AQA

20: Friday 24th March 2023

Please write clearly, in block capitals.

Centre number | | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

AM Session

GCSE MATHEMATICS

H

Higher Tier Paper 2 Calculator

Time allowed: 1 hour 30 minutes

Materials

For this paper you must have:
- mathematical instruments
- a calculator.

Instructions
- Use black ink or black ball-point pen. Draw diagrams in pencil.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 80.
- You may ask for more answer paper, graph paper and tracing paper. These must be tagged securely to this answer book.

Advice
- In all calculations, show clearly how you work out your answer.

For Examiner's Use	
Pages	Mark
2 - 3	
4 - 5	
6 - 7	
8 - 9	
10 - 11	
12 - 13	
14 - 15	
16 - 17	
18 - 19	
TOTAL	

1 Here is a linear sequence.

3 8 13 18

Work out an expression for the nth term of the sequence.

[2 marks]

Answer _____

2 Work out a fraction that is equivalent to 0.5%

[1 mark]

Answer _____

3 A straight line has equation $y = 6 - 2x$

Write down the gradient of the line.

[1 mark]

Answer _____

4 There are between 20 and 30 students in a class.

The ratio of left-handed students to right-handed students is 3 : 8

How many students are in the class?

[2 marks]

Answer _____

5 (a) Solve the inequality $\frac{2x}{3} \leq 4$

[2 marks]

Answer _____

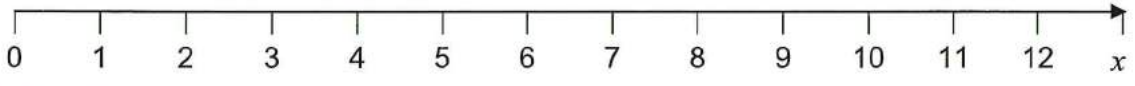
5 (b) Solve the inequality $4(x + 1) > 12$

[2 marks]

Answer _____

5 (c) Represent the solution set that satisfies **both** answers to part **(a)** and **(b)** on the number line.

[1 mark]



11

6 This formula works out the tax you pay on what you earn.

$$T = 0.2(E - 12570)$$

T is the tax you pay in pounds.

E is the amount you earn in pounds.

Alison pays £6300 tax.

Work out the amount she earns.

[3 marks]

Answer £ _____

7 Solve $x^2 = 12.25$

[2 marks]

Answer _____

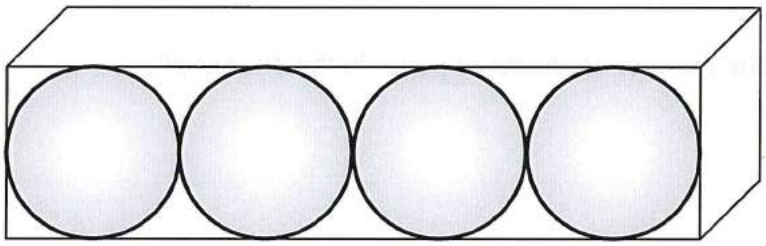
8 Volume of a sphere $= \frac{4}{3}\pi r^3$ where r is the radius.

8 (a) Work out the volume of a sphere of radius 6 cm.

[2 marks]

Answer _____ cm^3

8 (b) Four spheres of radius 6 cm are packed tightly into a cuboid as shown.



Work out the volume of the cuboid.

[4 marks]

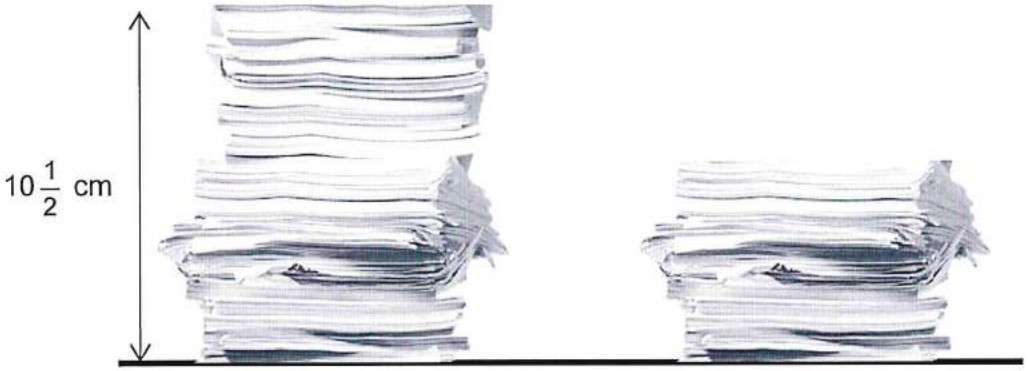
Answer _____ cm^3

11

9 Here are two piles of the same type of paper.

Each sheet of paper weighs 5 g.

