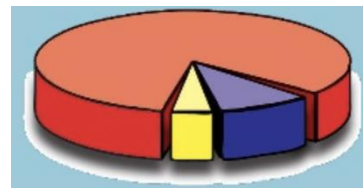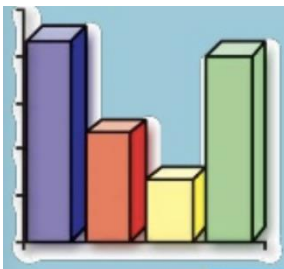Coatbridge High School
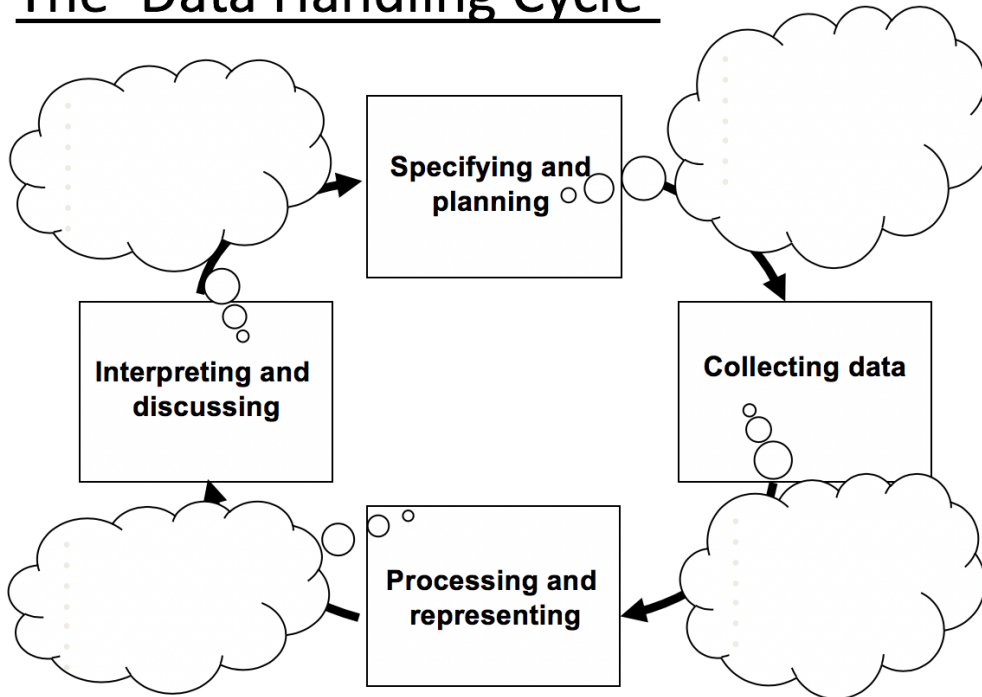Dare to Dream, Aim to Achieve

S1 Block 6

Statistics

- Recording Data
- Mean, median, mode & range
- Bar Graphs
- Pictographs
- Line graphs
- Pie Charts

Why do we collect data?

How do we collect data?

The 'Data Handling Cycle'

Specifying and planning

Collecting data

Interpreting and discussing

Processing and representing

Types of data

⇒

⇒

Remember we need SALT for all graphs/charts

.

S   Scale

A   Axes

L   Labels

T   Title

Recording Data

Class survey: What's your favourite colour?

Writing the colour out for each person looks confusing and can take up a lot of time. This is why we record the data in a frequency table.

Favourite Colour	Tally Marks	Frequency
Total		

Example
The list shows the results of a survey to find out the types of pets owned by some children.

cat cat dog dog dog fish fish horse bird cat dog dog fish fish fish rabbit
bird bird cat dog dog dog fish rabbit bird cat cat dog fish horse rabbit rabbit
bird cat dog dog dog fish fish horse

Complete the frequency table.

