HANDLING DATA

Pupils should be taught to:	As outcomes, Year 7 pupils should, for example:

Compare two simple distributions using the range, mode, mean or median

Compare the distributions of two sets of data, and the relationships between them, using the range and one of the mode, mean or median. For example:

- How do pupils travel to school?
  Compare the median and range of the times taken to travel to school for two groups of pupils, such as those who travel by bus and those who travel by car.

- Which newspaper is easiest to read?
  In a newspaper survey of the numbers of letters in 100-word samples, compare the mean and the range.

Newspaper type	Mean	Range
tabloid	4.3	10
broadsheet	4.4	14

- Which is your better catching hand?
  Use data from practical experiments to compare results for the writing hand with the non-writing hand, e.g. the mode and range for the number of cubes caught.

- Do First Division or Second Division teams score more goals?
  Use data from secondary sources to compare goals scored in a season by teams in the First Division and teams in the Second Division.
  Calculate the range, mean, median and mode.
  Write two sentences comparing the results, using the range and the mean, median or mode.

Communicate methods and results

Write a short report of a statistical enquiry. Illustrate with diagrams, graphs and charts, using **ICT** as appropriate; justify the choice of what is presented. For example:

- How do pupils travel to school?
  Draw conclusions based on the original questions and the data analysis. Indicate which diagrams and statistics have proved informative and why. Note difficulties or ambiguities that arose and how they were dealt with. Summarise conclusions: for example, 80% of pupils who live within one mile walk to school; many of those that travel by car do so because it fits in with a parent's journey to work.

- Do newspapers use words or sentences of different length? If so, why?
  Explain why the analysis might be misleading.
  Does the use of technical vocabulary, names of people, conjunctions and pronouns… have an effect in making word length similar?

- How will the population of different countries change over the next 50 years?
  Write an account based on population pyramids. Use terms such as birth rate, death rate and natural increase.

As outcomes, Year 8 pupils should, for example:	As outcomes, Year 9 pupils should, for example:

Compare two distributions using the range and one or more of the mode, mean or median.
For example:

- Which type of battery lasts longer?
  Use data from an experiment to calculate the range, median and mean of each type. Conclude, for example, that one brand is generally of higher quality, and one has less consistent manufacturing standards, as evidenced by a greater range.

- Compare and contrast weather patterns in England and Greece.
  Use secondary data to calculate the range, mean, mode, median of temperature, rainfall, hours of sunshine… in each country. Conclude, for example, that Greece is warmer on average, but also experiences a greater variety in weather patterns.

- Compare and contrast TV viewing patterns for different age groups.
  Compare teenagers with an adult sample. Infer, for example, that teenagers watch more TV, but adults have more consistent viewing patterns.

Compare two or more distributions, using the shape of the distributions and appropriate statistics.
For example:

- Compare long jump performance
  Use frequency diagrams to compare the overall performance of Year 7 and Year 9 pupils. Conclude, for example, that because the two distributions are similar in shape and range, there is a similar pattern of good, average and poor jumpers in each year.
  Calculate the means of Year 7 and Year 9 pupils' jumps to be, say, 217 cm and 234cm. Conclude that Year 9 pupils generally jump between 15cm and 20cm further than Year 7 pupils.

- Compare the populations of the UK and Brazil
  Conclude, for example, that the similar range indicates that at least some parts of the Brazilian population live as long as people do in the UK. Use the median age to explain that whereas half the population of the UK is over the age of 35, in Brazil half the population is under the age of 24.

- Investigate the contents of 25 gram bags of crisps

	Mean mass (g)	Range (g)
Jones crisps		
Strollers crisps		

From a table of summarised data, conclude that bags of Jones crisps are on average marginally lighter than bags of Strollers crisps, but that the greater range of the Jones crisps bags means that there will be quite a few heavy bags as well as quite a few light bags.

Communicate the results of a statistical enquiry and the methods used, using **ICT** as appropriate; justify the choice of what is presented. For example:

- Prepare and present a statistical report comparing the methods of transport to an out-of-town shopping centre and a town centre. Indicate the types of shopping customers use each centre for and their reasons.

- As part of a cross-curricular project with science, produce and present a report on how the communities in two habitats differ. Compare relevant factors such as light intensity and plant or animal diversity.

- After an experiment to simulate the cooling rates of penguins, present information that establishes the result: the two graphs plotted on the same diagram, or selected temperature values at the same times.

Communicate interpretations and results of a statistical enquiry using selected tables, graphs and diagrams from primary and secondary sources in support. For example:

- Describe the current incidence of male and female smoking in the UK, using frequency diagrams to demonstrate the peak age groups. Show how the position has changed over the past 20 years, using line graphs. Conclude that the only group of smokers on the increase is females aged 15–25 years. Suggest possible reasons, based on results from your own questionnaire.

- As a joint project with geography, write about development, showing an understanding of the difficulty of defining the term, given anomalies between the various measures. Evaluate the usefulness of the indicators from scatter graphs. Refer to tables of data for particular countries to suggest reasons for differences in development on different scales and in different contexts.

Pupils should be taught to:	As outcomes, Year 7 pupils should, for example:
Communicate methods and results (continued)	

As outcomes, Year 8 pupils should, for example:	As outcomes, Year 9 pupils should, for example:

Select tables, graphs and charts to support findings.
For example, choose a bar chart to represent second-hand car prices, because it conveys the progression in value (unlike the pie chart) and has a stronger visual image than the line graph, where the joining of points to show trends could mislead.

Second-hand car prices

Second-hand car prices

Second-hand car prices (£)
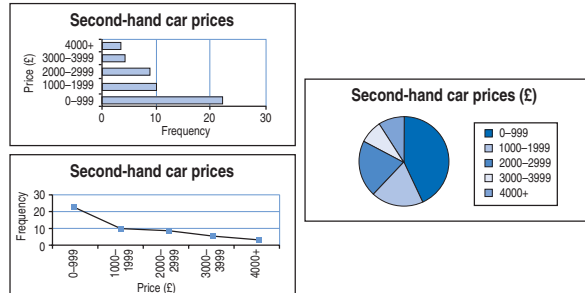
Identify misleading graphs and statistics, such as:
* incomplete diagrams;
* inappropriate use of scale or breaking the scale on the axes to magnify differences;
* treating discrete data as continuous data, and vice versa, or joining up points with lines for a discrete distribution;
* general conclusions from very small samples, e.g. '9 out of 10 cats prefer…';
* misinterpreting lines of best fit on scatter diagrams.

Recognise that graphs produced by popular **ICT packages** often suffer from some of these faults.

Examine results critically, and justify choice of statistical representation in written presentations, recognising the limitations of any assumptions and their effect on the conclusions drawn. For example:

* Study of populations of the UK and Brazil
  Conclude that the 'bottom-heavy' shape of the Brazilian population distribution could be due to a number of factors. Observe that a significant difference between the mean and median gives a measure of the skew of the distribution.

  Note that the 'bottom-heavy' effect could be due to a rising birth rate (giving an increasing number of younger people) or to a significant death rate at all ages (reducing the number of people still alive at each higher age group). Use the high population growth rate to indicate the former, but the high infant mortality and low life expectancy to support the latter.

  Use the roughly uniform population distribution, and high life expectancy, of the UK to argue that both mortality figures and the birth rate are low.

* Study of distribution of grass and non-grass plants
  Having examined the effect of moisture content of soil on the distribution of grass, recognise that other factors may be significant.