The taller pile weighs 7.5 kg.



height of taller pile : height of shorter pile = 5 : 3

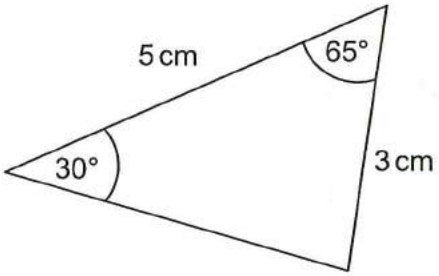
Work out the number of sheets of paper in the shorter pile.

[3 marks]

Answer _____

10 Here are four triangles.

J



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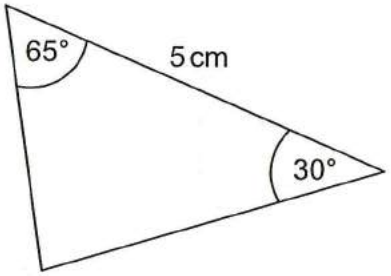

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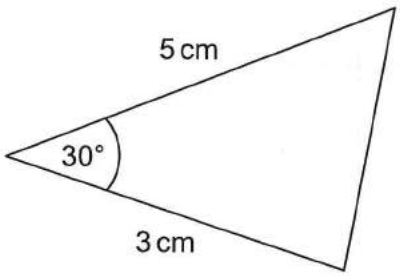

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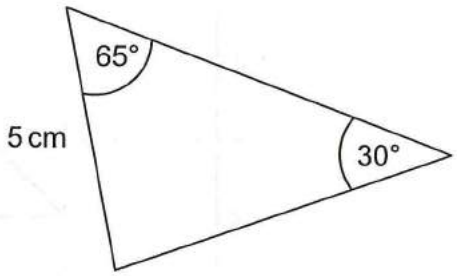


Which **two** triangles are congruent?

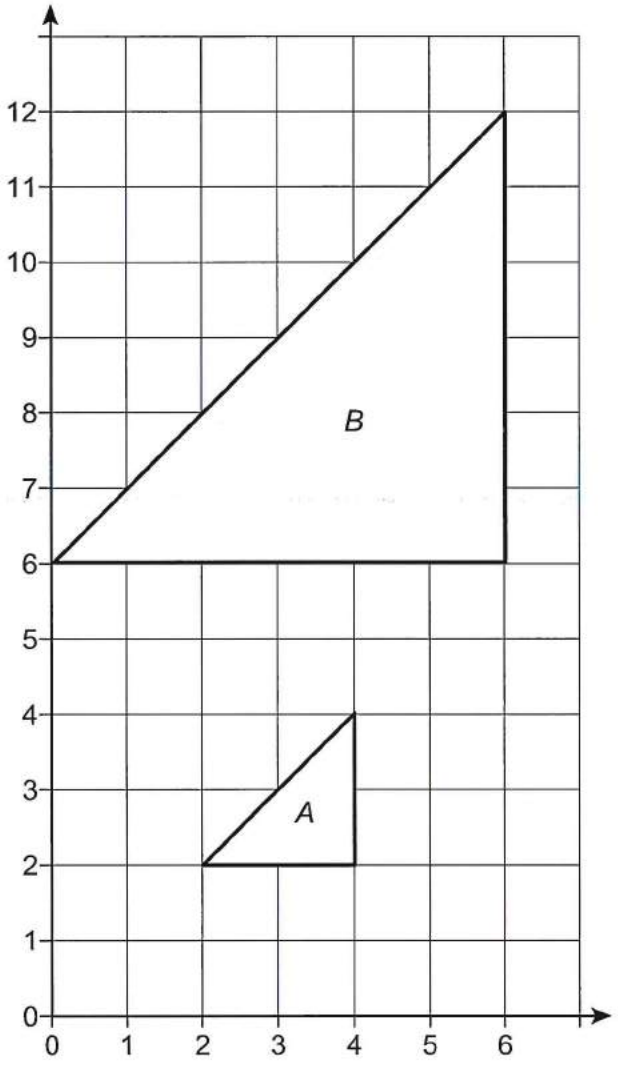
Give a reason for your answer.

