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Averages and Spread Measures

Solutions & Answer Key

Full worked solutions, marking scheme & answer key

IGCSE Mathematics

The Panda Math Tutor

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Companion to the *Student Worksheet*

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Note

About this booklet. These are the complete solutions to every question in the *Averages and Spread Measures — Student Worksheet*. Question numbers match exactly: the mean M1–M7, frequency tables F1–F4, grouped data G1–G4, the median D1–D6, mode and modal class O1–O5, choosing an average C1–C4, range and quartiles R1–R6, cumulative frequency U1–U4, box plots B1–B4, comparing data sets K1–K4, the Mixed Review MR1–MR10, and the examination questions 1–8 of Part III.
Reading from graphs. Any value read from a cumulative frequency curve is an *estimate*. The answers given here are the exact interpolated values with an acceptable range in brackets — an answer inside that range is fully correct.
Written answers. For comparison and "explain" questions, the wording given is a model answer. Any response making the same point in context earns the marks.
Part V collects the common mistakes to watch for, and Part VI is a quick answer key for fast marking.

4 Part IV — Complete Solutions

Note

Each solution names the formula being used and shows the steps in order, exactly as the notes recommend. Depth is scaled to difficulty — brief for basic questions, fuller for the harder ones.

4.1 Solutions — The Mean

Solution M1

$$\sum x = 12 + 17 + 9 + 14 + 8 = 60, \qquad n = 5,$$

$$\bar{x} = \frac{60}{5} = \boxed{12}.$$

Solution M2

$$\sum x = 23 + 31 + 18 + 26 + 27 + 19 = 144, \qquad n = 6,$$

$$\bar{x} = \frac{144}{6} = \boxed{24}.$$

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Solution M3

$$\sum x = 2.4 + 3.1 + 1.8 + 2.9 + 3.4 + 2.0 = 15.6, \qquad n = 6,$$

$$\bar{x} = \frac{15.6}{6} = \boxed{2.6\,\text{kg}}.$$

Solution M4

(a) Rearranging $\bar{x} = \dfrac{\sum x}{n}$ gives $\sum x = \bar{x} \times n$:

$$\sum x = 15 \times 8 = \boxed{120}.$$

(b) The new total is $120 + 24 = 144$ and there are now 9 values:

$$\bar{x} = \frac{144}{9} = \boxed{16}.$$

Solution M5

The total of all five numbers must be

$$\sum x = 18 \times 5 = 90.$$

The four known numbers add to

$$11 + 22 + 15 + 19 = 67.$$

Therefore the fifth number is

$$90 - 67 = \boxed{23}.$$

Solution M6

Total of the ten numbers:

$$\sum x = 7.5 \times 10 = 75.$$

Removing 12 leaves a total of $75 - 12 = 63$, spread over 9 values:

$$\bar{x} = \frac{63}{9} = \boxed{7}.$$

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