

As outcomes, Year 8 pupils should, for example:

Find the range of a set of continuous data, calculating this as the highest rounded-off figure minus the lowest rounded-off figure. For example:

- Calculate the range of temperatures recorded at a weather station over a 24-hour period. Compare with the range of data from weather stations at different sites.

Range of temperatures at Snowdon on 10 May 2000			
	Min.	Max.	Range
Summit	6.8 °C	13.8 °C	7 degrees
Llanberis	9.3 °C	15.5 °C	6.2 degrees
Clogwyn Station	9.3 °C	22.0 °C	12.7 degrees

Source: Snowdonia Weather Stations Project

Know that it can be helpful to state the range of a set of data as well as the mean, mode or median.

Find the median of a large set of data.

For example, find the median of:

- the time taken to run the London marathon;
- marks in a test taken by Year 8 pupils;
- the cost of a particular chocolate bar from various retailers.

Use a stem-and-leaf diagram to help find the median, range and mode. For example:

- Hours of sunshine for UK weather stations 10/05/00

Hours of sunshine for UK weather stations: 10/05/00														
(stem = hours, leaves = tenths)														
0	6	9												
1	6	9												
2	2	2	5	6	6	7	9							
3	0	0	0	0	1	2	2	5	5	5	7	8	9	
4	0	1	5	5	6	6	6	7	9					
5	0	1	5	5	6	8	9	9						
6	1	2	2	2	3	6	6	7	8	8	9	9	9	9
7	0	0	1	6	7	8	8							
8	0	0												

There are 65 items of data.
 The median is the 33rd item, 4.9 hours (4 hours and 54 minutes) of sunshine.
 The range is $8.0 - 0.6 = 7.4$ hours.
 The mode is 6.9 hours.

As outcomes, Year 9 pupils should, for example:

Estimate the range of a large set of grouped data.

For example:

Distance jumped (cm)	No. of pupils
$180 \leq d < 190$	2
$190 \leq d < 200$	6
$200 \leq d < 210$	9
$210 \leq d < 220$	7
$220 \leq d < 230$	15
$230 \leq d < 240$	18
$240 \leq d < 250$	8
$250 \leq d < 260$	2

- Estimate the range of the distances jumped by 67 pupils, from the data in this table.

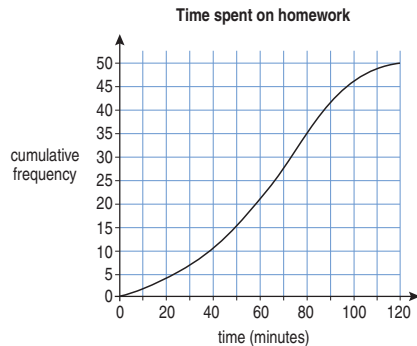
The first class is 180–189 cm, then 190–199cm, and so on. The last class is 250–259cm. An estimate of the range is calculated by using the lowest class value in the first class (or 179.5cm) and the highest class value in the last class (or 259.5cm), giving an estimate of the range to be $259.5 - 179.5 = 80$ cm.

Estimate the median and interquartile range of a large set of grouped data, where the original data are not available. For example:

- Estimate the median distance jumped by 67 pupils, from the data in the table above.

There are 67 pupils; the middle pupil is the 34th. The median must lie in the interval $220 \leq d < 230$, representing 15 pupils, from the 25th to 39th pupils. The 34th pupil is estimated to be 10/15 of the way along the interval of 10 cm, so an estimate of the median is 227cm to the nearest centimetre.

- Estimate the median and quartiles from a cumulative frequency diagram, e.g. by reading data for the 25th pupil from a graph showing the time that 50 pupils spent on homework.



HANDLING DATA

Pupils should be taught to:

Calculate statistics from data, using ICT as appropriate, finding the mode, mean, median and range (continued)

As outcomes, Year 7 pupils should, for example:

Calculate statistics. For example:

- A competition has three different games. Jane has played two of the games.

	Game A	Game B	Game C
Score	62	53	

To win, Jane needs a mean score of 60. How many points does she need to score in game C?

- Phil has these four cards. The mean is 4.

1	8	5	2	
1	8	5	2	?

Phil takes another card. The mean of the five cards is still 4. What number is on his new card?

- Rajshree has six cards.

10	10	10	10	?	?
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The six cards have a mean of 10 and a range of 6. What are the numbers on the other two cards?

- I can catch either a Direct bus or a Transit bus to go home. For my last five journeys on each bus, this is how long I had to wait:

Direct bus	10min	8min	5min	9min	8min
Transit bus	16min	1min	2min	15min	1min

Calculate the mean of the waiting time for each bus. Decide which bus it would be more sensible to catch. Explain why.

- Five careful measurements were made to find the mass of a nugget of gold. The five measurements were: 2.003 2.012 1.998 2.000 1.989 ounces. Find the mean of the five measurements.

