Data Analysis

Level 2

Having discussed the variety of ways and range of media used to present data, I can interpret and draw conclusions from the information displayed, recognising that the presentation may be misleading. **MNU 2-20a**

I have carried out investigations and surveys, devising and using a variety of methods to gather information and have worked with others to collate, organise and communicate the results in an appropriate way. **MNU 2-20b**

Level 3

I can work collaboratively, making appropriate use of technology, to source information presented in a range of ways, interpret what it conveys and discuss whether I believe the information to be robust, vague or misleading. **MNU 3-20a**

Level 4

I can evaluate and interpret raw and graphical data using a variety of methods, comment on relationships I observe within the data and communicate my findings to others. **MNU 4-20a**

Displaying data

Example: Some pupils were asked to name their favourite colour. The results are shown below.

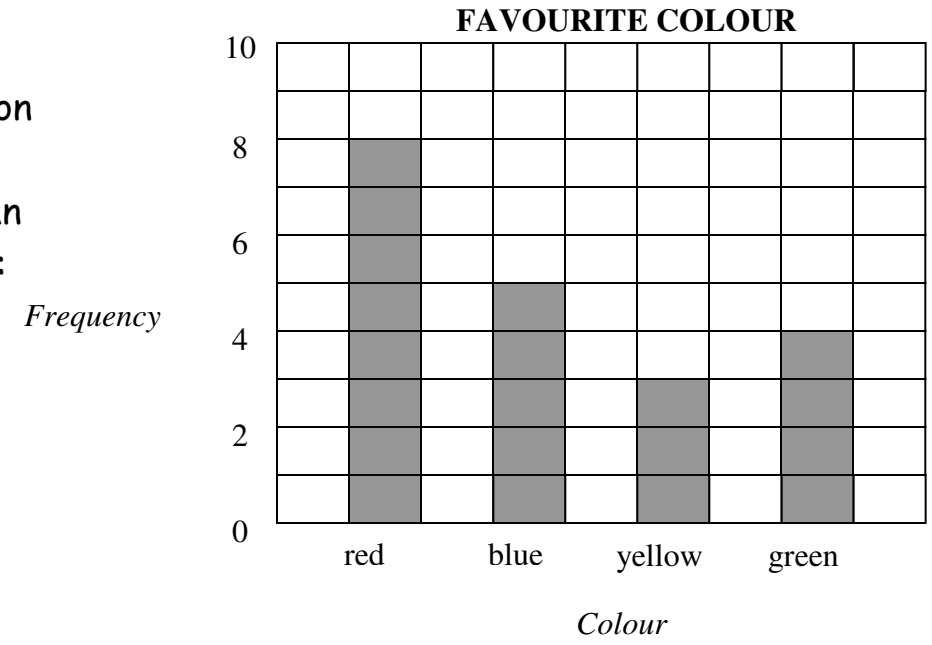
red	blue	yellow	red	blue	yellow	green
red	blue	red	green	red	blue	red
green	yellow	green	red	blue	red	

Frequency tables and bar charts

The above data can be represented in a frequency table:

Colour	*Tally*	*Frequency*
red	𝍸 | | |	8
blue	𝍸	5
yellow	| | |	3
green	| | | |	4

Using the information from the frequency table a bar graph can now easily be drawn:

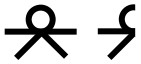


Note:

- A space should be left between bars when representing discrete data (separate categories).
- Bars could have been drawn horizontally rather than vertically.
- All bars should be clearly labelled and a uniform numerical scale must be shown. Both the horizontal and vertical axes should also be labelled. Pupils should be able to select an appropriate simple numerical scale, such as going up in 1s, 2s, 5s, 10s.

PICTOGRAPHS

The data can also be used to construct a pictograph:

Red	
Blue	
Yellow	
Green	

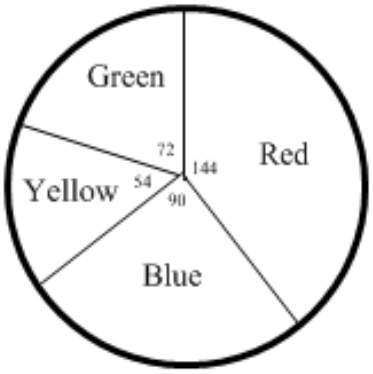
Key:  stands for 2 pupils

A key must be included with a pictograph and pupils should be able to interpret partial symbols.

PIE CHARTS

Another way of representing the above data is through the use of pie charts. To draw a pie chart the fraction of the complete circle (360^0) firstly needs to be calculated:

Colour	Frequency	Fraction of circle
Red	8	$\frac{8}{20}\times 360 = 144^0$
Blue	5	$\frac{5}{20}\times 360 = 90^0$
Yellow	3	$\frac{3}{20}\times 360 = 54^0$
Green	4	$\frac{4}{20}\times 360 = 72^0$
Total =	**20**	



Note: It is also common to draw a pie chart using percentages rather than fractions.

