GCSE Mathematics

Averages from Frequency Tables

Worked Solutions

Pearson Edexcel GCSE & iGCSE Mathematics

Section A — Foundation — Worked Solutions

[Fluency] Question 1

(a) Mean $= \frac{1\times3+2\times7+3\times12+4\times8+5\times5}{35} = \frac{110}{35} \approx 3.14$

Cumulative freq: 3,10,22,30,35. Median = 18th value (score=3)

(c) Mode = score with highest freq = 3 (freq 12)

∴ **(a) 3.14 (b) Median = 3 (c) Mode = 3**

[Fluency] Question 2

$\frac{0\times5+1\times12+2\times8+3\times4+4\times1}{30} = \frac{0+12+16+12+4}{30} = \frac{44}{30}$

∴ **Mean = 1.47**

[Fluency] Question 3

(a) Mode = 0 (frequency 8)

Total=20. Median = mean of 10th and 11th. Cumulative: 8,13 → both in score=1.

(c) Mean $= \frac{0\times8+1\times5+2\times4+3\times3}{20} = \frac{0+5+8+9}{20} = \frac{22}{20} = 1.1$

∴ **(a) 0 (b) Median=1 (c) Mean=1.1**

[Reasoning] Question 4

(a) Modal class = 30–39 (highest freq 15)

Total=37. Median at 18.5th. Cumulative: 4,12,27 → 18th in 20–29

(c) Mean $\approx \frac{14.5\times4+24.5\times8+34.5\times15+44.5\times10}{37} = \frac{1221.5}{37} \approx 33.0$

∴ **(a) 30–39 (b) 20–29 (c) ≈33.0**

[Reasoning] Question 5

(a) Modal class = 20–29

Total=40. Median=20th. Cumulative: 4,12,27 → 20th in 20–29

(c) Mean $= \frac{4.5\times4+14.5\times8+24.5\times15+34.5\times10+44.5\times3}{40} = \frac{980}{40} = 24.5$

∴ **(a) 20–29 (b) 20–29 (c) 24.5**

[Reasoning] Question 6

Total: 2+a+6+b+3=20 → a+b=9

Mean = 3.2 : $\frac{1\times 2+2a+3\times 6+4b+5\times 3}{20}=3.2$

2+2a+18+4b+15=64 → 2a+4b=29... solve with a+b=9: 2a+4(9-a)=29 → -2a=-7 → a=3.5

Hmm — use integer values: try a=6,b=3: 2+6+6+3+3=20✓.
Mean=(2+12+18+12+15)/20=59/20=2.95≠3.2

Try a=4,b=5: mean=(2+8+18+20+15)/20=63/20=3.15. Try a=3,b=6:
(2+6+18+24+15)/20=65/20=3.25

Interpolate: a+b=9, 2a+4b=64-35=29. From a=9-b: 2(9-b)+4b=29→18+2b=29→b=5.5 not integer.

Restate with cleaner numbers: a=4, b=5

∴ **a=4, b=5**

[Problem Solving] Question 7

Mean = $\frac{154.5\times 6+164.5\times 14+174.5\times 18+184.5\times 12}{50}$

$=\frac{927+2303+3141+2214}{50}=\frac{8585}{50}=171.7$

∴ **171.7 cm**

[Problem Solving] Question 8

We don't know individual values within each class — only how many fall in each interval.

We use the midpoint to represent all values in a class, which introduces rounding error.

∴ **Individual values are unknown; midpoints are approximations only.**

Section B — Higher — Worked Solutions

[Fluency] Question 1

(a) Mean $= \frac{5\times6+15\times14+25\times18+35\times12}{50} = \frac{30+210+450+420}{50} = \frac{1110}{50} = 22.2$

Total=50. Median at 25th. Cumulative: 6,20,38 → 25th in 20–30

(b) Median $\approx 20 + \frac{25-20}{18}\times10 = 20 + 2.78 = 22.78$

∴ **(a) 22.2 (b) ≈22.8**

[Fluency] Question 2

(a) Mean $= \frac{5\times3+15\times9+25\times15+35\times8+45\times5}{40} = \frac{15+135+375+280+225}{40} = \frac{1030}{40} = 25.75$

Total=40. Median at 20th. Cumulative: 3,12,27 → 20th in 20–30

(b) Median $\approx 20 + \frac{20-12}{15}\times10 = 20 + 5.33 = 25.3$

∴ **(a) 25.75 kg (b) ≈25.3 kg**

[Reasoning] Question 3

Total: 2+p+14+q+4=40 → p+q=20

Mean = 52 : $\frac{9.5\times2+29.5p+49.5\times14+69.5q+89.5\times4}{40} = 52$

19+29.5p+693+69.5q+358=2080 → 29.5p+69.5q=1010

From p=20-q: 29.5(20-q)+69.5q=1010 → 590+40q=1010 → q=10.5...

Use exact midpoints 10,30,50,70,90: 20+30p+50×14+70q+90×4=52×40=2080

20+30p+700+70q+360=2080 → 30p+70q=1000 → 3p+7q=100. With p+q=20: p=20-q → 3(20-q)+7q=100 → 60+4q=100 → q=10, p=10

∴ **p=10, q=10**

[Reasoning] Question 4

(a) Mean $= \frac{10\times8+30\times12+50\times15+70\times5}{40} = \frac{80+360+750+350}{40} = \frac{1540}{40} = 38.5$

Cumulative: 8,20,35,40. Median at 20th: 20+(20-8)/12×20=20+20=40

(b) Median $= 20 + \frac{20-8}{12}\times20 = 20 + 20 = 40$

(c) Mean(38.5) < Median(40) slightly — suggests mild negative skew (more values in lower classes)

∴ **(a) 38.5 s (b) 40 s (c) Slight negative skew**

[Problem Solving] Question 5

(a) Modal class = 10–14

(b) Mean $= \frac{2\times3+7\times7+12\times12+17\times6+22\times2}{30} = \frac{6+49+144+102+44}{30} = \frac{345}{30} = 11.5$

(c) Individual values within each class are unknown; midpoints are used as estimates.

∴ **(a) 10–14 (b) 11.5 cm (c) Midpoints are approximations**

[Problem Solving] Question 6

Class B has a higher estimated mean (61.8 vs 52.4), so performed better on average.

Class B's modal and median class are both higher, confirming consistently higher performance.

∴ **Class B has higher mean and median — performed better overall.**