



ACHIEVE ACADEMY

GCSE Maths — Higher Tier

Cumulative Frequency & Box Plots · 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.

Cumulative Frequency & Box Plots

Total marks available: 81

● Cumulative Frequency & Box Plots

✓ Range = 36; IQR = 12

Q1 · ● Developing · 2 marks

METHOD

$$\text{Range} = 53 - 17 = 36$$

$$\text{IQR} = 42 - 30 = 12$$

✓ Range = 44; IQR = 19

Q2 · ● Developing · 2 marks

METHOD

$$\text{Range} = 56 - 12 = 44$$

$$\text{IQR} = 44 - 25 = 19$$

✓ 55

Q3 · ● Developing · 1 mark

METHOD

Read the upper quartile directly from the box plot: 55

✓ Range = 33; IQR = 19

Q4 · ● Developing · 2 marks

METHOD

$$\text{Range} = 56 - 23 = 33$$

$$\text{IQR} = 49 - 30 = 19$$

✓ 63

Q5 · ● Developing · 1 mark

METHOD

Read the upper quartile directly from the box plot: 63

✓28

Q6 · ● Developing · 1 mark

METHOD

Read the minimum directly from the box plot: 28

✓Range = 43; IQR = 21

Q7 · ● Developing · 2 marks

METHOD

Range = $63 - 20 = 43$

IQR = $52 - 31 = 21$

✓Range = 36; IQR = 26

Q8 · ● Developing · 2 marks

METHOD

Range = $58 - 22 = 36$

IQR = $55 - 29 = 26$

✓72

Q9 · ● Developing · 1 mark

METHOD

Read the maximum directly from the box plot: 72

✓29

Q10 · ● Developing · 1 mark

METHOD

Read the minimum directly from the box plot: 29

✓ 7, 16, 38, 51, 57, 59

Q11 · ● Secure · 2 marks

METHOD

Running totals: 7 , $7 + 9 = 16$, $16 + 22 = 38$, $38 + 13 = 51$, $51 + 6 = 57$, $57 + 2 = 59$

Time (t minutes)	Frequency	Cumulative frequency
$10 < t \leq 20$	7	7
$20 < t \leq 30$	9	16
$30 < t \leq 40$	22	38
$40 < t \leq 50$	13	51
$50 < t \leq 60$	6	57
$60 < t \leq 70$	2	59

✓ 31

Q12 · ● Secure · 2 marks

METHOD

Read up from 25 to the curve and across: 31 (accept 29 to 32)

✓ Evening shift has the higher median, by 27.

Q13 · ● Secure · 2 marks

METHOD

Median Morning shift = 30, Median Evening shift = 57

Evening shift has the higher median, by 27.

✓ 9, 18, 32, 44, 49, 51

Q14 · ● Secure · 2 marks

METHOD

Running totals: 9, $9 + 9 = 18$, $18 + 14 = 32$, $32 + 12 = 44$, $44 + 5 = 49$, $49 + 2 = 51$

Time (t minutes)	Frequency	Cumulative frequency
$0 < t \leq 10$	9	9
$10 < t \leq 20$	9	18
$20 < t \leq 30$	14	32
$30 < t \leq 40$	12	44
$40 < t \leq 50$	5	49
$50 < t \leq 60$	2	51

✓ 4, 20, 34, 49, 56, 58

Q15 · ● Secure · 2 marks

METHOD

Running totals: 4, $4 + 16 = 20$, $20 + 14 = 34$, $34 + 15 = 49$, $49 + 7 = 56$, $56 + 2 = 58$

Height (h cm)	Frequency	Cumulative frequency
$20 < h \leq 30$	4	4
$30 < h \leq 40$	16	20
$40 < h \leq 50$	14	34
$50 < h \leq 60$	15	49
$60 < h \leq 70$	7	56
$70 < h \leq 80$	2	58

✓ Evening shift has the higher median, by 26.

Q16 · ● Secure · 2 marks

METHOD

Median Morning shift = 22, Median Evening shift = 48

Evening shift has the higher median, by 26.