Type of Pet	Tally Marks	Frequency
Cat		
Dog		
Fish		
Horse		
Bird		
Rabbit		
Total		

The frequency table helps us answer the following questions easily:
How many children own a dog?

What was the most popular pet?

What was the least popular pet?

How many people were asked?

Exercise 1

Table 1:

Put these 30 test scores out of 10 into the frequency table below:

3	5	6	3	1	5	5	7	8	1
9	7	7	4	3	3	3	2	10	2
6	5	5	10	2	5	4	8	3	3

Test Score	Tally	Frequency
0		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
Total		

What was the most common score?

What was the least common score?

Table 2:

Put the results of a survey regarding favourite pets into a frequency table.

Dog	Cat	Dog	Cat	Dog	Dog	Fish	Fish
Dog	Dog	Cat	Cat	Rabbit	Gerbil	Gerbil	Dog
Cat	Dog	Fish	Dog	Snake	Cat	Rabbit	Cat

Pet	Tally	Frequency

How many people chose dog as their favourite pet?

Mean, median, mode and range

Definitions:

Example data: 2 , 5 , 8 , 2 , 3, 4, 10

Median is the …………………. number. You find it by putting the numbers in ………………. and find the number in middle of the new list.

Median is:

Range is the …………………. number take away the …………………… number.
2 , 2 , 3 , 4 , 5 , 8 , **10**

Range is:

Mode is the ………….. frequent number.
2, 5, 8, 2, 3, 4, 10

Mode is:

Mean is the same as …………………. You find the mean by ………………….. all the numbers together and …………………… by the amount of numbers.

Mean is:

There are …… numbers in the list.

Example

Find the mean, median, mode and range of the following:
8, 7, 5, 5, 4, 3, 1, 2, 5

Exercise 2

Calculate the mean, mode, median and range of:

(a) 1, 6, 9, 5, 11, 8, 5, 13, 5.			
Mean:	Median:	Mode:	Range:

(b) 23, 11, 17, 12, 14, 29, 30, 11, 29, 19.			
Mean:	Median:	Mode:	Range:

(c) 8, 3, 6, 5, 2, 10, 1, 7, 4, 9.			
Mean:	Median:	Mode:	Range:

(d) 103, 134, 109, 112, 121, 148, 134.			
Mean:	Median:	Mode:	Range:

(e) 9, 1, 7, 3, 5, 4, 3, 5, 4, 8, 2, 9.			
Mean:	Median:	Mode:	Range:

2.   This list shows the amounts spent by seven families on their holidays :

£100, £400, £320, £300, £5430, £100, £350.

(a)   Calculate the mean, mode, median and range of these amounts.

(b)   Suggest which of the three averages is the most useful indicator of how much a typical family spends on their holiday.

3.   A sports shop is offering a discount on a particular type of running shoe. The manager wants to look at the number of each size sold so far in order to predict how many will be sold in the next week. This should hopefully mean that all sizes are available in the shop. Here's the list of all sizes sold:

7, 8, 8, 8, 8, 9, 9, 10, 10, 11, 11,

(a)   Calculate the mean, mode, and median of the data.

(b)   Which of the three averages is most useful to the manager?

4.   The temperature at noon on five days in January were :

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature ($^\circ$C)	6	6	3	2	3

Calculate the mean noon temperature and the range of temperatures.

Bar Graphs

Bar graphs are also used to display information.

