Histograms and Cumulative Frequency: exam questions

10 questions · 27 marks · mark schemes at the end

Name _____ Date _____ Score / 27

- Calculators are allowed on both 4MA1 Higher papers (1H and 2H). Show your working: most marks are for method.
- Mark schemes start after the questions. M marks are for a correct method, A marks for an accurate answer that follows a correct method, and B marks for a correct result on its own.
- Online, with more practice: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/histograms-and-cumulative-frequency

1. **2 marks**

(a) The class $10 < h \leqslant 25$ has a frequency of 18. Work out its frequency density. **(1)**

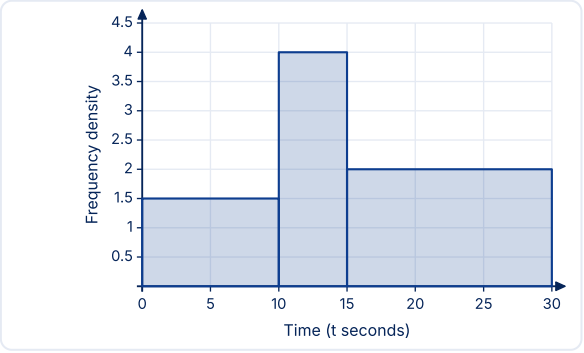
(b) The class $25 < h \leqslant 30$ has a frequency density of 4.4. Work out its frequency. **(1)**

2. **3 marks**

A histogram shows the times, t seconds, taken by some runners. The bars are:

$0 < t \leqslant 10$, frequency density 1.5; $10 < t \leqslant 15$, frequency density 4; $15 < t \leqslant 30$, frequency density 2.

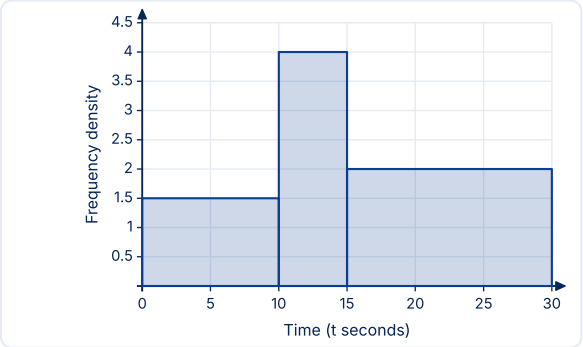
Work out the total number of runners.



3. **3 marks**

A histogram has bars $0 < t \leqslant 10$ with frequency density 1.5, $10 < t \leqslant 15$ with frequency density 4, and $15 < t \leqslant 30$ with frequency density 2, where t is a time in seconds.

Work out an estimate for the number of runners with times between 12 and 20 seconds.

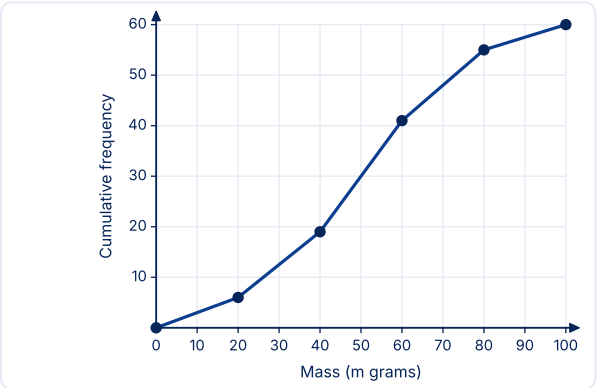


4. **3 marks**

The table gives cumulative frequencies for the masses, m grams, of 60 apples.

Mass (m g)	$\leqslant 20$	$\leqslant 40$	$\leqslant 60$	$\leqslant 80$	$\leqslant 100$
Cumulative frequency	6	19	41	55	60

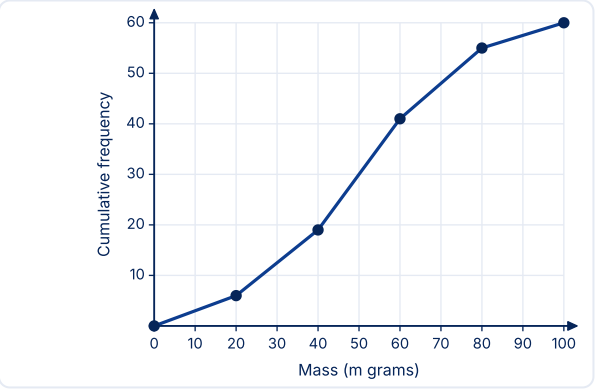
The points are plotted and joined with straight lines. Use the graph to find an estimate for the median mass.



5. **3 marks**

The cumulative frequencies for the masses of 60 apples are 6, 19, 41, 55 and 60 at 20 g, 40 g, 60 g, 80 g and 100 g. The points are plotted and joined with straight lines.

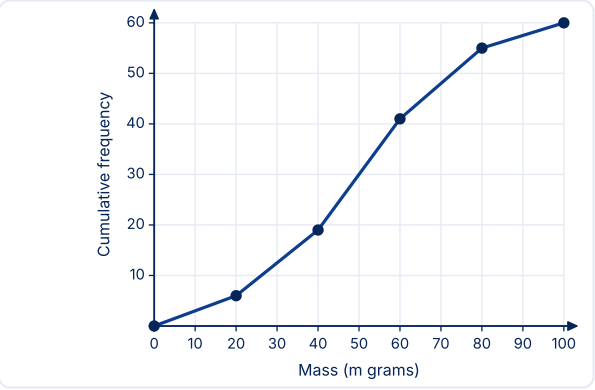
Work out an estimate for the interquartile range.