✓42

Q17 · ● Secure · 2 marks

METHOD

Read up from 15 to the curve and across: about 14
 $56 - 14 = 42$ (accept 40 to 44)

✓ Evening shift has the higher median, by 21.

Q18 · ● Secure · 2 marks

METHOD

Median Morning shift = 28, Median Evening shift = 49
Evening shift has the higher median, by 21.

✓14

Q19 · ● Secure · 2 marks

METHOD

Read up from 85 to the curve and across: about 39
 $53 - 39 = 14$ (accept 13 to 16)

✓9, 23, 44, 59, 63, 67

Q20 · ● Secure · 2 marks

METHOD

Running totals: 9, $9 + 14 = 23$, $23 + 21 = 44$, $44 + 15 = 59$, $59 + 4 = 63$, $63 + 4 = 67$

Distance (d km)	Frequency	Cumulative frequency
$20 < d \leq 30$	9	9
$30 < d \leq 40$	14	23
$40 < d \leq 50$	21	44
$50 < d \leq 60$	15	59
$60 < d \leq 70$	4	63
$70 < d \leq 80$	4	67

✓ (a) 9, 22, 37, 47, 56; (c) 34

Q21 · ● Greater Depth · 6 marks

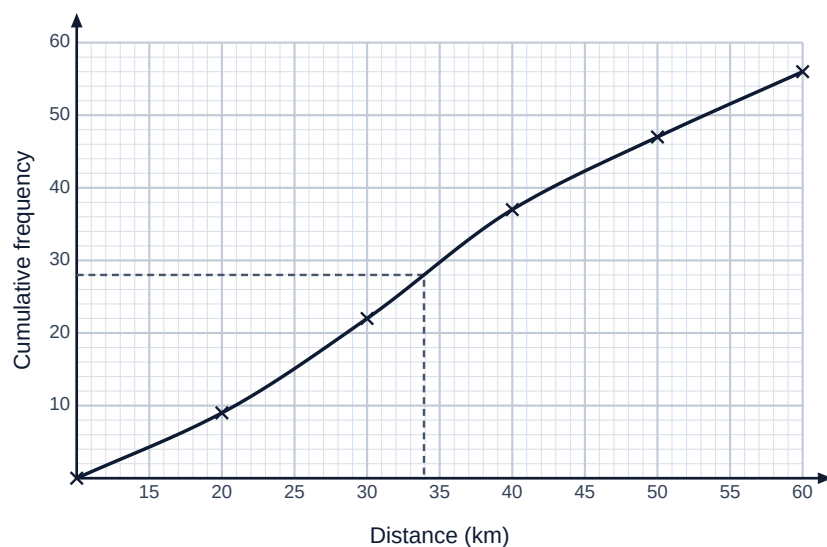
METHOD

(a) Running totals: 9, 22, 37, 47, 56

(b) Plot (10, 0) and each cumulative frequency at the upper class bound: (20, 9), (30, 22), (40, 37), (50, 47), (60, 56); join with a smooth curve

(c) Read across from 28: 34 (accept 33 to 35)

Distance (d km)	Frequency	Cumulative frequency
$10 < d \leq 20$	9	9
$20 < d \leq 30$	13	22
$30 < d \leq 40$	15	37
$40 < d \leq 50$	10	47
$50 < d \leq 60$	9	56



Group 2 has the higher median (by 7);
✓ Group 1 is more consistent (smaller IQR, by 15).

Q22 · ● Greater Depth · 4 marks

METHOD

Median Group 1 = 34, Median Group 2 = 41 so Group 2 has the higher median, by 7

IQR Group 1 = 11, IQR Group 2 = 26 so Group 1 is more consistent (smaller IQR), by 15