[2 marks]

5

11 Describe fully the single transformation that maps triangle *A* to triangle *B*.

[3 marks]



12 A menu has a choice of 2 starters, 7 main courses and 4 desserts.

Work out how many different choices of a 3-course meal are possible?

[2 marks]

Answer _____

13 On 1st January 2021 Carmal invested some money in a bank account.

The account pays 1.5% compound interest per year.
On 1st January 2022 Carmal added £2000 into the account.
On 1st January 2023 she had £10 271.80 in the account.

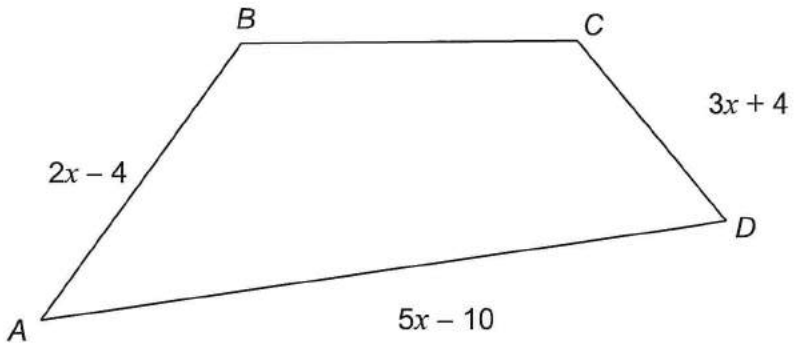
Work out how much money Carmal originally invested in the account.

[4 marks]

Answer £ _____

9

14 In this questions all lengths are in centimetres.



Not drawn accurately

Given $AB : CD = 1 : 2$

show that $AB : AD = 2 : 5$

[5 marks]

15 The probability that Jawin gets a take-away on a Friday night is 0.8

The probability that Claire gets a take-away on a Friday night is 0.7

These probabilities are **independent**.

15 (a) Calculate the probability that both Jawin and Claire get a take-away on a Friday night.

[1 mark]

Answer _____

15 (b) If Claire gets a take-away on a Friday night the probability that she gets one on a Saturday night is 0.3

If Claire **does not** get a take-away on a Friday night the probability that she gets one on a Saturday night is 0.9

Calculate the probability that Claire gets a take-away on exactly **one** of the two days.

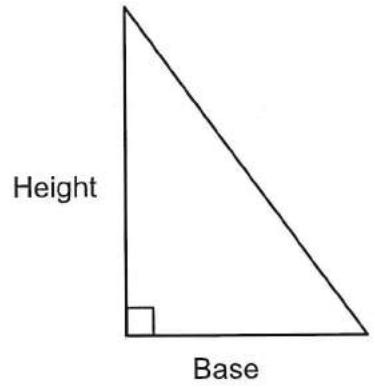
[4 marks]

Answer _____

10

16 The area of a right-angled triangle is $20\,cm^2$

The height of the triangle is twice the base.



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Work out the perimeter of the triangle in centimetres.

Give your answer in the form $a + b\sqrt{c}$, where a, b and c are integers.

[4 marks]

