nexamind EDUCATION

Name _____ Date _____

16.3 Choosing the right average — worked answers

Choose and explain which of the mode, median and mean is most appropriate for a given context, and recognise the effect of an outlier. · 48 questions

A · Fluency — Which average fits, and all four statistics computed.

1 Which average is most appropriate for **favourite colour of 30 learners**?

☐ mode
☐ median
☐ mean

Answer: mode
The **mode**, because the data is words, and only the mode works for words.

2 Which average is most appropriate for **shoe sizes sold in a shop**?

☐ mode
☐ median
☐ mean

Answer: mode
The **mode**, because the shop wants the size it sells most of.

3 Which average is most appropriate for **house prices on a street with one mansion**?

☐ mode
☐ median
☐ mean

Answer: median
The **median**, because one extreme value would drag the mean up and describe nobody.

4 Which average is most appropriate for **test scores with no extreme values**?

☐ mode
☐ median
☐ mean

Answer: mean
The **mean**, because it uses every score, which is what you want when nothing is extreme.

5 Which average is most appropriate for **salaries in a company where the owner earns ten times the rest**?

☐ mode
☐ median
☐ mean

Answer: median
The **median**, because the owner's salary distorts the mean badly.

6 Which average is most appropriate for **the most popular pizza topping**?

☐ mode
☐ median
☐ mean

Answer: mode
The **mode**, because the data is categories, not numbers.

7 Which average is most appropriate for **the number of goals per game over a season**?

☐ mode
☐ median
☐ mean

Answer: mean
The **mean**, because it accounts for every game, and no score is wildly extreme.

8 Which average is most appropriate for **times for 100 m, one runner having stopped to tie a lace**?

☐ mode
☐ median
☐ mean

Answer: median
The **median**, because that one very slow time is not typical of the rest.

9 Which average is most appropriate for **the mass of 50 similar parcels**?

☐ mode
☐ median
☐ mean

Answer: mean
The **mean**, because the values are close together, so every one is worth using.

10 Which average is most appropriate for **the most common number of people in a car**?

☐ mode
☐ median
☐ mean

Answer: mode
The **mode**, because the question literally asks which value happens most.

11 Which average is most appropriate for **daily temperature over a month**?

☐ mode
☐ median
☐ mean

Answer: mean
The **mean**, because temperatures do not have wild outliers, so all the data helps.

12 Which average is most appropriate for **the middle income of a country**?

☐ mode
☐ median
☐ mean

Answer: median
The **median**, because the word middle is asking for the median, and incomes are skewed.

13 These are house prices, in thousands of dollars:
180, 200, 210, 220, 240, 950
What is the mean? Give the answer to one decimal place.

Answer: 333.3
The total is 2000 and there are 6 values, so the mean is 2000 ÷ 6 = 333.3 to one decimal place.

14 These are house prices, in thousands of dollars:
180, 200, 210, 220, 240, 950
What is the median?

Answer: 215
In order: 180, 200, 210, 220, 240, 950. The median is 215.

15 These are house prices, in thousands of dollars:
180, 200, 210, 220, 240, 950
What is the range?

Answer: 770
950 − 180 = 770.

16 These are shoe sizes:
6, 7, 7, 8, 7, 9, 6
What is the mean? Give the answer to one decimal place.

Answer: 7.1
The total is 50 and there are 7 values, so the mean is 50 ÷ 7 = 7.1 to one decimal place.

17 These are shoe sizes:
6, 7, 7, 8, 7, 9, 6
What is the median?

Answer: 7
In order: 6, 6, 7, 7, 7, 8, 9. The median is 7.

18 These are shoe sizes:
6, 7, 7, 8, 7, 9, 6
What is the mode?

Answer: 7
7 occurs 3 times, more often than any other value.

19 These are shoe sizes:
6, 7, 7, 8, 7, 9, 6
What is the range?

Answer: 3
9 − 6 = 3.

20 Which value in this set is the outlier?
4, 5, 6, 5, 40

Answer: 40
40 sits a long way from all the others. An outlier like this is exactly what pulls a mean off course.

21 Which value in this set is the outlier?
12, 14, 13, 15, 90

Answer: 90
90 sits a long way from all the others. An outlier like this is exactly what pulls a mean off course.

22 Which value in this set is the outlier?
21, 22, 20, 23, 2

Answer: 2
2 sits a long way from all the others. An outlier like this is exactly what pulls a mean off course.

23 Which value in this set is the outlier?
7, 8, 9, 7, 60

Answer: 60
60 sits a long way from all the others. An outlier like this is exactly what pulls a mean off course.

B · Reasoning — Outliers, categories and why the reason earns the mark.

24 Which average is affected most by one extreme value?
- ☐ mode
- ☐ median
- ☐ mean
- ☐ they are all affected equally

Answer: mean
It uses every value, so an extreme one is fully counted.

25 Which average can be used for data that is **words**?
- ☐ mode
- ☐ median
- ☐ mean
- ☐ any of them

Answer: mode
You can count which colour occurs most; you cannot add colours up.

26 What is an **outlier**?
- ☐ The largest value
- ☐ A value far away from the rest
- ☐ The mode
- ☐ A mistake

Answer: A value far away from the rest
It may be a genuine reading or a recording error — either way it deserves a comment.