✓ (a) 7, 16, 35, 44, 52; (c) 45

Q23 · ● Greater Depth · 6 marks

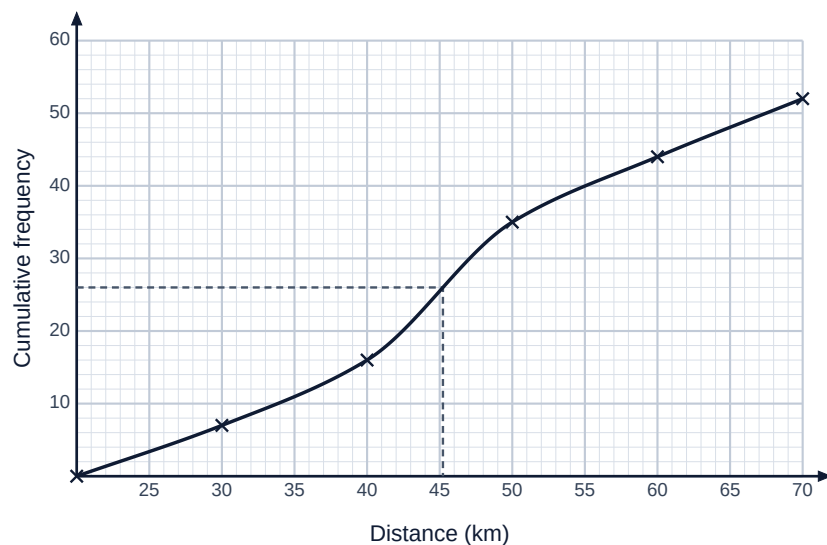
METHOD

(a) Running totals: 7, 16, 35, 44, 52

(b) Plot (20, 0) and each cumulative frequency at the upper class bound: (30, 7), (40, 16), (50, 35), (60, 44), (70, 52); join with a smooth curve

(c) Read across from 26: 45 (accept 44 to 46)

Distance (d km)	Frequency	Cumulative frequency
$20 < d \leq 30$	7	7
$30 < d \leq 40$	9	16
$40 < d \leq 50$	19	35
$50 < d \leq 60$	9	44
$60 < d \leq 70$	8	52



✓ (a) 6, 21, 43, 55, 62; (c) 24

Q24 · ● Greater Depth · 6 marks

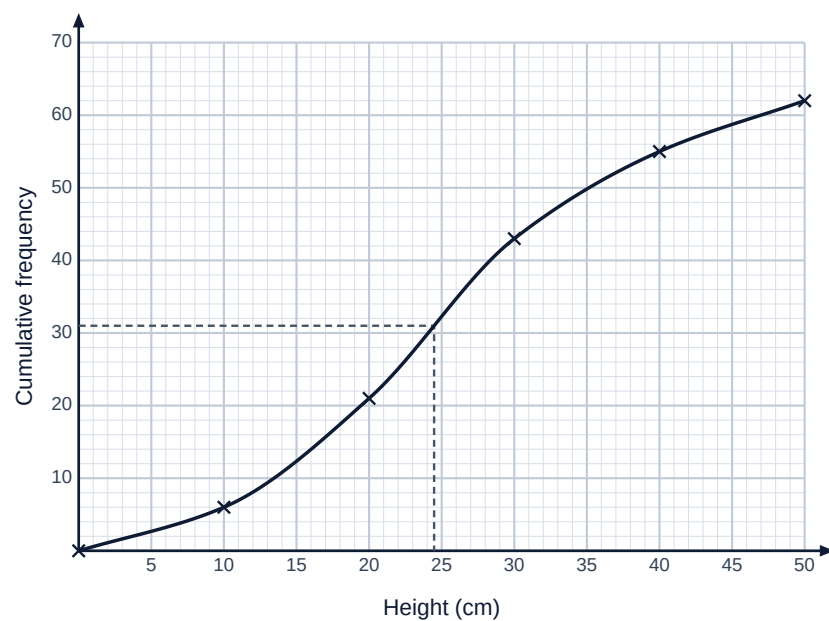
METHOD

(a) Running totals: 6, 21, 43, 55, 62

(b) Plot (0, 0) and each cumulative frequency at the upper class bound: (10, 6), (20, 21), (30, 43), (40, 55), (50, 62); join with a smooth curve

(c) Read across from 34: 24 (accept 23 to 26)

Height (h cm)	Frequency	Cumulative frequency
$0 < h \leq 10$	6	6
$10 < h \leq 20$	15	21
$20 < h \leq 30$	22	43
$30 < h \leq 40$	12	55
$40 < h \leq 50$	7	62



