ARKS KEYS TO NUMERACY

PRESENTING STATISTICS

PRESENTING STATISTICS

What you will look at in this section:

● **Why charts and graphs are used to present information**

● **How to read charts, graphs and tables**

● **How to extract relevant information**

● **How to produce some charts and graphs yourself**

Objectives

What you need to know:

● Four rules

● Percentages

Where in your life have you come across charts and graphs?

Write your ideas here:

HAVE
A GO

We live in an Information Age, where statistics on a wide range of subjects such as unemployment, spending, inflation, and crime are often presented in the form of graphs or charts. Just pick up a newspaper and you are most likely to find some examples. Charts in holiday brochures give the average number of hours of sunshine and the amount of rainfall in different locations around the world to help you decide on your holiday.

There are many ways of presenting numerical information. Presenting figures in charts or graphs can make it easier to extract relevant information quickly and accurately. They illustrate information in a clear way rather than just lists of figures.

They provide an instant visual impression of trends going up or down and from left to right.

Charts and Graphs

What to look for on a graph or chart:

- The chart should have a title to tell you what it is about

- The vertical and horizontal lines (called the axes) should be labelled describing the information and the figures represented

- The columns, bars or points on the horizontal axis should be equally spaced for easier reading

- The scale on the vertical axis should go up in appropriate equal amounts again to make reading the information easier.

Look at the following graph and notice the title, labelling and scale:

WHEAT YIELD IN EU-COUNTRIES 1996
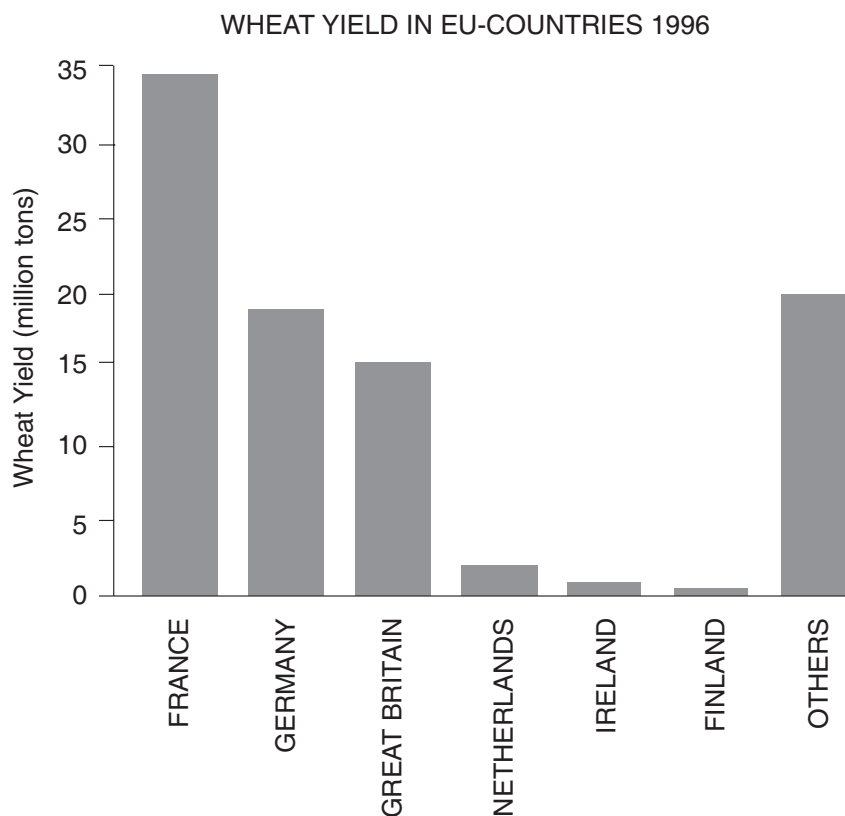
Activity 1

How goals were scored in the World Cup 1998

Activity

In the first 32 games 80 goals were scored altogether. After analysing the goals it was noted that the goals went into the net in 5 different places:

