6.9 Comparing Distributions: Test Pack

Calculators not allowed · about 55 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Write down the mean of the five test scores: 6, 9, 8, 7, 10.

(2)

2 A data set has mean 30 and range 12. If every value is increased by 5, what are the new mean and new range?

(3)

3 Two teachers compare their class test results out of 20.
Teacher P: scores 16, 15, 16, 17, 14, 16, 15, 16
Teacher Q: scores 10, 12, 14, 15, 16, 18, 19, 1
Find mean and range for both classes and state which class has the higher average and which is more consistent (smaller spread). Justify your answer with numbers.

(4)

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4 Which of these two datasets likely has the larger standard deviation? Give a short reason.
Set C: 49, 50, 51, 50, 49
Set D: 30, 40, 50, 60, 70

(3)

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5 Two groups of runners have these times in minutes.
Group E: 7, 8, 7, 9, 8
Group F: 5, 9, 7, 8, 7
Calculate each group's IQR and say which group is more consistent using IQR as the measure.

(4)

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6 State the 90th percentile (the value above which 10% of data lie) for this sorted list of 10 values: 2, 4, 6, 8, 10, 12, 14, 16, 18, 20.

(2)

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7 Explain in one sentence why the median is often a better measure than the mean for a distribution with outliers.

(2)

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8 State the median of the list: 12, 7, 9, 14, 11.

(1)

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9 Give the mode of these shoe sizes: 4, 6, 5, 6, 7, 6, 5.

(1)

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10 Here are summary statistics for minutes.
Ali: mean 28, range 3.
Bea: mean 16, range 18.
Compare the two sets of data.

(2)

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11 Calculate the range of these weights in kg: 48, 52, 45, 50, 47.

(2)

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12 The times in minutes that 8 people spent in a queue are: 10, 13, 17, 21, 24, 28, 30, 117.
Work out the mean and the median. Which average is a better summary of a typical wait? Give a reason.

(4)

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13 Here are summary statistics for marks.
Class 8X: mean 14, range 10.
Class 8Y: mean 21, range 16.
Compare the two sets of data.

(2)

14 Two sets of exam scores are shown.
Set X: 55, 57, 58, 59, 60, 61, 62
Set Y: 40, 42, 44, 50, 60, 80, 100
State which set is more likely to be skewed and explain how the mean and median compare for that skew (one or two sentences).

(3)

15 Here are the times, in seconds, of two runners over several races.
Runner A: 8, 27, 25, 23, 9, 8, 24
Runner B: 30, 33, 29, 39, 6, 20, 19
Compare the two runners using the median and the range.

(4)

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16 Compare the spread of these two small data sets using range and give a one-sentence conclusion.

A	3	4	5	6	7
B	1	5	5	6	9

(3)

17 A cumulative frequency for test marks out of 20 is given as: marks 0-5: 3, 6-10: 9, 11-15: 15, 16-20: 20 (cumulative). Estimate the median mark.

(2)

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Mark scheme · 6.9 Comparing Distributions: Test Pack

Question 1

sum of scores shown or stated (6+9+8+7+10 = 40) or method of adding	M1
mean = 8 cao	A1

Answer: **8.0 (or 8)**

Question 2

state new mean = old mean + 5	M1
state new range is unchanged (range = 12) or show reasoning	M1
new mean = 35 and new range = 12 cao	A1

Answer: **Mean = 35, Range = 12**

Question 3

correct mean for P or correct method shown (sum = 125, mean = 15.625)	M1
correct mean for Q or correct method shown (sum = 105, mean = 13.125)	M1
range for P = 17 - 14 = 3 and range for Q = 19 - 1 = 18 stated	M1
conclusion: P has higher average (15.625 > 13.125) and P is more consistent (smaller range) cao	A1

Answer: **P mean = 15.625, range = 3; Q mean = 13.125, range = 18. So P has the higher average and is more consistent.**

Question 4

identify D as having larger spread (values further from mean)	M1
reference to values being more widely spread or giving approximate ranges (C range 2, D range 40)	M1
conclusion that D has the larger standard deviation with brief reason cao	A1

Answer: **Set D; values are spread much more widely so standard deviation will be larger**

Question 5

correct ordered lists shown or used for each group	M1
correct Q1 and Q3 for one group (E ordered 7,7,8,8,9 -> Q1=7, Q3=8.5)	M1
correct Q1 and Q3 for the other group (F ordered 5,7,7,8,9 -> Q1=6, Q3=8.5)	M1
IQR E = 1.5, IQR F = 2.5 so Group E is more consistent (smaller IQR) cao	A1

Answer: **IQR E = 1.5, IQR F = 2.5; Group E is more consistent (smaller IQR)**

Question 6

correct method to find position: 0.9 x (n) = 0.9 x 10 = 9th value or appropriate percentile method	M1
90th percentile = 18 cao	A1

Answer: **18**

Question 7

state that outliers pull the mean towards them	M1
state that median is less affected by extreme values so better represents centre for skewed data cao	A1

Answer: **Because outliers pull the mean towards them, the median is less affected by extreme values and so better represents the centre for skewed distributions.**

Question 8

median = 11 cao	B1

Answer: **11**

Question 9

mode = 6 cao	B1

Answer: **6**

Question 10

comparison of the averages: Ali has the higher mean	B1
comparison of the spread: Ali is more consistent (smaller range)	B1

Answer: **Ali has the higher mean; Ali is more consistent as it has the smaller range**

Question 11

correct subtraction shown: max - min (52 - 45)	M1
range = 7 kg cao	A1

Answer: **7 kg**

Question 12

mean 32.5	B1
median 22.5	B1
median chosen	B1
reason: 117 is an extreme value which pulls the mean up	B1

Answer: **mean 32.5, median 22.5; the median is better because 117 is an extreme value**

Question 13

comparison of the averages: Class 8Y has the higher mean	B1
comparison of the spread: Class 8X is more consistent (smaller range)	B1

Answer: **Class 8Y has the higher mean; Class 8X is more consistent as it has the smaller range**

Question 14

identify Set Y as skewed (values spread with high outliers) or Set X as symmetric	M1
state effect on mean (pulled towards tail) or median less affected	M1
clear conclusion: for skewed Set Y mean is greater than median (because high values pull mean up) cao	A1

Answer: **Set Y is skewed; mean is greater than median because the high values pull the mean up**

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Question 15

medians 23 and 29	**B1**
ranges 19 and 33	**B1**
comparison of medians: Runner B has the higher median	**B1**
comparison of ranges: Runner A is more consistent	**B1**

Answer: **Runner B has the higher median (23 and 29); Runner A is more consistent (ranges 19 and 33)**

Question 16

correct range for A shown (7 - 3 = 4) or for B (9 - 1 = 8)	**M1**
both ranges stated (A = 4, B = 8)	**M1**
conclusion that B has larger spread cao	**A1**

Answer: **Range A = 4, Range B = 8; B has the larger spread**

Question 17

recognise median position is 1/2 of 20 = 10th value and locate it in 11-15 group (cumulative reaches 9 then 15)	**M1**
estimate median = about 11 (the median lies in the 11-15 group: accept 11 as the lowest value of the group, or about 11.3 by interpolation) cao	**A1**

Answer: **Approximately 11 (the median lies in the 11-15 group)**

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