



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Histograms · Practice Booklet

NAME:

CLASS:

DATE:

☐ Developing

☒ Secure

☐ Greater Depth

Answer every question in the working space provided. Method marks are available for correct working even if the final answer is wrong. Check the time allowed with your tutor before you start.

Histograms

Total marks available: 88

● Histograms

✓ 2.4, 3.4, 3.6, 4.4

Q1 · ● Developing · 2 marks

METHOD

Frequency density = frequency $\div$ class width

$$24 \div 10 = 2.4$$

$$51 \div 15 = 3.4$$

$$108 \div 30 = 3.6$$

$$44 \div 10 = 4.4$$

Mass (m grams)	Frequency	Frequency density
$60 < m \leq 70$	24	2.4
$70 < m \leq 85$	51	3.4
$85 < m \leq 115$	108	3.6
$115 < m \leq 125$	44	4.4

✓ 4.4, 4.4, 5.2, 5

Q2 · ● Developing · 2 marks

METHOD

Frequency density = frequency $\div$ class width

$$132 \div 30 = 4.4$$

$$22 \div 5 = 4.4$$

$$52 \div 10 = 5.2$$

$$100 \div 20 = 5$$

Age (a years)	Frequency	Frequency density
$10 < a \leq 40$	132	4.4
$40 < a \leq 45$	22	4.4
$45 < a \leq 55$	52	5.2
$55 < a \leq 75$	100	5

✓30

Q3 · ● Developing · 2 marks

METHOD

Frequency density = 3, class width = 10

Frequency = $3 \times 10 = 30$

✓3.4, 5, 2.8, 3.6

Q4 · ● Developing · 2 marks

METHOD

Frequency density = frequency $\div$ class width $68 \div 20 = 3.4$ $25 \div 5 = 5$ $28 \div 10 = 2.8$ $72 \div 20 = 3.6$

Distance (d km)	Frequency	Frequency density
$5 < d \leq 25$	68	3.4
$25 < d \leq 30$	25	5
$30 < d \leq 40$	28	2.8
$40 < d \leq 60$	72	3.6

✓0.6, 0.8, 5.2, 0.8

Q5 · ● Developing · 2 marks

METHOD

Frequency density = frequency $\div$ class width $18 \div 30 = 0.6$ $24 \div 30 = 0.8$ $26 \div 5 = 5.2$ $4 \div 5 = 0.8$

Distance (d km)	Frequency	Frequency density
$0 < d \leq 30$	18	0.6
$30 < d \leq 60$	24	0.8
$60 < d \leq 65$	26	5.2
$65 < d \leq 70$	4	0.8

✓150

Q6 · ● Developing · 2 marks

METHOD

Frequency density = 5, class width = 30

Frequency = $5 \times 30 = 150$

✓6

Q7 · ● Developing · 2 marks

METHOD

Frequency density = 1.2, class width = 5

Frequency = $1.2 \times 5 = 6$

✓36

Q8 · ● Developing · 2 marks

METHOD

Frequency density = 3.6, class width = 10

Frequency = $3.6 \times 10 = 36$

✓24

Q9 · ● Developing · 2 marks

METHOD

Frequency density = 2.4, class width = 10

Frequency = $2.4 \times 10 = 24$

✓1.4, 5, 1.4, 2.6, 3.6

Q10 · ● Developing · 2 marks

METHOD

Frequency density = frequency $\div$ class width

$$21 \div 15 = 1.4$$

$$75 \div 15 = 5$$

$$7 \div 5 = 1.4$$

$$26 \div 10 = 2.6$$

$$18 \div 5 = 3.6$$

Time (t minutes)	Frequency	Frequency density
$0 < t \leq 15$	21	1.4
$15 < t \leq 30$	75	5
$30 < t \leq 35$	7	1.4
$35 < t \leq 45$	26	2.6
$45 < t \leq 50$	18	3.6