Answer _____ cm

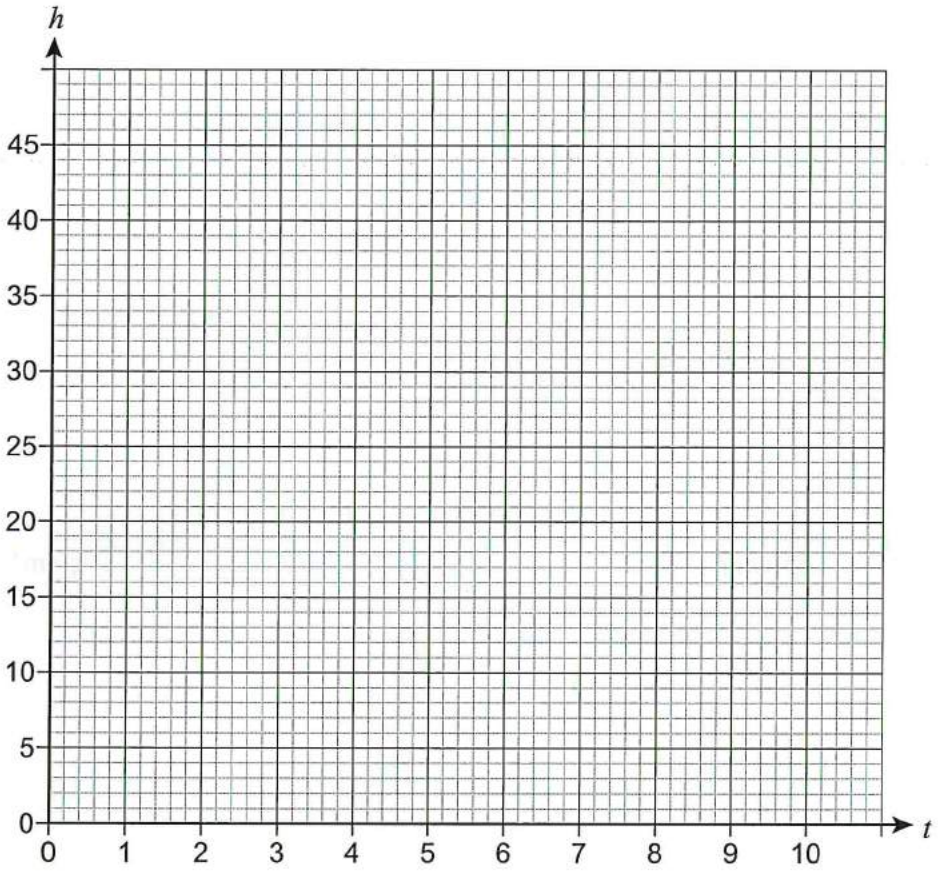
17 The height, h metres, of a ball at time, t seconds, is given by the function.

$$h = 0 \qquad 0 \leq t < 3$$

$$h = (13 - t)(t - 3) \qquad 3 \leq t \leq 10$$

17 (a) Draw a graph to show the height of the ball in the first 10 seconds.

[3 marks]



17 (b) By joining the points on the graph where $t = 5$ and $t = 8$ with a straight line, work out the average rate of change of height between 5 and 8 seconds.

[2 marks]

Answer _____ m/s

9

18 In this question use

1 pound = 0.4536 kilograms

1 inch = 2.54 centimetres

The density of concrete is 0.09 pounds per cubic inch.

Work out this density in grams per cubic centimetre.

[4 marks]

Answer _____ g/cm^3

19 The ages of 100 people who entered a theme park one day were recorded.

Age (years)	Number of people
$0 < a \leq 15$	12
$15 < a \leq 30$	35
$30 < a \leq 45$	28
$45 < a \leq 70$	21
$70 < a$	4

19 (a) There is a special offer:

18 years and under are free

Over 18s pay £36

On average 8000 people visit the theme park each day.

Estimate the total amount of money taken each day.

[3 marks]

Answer £ _____

19 (b) Jane says,

"12% of people entering the theme park are under 15 years of age."

Explain why she might be wrong.

[1 mark]

8

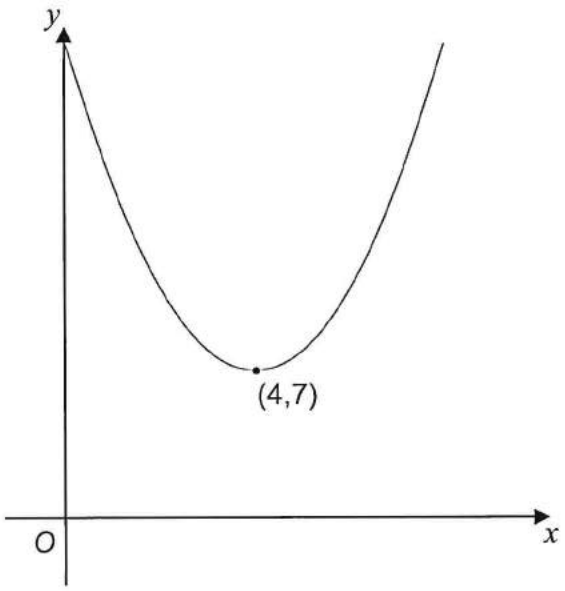
20 (a) Write $x^2 + 8x + 6$ in the form $(x + a)^2 + b$

[2 marks]

Answer _____

20 (b) A sketch of $y = x^2 + cx + d$ is shown.