Reading a bar graph

Example

January Weather in New York City
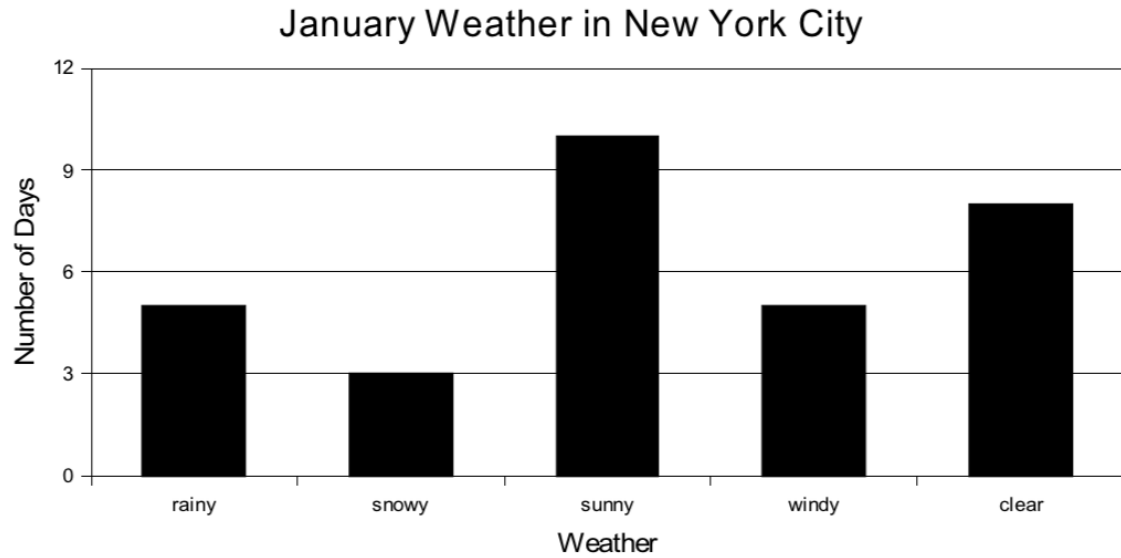
1. How many rainy days were there in January in New York City?

2. How many clear days were there?

3. Does the scale on this graph count by 2s, 3s, 4s, or 5s?

4. How many more sunny days than snowy days were there?

5. How many more clear days than rainy days were there?

6. How many days were there in January?

7. If there were two less sunny days and two more snowy days, how many snowy days would there have been?

8. Are there more rainy days or windy days?

Drawing a bar graph from a table of values

Example

Amy's school sol raffle tickets last week. The table shows the number of tickets sold on each day. Use the information in the table to complete the graph.