6. **2 marks**

The cumulative frequencies for the masses of 60 apples are 6, 19, 41, 55 and 60 at 20 g, 40 g, 60 g, 80 g and 100 g. The points are plotted and joined with straight lines.

Work out an estimate for the number of apples with a mass of more than 70 g.



7. **3 marks**

There are 60 students in Year 10. Each student either walks or cycles to school. 28 of the students are girls. 15 of the girls cycle. 20 of the boys walk.

How many students cycle to school?

8. **3 marks**

On a histogram, the class $20 < x \leqslant 30$ has a frequency of 15 and its bar is 3 cm tall. The bar for the class $30 < x \leqslant 50$ is 2.4 cm tall.

Work out the frequency of the class $30 < x \leqslant 50$.

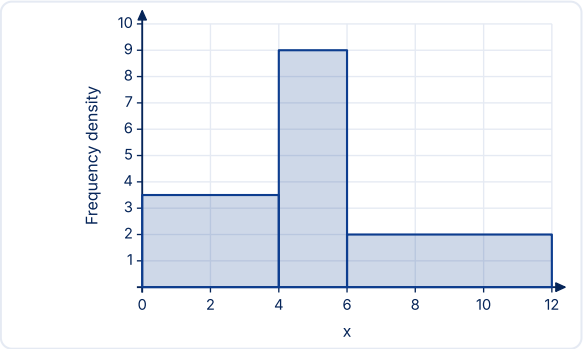
9. **2 marks**

Work out the frequency density of each class.

Class	$0 < x \leqslant 5$	$5 < x \leqslant 15$	$15 < x \leqslant 20$
Frequency	10	24	16

10. **3 marks**

A histogram has three bars: $0 < x \leqslant 4$ with frequency density 3.5, $4 < x \leqslant 6$ with frequency density 9, and $6 < x \leqslant 12$ with frequency density 2.



(a) How many values are in the class $0 < x \leqslant 4$? **(1)**

(b) Work out the total frequency. **(2)**

Answers and worked solutions

Question 1 — 2 marks

(a)

B1 $18 \div 15 = 1.2$

(b)

B1 $4.4 \times 5 = 22$

Answer: (a) 1.2; (b) 22

Question 2 — 3 marks

M1 one frequency correct: $10 \times 1.5 = 15$, $5 \times 4 = 20$ or $15 \times 2 = 30$

M1 $15 + 20 + 30$

A1 65

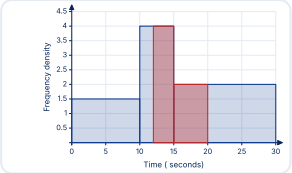
Answer: 65

Question 3 — 3 marks

M1 $3 \times 4 = 12$

M1 $5 \times 2 = 10$

A1 22



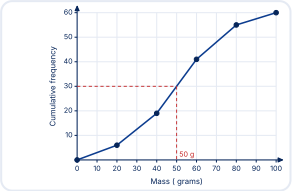
Answer: 22

Question 4 — 3 marks

M1 the 30th value, in the class $40 < m \leqslant 60$

M1 $40 + \dfrac{30 - 19}{22} \times 20$

A1 50 g



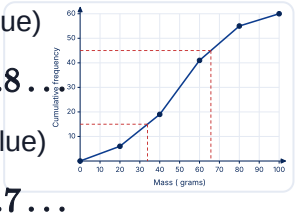
Answer: 50 g

Question 5 — 3 marks

M1 lower quartile (15th value) $20 + \dfrac{9}{13} \times 20 = 33.8\ldots$

M1 upper quartile (45th value) $60 + \dfrac{4}{14} \times 20 = 65.7\ldots$

A1 31.9 g

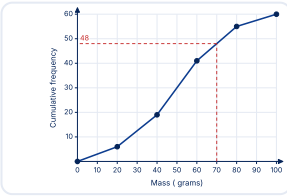


Answer: 31.9 g

Question 6 — 2 marks

M1 cumulative frequency at 70 g: $41 + \frac{1}{2} \times 14 = 48$

A1 $60 - 48 = 12$



Answer: 12

Question 7 — 3 marks

M1 boys: $60 - 28 = 32$

M1 boys who cycle: $32 - 20 = 12$

A1 $12 + 15 = 27$

Answer: 27

Question 8 — 3 marks

M1 frequency density $15 \div 10 = 1.5$, so 1 cm stands for 0.5

M1 $2.4 \times 0.5 = 1.2$

A1 $1.2 \times 20 = 24$

Answer: 24

Question 9 — 2 marks

B2 2, 2.4, 3.2

B1 for two correct.

Answer: 2, 2.4, 3.2

Question 10 — 3 marks

(a)

B1 14

(b)

M1 $2 \times 9 = 18$ or $6 \times 2 = 12$

A1 44

Answer: (a) 14; (b) 44

Online, with every solution: igcsemathrevision.com/igcse-frontend/4ma1/exam-questions/histograms-and-cumulative-frequency
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