

5

Television viewing

There are many articles in newspapers and magazines about popular TV programmes and films.

The articles often contain information on the most popular programmes and the average number of people who have watched them.

Is there any maths needed to understand the articles? We need to be able to understand the graphs and charts and what is meant by 'average'.



Talk about it

Do you watch TV or video tapes?

Do you visit the cinema?

Do you read articles in the newspaper or magazines about TV programmes or films?

Do you know which TV programmes are the most popular?

On average, how many hours of TV do you watch a week?

Do you read maps or plans?

What maths skills do you think you might need for these things?

These are the skills you will practise in this unit

Which are the most useful for you? Tick the boxes.

- | | |
|---|-------------|
| <input type="checkbox"/> Understanding and obtaining information from graphs and charts | Skill code |
| <input type="checkbox"/> Understanding and obtaining information from maps and scale drawings | HD1/L1.1 |
| <input type="checkbox"/> Representing data in a line graph | HD1/L1.1 |
| <input type="checkbox"/> Drawing and understanding plans | HD1/L1.2 |
| <input type="checkbox"/> Understanding how to describe and use data (averages and range) | HD1/L1.2 |
| <input type="checkbox"/> Designing a questionnaire for a survey to collect information | HD1/L1.3, 4 |
| | HD1/L1.2 |

How popular are TV programmes?

Newspapers and magazines often have articles about soap operas and other television programmes. Information on the number of viewers and favourite programmes is often displayed in a chart or graph.

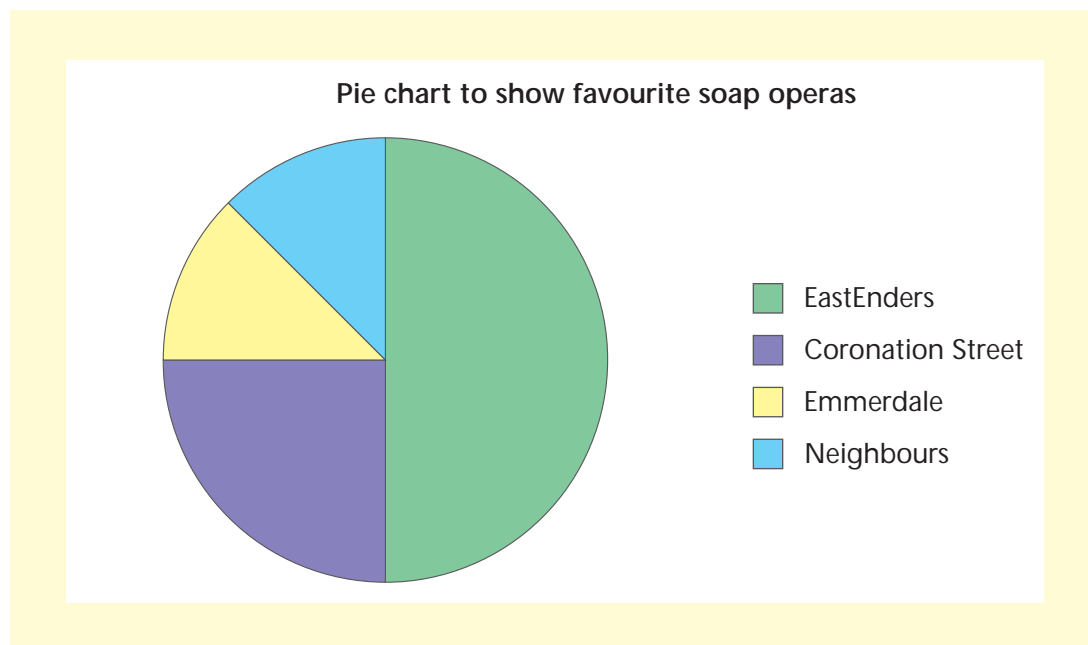
Remember

- A **graph** or a **chart** is a picture of numerical information.
- A **pie chart** is usually used when you want to show what proportion of the whole each group represents. A pie chart is a circle divided into **sectors**. The bigger the sector the more there are in that group.
- A **line graph** is usually used to show **trends**, such as the general increase or decrease across the whole graph.
- The **title** of the chart or graph and the labels on the **axes** or the key will tell you what the graph or chart is about.



Activity 1

Forty people were asked to choose their favourite soap opera. The results are shown in the pie chart below.



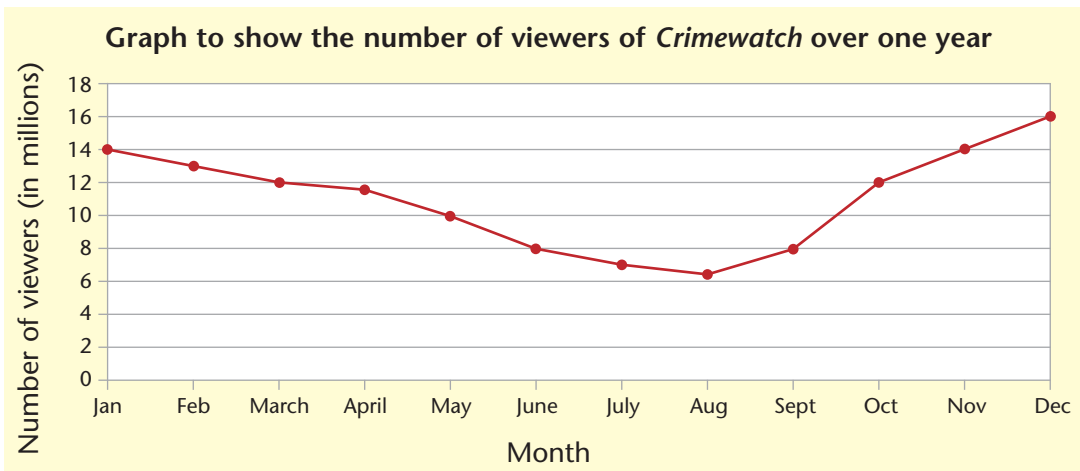
If we want to find out how many people preferred *Coronation Street*, we look at the sector for *Coronation Street*.

This sector is $\frac{1}{4}$ of the circle so $\frac{1}{4}$ of the people preferred *Coronation Street*.

$\frac{1}{4}$ of 40 = 10, therefore 10 people preferred *Coronation Street*.

- 1 Which is the most popular soap opera?
- 2 How many people preferred *EastEnders*?
- 3 How many people preferred *Emmerdale*?

Activity 2



The title tells us that the graph shows the number of viewers of *Crimewatch* over one year.

If we want to find out the number of viewers in September we look at the **horizontal axis** labelled 'Month' and go along to September. Then we go up to the line and read the value from the **vertical axis**.