✓ (a) 7, 54; (b) bar heights 3.6, 3.2

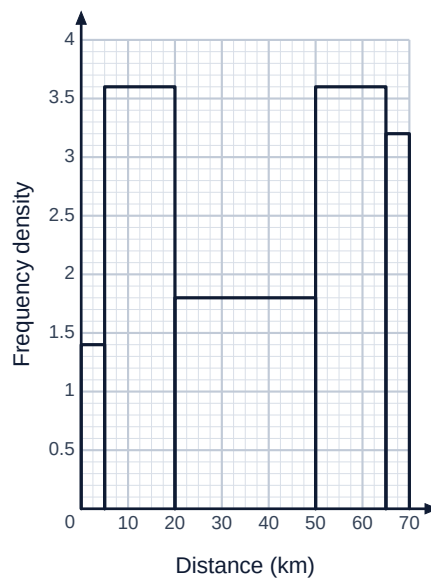
Q11 · ● Secure · 4 marks

METHOD

(a) $1.4 \times 5 = 7$; $1.8 \times 30 = 54$

(b) $54 \div 15 = 3.6$; $16 \div 5 = 3.2$

Distance (d km)	Frequency
$0 < d \leq 5$	7
$5 < d \leq 20$	54
$20 < d \leq 50$	54
$50 < d \leq 65$	54
$65 < d \leq 70$	16



✓ (a) 25, 20; (b) bar heights 2.4, 3.4

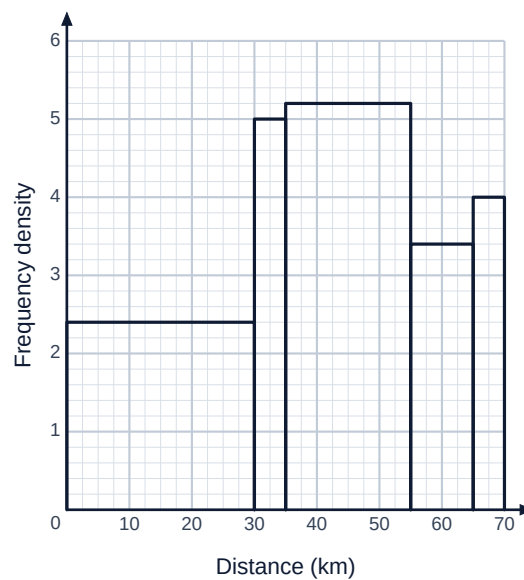
Q12 · ● Secure · 4 marks

METHOD

(a) $5 \times 5 = 25$; $4 \times 5 = 20$

(b) $72 \div 30 = 2.4$; $34 \div 10 = 3.4$

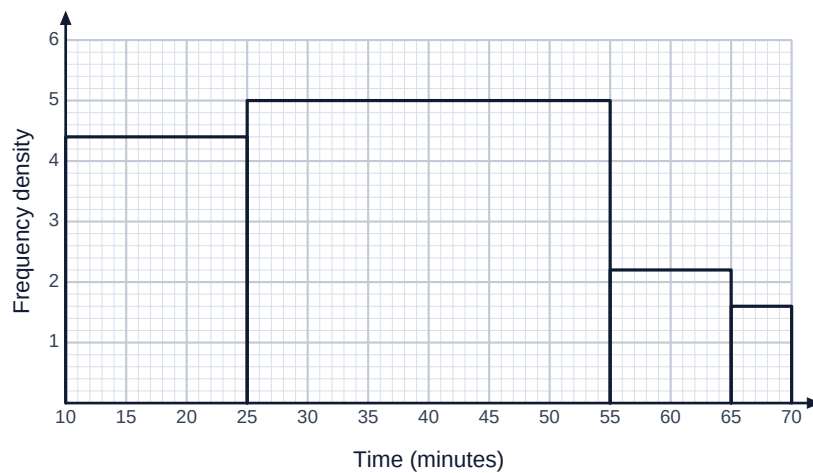
Distance (d km)	Frequency
$0 < d \leq 30$	72
$30 < d \leq 35$	25
$35 < d \leq 55$	104
$55 < d \leq 65$	34
$65 < d \leq 70$	20



