1 **(a)** Sangita and Asha share $140 in the ratio

Sangita : Asha = 4 : 3.

Show that Sangita receives $80.

[2]

(b) Sangita spends $\frac{7}{16}$ of her $80 on clothes.

(i) Calculate how much she spends on clothes.

Answer(b)(i) $ .... [2]

(ii) After Sangita has bought her clothes, the money remaining from the $80 is $\frac{9}{11}$ of the price of an electronic game.

Calculate the price of this game.

Answer(b)(ii) $ .... [2]

(c) Asha invests her $60 for two years at 6% per year compound interest.

Calculate the amount Asha has after the two years.
Give your answer correct to 2 decimal places.

Answer(c) $ .... [3]

2 **(a)** $y = 2x - 3$

    (i) Find the value of y when $x = -1$.

Answer(a)(i) .... [1]

    (ii) Make x the subject of the formula.

Answer(a)(ii) $x =$ .... [2]

    (iii) Find the value of x when $y = 6$.

Answer(a)(iii) .... [1]

(b) Solve the simultaneous equations $y = 2x - 3$ and $y = 9 - x$.

Answer(b) $x =$ ....

$y =$ .... [3]

3
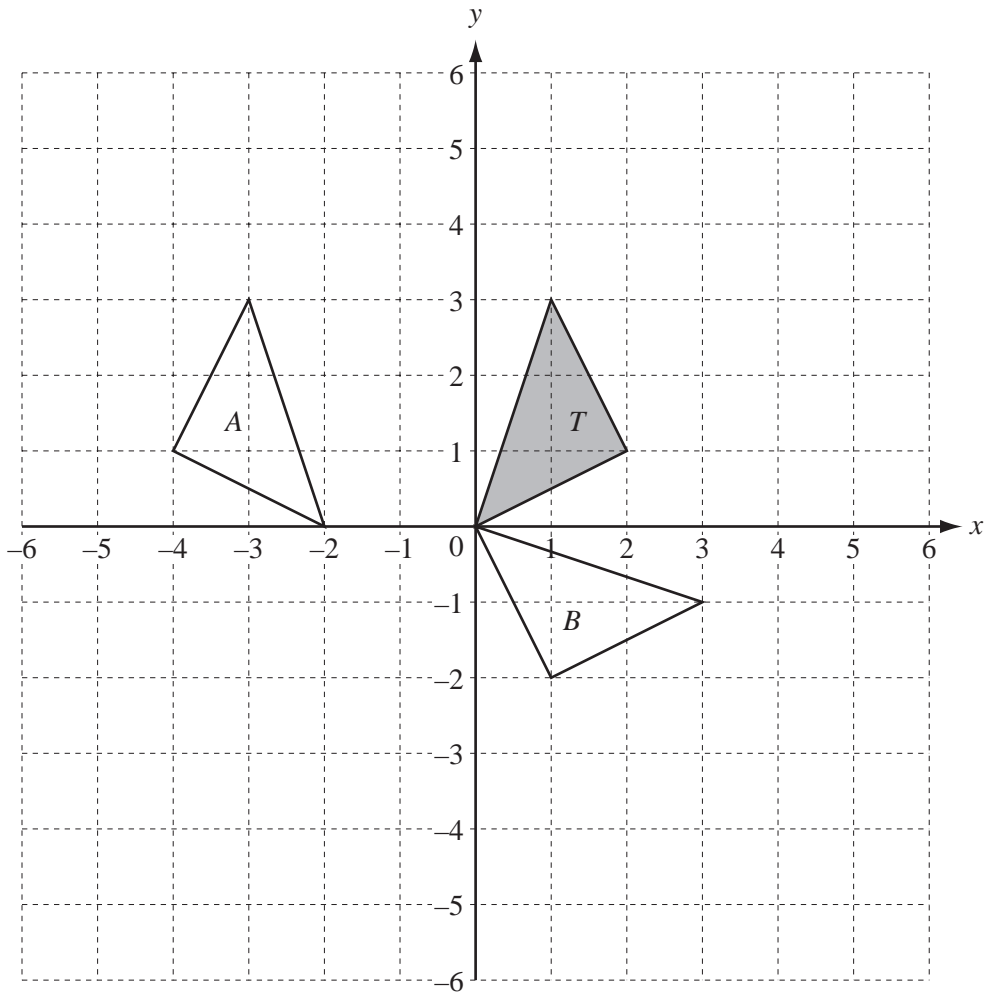
(a) Describe fully the **single** transformation that maps

    (i) triangle *T* onto triangle *A*,

    ....