The label on the vertical axis tells us that the number of viewers is in millions. So eight million people watched the programme in September.

1 How many people watched *Crimewatch* in July?

.....

2 How many people watched *Crimewatch* in August?

.....

3 In which month did *Crimewatch* have the highest number of viewers?

.....

4 Describe the trend in viewing figures for the year.

.....

.....

In your group, discuss possible reasons for these changing figures.



Review

Do you need more practice in obtaining information – from pie charts?

Yes ☐ No ☐

– from line graphs?

Yes ☐ No ☐

For more work on this, go to H1 (page 13) or E1 (page 15).

This work links to mini-project M2 (page 16).

Soap village

A TV company has designed a new village for a soap opera. To show what it will look like, the TV company has drawn a map and a scale drawing of one of the sets.

Remember

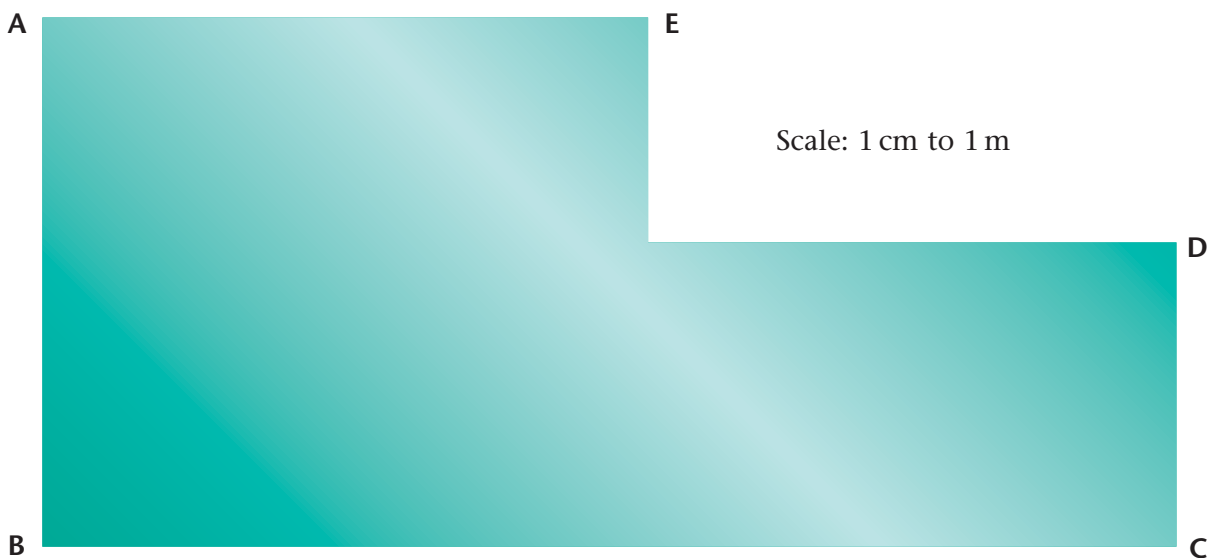
- To fit a drawing on to paper, the measurements have to be made smaller or scaled down. On a scale drawing, every measurement is in proportion to the actual or real measurement.
- The **scale** is the proportion by which each measurement has been reduced.
- A scale is written as a comparison between two lengths, e.g. 1 cm to 1 m, which is 1 cm to 100 cm or, as a ratio, 1 : 100.



Activity 3

The plan of one of the rooms on the set is shown below.

Diagram of set 2



To find out the actual overall length of the set, we measure the length in centimetres (cm). The length is 15 cm on the plan.

As each 1 cm on the plan is 1 m in the actual room, the actual or real length is 15 m.

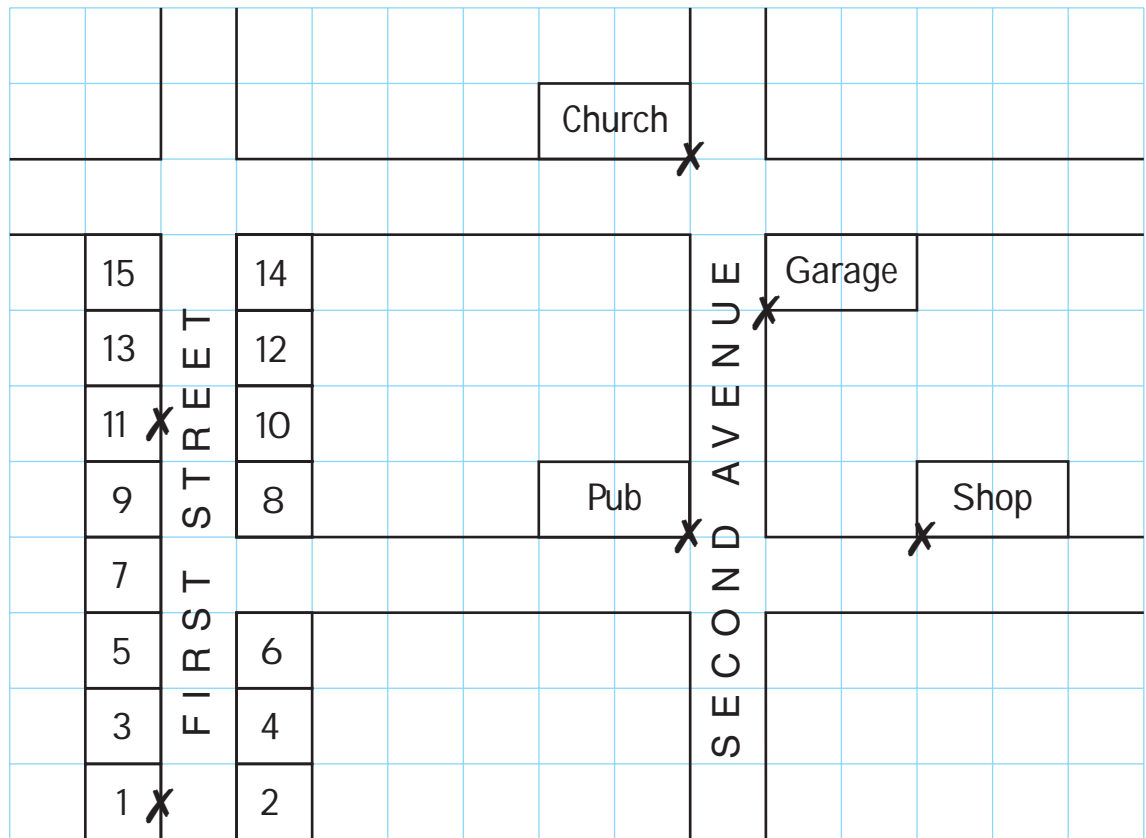
The side AB is 7 cm on the plan. It will be m in the real room.