Mon.	Tues.	Weds.	Thurs.	Fri.
55	40	25	35	80

Title:_____

Day of the Week
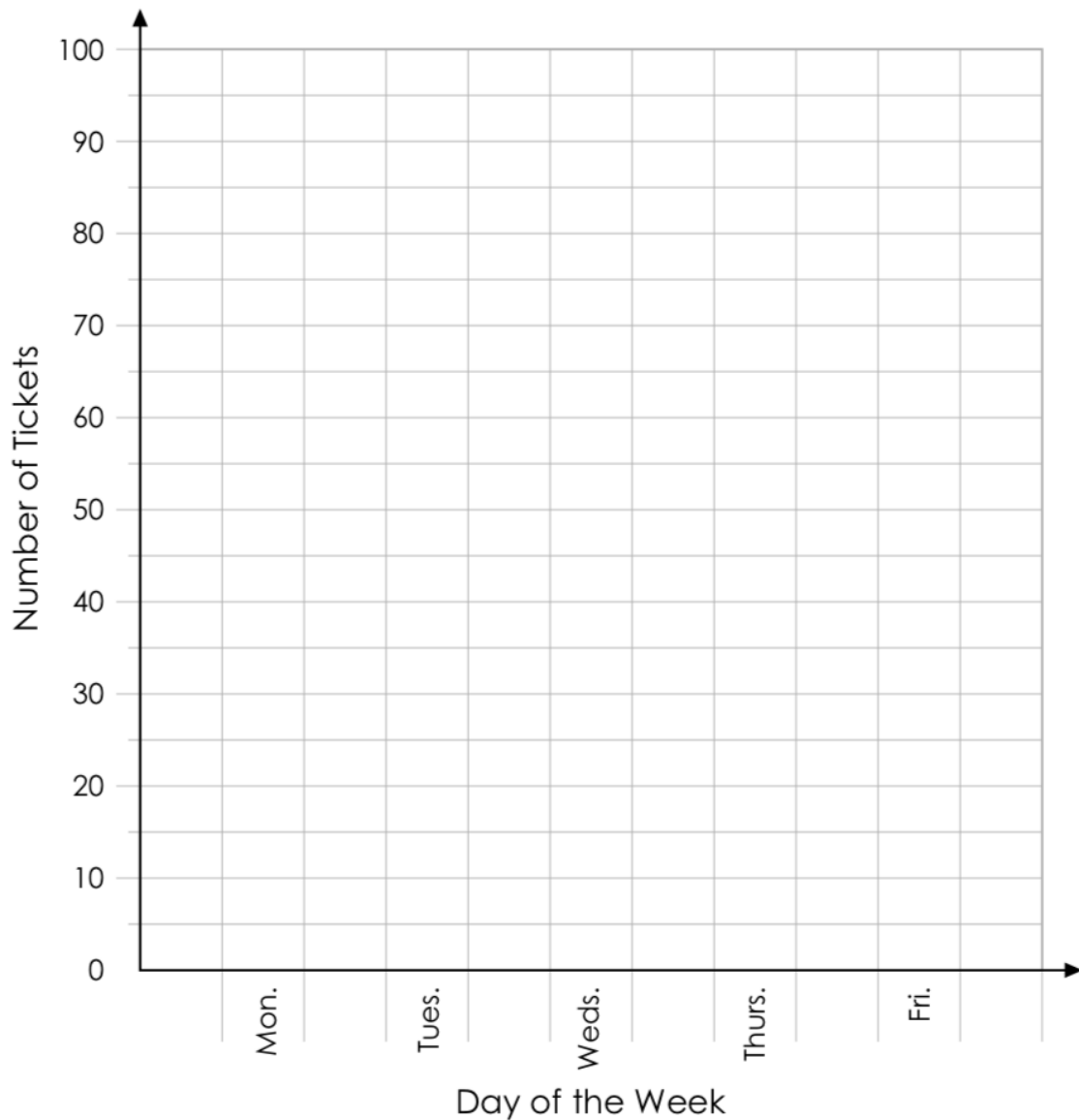
Use the bar graph you made to answer the questions.

1. How many tickets were sold on Monday?

2. How many tickets were sold on Thursday?

3. On which day were the most tickets sold?

4. On which day were the fewest tickets sold?

5. What is on the y-axis of this graph?

6. What is on the x-axis of this graph?

7. How many tickets were sold after Tuesday?

8. How many tickets were sold before Thursday?

9. During which two day period were 115 tickets sold?

10. How many fewer tickets were sold on Wednesday than Thursday?

Exercise 3

1. The bar chart shows the number of subjects given as homework each night.

   a. How many subjects are given on Monday?

   b. Which day is the most homework given?

   c. Which day is the least homework given?

   d. How many homeworks are given in the week?

Homework

Number of subjects / Days of the week
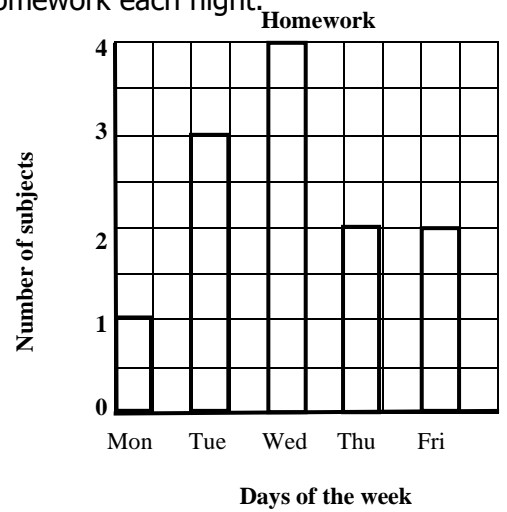
2. Use the bar chart showing some S1 pupils favourite colours.

