6.5 Averages from Frequency Tables: Test Pack

Calculators not allowed · about 55 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write down the mean, median and mode for each small frequency table.

(a) Data values: 2, 3, 3, 5 **(1)**

(b) Data values: 4, 4, 6 **(1)**

(c) Data values: 1, 2, 5, 6, 6 **(1)**

(d) Data values: 7, 7, 8, 9 **(1)**

2 A class of 15 pupils has scores with mean 12. One pupil with score 20 leaves and is replaced by a new pupil with score 8. Explain how the class mean changes and calculate the new mean.

(3)

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3 Estimate the mean from this grouped frequency table where class widths are 10.
Class: 0-9, 10-19, 20-29, 30-39
Frequency: 4, 6, 3, 2

(3)

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4 A frequency table shows marks 5, 6, 7 with frequencies 3, f, 4. The mean mark is 6.1. Find f.

(3)

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5 Stretch: A grouped table gives class intervals 1-3, 4-6, 7-9 with frequencies 5, 12, 8. Use the modal class to estimate the mode using linear interpolation within the modal class. The modal class is 4-6. Show your working and give your answer to 1 decimal place.

(4)

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6 Stretch: Which average, mean or median, would you quote for typical weekly pocket money if the distribution is strongly skewed by a few pupils with very large amounts? Give a short justification.

(3)

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7 The table shows the number of pets for a group of people.
number of pets = 2: frequency 6; number of pets = 3: frequency 3; number of pets = 4: frequency 5; number of pets = 5: frequency 6; number of pets = 6: frequency 6.
Work out the median.

(3)

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8 A small football club records goals scored in 5 matches: goals 0,1,2,3 with frequencies 1,2,1,1 respectively. Calculate the mean number of goals per match.

(2)

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9 The numbers of pets owned by 17 pupils are: 7, 5, 8, 4, 6, 7, 5, 4, 8, 8, 5, 8, 6, 4, 5, 4, 8.
What fraction of the pupils own exactly 7 pets? Give your answer in its simplest form.

(2)

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10 The numbers of pets owned by 18 pupils are: 8, 4, 7, 7, 8, 4, 4, 4, 4, 8, 6, 8, 6, 7, 8, 7, 5, 4.
Complete a frequency table to find how many pupils own 8 pets.

(2)

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11 From the table: Marks 0, 1, 2, 3 with frequencies 1, 4, 4, 1.

(a) State the mode. **(1)**

(b) Find the mean. **(1)**

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12 A set of 6 numbers has a mean of 9. Find the total sum of the 6 numbers.

(2)

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13 A grouped frequency table has class intervals 0-9, 10-19, 20-29 with frequencies 4, 10, 6. State the modal class and explain why the exact mode cannot be found from this table.

(2)

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14 A frequency table for the number of texts sent by 25 pupils shows:
Number of texts: 2, 3, 4
Frequency: 8, m, 6
Find m, then work out the mean number of texts sent.

(3)

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15 Two factory shifts recorded their average packing times.
Shift A: median = 18 minutes, mean = 19.5 minutes.
Shift B: median = 20 minutes, mean = 20.2 minutes.
State which shift's packing times are more likely to be skewed and justify your answer.

(3)

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16 Find the median of 1, 8, 3, 6, 4.

(1)

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17 A survey of 10 pupils records the number of siblings each has.
Number of siblings: 0, 1, 2, 3
Frequency: 3, 4, 2, 1
Calculate the mean number of siblings.