- Find the length of CD
 - on the scale drawing
 - in real life
- Find the length of AE
 - on the scale drawing
 - in real life

Activity 4

Map of a soap opera village

Scale 1:1000



The scale of the map is 1:1000. This means that every 1 centimetre on the map represents 1000 cm or 10 m in real life. When we work out actual distances from a map, we usually use metres or kilometres.

If we want to find the distance from the pub to the church, we measure the distance in cm. Measure between the crosses marked on the buildings. The distance is 5 cm. As 1 cm on the map is 1000 cm in real life, the actual distance from the pub to the church is $5 \text{ cm} \times 1000 \text{ cm} = 5000 \text{ cm}$ or 50 m.

- What is the distance from the pub to the shop:
a on the map? b in the village?
- How far is it from 1 First Street to 11 First Street:
a on the map? b in the village?
- Measure some other distances on the map. What would they be in the village?

Review

Do you need more practice in – finding dimensions on a scale drawing?

Yes ☐ No ☐

– finding distances on a map?

Yes ☐ No ☐

For more work on this, go to H2 and H4 (pages 13 & 14) or E2 (page 15).
This work links to mini-project M3 (page 16).

Viewing trends

Sometimes we display numerical information in a line graph.

Remember

A line graph has two axes: the **horizontal axis** and the **vertical axis**. The point where the axes cross is called the **origin**.

Both the horizontal and vertical axes should be labelled.

The graph should have a title.

It is important to choose a sensible **scale** so that the graph fills all the space available.



Activity 5

The table shows the number of video tapes sold by a shop over a ten-year period.

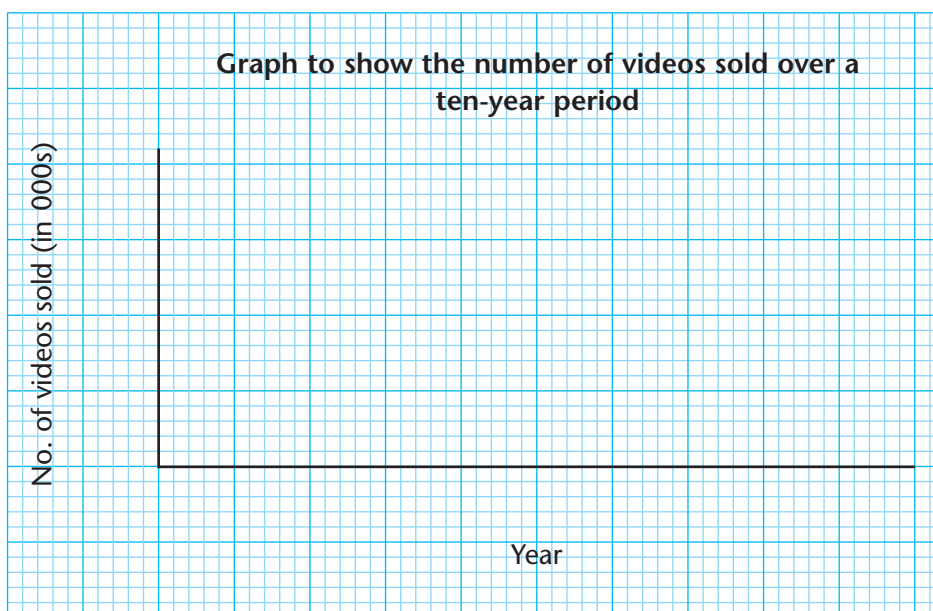
Year	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
No. of videos sold (in 000s)	25	27	28	26	30	32	36	28	24	20

Display this information as a line graph.

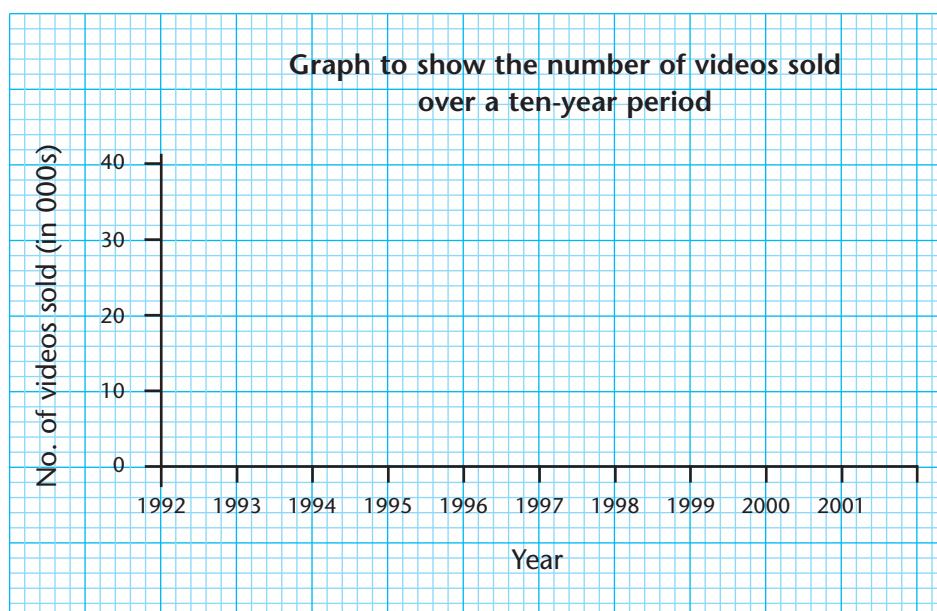
Step 1 We look in the first column of the table above to see what the information tells us. The table gives the video sales in thousands for each year from 1992 to 2001.

For example, in 1993, 27 000 videos were sold.