Favourite Colours

Number of Pupils / Colours
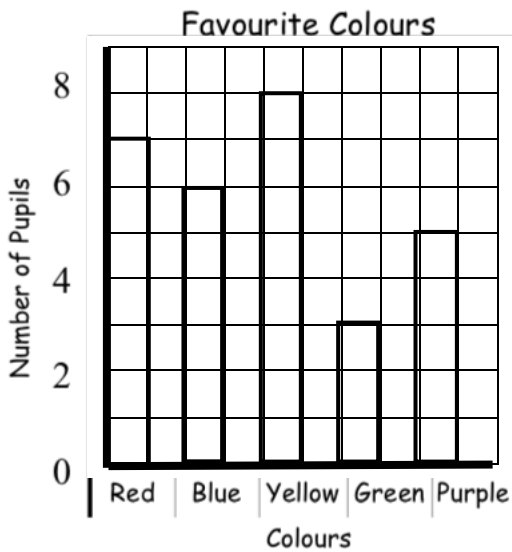
   a. How many pupils like the colour purple?

   b. Which colour is the most popular?

   c. Which colour is the least popular?

   d. How many pupils were included in this survey?

3. Bar chart showing the colours of cars seen outside a school.
4.

   a. How many cars were white?

   b. Which colour was seen the most often?

   c. Which colour was seen the least?

   d. How many cars were seen in this survey?

Colours of cars

Number of cars / Colours
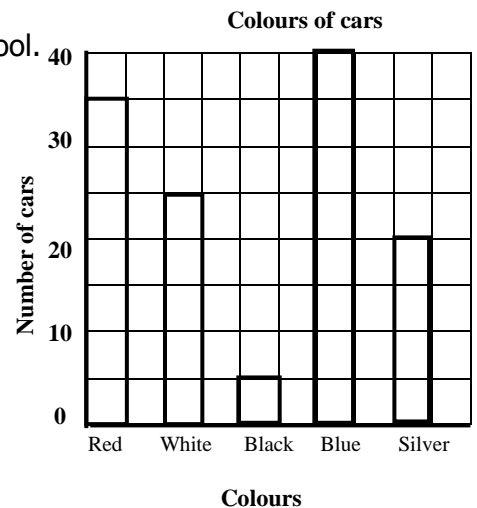
5. Draw a bar graph for to show the number of people who prefer a certain sport:

	Football	Netball	Rounders	Swimming	Golf	Cricket
Number of people	25	15	30	35	5	20