METHOD

Bar heights = frequency $\div$ class width: $66 \div 15 = 4.4$; $150 \div 30 = 5$; $22 \div 10 = 2.2$; $8 \div 5 = 1.6$

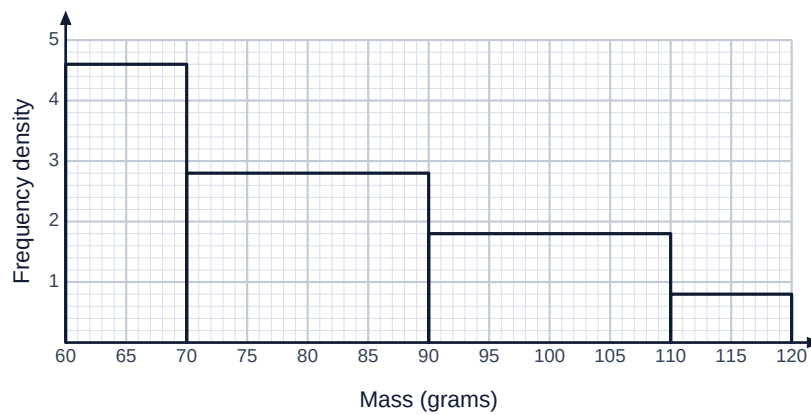
Time (t minutes)	Frequency	Frequency density
$10 < t \leq 25$	66	4.4
$25 < t \leq 55$	150	5
$55 < t \leq 65$	22	2.2
$65 < t \leq 70$	8	1.6



METHOD

Bar heights = frequency $\div$ class width: $46 \div 10 = 4.6$; $56 \div 20 = 2.8$; $36 \div 20 = 1.8$; $8 \div 10 = 0.8$

Mass (m grams)	Frequency	Frequency density
$60 < m \leq 70$	46	4.6
$70 < m \leq 90$	56	2.8
$90 < m \leq 110$	36	1.8
$110 < m \leq 120$	8	0.8



