

Name _____

Date _____

16.2 The mean — worked answers

Calculate the mean of a data set, find it from a frequency table, and use it to work backwards to a total or a missing value. · 64 questions

A · Fluency — Means, totals, and back again.

- 1 Find the **mean** of this set of data:

4, 6, 8, 10, 12

Answer: 8

Add them up: $4 + 6 + 8 + 10 + 12 = 40$. There are 5 values, so the mean is $40 \div 5 = 8$.

- 2 Find the **mean** of this set of data:

3, 7, 5, 9, 11

Answer: 7

Add them up: $3 + 7 + 5 + 9 + 11 = 35$. There are 5 values, so the mean is $35 \div 5 = 7$.

- 3 Find the **mean** of this set of data:

12, 15, 18, 21, 24

Answer: 18

Add them up: $12 + 15 + 18 + 21 + 24 = 90$. There are 5 values, so the mean is $90 \div 5 = 18$.

- 4 Find the **mean** of this set of data:

2, 4, 4, 6, 9

Answer: 5

Add them up: $2 + 4 + 4 + 6 + 9 = 25$. There are 5 values, so the mean is $25 \div 5 = 5$.

- 5 Find the **mean** of this set of data:

10, 20, 30, 40

Answer: 25

Add them up: $10 + 20 + 30 + 40 = 100$. There are 4 values, so the mean is $100 \div 4 = 25$.

- 6 Find the **mean** of this set of data:

7, 7, 8, 10

Answer: 8

Add them up: $7 + 7 + 8 + 10 = 32$. There are 4 values, so the mean is $32 \div 4 = 8$.

- 7 Find the **mean** of this set of data:

15, 25, 35, 45, 55

Answer: 35

Add them up: $15 + 25 + 35 + 45 + 55 = 175$. There are 5 values, so the mean is $175 \div 5 = 35$.

- 8 Find the **mean** of this set of data:

6, 9, 12, 15, 18

Answer: 12

Add them up: $6 + 9 + 12 + 15 + 18 = 60$. There are 5 values, so the mean is $60 \div 5 = 12$.

- 9 Find the **mean** of this set of data:

1, 3, 5, 7, 9, 11

Answer: 6

Add them up: $1 + 3 + 5 + 7 + 9 + 11 = 36$. There are 6 values, so the mean is $36 \div 6 = 6$.

- 10 Find the **mean** of this set of data:

20, 24, 28, 32

Answer: 26

Add them up: $20 + 24 + 28 + 32 = 104$. There are 4 values, so the mean is $104 \div 4 = 26$.

- 11 What is the **total** of this set of data?

4, 6, 8, 10, 12

Answer: 40

$4 + 6 + 8 + 10 + 12 = 40$. The total is the first thing the mean needs.

- 12 What is the **total** of this set of data?

3, 7, 5, 9, 11

Answer: 35

$3 + 7 + 5 + 9 + 11 = 35$. The total is the first thing the mean needs.

- 13 What is the **total** of this set of data?

12, 15, 18, 21, 24

Answer: 90

$12 + 15 + 18 + 21 + 24 = 90$. The total is the first thing the mean needs.

- 14 What is the **total** of this set of data?

2, 4, 4, 6, 9

Answer: 25

$2 + 4 + 4 + 6 + 9 = 25$. The total is the first thing the mean needs.

- 15 What is the **total** of this set of data?

10, 20, 30, 40

Answer: 100

$10 + 20 + 30 + 40 = 100$. The total is the first thing the mean needs.

- 16 What is the **total** of this set of data?

7, 7, 8, 10

Answer: 32

$7 + 7 + 8 + 10 = 32$. The total is the first thing the mean needs.

- 17 What is the **total** of this set of data?

15, 25, 35, 45, 55

Answer: 175

$15 + 25 + 35 + 45 + 55 = 175$. The total is the first thing the mean needs.

- 18 What is the **total** of this set of data?

6, 9, 12, 15, 18

Answer: 60

$6 + 9 + 12 + 15 + 18 = 60$. The total is the first thing the mean needs.

- 19** What is the **total** of this set of data?

1, 3, 5, 7, 9, 11

Answer: 36

$1 + 3 + 5 + 7 + 9 + 11 = 36$. The total is the first thing the mean needs.

- 20** What is the **total** of this set of data?

20, 24, 28, 32

Answer: 104

$20 + 24 + 28 + 32 = 104$. The total is the first thing the mean needs.

- 21** 5 numbers have a mean of 7. What is their total?

Answer: 35

Mean = total $\div$ how many, so total = mean $\times$ how many: $7 \times 5 = 35$.

- 22** 4 numbers have a mean of 12. What is their total?