Top left corner   9 goals

Bottom left corner   20 goals

Centre   20 goals

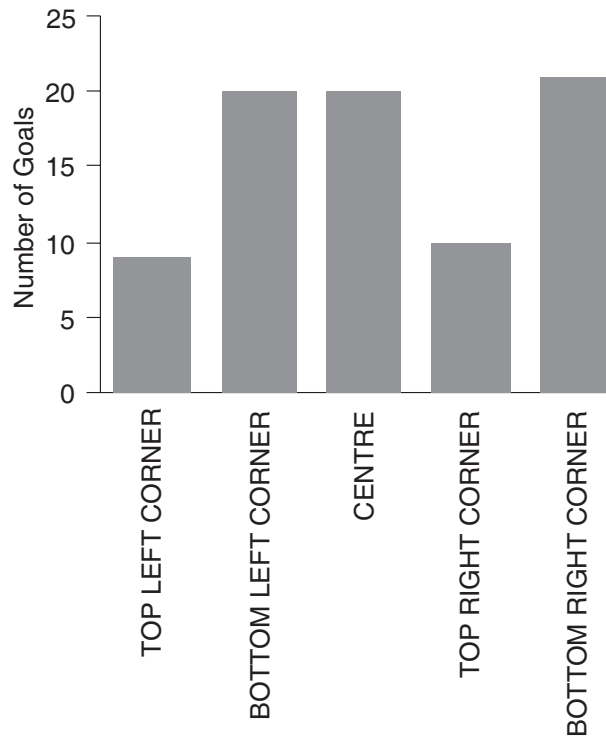Top right corner   10 goals

Bottom right corner   21 goals

How would you represent this information in a bar chart?

ARKS KEYS TO NUMERACY-FINLAND/SCOTLAND

Activity continued

Activity 1 continued

If you decided to put the number of goals scored up the vertical axis and the position of the goal scored along the bottom then your chart may look something like this:

Activity 2

Out of 60 goals the breakdown of how each goal was achieved was as follows:

Free kick	4 goals
After a free kick	4 goals
Penalty kick	4 goals
Corner kick	10 goals
Vertical feed	11 goals
Other	27 goals

Now present this information in your own chart:

Look at the two charts you have drawn with the information on World Cup goals. Who might use this information?

● Did you suggest that the goalkeeper might want to know which part of the net he should particularly protect when a goal shot looks likely.

● The team might want to know what type of goal was scored most often and therefore try to avoid giving away too many corner kicks.

BAR CHARTS

There are three types of bar chart:

● single bar charts

● vertical bar charts

● horizontal bar charts.

Single Bar Chart

One whole single bar represents 100% or the total amount.

The height of the various sections in the bar show how much each item is in relation to the other items.

Activity 3

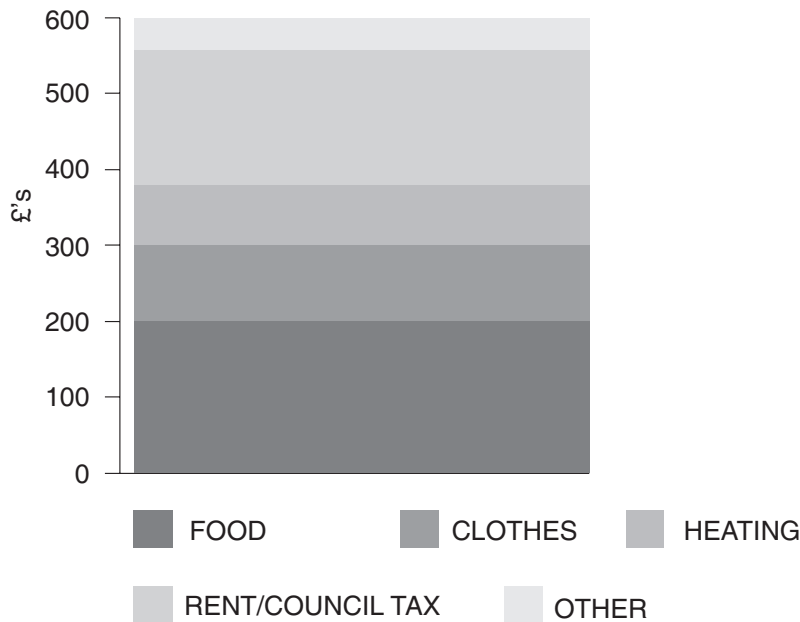A family spends a monthly wage of £600 in the following way:

Food   £200

Clothes   £100

Heating   £80

Rent/Council Tax   £180

Other   £40

This could be represented by the following **single bar chart**:

Activity 4

Now present the following information in a similar single bar chart to the one on the previous page.

A loaf of bread costs 50p. The price can be divided up as follows:

Farmer   9.8p

Mill   4.1p

Transport   0.6p

Bakery   27.1p

Retailer   8.4p

It might help with the vertical scale if you use graph paper.

Vertical Bar Charts

A vertical bar chart is a good way to present changes over a period of time or to compare amounts against one another.

The item name is displayed along the bottom (horizontal axis) while the values are shown up the side (vertical axis).

Activity 5

Use the information from the Monthly Family Spending, *Activity 3* to finish off the following chart:

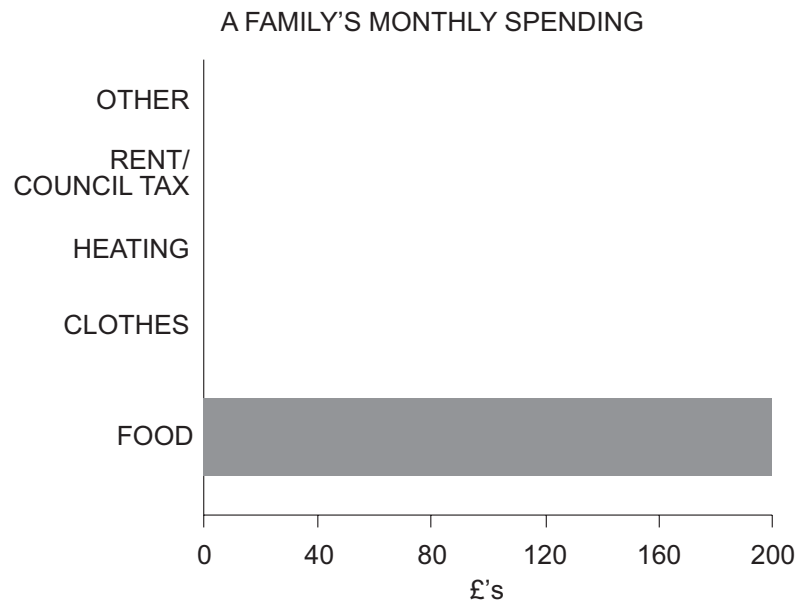Activity

A FAMILY'S MONTHLY SPENDING
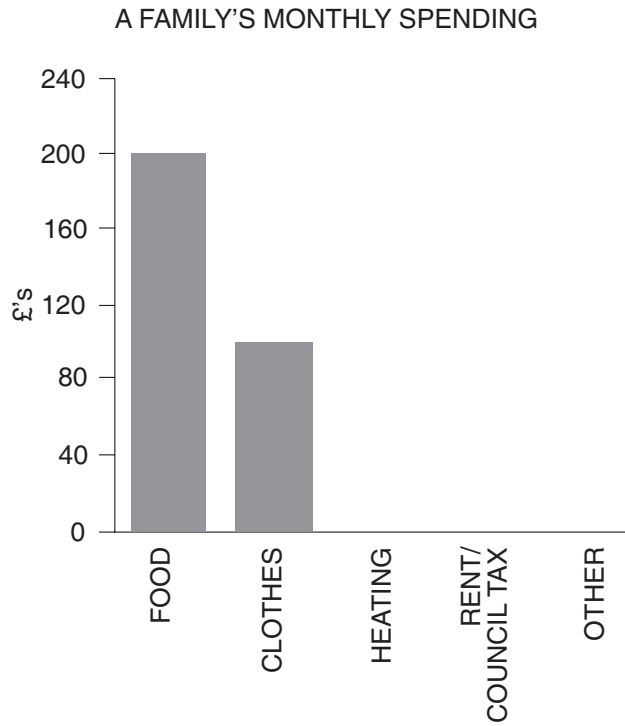
Horizontal Bar Charts

You can use a horizontal bar chart to make comparisons visual. This time the items are named on the vertical axis and the values are on the horizontal axis, emphasising the differences in numerical value.