    .... [2]

    (ii) triangle *T* onto triangle *B*.

    ....

    .... [3]
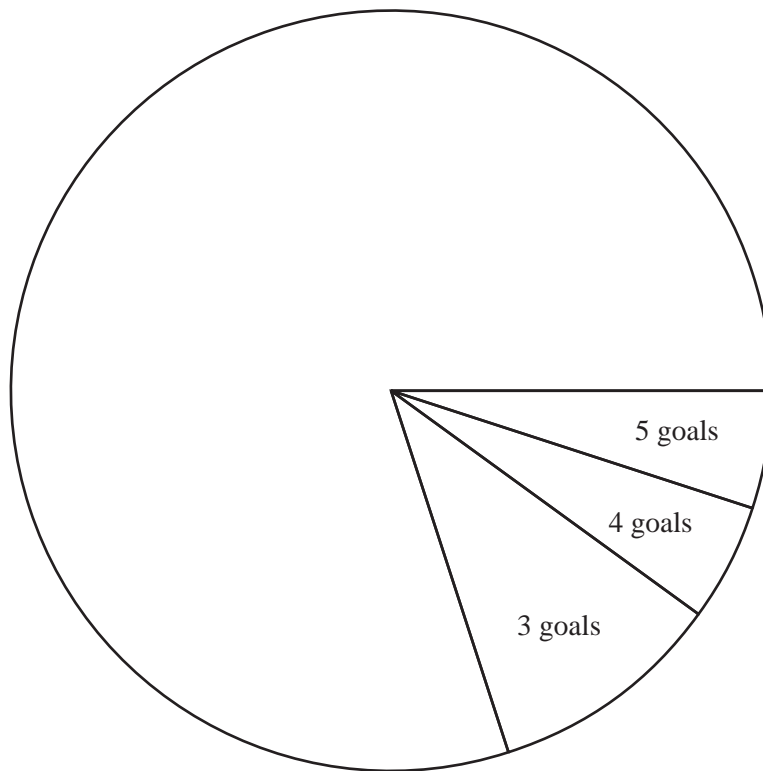
(b) On the grid, draw the enlargement of triangle *T*, centre (0, 0), scale factor 2.   [2]

4 Ahmed's football team has played 20 games.
The number of goals scored in these games is shown in the table.

Number of goals	0	1	2	3	4	5
Frequency	4	9	3	2	1	1

(a) Ahmed begins to draw a pie chart to show this information.

Complete the pie chart accurately and label each sector.

[3]

(b) Find

(i) the mode,

Answer(b)(i) .... [1]

(ii) the mean,

Answer(b)(ii) .... [1]

(iii) the range,

Answer(b)(iii) .... [1]

(iv) the lower quartile,

Answer(b)(iv) .... [1]

(v) the upper quartile.

Answer(b)(v) .... [1]

(c) A game is picked at random.

Find the probability that in this game

  (i) 1 goal was scored,

Answer(c)(i) .... [1]

  (ii) 6 goals were scored,

Answer(c)(ii) .... [1]

  (iii) more than one goal was scored.

Answer(c)(iii) .... [1]