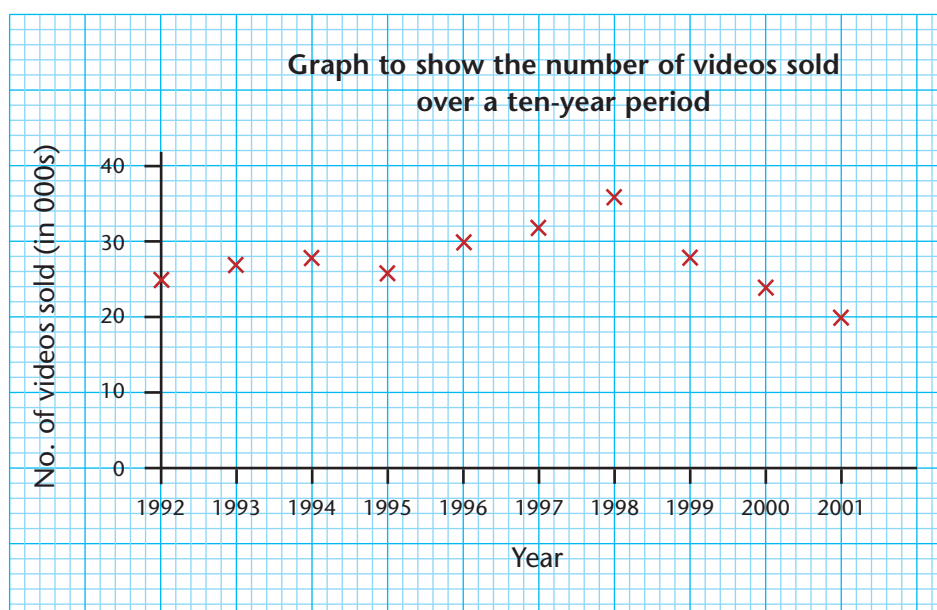
Step 2 Draw the horizontal and vertical axes and label them as in the table. Give the graph a title.



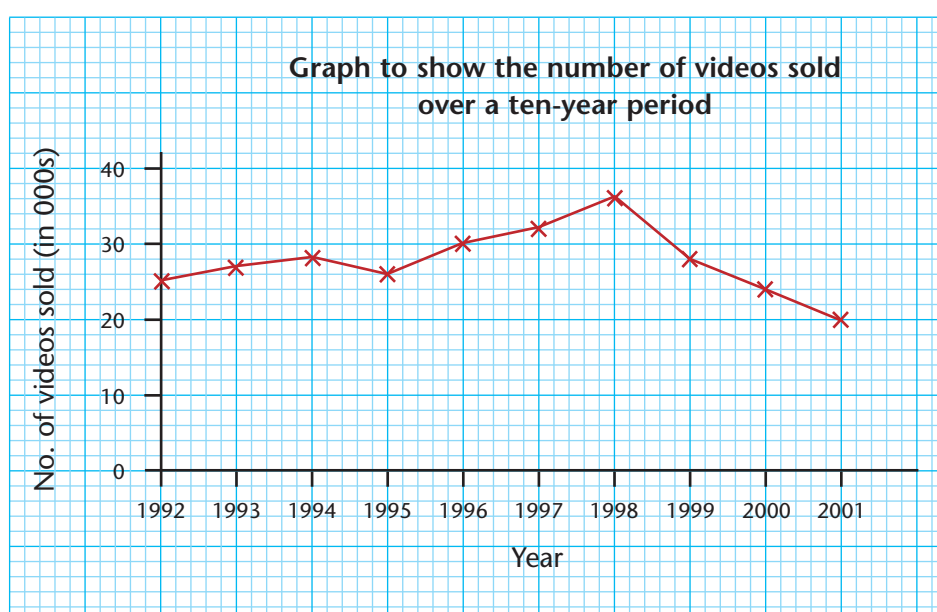
Step 3 Decide on a suitable scale. On the vertical axis, we need to go up to at least 36 thousands as this is the highest number of videos sold. On the horizontal axis, we need to have the years from 1992 to 2001. You may want to discuss this with your teacher.



Step 4 Plot the points from the table.



Step 5 Join the points using a ruler.



Remember

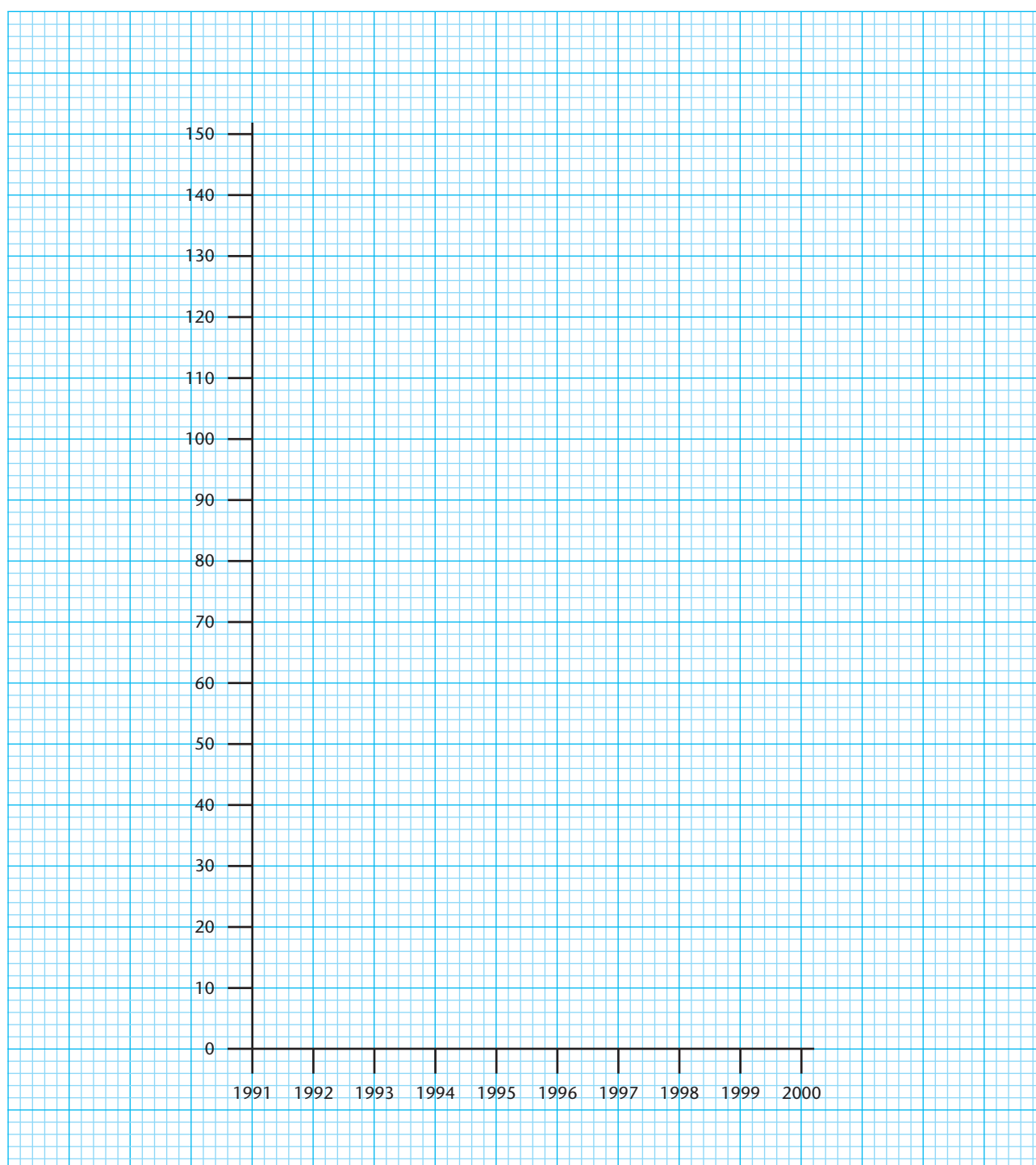
Use a pencil and mark a small cross.

