

Higher Level Only

Keywords:

- Mid-interval Value
- Interval
- Frequency
- Grouped frequency

Grouped Frequency Tables

Grouped frequency tables can be used to study information that is best looked at in groups due to the variety, range or quantity of the data.

For example, in a census a question might ask how many living in a household lie in certain age bands, such as 0-10 years.

This makes it easier for statisticians to study the demographics in our country

We use the **mid-interval value** for each group to help determine the overall mean. The mid-interval value is the mean of each group and is determined as follows:

$$\text{Mid-interval value} = \frac{\text{Upper interval value} + \text{Lower interval value}}{2}$$

This allows for the fact that some figures will be above the mean and some below the mean. Once you have calculated the mid-interval values for each group, you can then calculate the mean, using the formula as we saw last week.

Finding Mean of Grouped Frequency Tables

The following frequency table shows the time in minutes spent by a group of students on their mobile phones on a particular day:

No. of minutes	0–4	4–8	8–12	12–16
Frequency	3	5	6	11

(Note: 0 - 4 means greater than or equal to 0 mins, but less than 4 mins)

(a) Calculate the number of students in the group

Add together the frequency's

$$3 + 5 + 6 + 11 = 25 \text{ students}$$

(b) Calculate the mean number of minutes, spent by each student, on mobile phones.

Before calculating the mean we must calculate the mid-interval value for each group

Group	Mid-interval value
0-4	$\frac{0+4}{2} = 2$
4-8	$\frac{4+8}{2} = \frac{12}{2} = 6$
8-12	$\frac{8+12}{2} = \frac{20}{2} = 10$
12-16	$\frac{12+16}{2} = \frac{28}{2} = 14$

We can now calculate the mean using the following information:

Mid Interval Value	2	6	10	14
No. of Students	3	5	6	11

$$\bar{x} = \frac{(2 \times 3) + (6 \times 5) + (10 \times 6) + (14 \times 11)}{3 + 5 + 6 + 11} = \frac{6 + 30 + 60 + 154}{25} = \frac{250}{25} = 10$$

We can conclude that each student spent 10 minutes on average on their mobile phone.

Example:

Siobhan asked her class how many hours they spent watching television over the weekend. She decided to group the times into class intervals of 4 hours:

Hours	0-4	4-8	8-12	12-16	16-20
No. of Students	2	7	11	5	5

(a) Find the mean number of hours spent watching television

Find you must find the mid-interval values first

Group	Mid interval Values
0-4	$\frac{0 + 4}{2} = 2$
4-8	$\frac{4 + 8}{2} = 6$
8-12	$\frac{8 + 12}{2} = 10$
12-16	$\frac{12 + 16}{2} = 14$
16-20	$\frac{16 + 20}{2} = 18$

Using the information below we can calculate the mean:

Mid Interval Values	2	6	10	14	18
No. of Students	2	7	11	5	5

$$\bar{x} = \frac{(2 \times 2) + (6 \times 7) + (10 \times 11) + (14 \times 5) + (16 \times 5)}{2 + 7 + 11 + 5 + 5}$$

$$\bar{x} = \frac{4 + 42 + 110 + 70 + 80}{30}$$

$$\bar{x} = \frac{306}{30} = 10.2$$

We can conclude that students spent 10.2 hours watching television over the weekend.