



CALCULATOR ALLOWED



Advanced level questions

20 MIN

Mini Test 30: Chance and Data

1 The mean (average) of eight numbers is 56. When one of the numbers was left out, the mean decreased to 54. What number was left out?

- A 54 B 56 C 60 D 70

2 Three coins are tossed together. There are eight possible outcomes. What is the probability of getting 2 heads and 1 tail (in any order)?

- A $\frac{1}{8}$ B $\frac{1}{4}$ C $\frac{3}{8}$ D $\frac{1}{2}$

3 These are Phoebe's marks in her last seven weekly tests (marked out of 20).

Week	1	2	3	4	5	6	7
Mark	18	17	19	16	17	15	17

Which is correct?

- A mode = median \neq mean
 B mode \neq median = mean
 C mode = mean \neq median
 D mode = mean = median

4 Members of a tennis club are either seniors or juniors. The average age of the 25 junior members is 15 and the average age of the 15 senior members is 31. What is the average age of the club members?

- A 20 B 21 C 22 D 23

5 Sally recorded the colour of the roses on the bushes in a garden.

Colour	Number of rosebushes
Red	18
Orange	9
Yellow	7
White	12
Pink	14

Sally intended to draw a sector graph to show this information. What size is the angle needed for the red rosebushes?

°

6 Lulu did a test in which all the questions had to be judged true or false. The table shows her results.

	Lulu said true	Lulu said false
Was True	36	16
Was False	21	27

How many questions did Lulu get correct?

- A 36 B 52 C 57 D 63

7 Two dice are tossed together. There are 36 possible outcomes. What is the probability of getting a total of 4?

- A $\frac{1}{36}$ B $\frac{1}{18}$ C $\frac{1}{12}$ D $\frac{1}{9}$

8 In nine tests, Joe has an average mark of 78%. What would he need to score in his tenth test to increase his average to 80%?

- A 98% B 96% C 88% D 82%

9 The graph shows the number of mistakes made by students in a spelling test.

Mistakes made in a spelling test



Which is correct?

- A mode = median \neq mean
 B mode \neq median = mean
 C mode = mean \neq median
 D mode \neq mean \neq median

10 Consider these scores:

22 22 22 23 23 24 25

One score can be left out without affecting the mean. Which score is this?

- A 22 B 23 C 24 D 25

11 Sheridan recorded the number of movies his friends had seen over the holidays:

1, 1, 2, 3, 3, 3, 3, 4, 4, 4, 5

One of his friends who said he had seen 3 movies later claimed to have seen 4. Which will **not** increase when Sheridan's record is updated?

- A median B mode
 C mean D They will all increase.

12 The average height of six netball players is 1.75 metres. A seventh player is 1.61 metres tall. What is the average height of the seven players?

m

1 D 2 C 3 D 4 B 5 108° 6 D 7 C 8 A
9 B 10 B 11 A 12 1.73 m

1 Mean of 8 numbers is 56.

$$\begin{aligned} \text{Sum of 8 numbers} &= 8 \times 56 \\ &= 448 \end{aligned}$$

The mean of 7 numbers is 54.

$$\begin{aligned} \text{Sum of 7 numbers} &= 7 \times 54 \\ &= 378 \end{aligned}$$

$$\begin{aligned} \text{Difference} &= 448 - 378 \\ &= 70 \end{aligned}$$

The number left out was 70.

2 There are 8 different possibilities:

HHH, HHT, HTH, HTT, THH, THT, TTH, TTT.

Three of the possibilities involve two heads and a tail.

$$\text{Probability of 2 heads and 1 tail} = \frac{3}{8}$$

Week	1	2	3	4	5	6	7
Mark	18	17	19	16	17	15	17

In order, from lowest to highest, the scores are: 15, 16, 17, 17, 17, 18, 19.

There are more scores of 17 than any other so the mode is 17.

The middle score is the fourth one of the seven.

So the median is 17.

$$\begin{aligned} \text{The sum of the scores} &= 15 + 16 + 3 \times 17 + 18 + 19 \\ &= 119 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= 119 \div 7 \\ &= 17 \end{aligned}$$

So the mean, mode and median are all equal.

