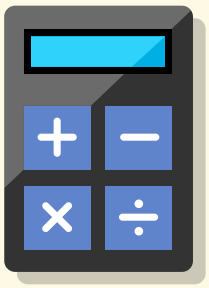
Graphing and analysing income data



This sequence is intended as a framework to be modified and adapted by teachers to suit the needs of a class group.

Resources needed

- Income distribution – Investigation
- Income distribution – Data sheet

Suggested activity sequence

Part A: Modelling

1 Introduce the concepts of central tendency, mean and median and provide a definition (write them on the board).

Central tendency: The tendency for the values of a random variable to cluster round its mean, mode, or median.

Mean: The average, found by adding the numbers and dividing the sum by the number of numbers in the list.

Median: Is the middle value in a list ordered from smallest to largest.

2 Do a simple example as a whole class to model the task. If you're all working together on this, everyone will need access to a computer with spreadsheet software.

This is the weekly take-home pay of 5 people in a netball team. Two people in the team didn't want to share their information.

$1845 $1529 $2135 $1150 $986

a. Set up a spreadsheet in Excel and arrange the Weekly Pay values numerically from lowest to highest.

	A	B
1		Weekly Pay
2		986
3		1150
4		1529
5		1845
6		2135
7	Average (mean)	
8	Median	

b. Use formulas to calculate average [=AVERAGE(B2:B6)] and median [=MEDIAN(B2B6)].

c. Discuss with students about the average and the median being the same.

3 The rest of the team have decided they will share what they are paid. One gets $950 and the other gets $3428.

a. Add rows to your spreadsheet to include these values, correct the formulas and examine the new mean and median.

b. Discuss what's happened to these measures of central tendency.

c. Set up this table on your spreadsheet.

Weekly Pay ($)	Number of people
0 – 999	
1000 – 1999	
2000+	
Total	=sum formula

d. Add the formula to calculate total people – discuss with students what they expect the figure to be and what they should do if it's not.

e. Display this data using:

i. A line graph.

ii. A column graph.

f. Add a chart. Try both a line graph and a column graph, change the colours and add titles.

Note: You could model how to construct a histogram. You might find slides 3-12 of the visualiser: *Graphing distributions and correlations* useful.

Part B: Investigating

Walk the students through the instructions of the *income distribution investigation*. reminding them of the similarities to the problem you modelled.

Students complete the investigation. To do so, they will need copies of the *income distribution data sheet.* Students may benefit from working individually and/or in small discussion groups.

Part C: Discussing results

When students have completed their investigations, discuss reasons why the average taxable income is so much higher than the median. (Because the income of some exceptionally well-paid people drags the average up). If necessary, provide an example:

> For example, imagine there are 10 people in a room: nine of them earn $10,000 a year, and one of them earns $500,000 a year.
>
> What's the average?
>
> Altogether, they earn $590,000 in a year. So, the average income in that room would be **$59,000** ($590,000 divided by 10 people).
>
> Notice how, because of the very high income of a single person, the average income for the group is much higher than the typical income of 90 per cent of people in the group? The person who earned $500,000 is an outlier. Outliers in data cause the averages to be misleading!

Discuss frequency and distribution and what students have learned.