✓(a) 44; (b) 16

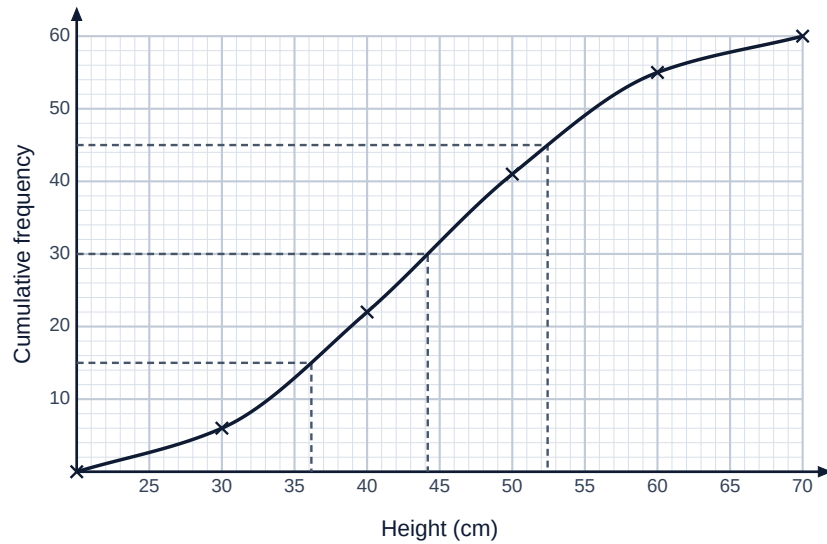
Q25 · ● Greater Depth · 4 marks

METHOD

(a) Median: read across from 30 ($60 \div 2$): 44 (accept 43 to 45)

(b) Lower quartile at 15: 36 (accept 35 to 37); upper quartile at 45: 52 (accept 51 to 54)

IQR = $52 - 36 = 16$ (accept 14 to 19)



✓(a) 27; (b) 18

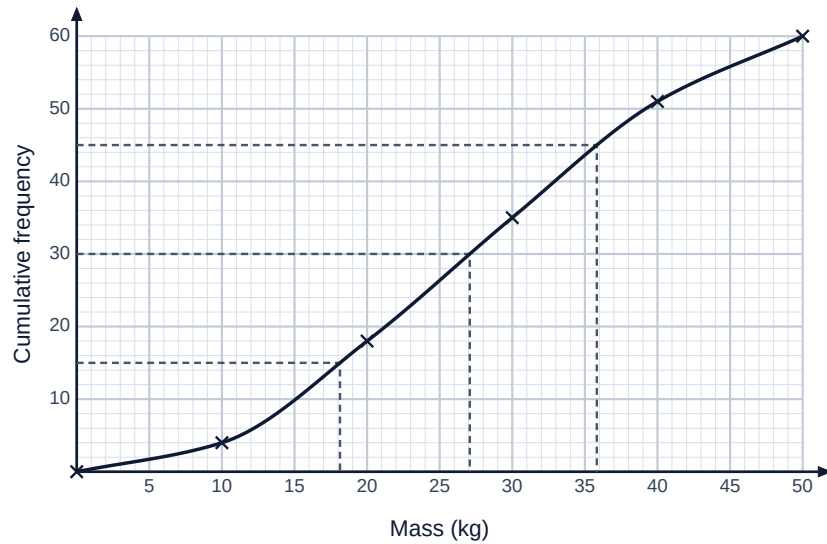
Q26 · ● Greater Depth · 4 marks

METHOD

(a) Median: read across from 30 ($60 \div 2$): 27 (accept 26 to 28)

(b) Lower quartile at 15: 18 (accept 17 to 19); upper quartile at 45: 36 (accept 35 to 37)

$IQR = 36 - 18 = 18$ (accept 16 to 20)