See Y456 examples (pages 116–17).

As outcomes, Year 8 pupils should, for example:

Calculate statistics. For example:

- Imran and Nia play three games. Their scores have the same mean. The range of Imran's scores is twice the range of Nia's scores. Write the missing scores in the table below.

Imran's score		40	
Nia's score	35	40	45

- John has three darts scores with a mean of 30 and a range of 20. His first dart scored 26. What were his other two scores?
- Collect data from weather stations over a 24-hour period.

Wind speed (mph) Snowdon 10/05/00

Location/time	Summit (1085 m)	Clogwyn (770 m)	Llanberis (105 m)
00:00	1	6	2
01:00	2	8	3
02:00	3	7	8
03:00	3	8	9
04:00	5	6	11
05:00	3	7	9
06:00	5	5	21
07:00	8	10	15
08:00	6	12	11
09:00	3	9	10
10:00	3	4	10
11:00	3	5	12
12:00	8	3	18
13:00	8	2	17
14:00	10	2	17
15:00	10	2	24
16:00	12	5	30
17:00	15	9	30
18:00	17	11	33
19:00	20	12	38
20:00	27	12	41
21:00	35	14	47
22:00	36	14	57
23:00	34	13	45

Source: Snowdonia Weather Stations Project

Calculate the mean and median wind speeds and the range.

	Summit	Clogwyn	Llanberis
Mean	11.54	7.75	21.58
Median	8	7.5	17
Range	35	12	55

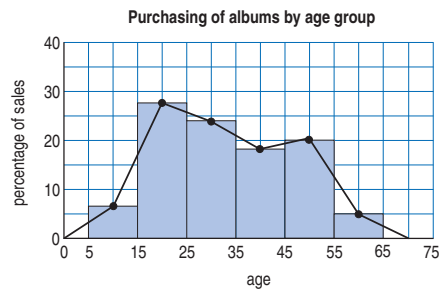
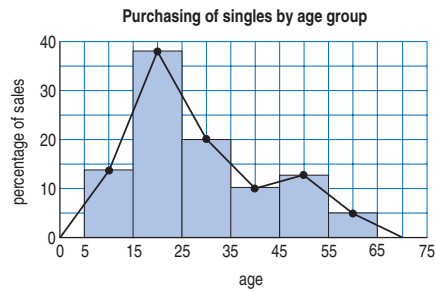
Which place had the least reliable weather?

As outcomes, Year 9 pupils should, for example:

Calculate statistics. For example:

- Three people have a median age of 30 and a mean age of 36. The range of their ages is 20. How old is each person?
- Three children have a mean age of 10. The range of their ages is 6. What is the lowest possible age:
 - of the youngest child?
 - of the oldest child?
- Amrita has five cards numbered in the range 0 to 20. She says: 'The range of my cards is 4, the mode is 6 and the mean is 5.' Is this possible?

Look at these two frequency diagrams.



- Estimate the mean age of people buying singles.
- Estimate the median age of people buying singles.
- Estimate the mean age of people buying albums.
- Estimate the median age of people buying albums.

What conclusions can you draw from your answers?

HANDLING DATA

Pupils should be taught to:

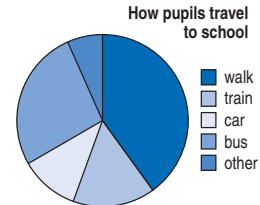
Construct graphs and diagrams to represent data, on paper and using ICT

As outcomes, Year 7 pupils should, for example:

Use, read and write, spelling correctly:
frequency diagram, bar chart, bar-line graph, pie chart...

Construct graphs and diagrams to represent data, on paper and using ICT, and identify key features. For example:

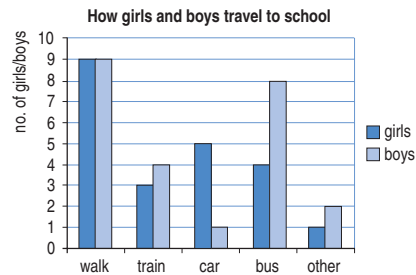
- **Pie charts** generated by ICT, for example:



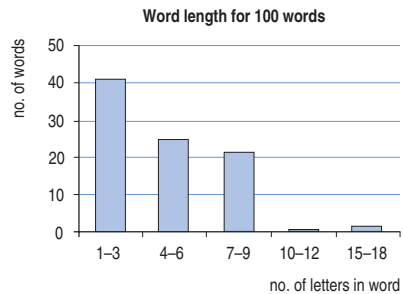
Know that the sizes of sectors of the chart represent the proportions in each category.

[Link to percentages \(pages 70–7\).](#)

- **Bar charts** for categorical data, for example:



- **Bar charts** for grouped discrete data, for example:



Choose suitable class intervals.