The turning point is (4, 7)



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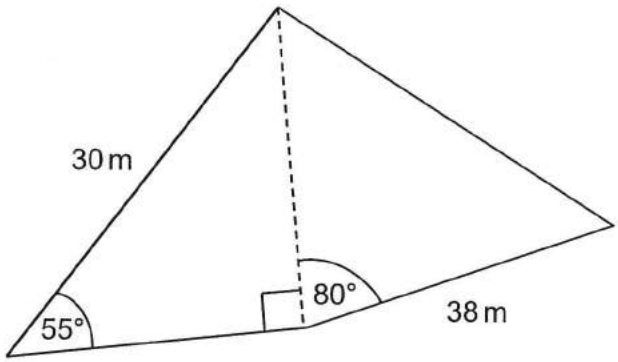
Work out the values of c and d.

[3 marks]

$c =$ _____ $d =$ _____

21 A crime scene is formed from two triangles as shown.

Police tape is needed to go around the perimeter.



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Police tape comes in 20 metre rolls.

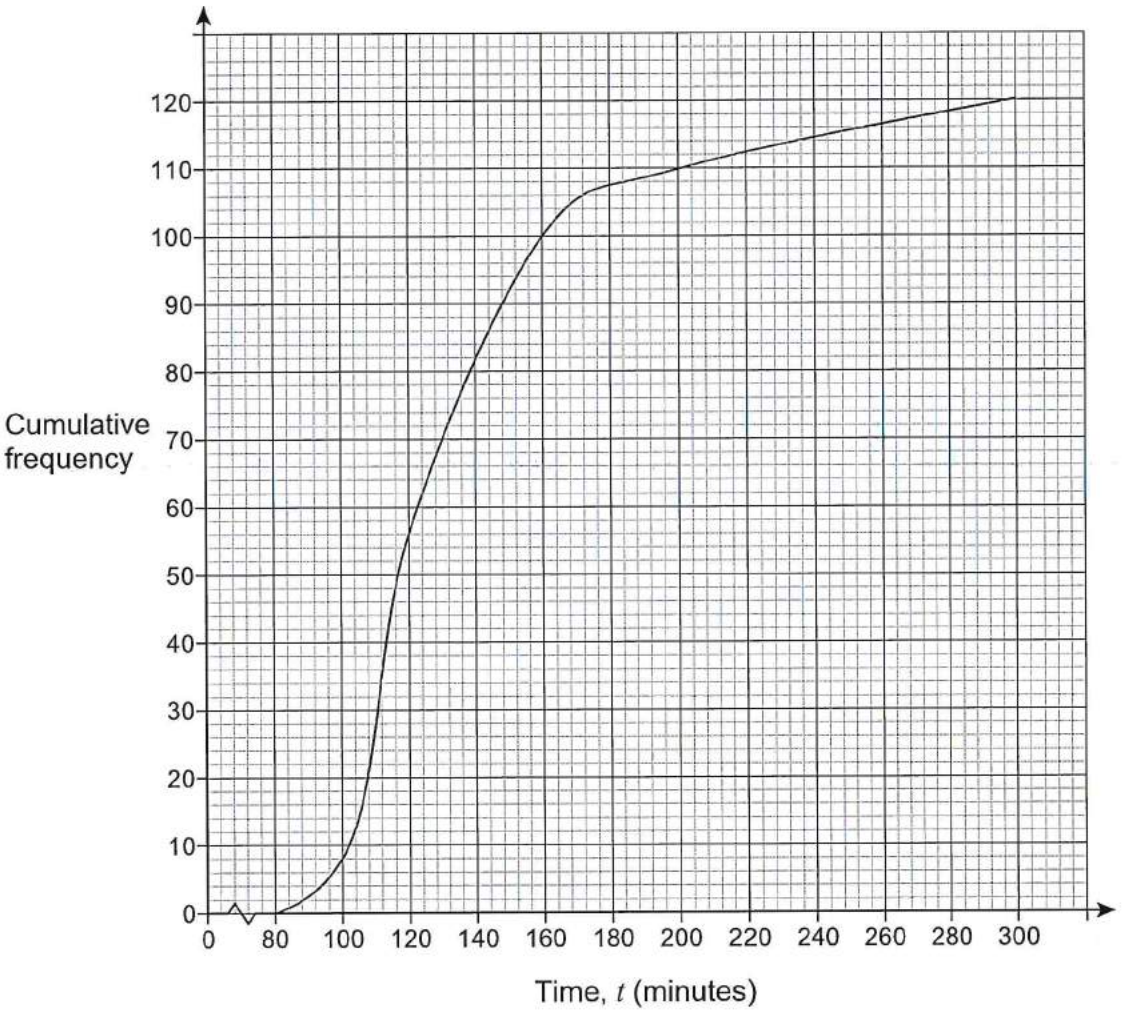
Work out the number of rolls needed.