Answer: 48

Mean = total $\div$ how many, so total = mean $\times$ how many: $12 \times 4 = 48$.

- 23** 6 numbers have a mean of 20. What is their total?

Answer: 120

Mean = total $\div$ how many, so total = mean $\times$ how many: $20 \times 6 = 120$.

- 24** 8 numbers have a mean of 9. What is their total?

Answer: 72

Mean = total $\div$ how many, so total = mean $\times$ how many: $9 \times 8 = 72$.

- 25** 10 numbers have a mean of 15. What is their total?

Answer: 150

Mean = total $\div$ how many, so total = mean $\times$ how many: $15 \times 10 = 150$.

- 26** 12 numbers have a mean of 6. What is their total?

Answer: 72

Mean = total $\div$ how many, so total = mean $\times$ how many: $6 \times 12 = 72$.

- 27** 4 numbers have a mean of 25. What is their total?

Answer: 100

Mean = total $\div$ how many, so total = mean $\times$ how many: $25 \times 4 = 100$.

- 28** 5 numbers have a mean of 30. What is their total?

Answer: 150

Mean = total $\div$ how many, so total = mean $\times$ how many: $30 \times 5 = 150$.

- 29** 5 numbers have a total of 60. What is their mean?

Answer: 12

$60 \div 5 = 12$.

- 30** 7 numbers have a total of 84. What is their mean?

Answer: 12

$84 \div 7 = 12$.

- 31** 8 numbers have a total of 120. What is their mean?

Answer: 15

$120 \div 8 = 15$.

- 32** 9 numbers have a total of 45. What is their mean?

Answer: 5

$$45 \div 9 = 5.$$

- 33** 12 numbers have a total of 144. What is their mean?

Answer: 12

$$144 \div 12 = 12.$$

- 34** 6 numbers have a total of 72. What is their mean?

Answer: 12

$$72 \div 6 = 12.$$

- 35** How many people were asked?

Number of pets	Frequency
0	4
1	7
2	5
3	4
Total	20

Answer: 20

Add the frequency column: $4 + 7 + 5 + 4 = 20$.

- 36** How many pets are there altogether?

Number of pets	Frequency
0	4
1	7
2	5
3	4
Total	20

Answer: 29

Multiply each value by its frequency, then add: $0 \times 4 = 0$, $1 \times 7 = 7$, $2 \times 5 = 10$ and $3 \times 4 = 12$. $0 + 7 + 10 + 12 = 29$.

- 37** What is the mean number of pets? Give the answer to two decimal places.

Number of pets	Frequency
0	4
1	7
2	5
3	4
Total	20

Answer: 1.45

Divide the total number of pets by the number of people: $29 \div 20 = 1.45$ pets. A mean can be a value nobody actually has — nobody owns 1.45 pets.

38 What is the modal number of pets?

Number of pets	Frequency
0	4
1	7
2	5
3	4
Total	20

Answer: 1

7 is the largest frequency, and it belongs to the row for 1 pet.

39 What is the range of the number of pets?

Number of pets	Frequency
0	4
1	7
2	5
3	4
Total	20

Answer: 3

$3 - 0 = 3$.

B · Reasoning — What the mean is doing, and what it cannot do.

40 How do you find the mean?

- ☐ The middle value
- ☐ The most common value
- ☐ Add them all up, then divide by how many there are
- ☐ Largest minus smallest

Answer: Add them all up, then divide by how many there are

It shares the total out equally between them.

41 What does the mean really do?

- ☐ Picks the middle
- ☐ Shares the total out equally
- ☐ Counts the most common
- ☐ Measures spread

Answer: Shares the total out equally

If everyone had the same, that is what they would each have.

42 Must the mean be one of the values in the data?

- ☐ Yes
- ☐ No

Answer: No

The mean number of children per family is famously something like 1.8, and no family has 1.8 children.

43 Given the mean and how many values there are, the total is ...

- ☐ mean $\div$ how many
- ☐ mean $\times$ how many
- ☐ mean $+$ how many
- ☐ impossible to find

Answer: mean $\times$ how many

Reverse the division. This is the step that unlocks most mean questions.

44 One very large value is added to a set. Which changes most?

- ☐ the mode
- ☐ the median
- ☐ the mean
- ☐ nothing changes

Answer: the mean

The mean uses every value, so an extreme one pulls it. The median barely moves.

45 Can the mean be larger than every value in the data?

- ☐ Yes
- ☐ No

Answer: No

It is a share of the total, so it must sit between the smallest and the largest.