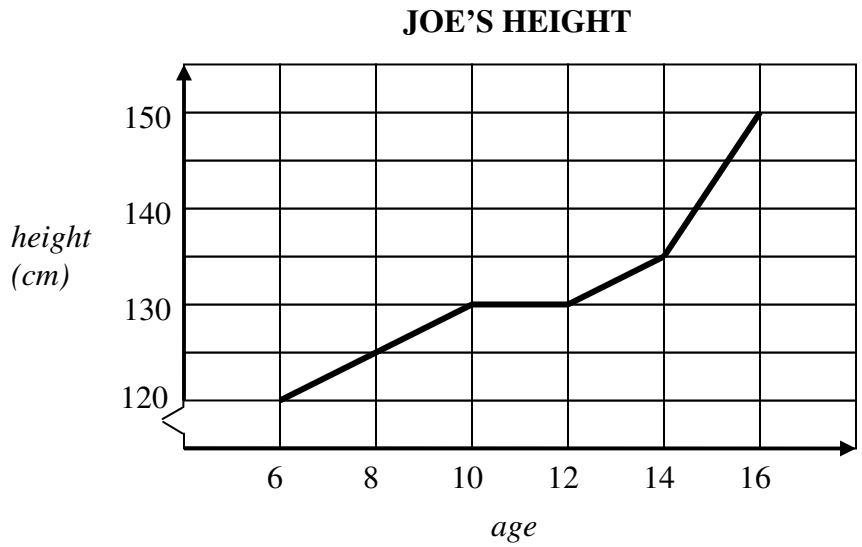
LINE GRAPHS

A line graph is used to graph a quantity which is continuously changing, eg the growth of a pupil or plant.

Example: Joe recorded his height at different ages.

Age 6	120 cm
Age 8	125 cm
Age 10	130 cm
Age 12	130 cm
Age 14	135 cm
Age 16	150 cm

Draw a line graph to illustrate this data.



Note that a jagged line is necessary because the vertical scale does not start at 0.

THE MEAN, MEDIAN, MODE AND RANGE

The mean, median and mode all represent the "average" value of a data set.

- To calculate the **mean**, add up all the data and divide by the total by the number of items of data.
- To find the **median**, arrange the data in order and find the middle number.
  If there are two numbers in the middle, the median is the mean of these two numbers and is found by adding the two numbers and dividing by 2.
- The **mode** is the most frequent value.
  There can sometimes be more than one mode for a data set.
- The **range** is a measure of spread and is found by calculating the highest value minus the lowest value.

Example

The number of days that each patient takes to recover after an operation was recorded.

10 6 5 5 7 8 3 8 4 5

- Mean = 61 ÷ 10 = 6.1 days
- Median - first arrange the data in order:

3 4 5 5 5 6 7 8 8 10

$\text{Median} = \frac{5+6}{2} = 5 \cdot 5$ days

- Mode = 5 days (most frequent value)
- Range = 10 – 3 = 7 days

Units of Chance and Uncertainty

Level 2

I can conduct simple experiments involving chance and communicate my predictions and findings using the vocabulary of probability.

MNU 2-22a

Level 3

I can find the probability of a simple event happening and explain why the consequences of the event, as well as its probability, should be considered when making choices.

MNU 3-22a

Level 4

By applying my understanding of probability, I can determine how many times I expect an event to occur, and use this information to make predictions, risk assessment, informed choices and decisions.

MNU 4-22a

The Language of Probability

$$\text{Probability of event P(event)} = \frac{\text{Number of favourable outcomes}}{\text{Total number of outcomes}}$$

Note: Probability = 0 means an event will NEVER occur
Probability = 1 means an event will DEFINITELY occur

Example

A dice is rolled:

P(1) = $\frac{1}{6}$ P(2) = $\frac{1}{6}$ P(3) = $\frac{1}{6}$ and so on …

P(even) = $\frac{3}{6} = \frac{1}{2}$ P(odd) = $\frac{3}{6} = \frac{1}{2}$

P(1,2,3,4,5,6) = 1 P(7) = 0

Pupils can also discuss the probability or chance of an event using phrases like 'likely' or 'unlikely'

Making predictions

Probability can be used to make predictions. For example, if half the pupils in a class have brown hair how many pupil in a group 200 would you expect to have brown hair? Also, in genetics, given a flower type what colour will be produced from the parent plant and what are the chances of that colour being produced. Another example would be the prediction of inheriting a disease from a parent.