

HANDLING DATA

Pupils should be taught to:

Plan how to collect and organise the data and design suitable data collection sheets and tables

As outcomes, Year 7 pupils should, for example:

Decide how to collect and organise the data needed; design a data collection sheet or questionnaire to use in a simple survey.
For example:

- Survey of ways of travelling to school

Name	Class	Age	Form of travel	Distance (m)	Depart time	Arrival time	Duration

- Survey of lengths of words (or sentences) in newspapers
Decide:
sample size, where in the newspaper to collect the words, what to do with data such as numbers, hyphenated words, abbreviations and other exceptional data.
- Investigation of populations of different countries
In geography, design a table to collect population data.

Construct frequency tables for sets of data, grouped where appropriate in equal class intervals. Know that the final or initial interval may be open, e.g. for ages 'over 80'.
For example:

- How do pupils travel to school?
Intervals of 5 minutes are likely to be more useful than intervals of 1 minute or 1 hour.
Discuss where to put a journey time such as 15 minutes.

Journey time in minutes	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35+
No. of pupils								

- How easy are newspapers to read?
Take the first 100 words from a front-page story of a newspaper. Record the number of letters in each word. Record the data in intervals of 4 letters.

No. of letters (n)	1-4	5-8	9-12	13-16	17-20
Express					
Mail					
Telegraph					

Record the data again in intervals of 3 letters.
Which are more useful: intervals of 3 letters or intervals of 4 letters? Why?

- Which is your better catching hand?
Place 10 centimetre cubes on the back of your writing hand. Toss them gently upwards, turn your hand round quickly, and catch as many as you can.
Repeat for the non-writing hand.
Record the results of the whole class in a frequency table.

Cubes caught (c)	0	1	2	3	4	5	6	7	8	9	10
Writing hand											
Non-writing hand											

Specifying a problem, planning and collecting data

As outcomes, Year 8 pupils should, for example:

Decide how to collect the data (e.g. a survey or experiment), including sample size. Plan a simple survey or experiment, and design a suitable data collection sheet. For example:

- Survey of the price of second-hand cars

Vendor	Price band					
	<£2000	£2000-£3999	£4000-£5999	£6000-£7999	£8000-£9999	£10 000+
Private						
Dealer						

- Comparison of invertebrate communities in two contrasting sections of a stream

Invertebrate indicator animals	No. at site A	No. at site B
Bloodworm		
Caddis fly larva		
Freshwater shrimp		
Mayfly nymph		
Rat tailed maggot		
Sludge worm		
Stonely nymph		
Water louse		

Construct frequency tables for sets of continuous data, with given equal class intervals. Know that class intervals should be continuous with no gaps or overlaps; the last group may be open. For example:

- Timing of goals scored in Premier League matches on one Saturday
Discuss how and where to record a goal scored after, say, 60 minutes, emphasising that the choice must be consistent for each similar occurrence.

Time (minutes)	Frequency
$0 < T \leq 15$	4
$15 < T \leq 30$	5
$30 < T \leq 45$	6
$45 < T \leq 60$	1
$60 < T \leq 75$	4
$75 < T \leq 90$	7

As outcomes, Year 9 pupils should, for example:

Design a survey or experiment to capture relevant data from one or more sources; determine sample size and degree of accuracy needed; design, trial and if necessary refine data collection sheets. For example:

- Investigation of jumping or throwing distances
Check that the data collection sheet is designed to record all factors that may have a bearing on the distance jumped or thrown, such as age or height. Decide the degree of accuracy needed for each factor. Recognise that collecting too much information will slow down the experiment; too little may limit its scope.
- Survey of acceleration data for popular cars
Check that the published data contain what is expected. Round published engine sizes to the nearest 0.1 litre to eliminate unnecessary accuracy in data such as 1428 cc and 1964 cc.
- Study of the distribution of grass
Use a quadrat or points frame to estimate the numbers of grass and non-grass plants growing in equal areas at regular intervals from a north-facing building. Repeat next to a south-facing building. Increase accuracy by taking two or more independent measurements.
- Questionnaire on attitudes to fairly-traded goods
Test questions on a small sample before refining them for a larger sample.