46 The mean of 5 numbers is 8. One of them changes from 4 to 9. The new mean is ...

- ☐ 8
- ☐ 8.5
- ☐ 9
- ☐ 13

Answer: 9

The total rises by $9 - 4 = 5$. Spread over 5 numbers that is $5 \div 5 = 1$ each, so the mean rises by 1, from 8 to 9.

47 Why is the mean called an average?

- ☐ It is in the middle of the list
- ☐ It is a single value that stands for the whole set
- ☐ It is the most common
- ☐ It is the largest

Answer: It is a single value that stands for the whole set

Mode, median and mean are all averages; they simply choose the representative differently.

48 To find the mean from a frequency table you ...

- ☐ add the frequencies and divide by how many rows
- ☐ multiply each value by its frequency, add those, then divide by the total frequency
- ☐ add the values and divide by the number of rows
- ☐ take the largest frequency

Answer: multiply each value by its frequency, add those, then divide by the total frequency

The frequency says how many times that value should be counted.

49 Is the mean always a sensible average to quote?

☐ Yes

☐ No

Answer: No

For house prices one mansion drags it up. Section 16.3 is about choosing.

C · Challenge — Missing values, and means that change.

50 Five numbers have a mean of 12. Four of them are 8, 10, 14 and 16. What is the fifth?

Answer: 12

The total must be $12 \times 5 = 60$. The four given add to $8 + 10 + 14 + 16 = 48$, so the fifth is $60 - 48 = 12$.

51 Six numbers have a mean of 9. Five of them are 4, 7, 9, 12 and 13. What is the sixth?

Answer: 9

The total must be $9 \times 6 = 54$. The five given add to $4 + 7 + 9 + 12 + 13 = 45$, so the sixth is $54 - 45 = 9$.

52 The mean of 4 numbers is 15. A fifth number, 25, is added. What is the new mean?

Answer: 17

The first four total $15 \times 4 = 60$. Adding 25 gives $60 + 25 = 85$, over 5 numbers: $85 \div 5 = 17$.

53 The mean of 8 numbers is 11. Two numbers, both 20, are added. What is the new mean?

Answer: 12.8

The eight total $11 \times 8 = 88$. Adding $20 + 20 = 40$ gives $88 + 40 = 128$, over 10 numbers: $128 \div 10 = 12.8$.

54 A class of 20 has a mean test score of 14. A learner who scored 6 is removed. What is the new mean, to two decimal places?

Answer: 14.42

The total is $14 \times 20 = 280$. Removing 6 leaves $280 - 6 = 274$ over 19 learners: $274 \div 19 = 14.42$ to two decimal places.

55 The mean of 3, 8, x and 13 is 9. What is x ?

Answer: 12

The total must be $9 \times 4 = 36$. The three given add to $3 + 8 + 13 = 24$, so $x = 36 - 24 = 12$.

56 Ten numbers have a mean of 6. Each one is doubled. What is the new mean?

Answer: 12

Doubling every value doubles the total, and the count is unchanged, so the mean doubles: $6 \times 2 = 12$.

D · Word problems — Scores, goals, takings and speeds.

57 Five test scores are 12, 15, 18, 11 and 14. What is the mean score?

Answer: 14

$12 + 15 + 18 + 11 + 14 = 70$, and $70 \div 5 = 14$.

58 A footballer scores 2, 0, 1, 3 and 4 goals in five games. What is the mean number of goals per game?

Answer: 2

$2 + 0 + 1 + 3 + 4 = 10$, and $10 \div 5 = 2$.

- 59** Six parcels have a mean mass of 4 kg. What is their total mass, in kilograms?

Answer: 24

$$4 \times 6 = 24 \text{ kg.}$$

- 60** A shop takes \$340, \$280, \$410 and \$370 over four days. What is the mean daily takings, in dollars?

Answer: 350

$$340 + 280 + 410 + 370 = 1400, \text{ and } 1400 \div 4 = 350.$$

- 61** The mean height of 12 learners is 145 cm. What is their total height, in centimetres?

Answer: 1740

$$145 \times 12 = 1740 \text{ cm.}$$

- 62** A car travels 240 km in 4 hours. What is its mean speed, in kilometres per hour?

Answer: 60

$$240 \div 4 = 60 \text{ km/h.}$$

- 63** Seven people have a mean age of 30. An eighth person aged 22 joins them. What is the new mean age?

Answer: 29

The seven total $30 \times 7 = 210$. Adding 22 gives $210 + 22 = 232$, over 8 people: $232 \div 8 = 29$.

- 64** A factory's daily output over 5 days had a mean of 480 items. On the sixth day it made 540. What is the mean over the six days?

Answer: 490

The first five total $480 \times 5 = 2400$. Adding 540 gives $2400 + 540 = 2940$, over 6 days: $2940 \div 6 = 490$.