8

5
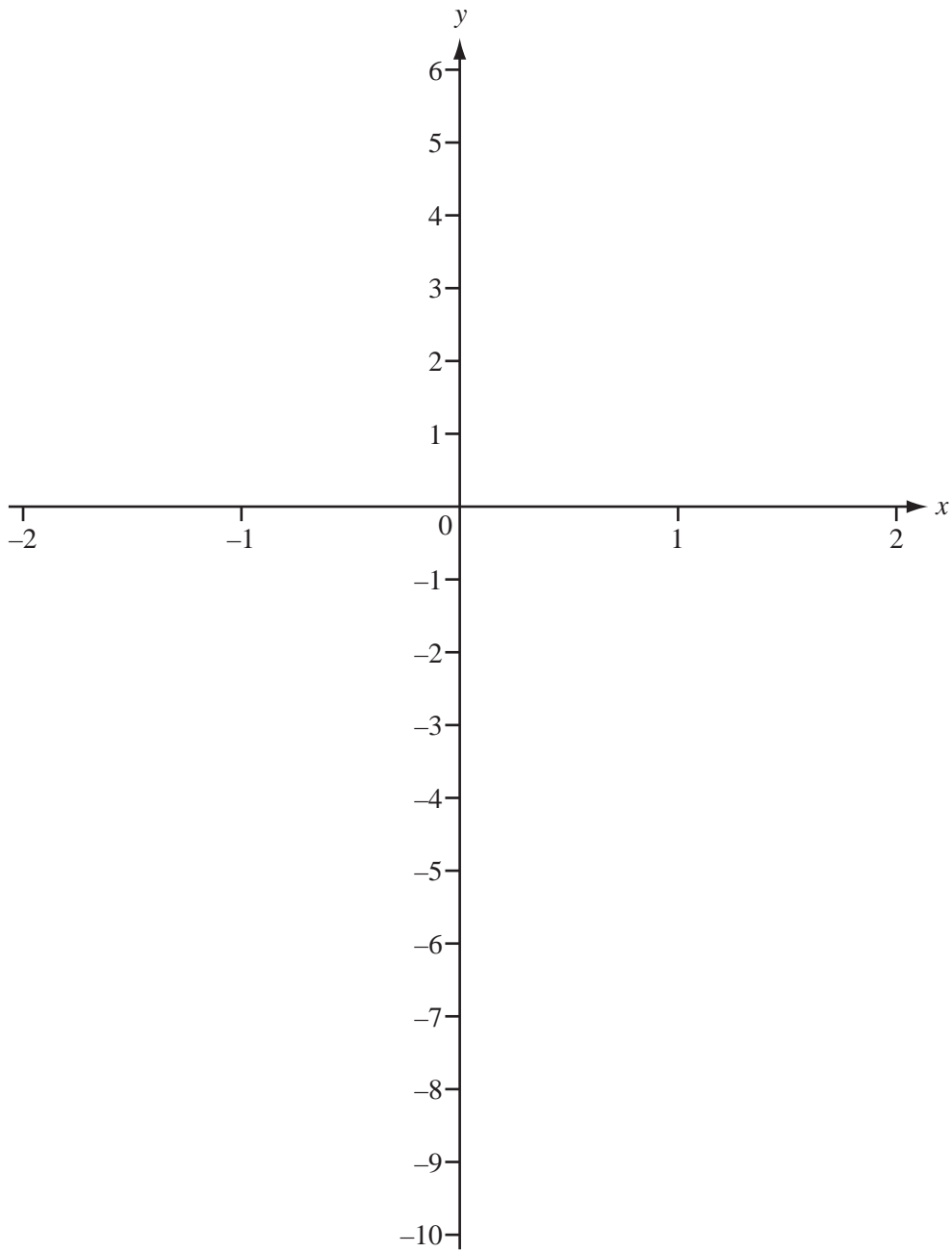
(a) On the diagram, sketch the graphs of

(i) $y = \dfrac{1}{x^3}$, for $-2 \leqslant x \leqslant 2, x \neq 0,$ [2]

(ii) $y = x^3 - 2$, for $-2 \leqslant x \leqslant 2.$ [2]

(b) The graph of $y = \dfrac{1}{x^3}$ has two asymptotes.

Write down the equation of each asymptote.

Answer(b) ....

.... [2]

(c) (i) The graphs of $y = \dfrac{1}{x^3}$ and $y = x^3 - 2$ intersect at two points.

Write down the co-ordinates of these two points.

Give each answer correct to 4 decimal places.

Answer(c)(i) (............................... , ...)

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

(ii) Solve the equation $\dfrac{1}{x^3} = x^3 - 2$.

Give each answer correct to 4 decimal places.

Answer(c)(ii) $x =$ .... or $x =$ .... [1]

(d) The graph of $y = x^3 - 2$ is a single transformation of the graph of $y = x^3$.