✓(a) 35; (b) 15

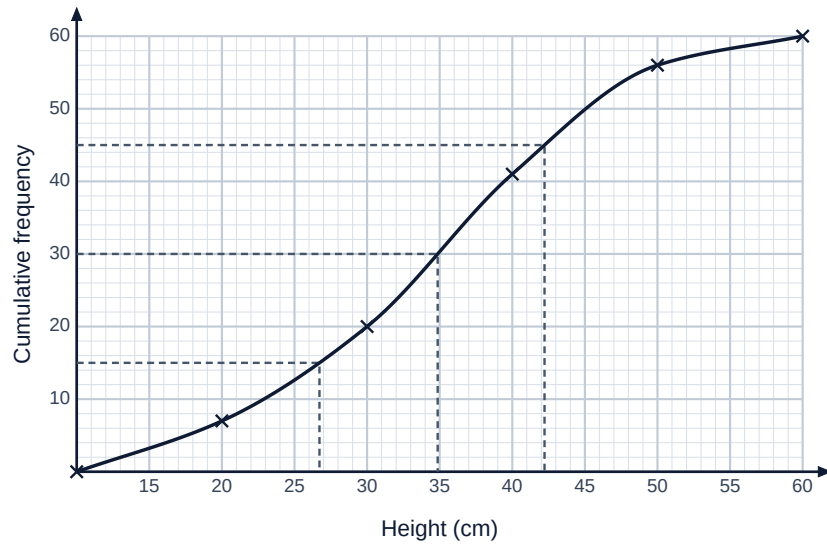
Q27 · ● Greater Depth · 4 marks

METHOD

(a) Median: read across from 30 ($60 \div 2$): 35 (accept 34 to 36)

(b) Lower quartile at 15: 27 (accept 25 to 28); upper quartile at 45: 42 (accept 41 to 44)

IQR = $42 - 27 = 15$ (accept 13 to 19)



✓(a) 36; (b) 15

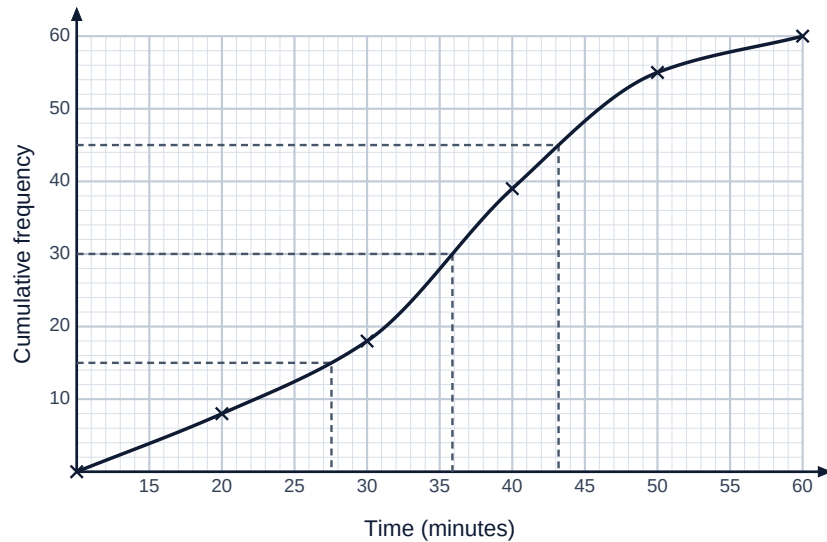
Q28 · ● Greater Depth · 4 marks

METHOD

(a) Median: read across from 30 ($60 \div 2$): 36 (accept 35 to 37)

(b) Lower quartile at 15: 28 (accept 26 to 29); upper quartile at 45: 43 (accept 42 to 45)

IQR = $43 - 28 = 15$ (accept 13 to 19)



Group 2 has the higher median (by 27);
✓ Group 1 is more consistent (smaller IQR, by 13).

Q29 · ● Greater Depth · 4 marks

METHOD

Median Group 1 = 25, Median Group 2 = 52 so Group 2 has the higher median, by 27

IQR Group 1 = 8, IQR Group 2 = 21 so Group 1 is more consistent (smaller IQR), by 13

Team Y has the higher median (by 16);
✓ Team X is more consistent (smaller IQR, by 5).

Q30 · ● Greater Depth · 4 marks

METHOD

Median Team X = 32, Median Team Y = 48 so Team Y has the higher median, by 16

IQR Team X = 9, IQR Team Y = 14 so Team X is more consistent (smaller IQR), by 5