Activity 6

Again using the Monthly Family Spending information complete the following chart:

A FAMILY'S MONTHLY SPENDING

Activity 7

If you would like to practise making more Bar Charts, use the information on the cost of a loaf of bread to present vertical and horizontal bar charts.
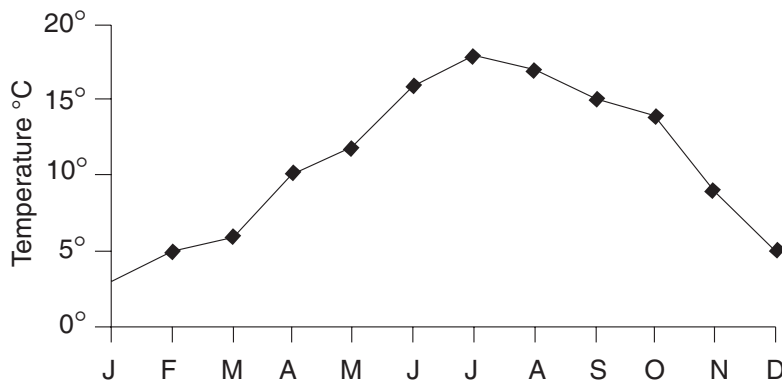
Line Graphs

Information can also be presented as points on a graph.

A line is then formed by joining the points from left to right.

It is not always necessary to start from zero on a graph as this will depend on the values involved.

Activity 8

The following line graph shows the monthly temperatures in °C for London.

Answer the following questions by reading the information from the line graph above.

1. What was the temperature in London in:

November ⬚

March ⬚

July ⬚ ?

2. Which month had:

The highest temperature ⬚

The lowest temperature ⬚ ?

Activity

Activity 8 continued

3. What was the difference in temperature between:

July and December [ ]

August and March [ ] ?

4. In which month was the temperature:

10°C [ ]

15°C [ ]

5°C [ ] ?