27 House prices on a street are 180, 200, 210, 220, 240 and 950 thousand. Which average describes the street better?
- ☐ the mean
- ☐ the median
- ☐ the mode
- ☐ neither

Answer: the median
The mean is about 333 thousand, which is more than five of the six houses cost. The median, 215, describes them far better.

28 A shop wants to know which size to order most of. It should use …

- ☐ the mean
- ☐ the median
- ☐ the mode
- ☐ none of them

Answer: the mode

It wants the most frequent size, and a mean shoe size of 7.1 is no use to anyone — nobody has size 7.1 feet.

29 Should you always ignore an outlier?

- ☐ Yes
- ☐ No

Answer: No

It may be a genuine and important reading. Investigate it and say what you decided — do not silently delete it.

30 Why quote a range alongside an average?

- ☐ It looks thorough
- ☐ Because an average alone says nothing about how spread out the data is
- ☐ It is required
- ☐ To find the mode

Answer: Because an average alone says nothing about how spread out the data is

Two classes with the same mean can be worlds apart in consistency.

31 Which average is best when the values are close together with no extremes?

- ☐ mode
- ☐ median
- ☐ mean
- ☐ they are equally good

Answer: mean

Nothing distorts it, and it uses all the information available.

32 Can the mean, median and mode of a set all be the same?

- ☐ Yes
- ☐ No

Answer: Yes

For a symmetric set such as 4, 5, 5, 5, 6 all three are 5.

33 A question says “explain which average is most appropriate”. What must your answer include?

- ☐ The value only
- ☐ The name of the average and a reason from the context
- ☐ All three averages
- ☐ A chart

Answer: The name of the average and a reason from the context

The reason is where the mark is. “The median, because one house is far more expensive than the rest.”

C · Challenge — The effect of removing or correcting a value.

34 The set 4, 5, 6, 5, 40 has an outlier. What is the mean with the outlier included?

Answer: 12

4 + 5 + 6 + 5 + 40 = 60, and 60 ÷ 5 = 12.

35 The set 4, 5, 6, 5, 40 has an outlier. What is the mean with the outlier removed?

Answer: 5

Without 40: 4 + 5 + 6 + 5 = 20, and 20 ÷ 4 = 5. The outlier more than doubled the mean.

36 The set 4, 5, 6, 5, 40 has an outlier. What is the median?

Answer: 5

In order: 4, 5, 5, 6, 40. The middle value is 5 — the outlier has not moved it at all.

37 A class of 30 has a mean score of 15. The teacher finds one score was recorded as 40 instead of 4. What is the corrected mean?

Answer: 13.8

The recorded total was 15 × 30 = 450. Correcting the score removes 36: 450 − 36 = 414, and 414 ÷ 30 = 13.8.

38 Two classes both have a mean score of 12. Class A has range 4 and class B has range 20. Which class number is the more consistent, A or B? Answer 1 for A and 2 for B.

Answer: 1

The same average, but class A's scores are far closer together. A smaller range means more consistent.

39 Five values have a mean of 10 and a range of 4. The smallest is 8. What is the largest?

Answer: 12

8 + 4 = 12. The mean is not needed for this part — a nice reminder to read what is actually asked.

40 Six numbers have a mean of 20. The largest, 45, is removed. What is the mean of the remaining five?

Answer: 15

The total was 20 × 6 = 120. Removing 45 leaves 120 − 45 = 75 over 5 numbers: 75 ÷ 5 = 15.

D · Word problems — Salaries, bakeries, cricket and consistency.

41 In an office, nine people earn $30 000 and the manager earns $210 000. What is the mean salary, in dollars?

Answer: 48000

The total is 9 × 30000 + 210000 = 480000, over 10 people: 480000 ÷ 10 = 48000 dollars.

42 In that office, what is the median salary, in dollars?

Answer: 30000

In order, nine salaries of 30000 come first. With ten values the median is halfway between the 5th and 6th, and both are 30000. The median describes the staff far better than the mean does.

43 A bakery records daily sales of 40, 42, 39, 41 and 158 loaves — the last being a festival day. What is the median?

Answer: 41

In order: 39, 40, 41, 42, 158. The middle value is 41.

44 For that bakery, what is the mean, to the nearest whole loaf?

Answer: 64

40 + 42 + 39 + 41 + 158 = 320, and 320 ÷ 5 = 64. That is more than any ordinary day — the festival has distorted it.

45 A survey records favourite fruits: apple, banana, apple, cherry, apple, banana. How many people chose the modal fruit?

Answer: 3

Apple was chosen three times, more than any other — and the mode is the only average that can handle words at all.

46 A cricketer scores 12, 15, 0, 18, 95 and 10. Which is larger, the mean or the median? Answer 1 for the mean and 2 for the median.

Answer: 1

The total is 150, so the mean is 150 ÷ 6 = 25. In order the scores are 0, 10, 12, 15, 18, 95, so the median is halfway between 12 and 15, which is 13.5. The mean is larger, pulled up by the 95.

47 Two shops have mean daily sales of 50. Shop A has a range of 6 and shop B a range of 60. Which shop's sales are easier to plan for? Answer 1 for A and 2 for B.

Answer: 1

Shop A's sales barely vary, so stock and staffing can be planned confidently. The average alone would not have told you that.

48 A learner's five scores are 7, 8, 8, 9 and 8. What is the range?

Answer: 2

9 − 7 = 2. A very small range: this learner is consistent.