Know that the bars may be labelled with the range that they represent, but not the divisions between the bars.

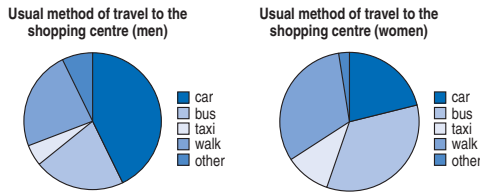
Know the conventions for marking the axes when the scale does not start from zero (see [page 172](#)).

As outcomes, Year 8 pupils should, for example:

Use vocabulary from previous year and extend to: population pyramid, scatter graph, distance–time graph, line graph...

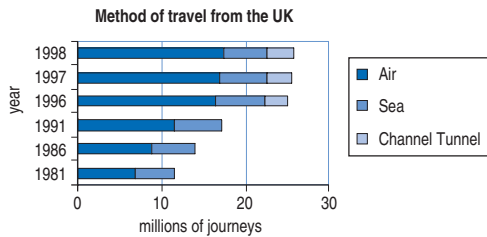
Construct graphs and diagrams to represent data, on paper and using ICT, and identify key features.

- **Pie charts:** Understand that pie charts are mainly suitable for categorical data. Draw pie charts using **ICT** and by hand, usually using a **calculator** to find the angles. For example, draw these graphs to compare shopping travel habits.

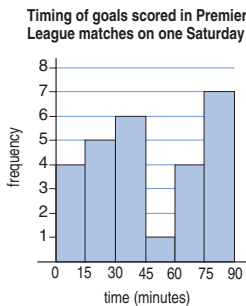


Link to percentages (pages 70–7).

- **Bar charts:** Compound bar charts allow both overall trends and changes in subcategories to be shown, for example:



- **Frequency diagrams** for a continuous variable, for example:



Choose suitable class intervals. The bars in this graph represent intervals of $0 \leq t < 15$ minutes, $15 \leq t < 30$ minutes, etc.

Know that for continuous data the divisions between the bars should be labelled.

As outcomes, Year 9 pupils should, for example:

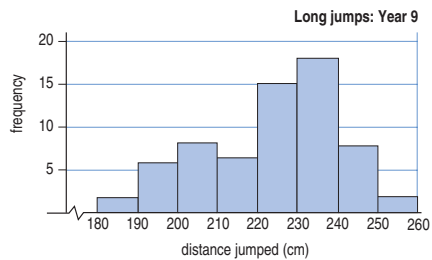
Use vocabulary from previous years and extend to: line of best fit, cumulative frequency graph...

Construct graphs and diagrams to represent data, on paper and using ICT, and identify key features.

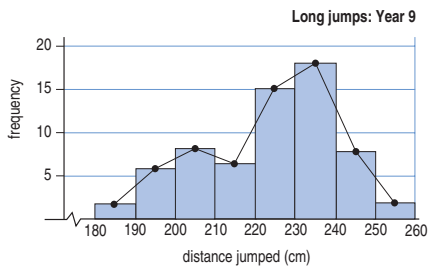
Appreciate that:

- A table usually gives all the data that can be retrieved.
- A graph, chart or diagram representing the data highlights particular features that a table does not.
- Data shown in a graph, chart or diagram are often in an aggregated form that does not allow the original data to be extracted.
- Calculated statistics are representative values of data sets.

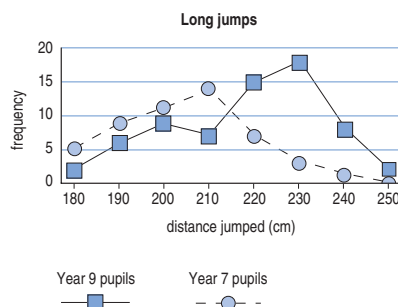
- **Frequency diagrams and polygons**, e.g. in this graph bars represent intervals of $180 \leq d < 190$, etc.



Use frequency polygons, for example:



Use superimposed frequency polygons rather than bar charts to compare results, for example the distances jumped by pupils in Year 7 and pupils in Year 9.



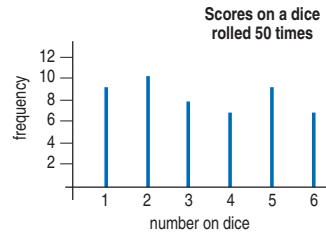
HANDLING DATA

Pupils should be taught to:

Construct graphs and diagrams to represent data, on paper and using ICT (continued)

As outcomes, Year 7 pupils should, for example:

- **Bar-line graphs** for a discrete variable, for example:



Know that:

- The length of the bar represents the frequency.
- What is being counted or measured (the independent variable) is placed on the horizontal axis, and the count or measure (the dependent variable) on the vertical axis.
- It is not appropriate to join the tops of the bars.

See Y456 examples (pages 114–17).