✓ (a) 72, 78; (b) bar heights 2.6, 2.4

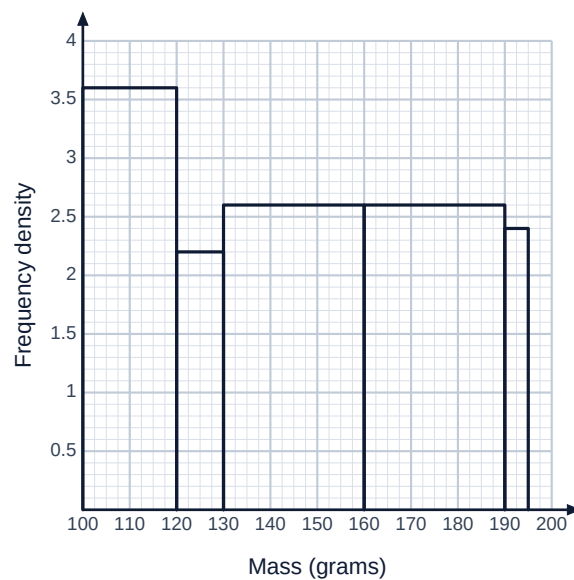
Q15 · ● Secure · 4 marks

METHOD

(a) $3.6 \times 20 = 72$; $2.6 \times 30 = 78$

(b) $78 \div 30 = 2.6$; $12 \div 5 = 2.4$

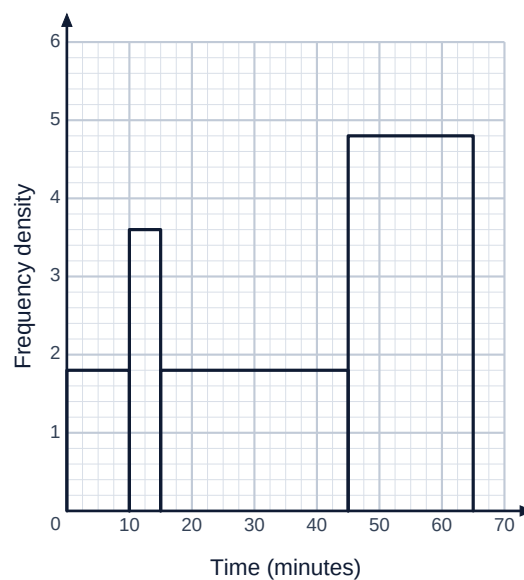
Mass (m grams)	Frequency
$100 < m \leq 120$	72
$120 < m \leq 130$	22
$130 < m \leq 160$	78
$160 < m \leq 190$	78
$190 < m \leq 195$	12



METHOD

Bar heights = frequency $\div$ class width: $18 \div 10 = 1.8$; $18 \div 5 = 3.6$; $54 \div 30 = 1.8$; $96 \div 20 = 4.8$

Time (t minutes)	Frequency	Frequency density
$0 < t \leq 10$	18	1.8
$10 < t \leq 15$	18	3.6
$15 < t \leq 45$	54	1.8
$45 < t \leq 65$	96	4.8



✓ (a) 18, 5; (b) bar heights 2.4, 2

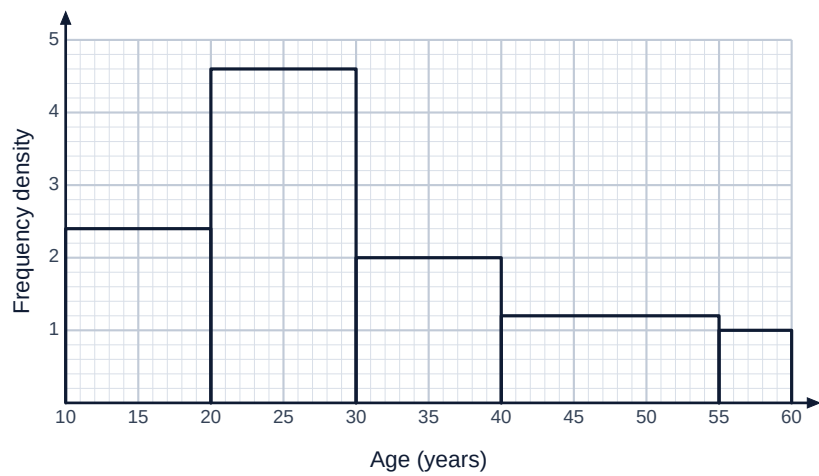
Q17 · ● Secure · 4 marks

METHOD

(a) $1.2 \times 15 = 18$; $1 \times 5 = 5$

(b) $24 \div 10 = 2.4$; $20 \div 10 = 2$

Age (a years)	Frequency
$10 < a \leq 20$	24
$20 < a \leq 30$	46
$30 < a \leq 40$	20
$40 < a \leq 55$	18
$55 < a \leq 60$	5



