

Statistics 2

This class deals with mean

Mean

The symbol used is \bar{x} .

Type 1 To find the mean of a group of numbers.

$$\text{Mean} = \frac{\text{Add up the numbers}}{\text{Number of numbers}}$$

Example 1 Find the mean of 2, 4, 7, 3 and 1.

$$\text{Mean} = \frac{2 + 4 + 7 + 3 + 1}{5} = \frac{17}{5} = 3\frac{2}{5}$$

Type 2 To find a missing number when given mean.

Example 2 If 3, 6, 8, x , 9 have a mean of 7 find the value of x .

$$\frac{3 + 6 + 8 + x + 9}{5} = 7$$

$$x = 9$$

Type 3: To find mean of a frequency table.

Use the heading \underline{x} \underline{f} \underline{fx} and then the formula.

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

Line 1: Under the x write the top line of the frequency vertically down.

Line 2: Under the f write the bottom line of the frequency vertically down

Line 3: Under the fx multiply line 1 by line 2.

Note \sum mean to add up

Example 3 Find the mean of the following.

Goals	1	2	3	4	5	6
Games	10	11	8	7	7	5

To find the mean first do out a new table (make sure to learn the headings)

$\frac{x}{1}$	$\frac{f}{10}$	$\frac{fx}{10}$
2	11	22
3	8	24
4	7	28
5	7	35
6	<u>5</u>	<u>30</u>
Add	48	149

$$\text{Mean} = \frac{\sum fx}{\sum f} = \frac{149}{48}$$

Type 4 To find the mean of a grouped frequency distribution table.

A grouped frequency distribution table is where we group the information in wider bands. For example we may talk about the games in which there were 0 - 2 goals scored.

To find the mean we use the exact same method as above but use the mid - interval of the group

What is meant by mid - interval? What is the mid interval of 0 and 2? The answer is the number in the middle of 0 and 2 so mid - interval 1. Mid - interval of 2 - 4 is 3 and of 4 - 6 is 5 and of 6 - 8 is 7.

Example 4 The following shows the ages of 30 children in a housing estate.

Height	0 - 2	2 - 4	4 - 6	6 - 8
No. of pupils	12	9	6	3

Interval	Mid-interval	f	fx
0-2	1	12	12
2-4	3	9	27
4-6	5	6	30
6-8	7	<u>3</u>	<u>21</u>
	Add	30	90

$$\bar{x} = \frac{90}{30} = 3$$

Type 5 To find a missing frequency when given mean.

Example 5 The table below shows the number of goals scored by a team during a season if the mean number of goals scored is 2 find the value of x ?

Goals	0	1	2	3	4
Games	3	3	4	x	3

Method 1

x	f	fx
0	3	0
1	3	3
2	4	8
3	x	$3x$
4	3	12
Add	$13 + x$	$23 + 3x$

$$\frac{23 + 3x}{13 + x} = \frac{2}{1} \quad \text{let answer} = 2 \text{ from question}$$

$$\frac{23 + 3x = 2(13 + x)}{13 + x} \quad \text{get a common denominator}$$

$$23 + 3x = 26 + 2x \quad \text{multiply out}$$

$$3x - 2x = 26 - 23 \quad \text{letters to one side and numbers to the other}$$

$$x = 3$$

Note $0 + 3 + 8 + 3x + 12 = 23 + 3x$ this is where the most common mistake is made and a lot of students will make the mistake of $0 + 3 + 8 + 3x + 12 = 26x$ which is not right.

Example 6 People attending a course were asked to choose one of the whole numbers from 1 to 12. The results were recorded as follows

Number	1 - 3	4 - 6	7 - 9	10 - 12
No. of people	3	x	2	8

Using mid - interval values, 6.5 was calculated as the mean of the numbers chosen. Find the value of x .

Method 1

Interval	Mid - interval	f	fx
1 - 3	2	3	6
4 - 6	5	x	$5x$
7 - 9	8	2	16
10 - 12	11	8	88
	Add	$x + 13$	$5x + 110$

$$\frac{5x+110}{x+13} = 6.5$$

$$\frac{5x+110}{x+13} = \frac{6.5}{1}$$

$$\frac{5x+110}{x+13} = 6.5(x+13)$$

$$5x+110 = 6.5(x+13)$$

$$5x+110 = 6.5x+84.5$$

$$5x - 6.5x = 84.5 - 110$$

$$-1.5x = -22.5$$

$$1.5x = 22.5$$

$$x = 17$$

Type 6 Worded questions.

These are questions in which we are told the number of numbers and their mean and what we have to do is find the sum of the numbers by using the idea that

$$\text{Mean} = \frac{\text{sum of numbers}}{\text{number of numbers}} \text{ and changing it around to}$$

$$\text{Sum of numbers} = \text{mean} \times \text{number of numbers}$$

Example 7 The mean of 4 numbers is 6 and of another 5 numbers is 8 find mean of all 9 numbers.

$$4 \text{ numbers} - \text{Mean of } 6 - \text{total of } 24$$

$$5 \text{ numbers} - \text{Mean of } 8 - \text{total of } 40$$

We have figured out that there are 9 numbers, which must have a total of 64 (24+40)

$$\text{Mean} = \frac{\text{sum of numbers}}{\text{number of numbers}} = \frac{64}{9}$$

Example 8 Given 5 numbers have a mean of p and 4 number have a mean of q. All 9 numbers have a mean of r. Write p in terms of q and r.

$$5 \text{ numbers} - \text{Mean of } p - \text{total of } 5p$$

$$4 \text{ numbers} - \text{Mean of } q - \text{total of } 4q$$

$$9 \text{ numbers} - \text{Mean of } r - \text{total of } 9r$$

$$5p + 4q = 9r$$

$$5p = 9r - 4q$$

$$p = \frac{9r - 4q}{5}$$