Construct tables for large sets of raw data, discrete and continuous, choosing suitable class intervals.

Know that to group data loses information but grouping is necessary to ensure that large data sets are manageable. For example:

- Group long jump distances initially in intervals of 5 cm or 10 cm, recognising that the number of groups created may be too few for further analysis, or too many to reveal key features.

When organising large data sets, find suitable class intervals to fit the full range of the data. For example:

- Population distribution data for the UK 1999

Ages	Population	Ages	Population	Ages	Population
0-9	3 890 782	0-14	5 917 365	0-19	7 979 251
10-19	4 088 469	15-29	6 234 857	20-39	9 215 053
20-29	4 172 971	30-44	7 608 956	40-59	8 272 666
30-39	5 042 082	45-59	5 705 792	60-79	4 152 609
40-49	4 818 389	60-74	3 364 102	80+	871 715
50-59	3 454 277	75-89	1 533 287		
60-69	2 374 917	90+	126 935		
70-79	1 777 692				
80-89	744 780				
90+	126 935				

HANDLING DATA

Pupils should be taught to:

Plan how to collect and organise the data and design suitable data collection sheets and tables (continued)

Collect and record data from primary and secondary sources

As outcomes, Year 7 pupils should, for example:

Collect and record small sets of data as planned from surveys and experiments or secondary sources.

For plans, see pages 248–53.

Specifying a problem, planning and collecting data

As outcomes, Year 8 pupils should, for example:

Design and use simple two-way tables. For example, design, read and compare the cells in two-way tables such as:

- Method of transport to different shopping centres

	Car	Bus	Train	Walk	Coach	Other
Local centre						
Town centre						
Out-of-town development						

- Method of transport and distance to school

Distance (km)	Car	Bus	Train	Walk	Coach	Other
0–0.5						
0.5–1						
1–1.5						
1.5–2						
2–2.5						
2.5–3						
3+						

Collect data as planned from secondary sources or by carrying out a survey or experiment, involving observation, data-logging using ICT, or questionnaire.

For plans, see pages 248–53.

As outcomes, Year 9 pupils should, for example:

Design and use two-way tables. For example:

- Use a two-way table to highlight the difference between male and female smoking patterns in the UK in different age groups, and any trends visible over time.

1986			1986			1976		
Age	Male %	Female %	Age	Male %	Female %	Age	Male %	Female %
18–19	25	32	18–19	30	31	18–19	38	35
20–24	43	37	20–24	41	38	20–24	48	44
25–34	38	33	25–34	37	35	25–34	48	41
35–49	30	30	35–49	37	33	35–49	49	44
50–59	27	26	50–59	34	34	50–59	49	45
60+	17	18	60+	28	22	60+	40	42

UK smoking and age distribution 1976–1996

- The cost of an old Barbie doll depends on both its condition and whether or not it is in the original box. The table shows what percentage of the original cost the secondhand value retains.

Condition	Boxed	Not boxed
Excellent	100%	65%
Good	80%	32%
Poor	50%	15%

By considering the percentage lost by not having its original box, examine the claim that the importance of the box increases with the doll's condition.

Gather data as planned from specified secondary sources, including printed tables and lists from ICT-based sources. Identify what extra information may be required to pursue a further line of enquiry.

For example:

- As part of a study in science of car engine sizes, discuss whether the published value for bhp or 'torque' may be a better measure of 'power' than engine size.
- When designing a questionnaire about fairly-traded goods, include some questions on social or moral attitudes for later analysis.
- As part of a study of development indicators, discuss whether:
 - features relating to development are particular to the countries selected or are representative of wider trends;
 - some measures appear not to vary as much as others, and may be less useful as indicators of development.

Respond to problems of unavailable data, or data that relate to different dates, or that are organised in different ways (e.g. some appearing in tabular form, some in graphical form, some in summarised form), for example, by estimating the required comparable value.