Describe fully this **single** transformation.

.... [2]

6

y

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B (10, 9)

A (2, 3)　　　　　　　　　C

0 → x
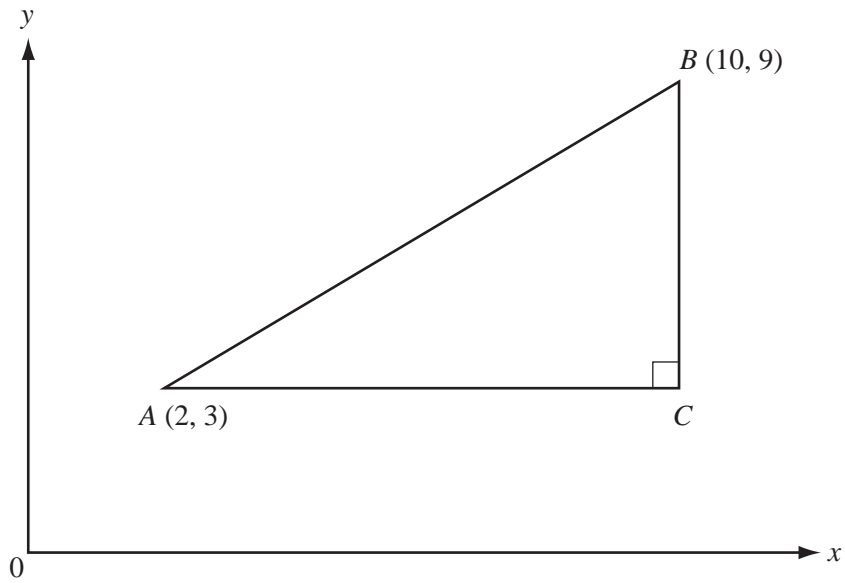
In the right-angled triangle *ABC*, *A* is the point (2, 3) and *B* is the point (10, 9).

(a) Write down the co-ordinates of the point *C*.

Answer(a) (............... , ...) [1]

(b) Calculate the length of *AB*.

Answer(b) .... [3]

(c) (i) Find the gradient of *AB*.

Answer(c)(i) .... [2]

(ii) The line *l* is parallel to *AB* and passes through the origin.

Write down the equation of *l*.

Answer(c)(ii) .... [1]

7 Each day a train leaves Paris at 20 32 and arrives in Barcelona at 08 24 the next day.

The distance between Paris and Barcelona is 1150 km.

(a) (i) Find the time taken for the journey, in hours and minutes.

Answer(a)(i) .... h .... min [2]

(ii) Calculate the average speed of the train, in kilometres per hour.

Answer(a)(ii) .... km/h [3]

(b) One day the average speed of the train was 95 km/h.
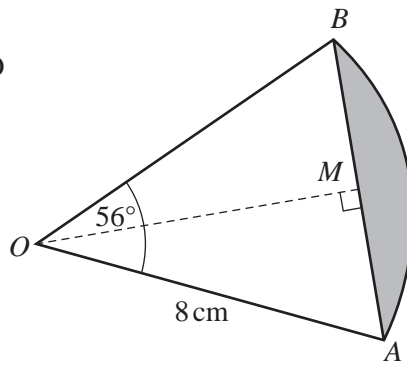As a result the train was late arriving in Barcelona.

Calculate by how many minutes the train was late.
Give your answer correct to the nearest minute.

Answer(b) .... min [3]

8

NOT TO SCALE

B

M

56°

O

8 cm

A

OAB is a sector of a circle, centre *O*, radius 8 cm.
Angle *AOB* = 56°.
M is the midpoint of the chord *AB*.
OM is perpendicular to the chord *AB*.