- 1 The table below shows the number of people who went to the cinema from 1991 to 2000.

Year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
No. of people (in millions)	100	104	114	124	115	124	139	136	140	143

As the highest number of people visiting the cinema in a year is 143 million, we need the scale on the vertical axis to go up to at least 143 million.

The graph has been started for you. Plot the points and finish the graph. Remember to label the axes and to give the graph a title.



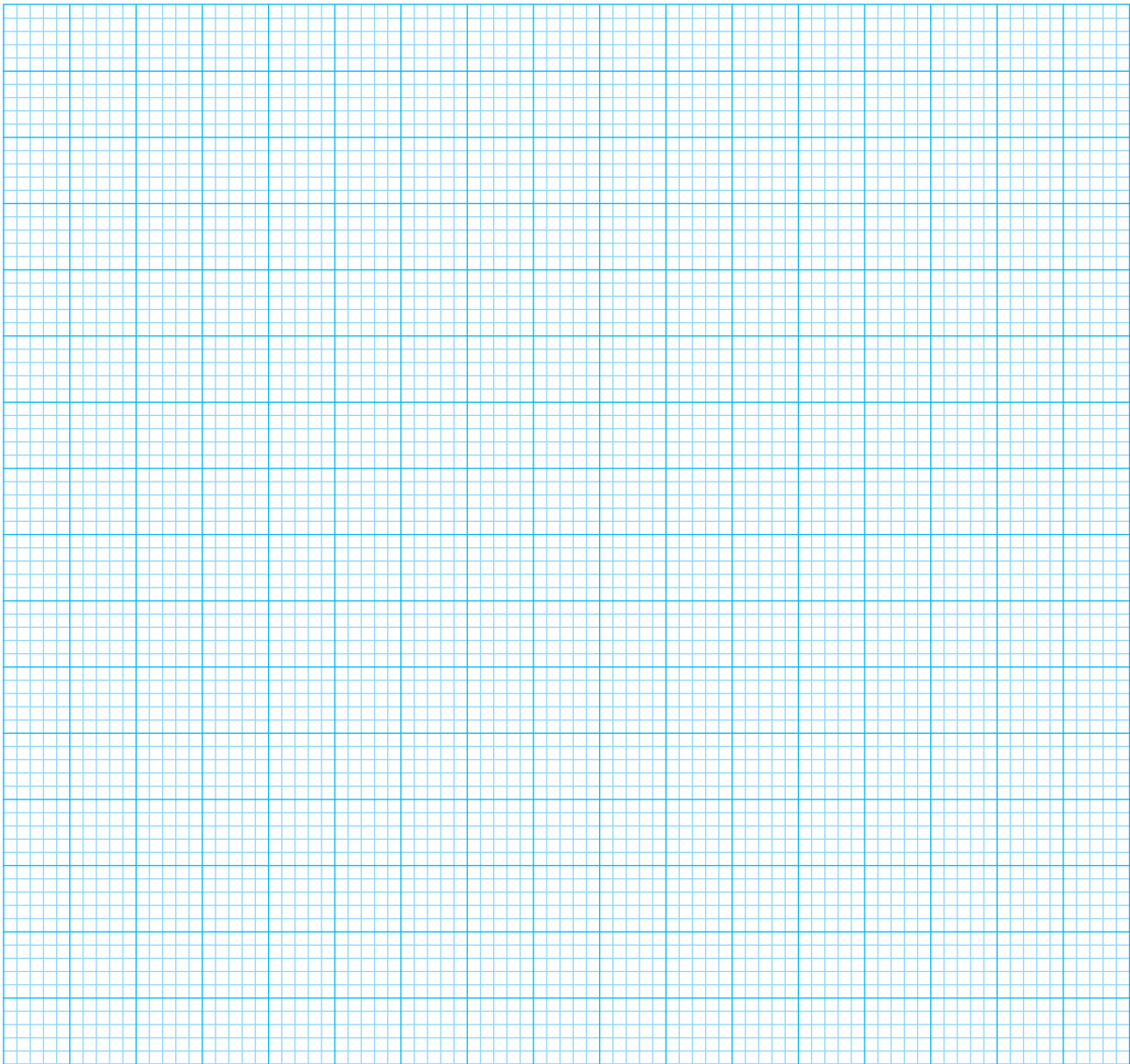
2 The table shows the average number of hours that people in Britain watch TV in one week.

Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
No. of hours	40	39	34	27	24	18	16	14	16	24	26	34

Using the graph paper below, draw a graph to show this information.

As a group, discuss what you will put on each axis.

If you make a mistake **DON'T WORRY**, but don't try to change it.
Have another try or use fresh paper.



Review

Do you need more practice in drawing line graphs?

Yes

No

For more work on this, go to H3 (page 13) or E1 (page 15).

What do we mean by 'average'?

When we read articles in newspapers and magazines about TV and cinema they often talk about the 'average' and the 'range'.

Remember

The **mean** is the most commonly used average in everyday life.

To find the mean we add all the values and then divide this total by the number of values.

The **range** gives the spread of the data.

To find the range we subtract the smallest value from the highest value.



Activity 6

Ten people were asked how many TV sets they had in their household. The answers were

2, 4, 1, 3, 1, 2, 3, 2, 2, 3

To find the average or mean number of TV sets in a household, we add together all the values

$$2 + 4 + 1 + 3 + 1 + 2 + 3 + 2 + 2 + 3 = 23$$

We have 10 values, so we divide 23 by 10.

$$23 \div 10 = 2.3$$

The average (mean) number of TV sets in a household is 2.3.

To find the range (or spread) of the data, we find the smallest value, which is 1 and the highest value, which is 4. We subtract 1 from 4, which is 3. So the range (or spread) of the data is 3.

- 1 Eight people were asked how often they had visited the cinema in the last year. The answers were:

6, 4, 3, 2, 15, 0, 1, 8

Find the mean and the range for the number of times that people visited the cinema in one year.

$$6 + 4 + 3 + 2 + 15 + 0 + 1 + 8 = \boxed{} \text{ times}$$

$$\text{The mean is } \boxed{} \div 8 = \boxed{} \text{ times.}$$

$$\text{The range is } \boxed{} - 0 = \dots\dots\dots \text{ times.}$$

- 2 Nine people were asked how many hours they spent listening to the radio in one week. Their answers were:

10, 19, 4, 8, 0, 6, 25, 12, 14

Find the mean (average) number of hours people listened to the radio in one week and the range or spread in the number of hours.

