YEAR 9 - STATISTICS

Example (i): Calculate the mean, median, mode, range and interquartile range for
the following set of scores:

29, 12, 17, 23, 31, 25, 19, 15, 16, 23, 18

Solution:

Example (ii): Roy's batting average for 3 innings in a 20-20 cricket competition is
40 runs. How many runs must he score in the fourth game to raise his
average to 50 runs?

Example: 123 students were asked the number of music tracks they had down
loaded in the past week. The results are shown in the following table.
Calculate the mean, mode and range.

Solution:

Score x	Frequency f
2	4
3	10
4	13
5	19
6	28
7	22
8	16
9	8
10	3

Example: Draw a histogram and frequency polygon using the information from
the frequency distribution table in the previous section.

Solution:

CUMULATIVE FREQUENCY

> The cumulative frequency for a given score is the 'sum of the frequency for that score plus all the scores less than that score'.

To determine the median from a frequency distribution table it is easy to add another column called the **cumulative frequency** column. The entries are determined by simple addition in the frequency column.

Example: You can now determine the median number of downloads for the students in the example in the previous section, by adding a cumulative frequency column to the frequency distribution table.

Score x	Frequency f	Frequency × score fx
2	4	8
3	10	30
4	13	52
5	19	95
6	28	168
7	22	154
8	16	128
9	8	72
10	3	30

GROUPED FREQUENCY TABLE

Example: The heights of 50 students in Year 11 were measured and recorded to the nearest centimetre.

157	164	167	175	179	172	159	166	145	174
169	150	152	153	178	158	169	149	139	161
164	183	175	168	165	145	158	176	161	176
167	164	153	140	177	159	155	158	173	163
157	171	165	170	165	160	166	162	166	146

Construct a frequency distribution table including class centre, frequency, fx and cumulative frequency columns.
Determine the mean and modal class for the distribution.

Example: Draw a cumulative frequency histogram and ogive for the height distribution in the previous section. Estimate the median graphically.

STEM-AND-LEAF DIAGRAMS

These are a neat way of recording numerical data while showing the shape of the information. In any stem-and-leaf diagram the first digit in the scores is recorded as the **stem**, and the second digit is recorded as the **leaf**.

Example: The following data records the hours of paid work for a group of social tennis players in a week.

12, 35, 19, 42, 31, 23, 9, 40, 28, 38, 35, 36

Present this information in a stem-and-leaf plot and determine the range, mode, median and mean.

Solution:

BACK-TO-BACK STEM-AND-LEAF DIAGRAMS

These are used when two sets of related data are compared.

Example: The following back-to-back stem-and-leaf plot shows the weekly hours of study for two different Year 11 mathematics classes.

Class A		Class B
9 5 1	0	0 6
8 7 3 0	1	2 5 8
6 □ 1	2	1 2 2 4
8 3	3	1 2 4 ◊

(i)   Calculate the missing score (□) if the mean of Class A is 17.75.

(ii)   Determine the missing value (◊) if Class B is bimodal.

(iii)   Calculate the interquartile range for each class.

BOX-AND-WHISKERS PLOT

A five-number summary (also called a box-and-whisker plot) provides a visual summary of a distribution, starting at the lowest score, then the positions of Q_1, Q_2 and Q_3 and finishing with the highest score.

The whiskers are never more than $1\frac{1}{2}$ times as long as the interquartile range. A score is considered an outlier when it is more than $1\frac{1}{2}$ times the interquartile range below the lower quartile or above the upper quartile.
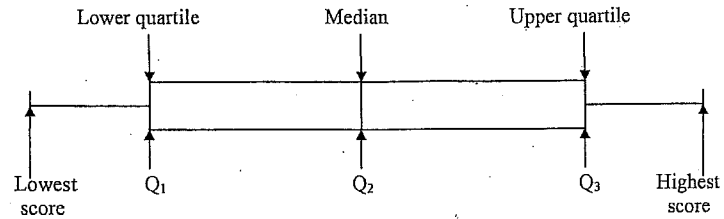
Example: Last night Claire spoke to several of her friends on the phone.
Her father recorded the length of the calls.
Construct a box-and-whisker plot to display the length of calls.

Length of Claire's calls in minutes:

$$4, \ 8, \ | \ 14, \ 16, \ | \ 19, \ 21, | \ 23, \ 49$$

DOUBLE BOX-AND-WHISKERS PLOT

Example: The following are the starting weights (to the nearest kg) of the 16 contestants in a Biggest Loser contest.

Females: 108, 109, 117, 121, 127, 127, 128, 132, 163

Males: 134, 139, 149, 155, 161, 165, 202

Display the data in a double box-and-whisker plot.
Calculate the median, range and interquartile range for each set of data and identify any outliers that may exist.