[6 marks]

Answer _____

11

22 The cumulative frequency diagram shows the times taken by runners to complete a half marathon.



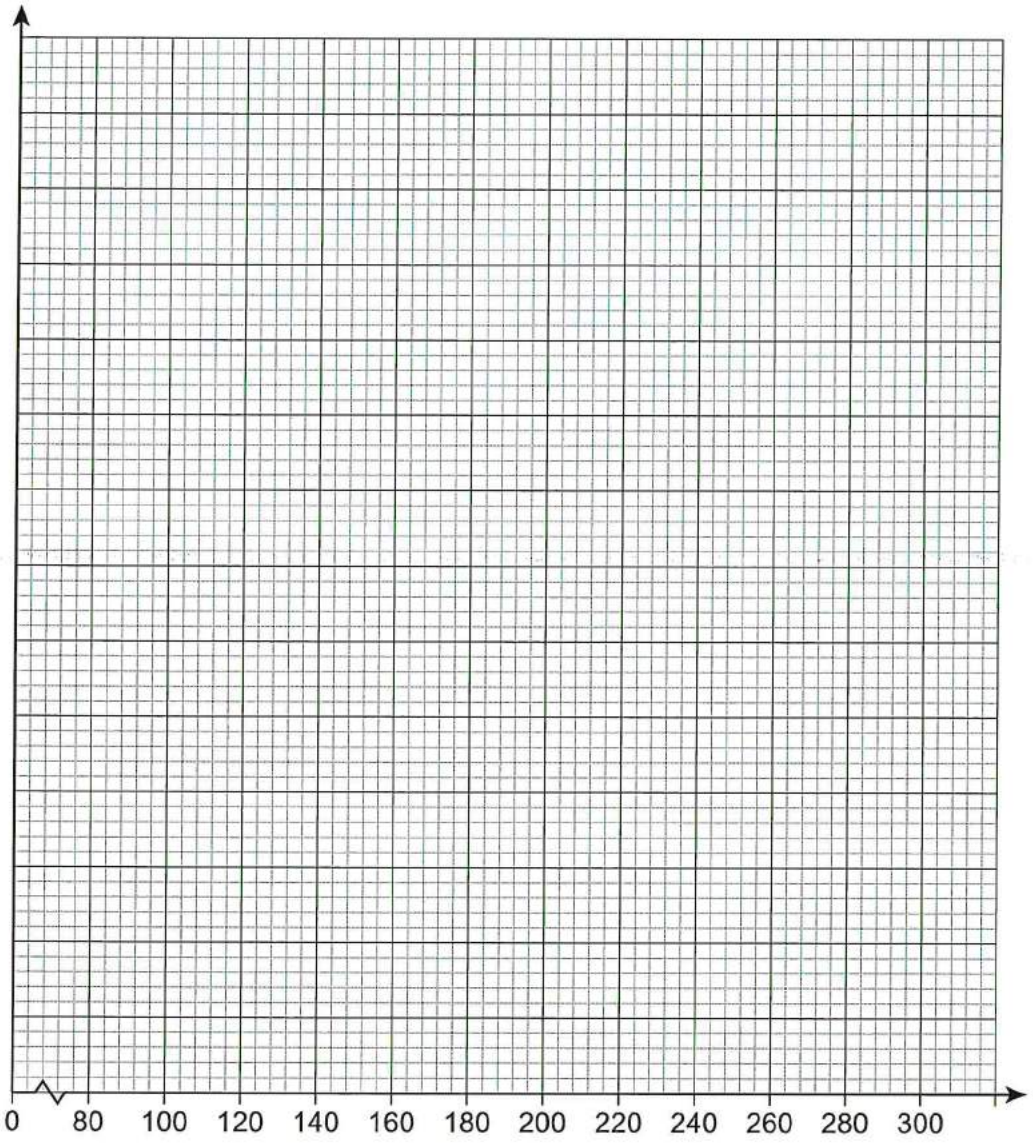
On the grid opposite, draw a histogram to represent the data.

Use this table to help you.

[6 marks]

Time, t (minutes)	Cumulative frequency
$t < 100$	
$t < 120$	
$t < 160$	
$t < 200$	
$t < 300$	

Time, t (minutes)	Frequency	Class width	Frequency density
$80 \leqslant t < 100$			
$100 \leqslant t < 120$			
$120 \leqslant t < 160$			
$160 \leqslant t < 200$			
$200 \leqslant t < 300$			



END OF QUESTIONS

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