GCSE Mathematics

Cumulative Frequency & Box Plots

Worked Solutions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation — Worked Solutions

[Fluency] Question 1

Cumulative frequencies: 5, 15, 35, 45, 50

Plot points at (20,5),(40,15),(60,35),(80,45),(100,50) and join with smooth curve

∴ **CF: 5, 15, 35, 45, 50**

[Fluency] Question 2

n=50. Median at 25th: x≈50. LQ at 12.5th: x≈35. UQ at 37.5th: x≈65

∴ **(a) 50 (b) 35 (c) 65 (d) IQR=30**

[Fluency] Question 3

Draw horizontal line from y=25 to curve, drop vertical to read median

Box from LQ=35 to UQ=65, line at median=50, whiskers to 10 and 92

∴ **Box plot correctly drawn ✓**

[Reasoning] Question 4

(a) Median = line inside box = 50

(b) IQR = UQ–LQ = 65–35 = 30

(c) UQ = 65% → 25% scored above 65%

∴ **(a) 50 (b) 30 (c) 25%**

[Reasoning] Question 5

CF: 8,22,42,52,60. n=60. Median at 30th → in 20-30 class

$$\text{Median} \approx 20 + \frac{30-22}{20} \times 10 = 24$$

$$LQ \approx 20 + \frac{15-22}{20} \times 10 \ldots \text{at 15th: in 10-20} \approx 17.9$$

$$UQ \approx 30 + \frac{45-42}{10} \times 10 = 33$$

IQR = 33-17.9 ≈ 15.1

∴ **Median ≈ 24 min, IQR ≈ 15 min**

[Problem Solving] Question 6

CF: 4,16,34,44,50. n=50. Median at 25th → in 160-170

$$\text{Median} \approx 160 + \frac{25-16}{18} \times 10 \approx 165$$

LQ at 12.5th → in 150-160 ≈ 157. UQ at 37.5th → in 170-180 ≈172. IQR≈15

Box plot: whisker from ≈142 to ≈188, box 157-172, median 165

∴ **Median ≈ 165 cm, IQR ≈ 15 cm**

Section B — Higher — Worked Solutions

[Fluency] Question 1

Read CF at x=70: ≈41. Number above = 50–41=9

10th percentile at 0.1×50=5th value: x≈20

∴ **(a) 9 students (b) ≈20%**

[Fluency] Question 2

Class B has higher median (60 vs 50) and higher UQ (72 vs 65)

Both have similar IQR (~30). Class B performed better overall.

Class A has lower minimum (10 vs 20) suggesting more low scorers.

∴ **Class B higher median and UQ; similar spread; Class B performed better overall.**

[Reasoning] Question 3

CF: 6,20,40,48,50. n=50. Median at 25th → in 100-150

$$\text{Median} \approx 100 + \frac{25-20}{20} \times 50 = 112.5$$

LQ at 12.5th → in 50-100 ≈ 73.2. UQ at 37.5th → in 100-150 ≈137.5. IQR≈64.3

Above 130g: CF at 130≈36 → above=50-36=14 → 14/50=28%

∴ **Median ≈ 112.5g, IQR ≈ 64.3g, above 130g ≈ 28%**

[Reasoning] Question 4

Box plot: whiskers at 20 and 95, box from 42 to 71, median at 58

$$UQ + 1.5 \times IQR = 71 + 1.5 \times 29 = 71 + 43.5 = 114.5$$

95 < 114.5 → 95 is NOT an outlier by this rule

∴ **95 is not an outlier (114.5 threshold not exceeded)**

[Problem Solving] Question 5

Group A CF: 4,20,32,40. Group B CF: 2,10,28,40

Group A median at 20th → in 30-60: 30+(20-4)/16×30=30+30=60

Group B median at 20th → in 60-90: 60+(20-10)/18×30=60+16.7=76.7

Group B has higher median (76.7 vs 60) — took longer on average

Group A: LQ≈41,UQ≈75,IQR≈34. Group B: LQ≈56,UQ≈86,IQR≈30

∴ **Group B: higher median (76.7 vs 60); similar IQR. Group B took longer.**