✓ (a) 63, 18; (b) bar heights 2.8, 5

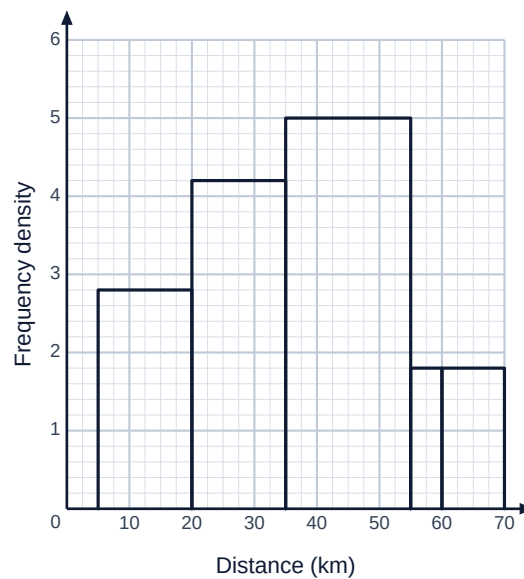
Q18 · ● Secure · 4 marks

METHOD

(a) $4.2 \times 15 = 63$; $1.8 \times 10 = 18$

(b) $42 \div 15 = 2.8$; $100 \div 20 = 5$

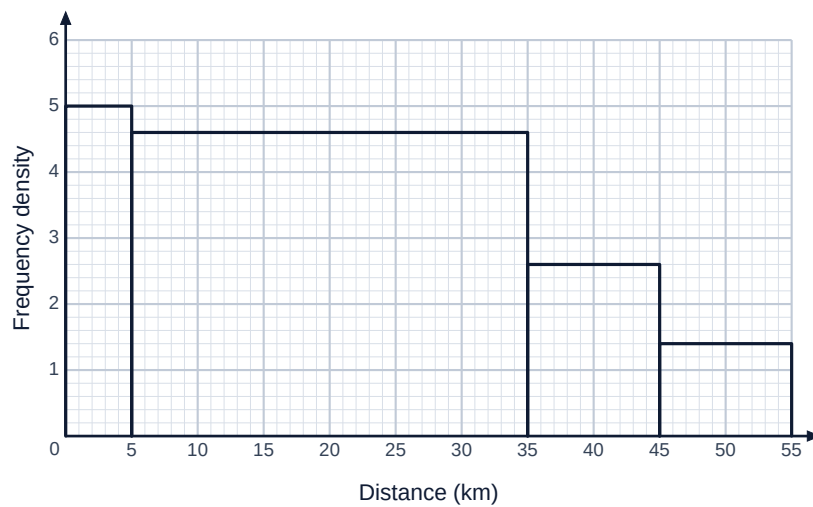
Distance (d km)	Frequency
$5 < d \leq 20$	42
$20 < d \leq 35$	63
$35 < d \leq 55$	100
$55 < d \leq 60$	9
$60 < d \leq 70$	18



METHOD

Bar heights = frequency $\div$ class width: $25 \div 5 = 5$; $138 \div 30 = 4.6$; $26 \div 10 = 2.6$; $14 \div 10 = 1.4$

Distance (d km)	Frequency	Frequency density
$0 < d \leq 5$	25	5
$5 < d \leq 35$	138	4.6
$35 < d \leq 45$	26	2.6
$45 < d \leq 55$	14	1.4



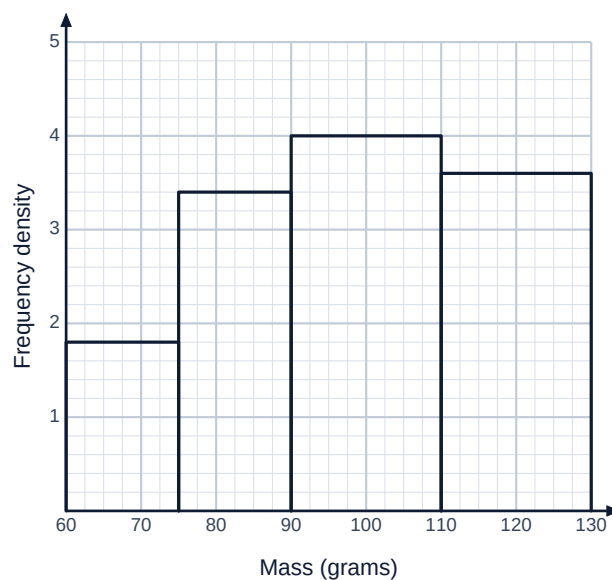
✓ Bars of height 1.8, 3.4, 4, 3.6

Q20 · ● Secure · 3 marks

METHOD

Bar heights = frequency $\div$ class width: $27 \div 15 = 1.8$; $51 \div 15 = 3.4$; $80 \div 20 = 4$; $72 \div 20 = 3.6$