Activity

Activity 9

In the following chart you can find the amounts of rainfall, or precipitation, in different towns in Finland. Choose **one town** and represent the different monthly precipitation figures in a line graph.
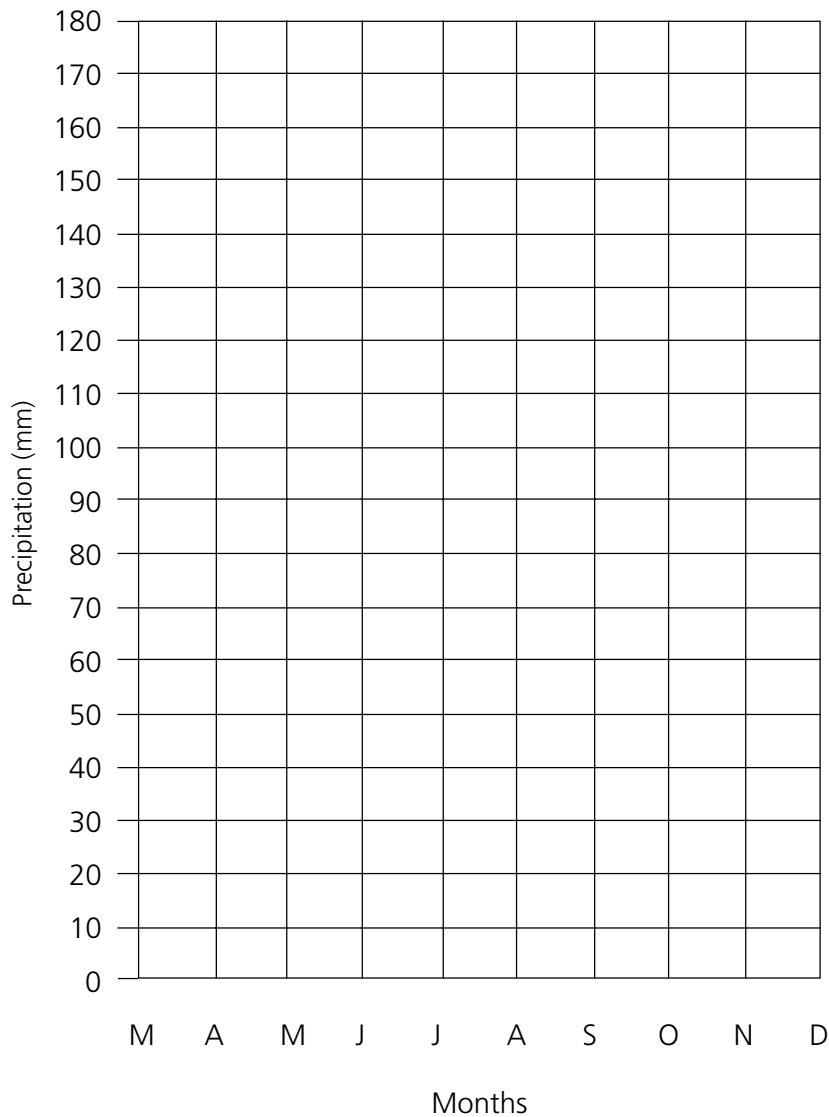
Figures for Finnish towns' precipitation

	A	B	C	D	E	F	G	H	I
March	40	45	54	52	28	53	22	18	23
April	28	24	31	59	26.6	65	18	11	19
May	9	7	28	79	35.5	68	42	14	45
June	37	41	32	91	22	41	89	31	34
July	53	81	41	51	135	176	85	65	66
August	114	99	105	106	145	148	86	71	76
September	24	87	134	71	70	67	62	33	42
October	73	98	79	49	52	50	30	23	64
November	52	10	16	20	17	29	31	17	22
December	73	69	51	53	40	63	41	43	40

Activity 9 continued

Precipitation (mm)

180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

M A M J J A S O N D

Months

Now choose a second and third town and add the precipitation for each onto your line graph.

How will you identify which towns are represented?

Activity 9 continued

Did you think about producing a key at the bottom of the graph to explain your diagram? A **key** is a small information box which tells the reader what the different lines represent.

Another method would be to mark the points on your diagram with different shapes so that the reader would be able to identify which town is represented by each line and compare them without any confusion.

Example Key

	X		X		
Vassa		X		X	X	X
Oulu		O	O		O	O
			O		

If you would like to practise producing some more line graphs, why not make a graph showing the weather changes in your own town or country. You can collect the information from the weather reports in the newspaper.

PIE CHARTS

Florence Nightingale is probably best known as a nurse in the Crimean War. However, she also invented pie charts as a means of demonstrating her argument that more soldiers died from disease rather than from the actual battles.

Information on a pie chart is usually represented as a percentage, where the whole circle represents 100% or the total amount.