.....

.....

.....

- 3 Nine people were asked how many video tapes they had. Their answers were:

25, 18, 12, 9, 21, 35, 22, 3, 30

Find the mean number of video tapes that this group of people owned and the range of the data.

.....

.....

.....

- 4 The number of viewers for the most popular TV programmes over a six-year period were:

Year	1995	1996	1997	1998	1999	2000
Number of viewers (in millions)	23	24	19	24	20	19

Find the mean number of viewers for the most popular TV programmes over the six-year period and find the range of the data.

.....

.....

.....



Review

Do you need more practice in – finding the mean?

Yes ☐ No ☐

– finding the range?

Yes ☐ No ☐

For more work on this, go to H6 (page 14) or E3 (page 15).

This work links to mini-projects M1 and M2 (page 16).

What do you watch on TV?

If we want to carry out market research to find out about television viewing habits we can use a specially designed questionnaire.



Activity 7

There are many different types of television programme such as soap operas, documentaries, films, etc. If we ask the question 'Which type of television programme do you prefer?' we may get many different answers. It is easier to give alternatives for people to tick.

E.g. Which type of television programme is your favourite?
Tick the box.

Soap operas ☐ Documentaries ☐ Dramas ☐
Comedies ☐ Films ☐ Other ☐

If we ask people their age, we will get many different ages (and people may be sensitive about giving their exact age). Therefore, it is better to have ages grouped (and never overlapping).

E.g. Which of these age ranges are you in?

under 16 ☐ 16–30 ☐ 31–45 ☐ 46–60 ☐ over 60 ☐

If we are surveying only a small number of people (say, ten or fewer), we may not need to group the data.

Complete the following questions as if you were going to ask 30 or more people to reply.

- 1 Write a question to find out which television channel people watch most often.

.....
.....

- 2 Write a question to find out how many television sets people have in their homes.

.....
.....

Remember

Questionnaires are often used in surveys to collect **statistical** information.

Questionnaires should be short, about one or two pages.

It may be helpful to have 'yes' or 'no' answers or 'boxes' for the answers that are ticked.

(Try to avoid questions with more than one answer.)



Review

Do you need more practice in writing questionnaires?

Yes ☐ No ☐

For more work on this, go to H5 (page 14) or E4 (page 15).
This work links to mini-project M1 (page 16).

Activity H1

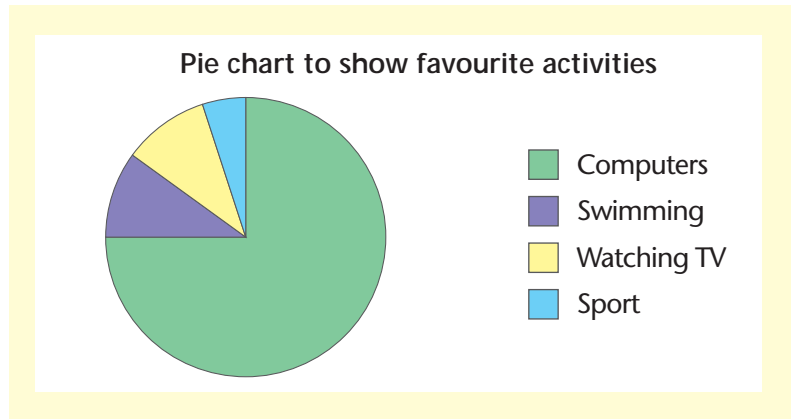
- 1 A hundred people were asked what their favourite activity was. The results are shown in the pie chart.

What is the least favourite activity?

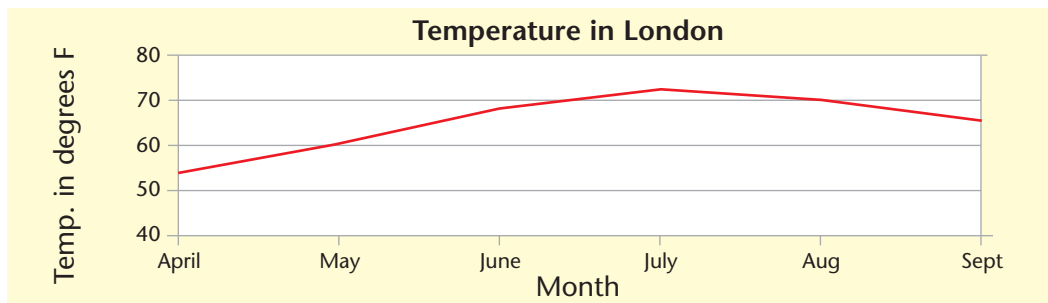
.....

How many people gave computers as their favourite activity?

.....



2



In which month was the temperature lowest?

What was the temperature in May?

Activity H2

- 1 Ask your teacher for a local map. What is the scale on the map?

.....

.....

- 2 Choose some landmarks and find the distances on the map and in real life.

.....

.....

Activity H3

The number of cars sold by a garage over a six-month period is shown in the table below.

Month	Jan	Feb	March	April	May	June
No. of cars sold	15	90	24	18	23	12

Draw a line graph to show this information on separate graph paper.

Discuss with your group what this graph shows.



Activity H4

Make a plan of a room in your home.



Activity H5

- 1 Write a question to find out which leisure activity people prefer.
.....
- 2 Write a question to find out if people like the new leisure centre.
.....
- 3 Explain why 'What is your favourite TV programme?' may not be a useful question to ask in a questionnaire. Rewrite the question in a suitable way.
.....
.....
.....



Activity H6

- 1 Eight people were asked their ages. Their answers were:
37, 42, 29, 17, 15, 22, 31, 38
What is the mean age and the range of ages?
.....
.....
- 2 The weekly wages of 10 people were:
£210, £225, £235, £241, £219, £252, £243, £229, £227, £239
Work out the mean wage and the range in wages:
.....
.....
- 3 The number of tyres sold at a garage each day one week were:
18, 16, 14, 23, 7, 19, 3
Work out the mean and range for the number of tyres.
.....
.....

Extension

Activity E1

- 1 Look in a newspaper for pie charts and line graphs. Write down the information each chart or graph shows.

.....

- 2 The table below shows conversions between pounds (£) and euros. Draw a conversion graph to convert pounds to euros.