4 Sum of the ages of the juniors = $25 \times 15 = 375$

Sum of the ages of the seniors = $15 \times 31 = 465$

Total of all the ages = $375 + 465 = 840$

Total number of members = $25 + 15 = 40$

Average age of the members = $840 \div 40 = 21$

Colour	Number of rosebushes
Red	18
Orange	9
Yellow	7
White	12
Pink	14

Total rosebushes = $18 + 9 + 7 + 12 + 14 = 60$

$$\begin{aligned} \text{Fraction of red rosebushes} &= \frac{18}{60} \\ &= \frac{3}{10} \end{aligned}$$

Total degrees in a sector graph = 360°

Degrees needed for red rosebushes

$$\begin{aligned} &= \frac{3}{10} \times 360^\circ \\ &= 108^\circ \end{aligned}$$

	Lulu said true	Lulu said false
Was True	36	16
Was False	21	27

Of the questions that were true, Lulu said 36 were true. So she got 36 of the true questions correct.

Of the questions that were false, Lulu said 27 were false. So she got 27 of the false questions correct.

$$\begin{aligned} \text{Total correct questions} &= 36 + 27 \\ &= 63 \end{aligned}$$

7 There are 36 possible outcomes.

There are 3 different ways of scoring 4: $1 + 3, 2 + 2$ and $3 + 1$.

$$\begin{aligned} \text{So the probability of scoring 4} &= \frac{3}{36} \\ &= \frac{1}{12} \end{aligned}$$

8 The average of 9 tests is 78.

$$\begin{aligned} \text{Total marks from 9 tests} &= 9 \times 78 \\ &= 702 \end{aligned}$$

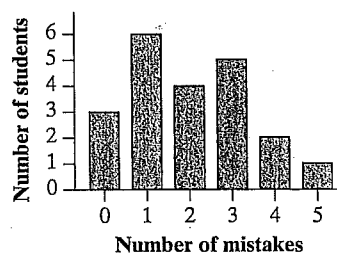
In order to have an average of 80 after 10 tests:

$$\begin{aligned} \text{Total marks from 10 tests} &= 10 \times 80 \\ &= 800 \end{aligned}$$

$$\begin{aligned} \text{Extra marks needed} &= 800 - 702 \\ &= 98 \end{aligned}$$

Joe would need to score 98% in his tenth test.

9 Mistakes made in a spelling test



More students made 1 mistake than any other number of mistakes so the mode is 1.

$$\begin{aligned} \text{Total number of students} &= 3 + 6 + 4 + 5 + 2 + 1 \\ &= 21 \end{aligned}$$

So, there will be 21 scores altogether.

The middle score will be the 11th score.

It will be 2.

So the median is 2.

[If written out in order they would be 0, 0, 0, 1, 1, 1, 1, 1, 2, 2, 2, 2, 3, ...]

$$\begin{aligned} \text{Total mistakes made} &= 6 \times 1 + 4 \times 2 + 5 \times 3 + 2 \times 4 + 1 \times 5 \\ &= 42 \end{aligned}$$

$$\begin{aligned} \text{Mean} &= 42 \div 21 \\ &= 2 \end{aligned}$$

So the median and mean are both 2 but the mode is 1.

So mode \neq median = mean

10 22, 22, 22, 23, 23, 24, 25

There are 7 scores.

The sum of the scores

$$= 3 \times 22 + 2 \times 23 + 24 + 25$$

$$= 161$$

$$\text{Mean} = 161 \div 7$$

$$= 23$$

So, because the mean is 23 a score of 23 can be left out and the mean will not change.

11 1, 1, 2, 3, 3, 3, 3, 4, 4, 4, 5

There are 11 scores.

The median is the sixth score.

$$\text{Median} = 3$$

There are more 3s than any other number.

$$\text{Mode} = 3$$

The sum of the scores

$$= 2 \times 1 + 2 + 4 \times 3 + 3 \times 4 + 5$$

$$= 33$$

$$\text{Mean} = 33 \div 11$$

$$= 3$$

Now if one score of 3 changes to 4:

1, 1, 2, 3, 3, 3, 4, 4, 4, 4, 5

The median is still the sixth score. It is still 3.

The mode changes to 4.

The sum of the scores

$$= 2 \times 1 + 2 + 3 \times 3 + 4 \times 4 + 5$$

$$= 34$$

$$\text{Mean} = 34 \div 11$$

$$= 3.090909\dots$$

So the mean and mode increase but the median stays the same.

[It wasn't necessary to calculate the mean; if one score is increased the mean must also increase.]

12 The average height of 6 players is 1.75 m.

$$\text{The sum of the 6 heights} = 6 \times 1.75 \text{ m}$$

$$= 10.5 \text{ m}$$

$$\text{The sum of the 7 heights} = (10.5 + 1.61) \text{ m}$$

$$= 12.11 \text{ m}$$

$$\text{Average height of 7 players} = (12.11 \div 7) \text{ m}$$

$$= 1.73 \text{ m}$$