Mass (m grams)	Frequency	Frequency density
$60 < m \leq 75$	27	1.8
$75 < m \leq 90$	51	3.4
$90 < m \leq 110$	80	4
$110 < m \leq 130$	72	3.6



✓ $20 < a \leq 30$ (14 compared with 9)

Q21 · ● Greater Depth · 3 marks

METHOD

$$60 < a \leq 65: 1.8 \times 5 = 9$$

$$20 < a \leq 30: 1.4 \times 10 = 14$$

$20 < a \leq 30$ has more, by 5

✓21

Q22 · ● Greater Depth · 3 marks

METHOD

$$2.6 \times 5 = 13$$

$$1.6 \times 5 = 8$$

$$\text{Total} = 21$$

✓ $40 < a \leq 70$ (108 compared with 25)

Q23 · ● Greater Depth · 3 marks

METHOD

$$85 < a \leq 90: 5 \times 5 = 25$$

$$40 < a \leq 70: 3.6 \times 30 = 108$$

$40 < a \leq 70$ has more, by 83

✓188

Q24 · ● Greater Depth · 3 marks

METHOD

$$0.8 \times 5 = 4$$

$$4.6 \times 10 = 46$$

$$4.2 \times 30 = 126$$

$$2.4 \times 5 = 12$$

$$\text{Total} = 188$$

✓156

Q25 · ● Greater Depth · 4 marks

METHOD

The bar for $0 < d \leq 30$ has area proportional to 42: use it to find the scale (frequency density = frequency $\div$ width = $42 \div 30 = 1.4$)

$$1.4 \times 30 = 42$$

$$3.2 \times 5 = 16$$

$$2.6 \times 20 = 52$$

$$2.8 \times 10 = 28$$

$$3.6 \times 5 = 18$$

$$\text{Total} = 42 + 16 + 52 + 28 + 18 = 156$$

✓144

Q26 · ● Greater Depth · 4 marks

METHOD

The bar for $15 < t \leq 30$ has area proportional to 15: use it to find the scale (frequency density = frequency $\div$ width = $15 \div 15 = 1$)

$$0.6 \times 15 = 9$$

$$1 \times 15 = 15$$

$$0.6 \times 30 = 18$$

$$4.4 \times 15 = 66$$

$$1.8 \times 20 = 36$$

$$\text{Total} = 9 + 15 + 18 + 66 + 36 = 144$$

✓185

Q27 · ● Greater Depth · 4 marks

METHOD

The bar for $30 < d \leq 50$ has area proportional to 68: use it to find the scale (frequency density = frequency $\div$ width = $68 \div 20 = 3.4$)

$$2.4 \times 30 = 72$$

$$3.4 \times 20 = 68$$

$$1.2 \times 10 = 12$$

$$5.2 \times 5 = 26$$

$$1.4 \times 5 = 7$$

$$\text{Total} = 72 + 68 + 12 + 26 + 7 = 185$$

✓132

Q28 · ● Greater Depth · 3 marks

METHOD

$$2.2 \times 15 = 33$$

$$4.4 \times 20 = 88$$

$$2.2 \times 5 = 11$$

$$\text{Total} = 132$$

✓ $20 < t \leq 50$ (96 compared with 88)

Q29 · ● Greater Depth · 3 marks

METHOD

$$65 < t \leq 85: 4.4 \times 20 = 88$$

$$20 < t \leq 50: 3.2 \times 30 = 96$$

$20 < t \leq 50$ has more, by 8

✓ 129

Q30 · ● Greater Depth · 3 marks

METHOD

$$3 \times 25 = 75$$

$$3 \times 10 = 30$$

$$1.2 \times 20 = 24$$

$$\text{Total} = 129$$