£	10	20	30	40	50
euros	15	30	45	60	75

- a Use your graph to convert £25 to euros
 - b How many euros would you get for £46?
 - c How many pounds would you get for 50 euros?
- 3 Use a spreadsheet package to draw the graphs from Activity 5 (pages 6–9). Try out different ways of representing the data or different scales. Discuss the most suitable representation and the most appropriate scale with your group.

Activity E2

- 1 Use a road map of the UK to plan a route from your town or city to London. If you live in London plan a route to Manchester. Using the scale on the map, work out the distance from where you live to London or Manchester.
- 2 Draw a rough plan of how you would travel from your home to the town or city centre.

Activity E3

- 1 Look in some travel brochures or on the Internet to find out temperatures over a six-month period for different resorts. Work out the mean temperature and the range in temperatures for each resort. How do they compare with the mean temperature and the range in temperature in the UK?
- 2 Work out the mean and range of the data in:
 - a Activity 2 (page 3)
 - b Activity 5, question 2 (page 9).

Activity E4

Design a questionnaire to find out what leisure facilities people in your local area would like. What do your results show you?



Mini-projects



Activity M1

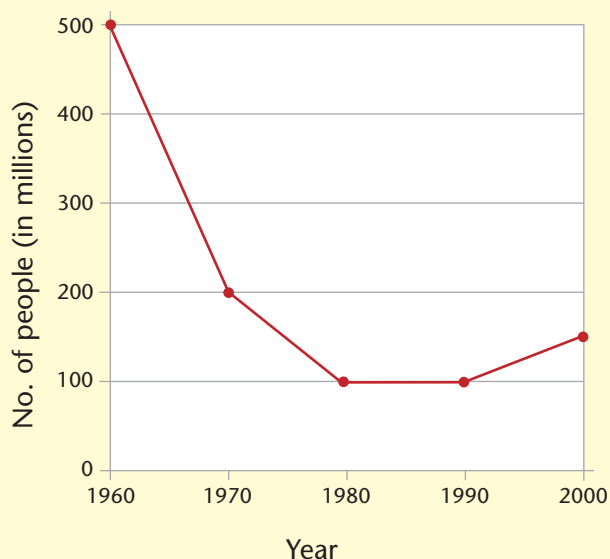
In the UK, a person spends an average of 26 hours a week watching TV and an average of 19 hours a week listening to the radio. Survey 15 of your friends to compare their TV viewing and radio listening habits with that of an average person. Also, find out what their favourite TV programmes are and where they usually listen to the radio (e.g. in the car, in the kitchen, etc).

- 1 Design a suitable questionnaire.
- 2 Ask 15 of your friends to complete the questionnaire.
- 3 Calculate the mean number of hours and the range in hours for TV viewing and radio listening. How do your friends compare with the average person in the UK?
- 4 Display your findings in charts and graphs.

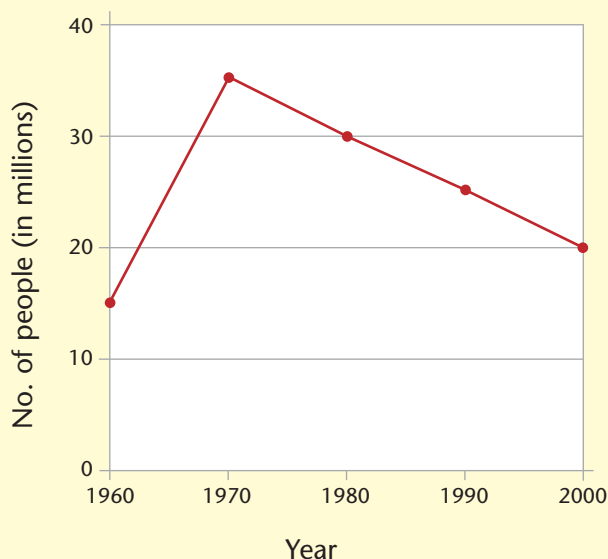


Activity M2

Cinema admissions from 1960 to 2000



Largest TV audiences from 1960 to 2000



Use the graphs above to work out the mean (or average) and range (or spread) in cinema admissions and TV audiences from 1960 to 2000.

As a group, discuss the trends shown by the graphs. What reasons do you think there are for these trends?



Activity M3

Look on the website www.bbc.co.uk/eastenders/thesquare/. On this website, there is a plan of Albert Square. Draw a 2-D plan of Albert Square.



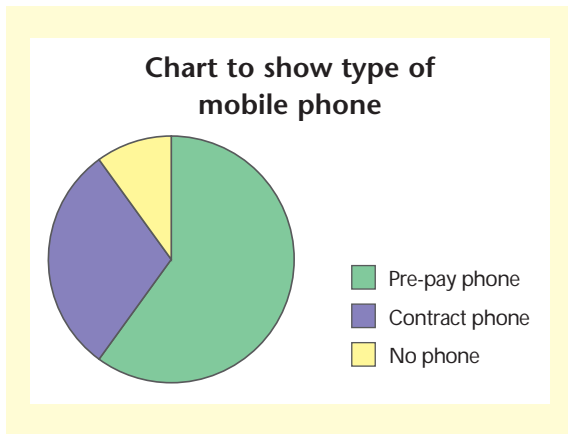
Check it



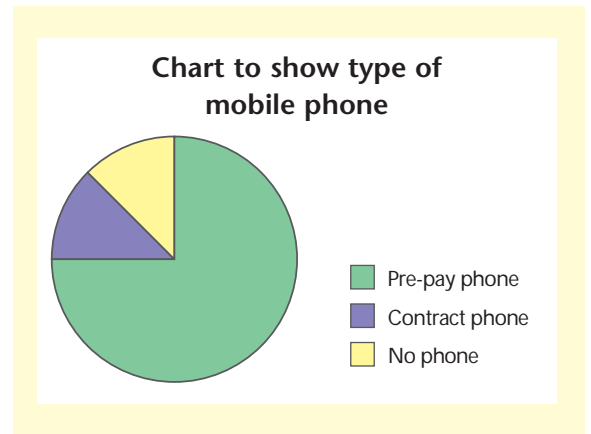
Activity C1

- 1 In a survey, $\frac{3}{4}$ of people have a pre-pay mobile, $\frac{1}{8}$ have a contract mobile phone and $\frac{1}{8}$ do not have a mobile phone. Which of the following charts displays this information?