(2)

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Mark scheme · 6.5 Averages from Frequency Tables: Test Pack

Question 1

(a) mean = 3.25, median = 3, mode = 3 cao — **B1**

(a) Answer: **mean 3.25; median 3; mode 3**

(b) mean = 14/3, median = 4, mode = 4 cao — **B1**

(b) Answer: **mean 14/3; median 4; mode 4**

(c) mean = 20/5, median = 5, mode = 6 cao — **B1**

(c) Answer: **mean 4; median 5; mode 6**

(d) mean = 7.75, median = 7.5, mode = 7 cao — **B1**

(d) Answer: **mean 7.75; median 7.5; mode 7**

Question 2

state original total = 15 * 12 = 180 or show change in total by -12 (20 replaced by 8) — **M1**

new total = 180 - 20 + 8 = 168 — **M1**

new mean = 168/15 = 11.2 cao — **A1**

Answer: **11.2**

Question 3

use class midpoints 4.5, 14.5, 24.5, 34.5 and multiply by frequencies to get sums: 4*4.5 + 6*14.5 + 3*24.5 + 2*34.5 — **M1**

compute total frequency 15 and total of midpoint*freq = 18 + 87 + 73.5 + 69 = 247.5 (allow small rounding steps) — **M1**

mean approx = 247.5/15 = 16.5 cao — **A1**

Answer: **16.5**

Question 4

use equation (5*3 + 6*f + 7*4)/(3+f+4) = 6.1 or equivalent — **M1**

form 15 + 6f + 28 = 6.1(7 + f) => 43 + 6f = 42.7 + 6.1f and solve — **M1**

f = 3 cao — **A1**

Answer: **3**

Question 5

identify modal class 4-6 and write class width = 3, f1 = frequency of modal class = 12, f0 = previous class freq = 5, f2 = next class freq = 8 — **M1**

write interpolation formula estimate mode = L + ((f1 - f0)/(2*f1 - f0 - f2)) * w where L = lower class boundary and w = class width — **M1**

substitute values: L = 3.5, w = 3, numerator = 12 - 5 = 7, denominator = 2*12 - 5 - 8 = 24 - 13 = 11 giving fraction 7/11 — **M1**

mode approx = 3.5 + (7/11)*3 = 3.5 + 21/11 = 3.5 + 1.909... = 5.409... => 5.4 (1 dp) cao — **A1**

Answer: **5.4**

Question 6

state median as the preferred average — **M1**

give reason that mean is pulled by extreme values while median resists extremes — **M1**

concise conclusion: quote median because it better represents a typical pupil in skewed data — **A1**

Answer: **Median; because it is not affected by extreme large amounts and better represents a typical pupil**

Question 7

26 values in total, median at position 13.5 — **M1**

cumulative frequency used — **M1**

4 cao — **A1**

Answer: **4**

Question 8

use of sum value*frequency: 0*1 + 1*2 + 2*1 + 3*1 = 0 + 2 + 2 + 3 = 7 — **M1**

mean = 7/5 = 1.4 cao — **A1**

Answer: **1.4**

Question 9

frequency 2 found — **M1**

2/17 cao — **A1**

Answer: **2/17**

Question 10

systematic counting or a tally of the data — **M1**

5 cao — **A1**

Answer: **5**

Question 11

(a) mode = 1 and 2 (bimodal) cao — **B1**

(a) Answer: **1 and 2**

(b) mean = (0*1 + 1*4 + 2*4 + 3*1)/10 = 15/10 = 1.5 cao — **B1**

(b) Answer: **1.5**

Question 12

recognises sum = mean x number of values — **M1**

54 cao — **A1**

Answer: **54**

Question 13

modal class 10-19 cao — **B1**

reason: data are grouped so individual values inside the class are unknown, so the exact mode cannot be found — **B1**

Answer: **modal class 10-19; exact mode unknown because grouped data hide the individual values**

Question 14

m = 25 - 8 - 6 = 11 — **M1**

sum of value x frequency = 73 — **M1**

mean = 2.92 cao — **A1**

Answer: **m = 11; mean = 2.92**

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Question 15

calculates or compares the gap between mean and median for each shift	**M1**
states that a bigger gap between mean and median suggests more skew	**M1**
concludes Shift A is more likely skewed because its mean-median gap (1.5) is larger than Shift B's (0.2)	**A1**

Answer: **Shift A is more likely to be skewed**

Question 16

median = 4 cao	**B1**

Answer: **4**

Question 17

sum of value x frequency = 11 or equivalent method shown	**M1**
mean = 1.1 cao	**A1**

Answer: **1.1**

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