Calculate

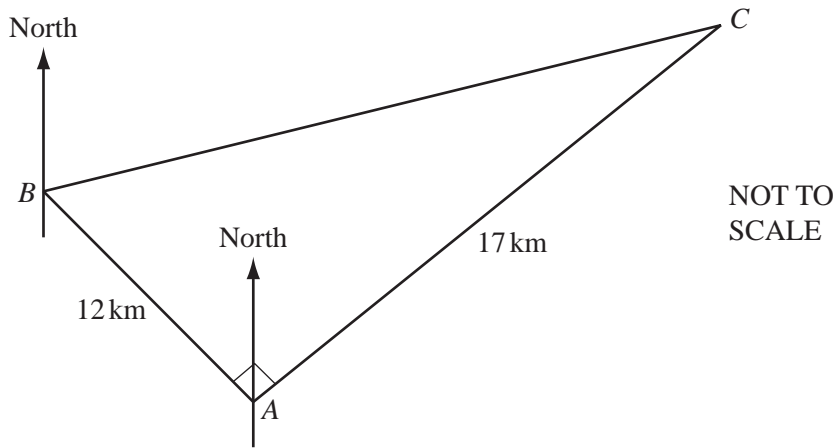**(a)** the length of the **arc** *AB*,

Answer(a) .... cm   [2]

(b) the length of the **chord** *AB*,

Answer(b) .... cm   [3]

(c) the perimeter of the shaded region.

Answer(c) .... cm   [1]

9

North

C

B

North

17 km

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12 km

A

B is 12 km from *A* on a bearing of 320°.
C is 17 km from *A*.
Angle *BAC* = 90°.

(a) Find the bearing of *C* from *A*.

Answer(a) .... [1]

(b) Use trigonometry to calculate angle *ABC*.

Answer(b) .... [2]

(c) Calculate the bearing of *C* from *B*.

Answer(c) .... [2]

10 A sphere has a radius of 8 cm.

(a) Calculate the surface area.

Answer(a) .... cm^2 [2]

(b) Calculate the volume.

Answer(b) .... cm^3 [2]

(c) The sphere is solid and is made of iron.
1cm^3 of iron has a mass of 7.87 g.

Calculate the mass of the sphere in

(i) grams,

Answer(c)(i) .... g   [2]

(ii) kilograms.

Answer(c)(ii) .... kg   [1]

(d) The sphere is melted down and made into a cube.

Use your answer to **part (b)** to calculate the length of a side of the cube.

Answer(d) .... cm   [2]

11

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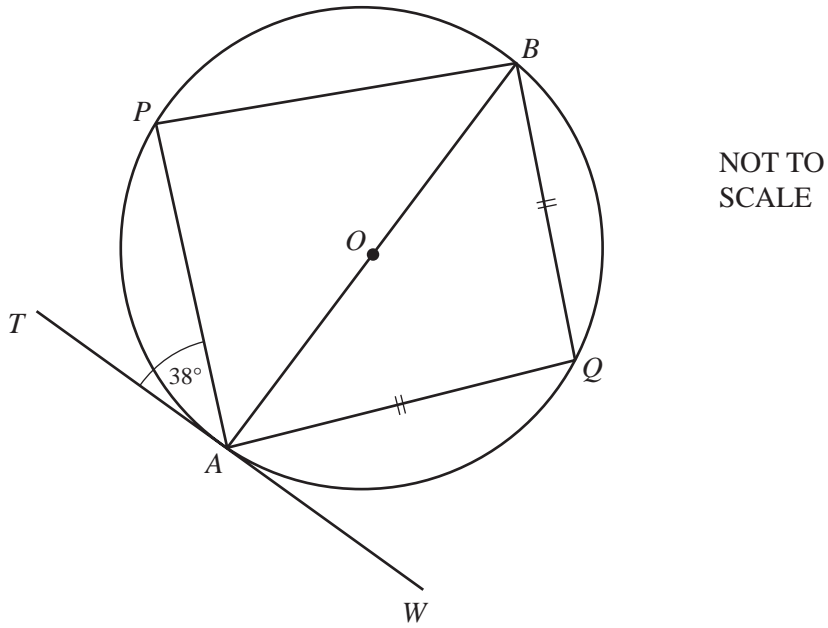
A, *B*, *P* and *Q* are points on the circumference of a circle, centre *O*.
AB is a diameter.
TAW is a tangent to the circle at *A*.
AQ = *QB* and angle *PAT* = 38°.

(a) Find the size of

    (i) angle *APB*,

Answer(a)(i) .... [1]

    (ii) angle *PBA*,

Answer(a)(ii) .... [1]

    (iii) angle *BAQ*.