Activity 10

Look at the following pie chart and answer these questions:
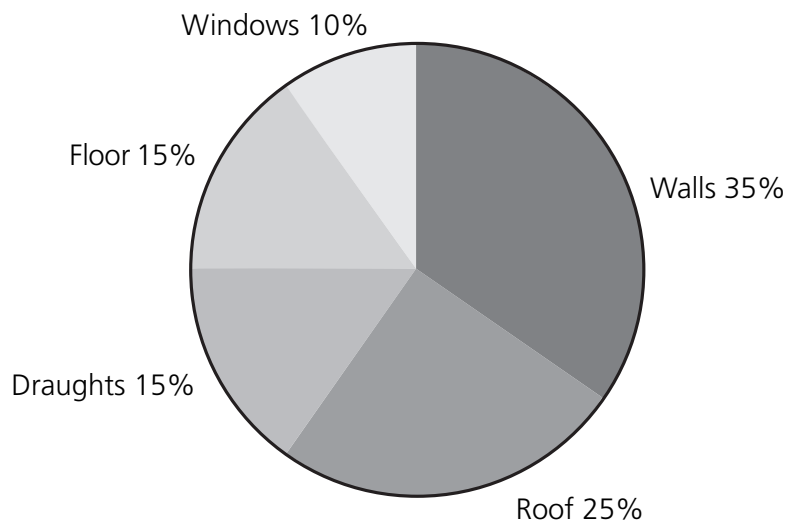
Heat Loss by Structure

How much heat is lost through the floor?

How much heat is lost through the roof?

Where is the greatest heat loss?

Where is the least heat loss?

Can you think of any ideas that might save heat loss in your home?

Activity

AVERAGES

Activity 11

How would you work out the average number of children within the families of your closest relatives?

Your family	3 children
Your sister's family	2 children
Your older brother's family	no children
Your twin brother's family	1 child

How would you work this out?

Possible method:

Add the number of children altogether $\qquad$ 3 + 2 + 1 = 6

Then divide this by the number of families $\qquad$ 6 ÷ 4 = 1.5 children

So the average number of children in this example is 1.5 or one and a half children.

Activity

Activity 12

What is the average number of children in your study group?

Group task

INTERPRETING STATISTICS

Everyday in the newspapers and on the television news we are bombarded with figures about different subjects such as unemployment rates, manufacturing outputs, days off work sick, how many people agree or disagree with a particular point of view. What do these figures really mean? Should we believe all the figures we read? It can get quite confusing.

The simple answer is that we should not believe everything. Most figures can be accepted as guidelines, but very few actually give the whole story. The figures depend on many things, eg think about unemployment figures and who is actually included when they are calculated. British unemployment statistics are usually based only on the numbers actually applying for unemployment benefit. They do not include young people under the age of 18 who are not yet old enough to receive benefit, or women whose partners claim for them.

An opinion poll may claim that a certain percentage of the population are not in favour of fox hunting but how do the researchers reach this conclusion? Opinion polls work by asking a cross-section of the population (people from different income groups, localities, ages) what their views are. Their responses are then categorised and presented as percentages or in charts.

Averages are often used in published figures. That is how you can end up with a statement such as the average British family has 2.4 children. Of course you cannot have part of a child. These figures are devised by adding all the children in so many families together and dividing by the number of families. When presented as an average, you can't tell that some families have only one child whilst other families may have four or five children.

Activity 13

Look at the following statistics and discuss with a partner what the figures actually mean and how useful they might be:

1) The average primary school class has 30 children to one teacher. What does this actually mean?

[   ]

(This figure tells us very little. We don't actually know how many classes have exactly 30 children. Some will have many more whilst some may have much less.)

2) 13% of the population have some problems with reading and writing. What does this figure tell you?

[   ]

(Again this doesn't really give much information. You are given no idea of how severe the problems might be for some people or whether most people just feel that their spelling isn't very good.)

Activity 13 continued

3)   Holiday brochures show charts with the monthly average sunshine hours per day for most destinations. Can you guarantee that amount of sunshine on your holiday?

(No you can't. You may be lucky and get more but in a particularly bad year you might be rained on everyday.)

Remember to look at figures in charts and graphs to see what information the figures have been based on. Read between the lines and make sure you know what has or has not been included when the charts were being compiled. Remember averages can't show the best or the worst figures.

Don't believe every figure you see.

ANSWERS to ACTIVITIES

Answer to Activity 8 (pages 303-304)

1) 10°C

   6°C

   16°C

2) July

   January

3) 13°C

   11°C

4) April

   September

   February/December

Answer to Activity 10 (page 307)

15%

25%

Walls 35%

Windows 10%

ARKS KEYS TO NUMERACY-FINLAND/SCOTLAND