2.14 Averages: Test Pack

EDEXCEL 1MA1 · Calculator allowed · about 70 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Here are the shoe sizes of 9 students in a class:

5, 6, 5, 7, 8, 5, 6, 9, 5

Write down the mode of the shoe sizes.

(Total for Question 1 is 1 mark)

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2 Here are the number of goals scored by a hockey team in 7 matches:

4, 4, 6, 7, 7, 7, 9

Put a ring around the mode of this list of numbers.

- ☐ A) 4
- ☐ B) 6
- ☐ C) 7
- ☐ D) 9

(Total for Question 2 is 1 mark)

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3 Here are the heights, in centimetres, of 6 tomato plants grown in a greenhouse:

142, 118, 135, 127, 109, 151

Work out the range of the heights.

(Total for Question 3 is 2 marks)

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4 Priti was asked to find the mean of these numbers:
7, 12, 9, 15, 11, 6
Her working is shown below:
7 + 12 + 9 + 15 + 11 + 6 = 62
Mean = 62 / 6 = 10.33 (2 dp)
Priti has made an error. Identify her error and work out the correct mean.

(Total for Question 4 is 3 marks)

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5 A shop manager wants to advertise the 'typical' price of trainers sold last week. The price, in £, of each of the 9 pairs of trainers sold were:
40, 42, 45, 40, 41, 43, 40, 250, 44

(a) Calculate the mean price. **(2)**

.....

(b) Find the median price. **(2)**

.....

(c) The manager wants to use the average that best represents the 'typical' price. State whether the mean or the median should be used, giving a reason. **(2)**

(Total for Question 5 is 6 marks)

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6 Here is a set of data:
3, 7, 3, 9, 7, 2
State whether this data set has one mode, two modes (it is bimodal), or no mode.

(Total for Question 6 is 1 mark)

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7 Here are the ages, in years, of 7 people at a family party:
23, 19, 45, 8, 31, 12, 27
Find the median age.

(Total for Question 7 is 2 marks)

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8 For each statement, write down whether it is True or False.

(a) If a data set contains a value that is much higher than the rest, the median is usually a better measure of the average than the mean. **(1)**

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(b) The mode of a set of data is always unique. **(1)**

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(c) To find the range of a set of data, you subtract the mean from the largest value. **(1)**

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(Total for Question 8 is 3 marks)

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9 The mean of five numbers is 9. Four of the numbers are 6, 4, 11 and 14. Work out the fifth number.

(Total for Question 9 is 3 marks)

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10 A shoe shop wants to know which shoe size to order the most of for their winter stock. State which average (mean, median or mode) would be most useful for this purpose, and give a reason for your choice.

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(Total for Question 10 is 2 marks)

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11 A student, Ade, is working out the mean of these five numbers: 8, 12, 5, 19, 6. Here is his working:

$8 + 12 + 5 + 19 + 6 = 50$

Mean $= 50 / 4 = 12.5$

(a) Identify the error Ade has made in his working. **(1)**

(b) Work out the correct mean. **(2)**

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(Total for Question 11 is 3 marks)

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12 A class of 30 students sat a test. The mean mark was 62. A marking error is then found: one student's mark was recorded as 45 but should have been 75.

(a) Work out the correct mean mark for the class. **(3)**

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(b) Without recalculating, state whether the corrected mean is higher or lower than the original mean, and explain why. **(1)**

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(Total for Question 12 is 4 marks)

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13 Two tutor groups, 10R and 10G, each of 10 pupils, recorded how many books each pupil read last month.

10R:

Books read: 0, 1, 2, 3, 4

Frequency: 1, 2, 4, 2, 1

10G:

Books read: 0, 1, 2, 3, 4

Frequency: 0, 3, 4, 3, 0

(a) Show that the mean number of books read is the same for 10R and 10G. **(3)**

(b) Work out the range for each tutor group, and use your answers to state which tutor group's reading amounts were more consistent. **(3)**

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(Total for Question 13 is 6 marks)

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14 A local estate agent is describing the typical house price on a street. Nine of the ten houses on the street sold for around £200,000 each. The tenth house, much larger than the rest, sold for £950,000. Explain why the median would give a more useful description of the typical house price on this street than the mean.

.....

.....

(Total for Question 14 is 2 marks)

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15 A data set has n values with mean m. A new data set is formed by adding a constant amount k to every value in the original data set. Show that the mean of the new data set is m + k.

(Total for Question 15 is 3 marks)

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16 A student, Kwame, wants to find the median of this data set:
14, 3, 27, 9, 21, 6, 18
Kwame writes: 'There are 7 numbers, so the median is the 4th number listed, which is 9.'

(a) Explain the error in Kwame's method. **(1)**

(b) Find the correct median. **(1)**

(Total for Question 16 is 2 marks)

17 A drama club has 12 boys with a mean age of 14 years, and g girls with a mean age of 16 years. The mean age of all the boys and girls together is 15 years. Work out the value of g.

(Total for Question 17 is 4 marks)

18 Five positive integers have a mean of 6, a median of 5, a mode of 4 and a range of 7. Find a set of five numbers that satisfies all four conditions.

(Total for Question 18 is 4 marks)

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Mark scheme · 2.14 Averages: Test Pack

A correct answer earns full marks unless the question asks for working, a method, proof or explanation.