Answer(a)(iii) .... [1]

(b) Use answers from **part (a)** to explain why the lines *PB* and *AQ* are **not** parallel.

....

.... [1]

12 The table shows information about the heights of 120 flowers.

Height (h cm)	$0 \leqslant h < 10$	$10 \leqslant h < 20$	$20 \leqslant h < 30$	$30 \leqslant h < 40$
Frequency	19	37	47	17

(a) Calculate the percentage of the flowers with a height of less than 10 cm.

Answer(a) .... %   [2]

(b) Find the fraction of the flowers with a height of at least 20 cm.
Give your answer in its lowest terms.

Answer(b) ....   [2]

(c) Calculate an estimate of the mean height of the flowers.

Answer(c) .... cm   [2]

(d) (i) Complete the cumulative frequency table.

Height (h cm)	$h < 10$	$h < 20$	$h < 30$	$h < 40$
Cumulative frequency	19			120

[2]

(ii)

Cumulative frequency
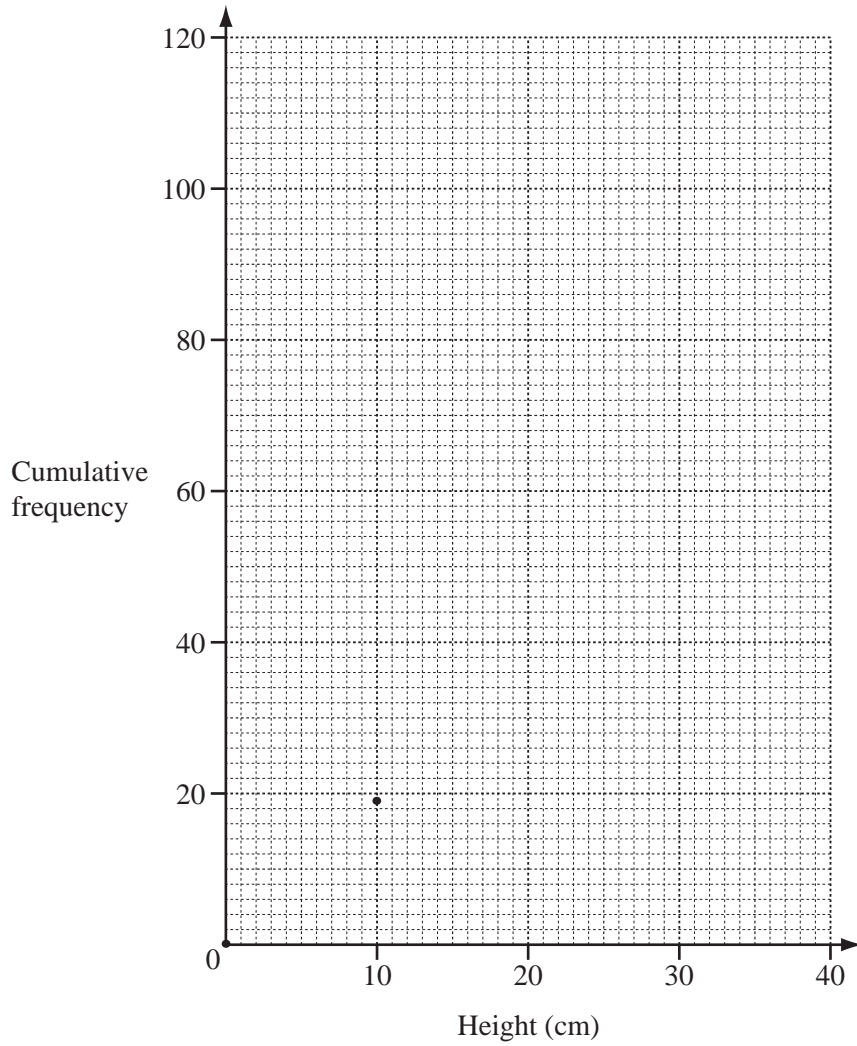
Height (cm)

On the grid, draw the cumulative frequency curve from the information in your table in **part (d)(i)**.

The points (0, 0) and (10, 19) have been plotted for you. [3]

(iii) Use your cumulative frequency curve to find the median height.

Answer(d)(iii) .... cm [1]

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