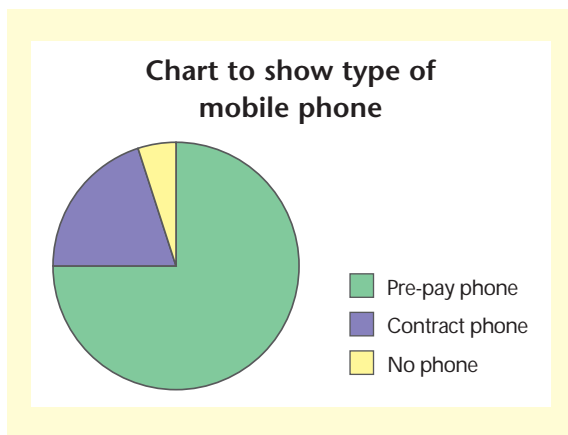
a



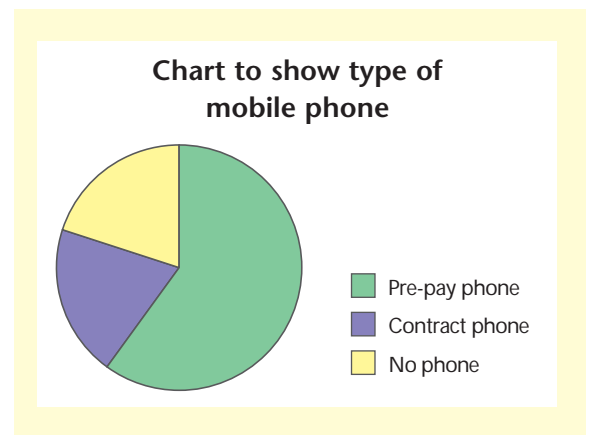
b



c



d

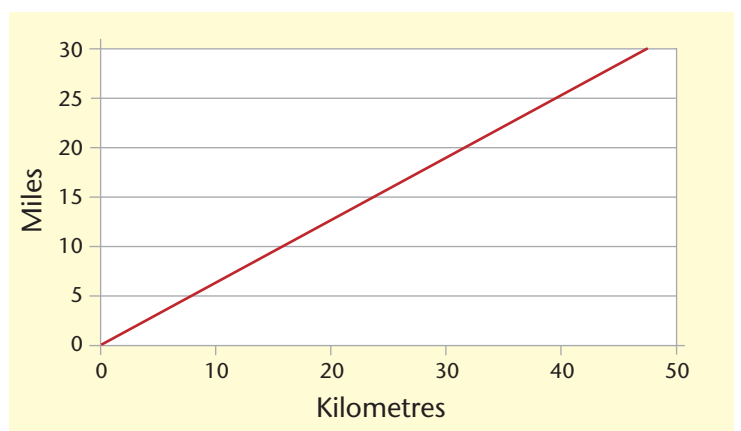


- 2 What is missing from this graph?

- a there is no title
- b the horizontal axis is not labelled
- c the vertical axis is not labelled
- d there is no key

- 3 Using the graph in question 2, how many miles are there in 40 kilometres?

- a 24 miles
- b 45 miles
- c 25 miles
- d 5 miles





Activity C2

Five friends take part in a sponsored event. The sponsor money they receive is recorded in the table.

Name	Mary	John	Dev	Emma	Mark
Sponsor money (£)	80	45	50	30	65

Tick the correct answers.

- What is the mean or average amount of sponsorship money collected?
a £270 b £50
c £30 d £54
- What is the range in the amount of sponsorship money?
a £50 b £30
c £80 d £54

How am I doing?

Now look back at the skills listed on page 1.

Then complete the sentences below.

I am confident with

.....
.....

I need more practice with

.....

Date

Activity 1

- 1 EastEnders
- 2 20 people
- 3 5 people

Activity 2

- 1 7 million people
- 2 6.5 million people
- 3 December
- 4 From 14 million viewers in January, the number of viewers decreases gradually each month until August, when there are 6.5 million viewers. The viewing figures then increase each month until December.

Activity 3

AB is 7 m in the real room.

- 1 a CD is 4 cm on the scale drawing.
b CD is 4 m in real life.
- 2 a AE is 8 cm on the scale drawing.
b AE is 8 m in real life.

Activity 4

- 1 a 3 cm
b $3000 \text{ cm} = 30 \text{ m}$
- 2 a 5 cm
b $5000 \text{ cm} = 50 \text{ m}$
- 3 Answers will vary.

Activity 5

- 1 Check with your teacher.
- 2 Check with your teacher.

Activity 6

- 1 The mean is 4.875. When we round to the nearest whole number, the mean is five. The range is 15.
- 2 The mean is 10.89 hours. The range is 25 hours.
- 3 The mean is 19.44 video tapes. Rounded to the nearest whole number, the mean is 19 video tapes. The range is 32.
- 4 The mean is 21.5 million viewers. The range in viewers is 5 million.

Activity 7

- 1 Check with your teacher.
- 2 Check with your teacher.

Help

Activity H1

- 1 The least favourite activity is sport. Seventy-five people prefer computing.
- 2 The lowest temperature was in April. In May the temperature was 60 degrees Fahrenheit.

Activity H2

- 1 Check with your teacher.
- 2 Check with your teacher.

Activity H3

Check with your teacher.

Activity H4

Check with your teacher.

Activity H5

- 1 Check with your teacher.
- 2 Check with your teacher.
- 3 You may get many different programmes. Check your question with your teacher.

Activity H6

- 1 The mean age is 28.88 years. The range in ages is 27 years.
- 2 The mean wage is £232. The range is £42.
- 3 The mean is 14.29 tyres, which is 14 tyres (rounded to the nearest whole number). The range is 20 tyres.

Extension

Activity E1

- 1 Discuss with your teacher.
- 2 Check with your teacher.
 - a £25 is €37.50
 - b £46 is €69
 - c €50 is £33



Activity E2

- 1 Check with your teacher.
- 2 Check with your teacher.

Activity E3

- 1 Check with your teacher.
- 2 a $14 + 13 + 12 + 11.5 + 10 + 8 + 7 + 6.5 + 8 + 12 + 14 + 16 = 132$
 $132 \div 12 = 11$
The mean is 11 million viewers. The range is 9.5 million viewers.
b The mean is 26 hours. The range is 26 hours.

Activity E4

- 1 Check with your teacher.

Mini-projects

Activity M1

- 1 Check with your teacher.

Activity M2

The mean and range for cinema admissions is

Mean = $(500 + 200 + 100 + 100 + 150) = 1050/5 = 210$ million

The range is $500 - 100 = 400$ million people

The mean and range for largest TV audiences is

Mean = $(15 + 35 + 30 + 25 + 20) = 125$ million
 $125 \text{ million} \div 5 = 25$ million

Range = $30 - 15 = 15$ million viewers

Discuss trends with your teacher.

Activity M3

Check with your teacher.

Check it

Activity C1

- 1 b
- 2 a
- 3 c

Activity C2

- 1 d
- 2 a