Question 1

5 cao **B1**

Answer: 5

Question 2

C (7) cao **B1**

Answer: C) 7

Question 3

151 and 109 identified as the highest and lowest values, oe (151 - 109) **M1**

42 cao **A1**

Answer: 42 cm

Question 4

identifies that the total (62) is incorrect / an addition error has been made **B1**

60 stated as the correct total **B1**

10 cao (60 / 6) **B1**

Answer: Priti's addition is wrong; the correct total is 60, so the correct mean is 10.

Question 5

(a) (40+42+45+40+41+43+40+250+44) / 9, oe (sum = 585 seen) **M1**

(a) 65 cao **A1**

(a) Answer: £65

(b) prices placed in order: 40, 40, 40, 41, 42, 43, 44, 45, 250, oe **M1**

(b) 42 cao **A1**

(b) Answer: £42

(c) median **B1**

(c) correct reason, e.g. £250 is an outlier / much higher than the other prices, so it makes the mean too high to be typical, oe **B1**

(c) Answer: The median (£42) should be used, because the price of £250 is an outlier that pulls the mean (£65) higher than most of the prices.

Question 6

two modes (bimodal): 3 and 7, oe **B1**

Answer: Two modes (bimodal): 3 and 7

Question 7

ages correctly ordered: 8, 12, 19, 23, 27, 31, 45 **M1**

23 cao **A1**

Answer: 23

Question 8

(a) True **B1**

(a) Answer: True

(b) False **B1**

(b) Answer: False

(c) False **B1**

(c) Answer: False

Question 9

5 x 9 (= 45) found **M1**

45 - (6 + 4 + 11 + 14) (oe: 45 - 35) **M1**

10 cao **A1**

Answer: 10

Question 10

mode **B1**

correct reason, e.g. the mode shows the shoe size that is bought most often/most frequently, which tells the shop what to stock the most of **B1**

Answer: Mode, because it identifies the shoe size bought most often, which the shop needs to stock the most of

Question 11

(a) Ade divided by 4 instead of 5, oe (there are 5 numbers in the list, not 4) **B1**

(a) Answer: Ade divided the total by 4 instead of by 5

(b) 50 / 5 **M1**

(b) 10 cao **A1**

(b) Answer: 10

Question 12

(a) 30 x 62 (= 1860) found **M1**

(a) 1860 - 45 + 75 (oe: 1860 + 30) **M1**

(a) 63 cao **A1**

(a) Answer: 63

(b) higher, because the corrected mark (75) is greater than the mark it replaced (45), so the total (and therefore the mean) increases **B1**

(b) Answer: Higher, because 75 is greater than the 45 it replaced, so the total mark increases

Question 13

(a) 10R total books = (0x1)+(1x2)+(2x4)+(3x2)+(4x1) (= 20) seen **M1**

(a) 10G total books = (0x0)+(1x3)+(2x4)+(3x3)+(4x0) (= 20) seen **M1**

(a) both means = 20/10 = 2.0, hence equal, cso **A1**

(a) Answer: Both means = 2.0 (shown to be equal)

(b) 10R range = 4 (from 4 - 0) **B1**

(b) 10G range = 2 (from 3 - 1) **B1**

(b) 10G (ft from correct ranges), because its smaller range shows the number of books read varied less/was more consistent **B1**

(b) Answer: 10R range = 4, 10G range = 2; 10G was more consistent

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Question 14

states that the £950,000 house pulls/inflates the mean well above what most houses actually sold for **B1**

states that the median is not affected by the one very high value, so it better represents the typical price on the street **B1**

Answer: The median is more useful because the one much higher price would pull the mean up, making it look higher than what most houses actually sold for; the median is not affected by this extreme value

Question 15

original total = n x m (from the definition of the mean) **M1**

new total = nm + nk (each of the n values increases by k, so the total increases by n x k) **M1**

new mean = (nm + nk) / n = m + k, cso **A1**

Answer: New mean = m + k (shown)

Question 16

(a) the data must be arranged in order (ascending or descending) before finding the middle value; Kwame took the 4th value as listed, not the 4th value once ordered **B1**

(a) Answer: Kwame did not put the numbers in order first; the median must be found from the ordered data, not the order the numbers were listed in

(b) 14 cao **B1**

(b) Answer: 14

Question 17

12 x 14 (= 168) found (total age of boys) **M1**

sets up (168 + 16g) / (12 + g) = 15 (oe) **M1**

168 + 16g = 180 + 15g (oe), leading to g = 12 **M1**

g = 12 cao **A1**

Answer: g = 12

Question 18

uses the mean to find the total of the five numbers: 5 x 6 = 30 **M1**

uses the mode and median conditions correctly, e.g. two values equal to 4 placed as the two lowest numbers, with 5 as the (3rd, middle) value **M1**

uses the range condition with the smallest value (4) to fix the largest value (4 + 7 = 11), then finds the remaining value from the total **M1**

a fully correct set of five positive integers satisfying all four conditions, e.g. 4, 4, 5, 6, 11 (accept any other valid set) **A1**

Answer: 4, 4, 5, 6, 11 (one valid answer; other correct sets may exist)

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