Number of People
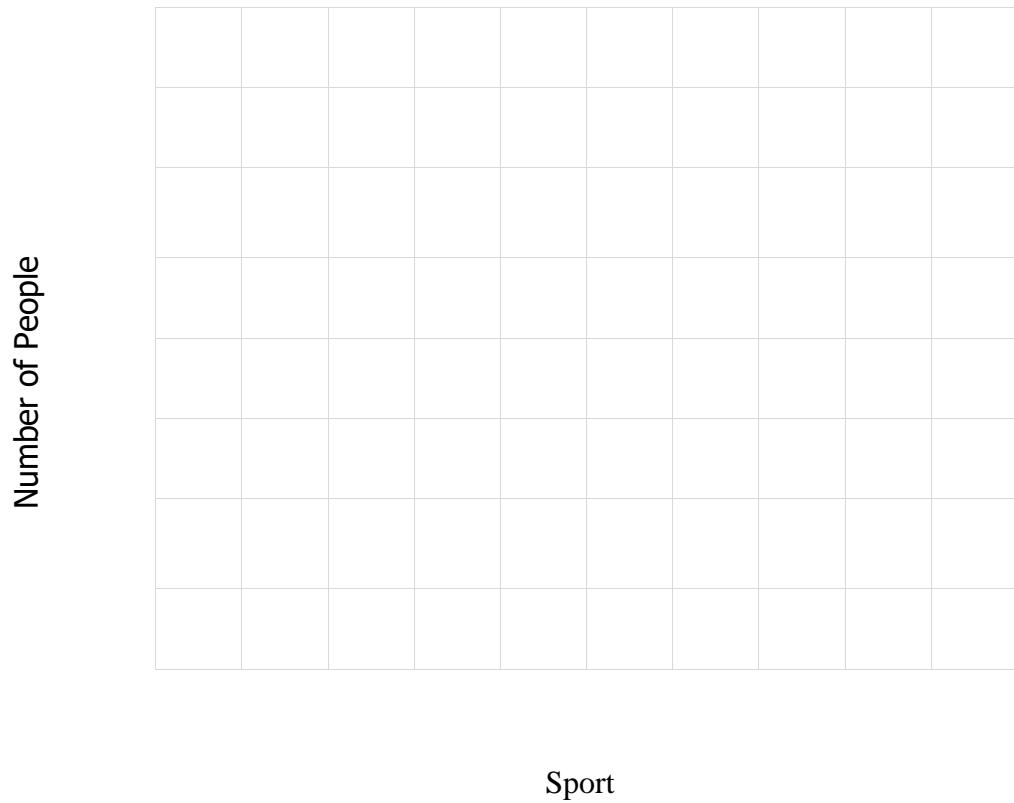
Sport

a. What was the most popular spot?

b. What was the least popular sport?

c. How many people were included in the survey?

Pictographs

Reading a pictograph

Example

This pictograph shows how the pupils in S1 get to school.

Transport

Car

Walk

Bus
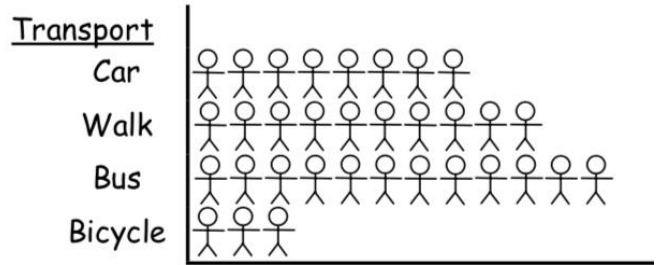
Bicycle

Key : ☺= 1 pupil

1. How many pupils travel to school by:

    i)   Car

    ii) Walking

    iii) Bus

    iv) Bicycle

2. What is the most popular way of getting to school?

3. What is the least popular way to get to school?

4. How many pupils were included in the survey?

Drawing a pictograph

Example

Draw a pictograph to show the number of letters delivered each day from the information given in the table:

	Mon	Tue	Wed	Thu	Fri	Sat
Number of letters	6	10	2	4	8	3

Use a symbol like ✉ to represent 1 letter.

Key:

Exercise 4

1. The pictograph shows the number of pupils in each form that have travelled on a plane.

✈ = 2 pupils
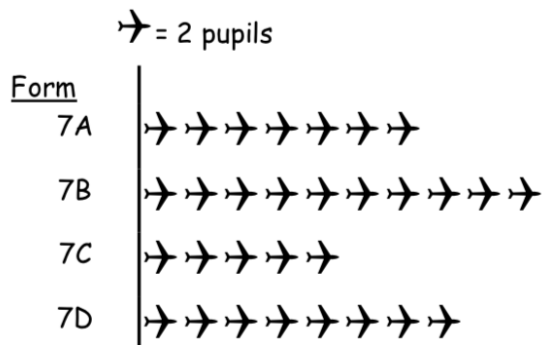
Form
- 7A ✈ ✈ ✈ ✈ ✈ ✈ ✈
- 7B ✈ ✈ ✈ ✈ ✈ ✈ ✈ ✈ ✈ ✈
- 7C ✈ ✈ ✈ ✈ ✈
- 7D ✈ ✈ ✈ ✈ ✈ ✈ ✈

a) How many from form 7C have travelled on a plane?

b) Which form has the most pupils who have been on a plane?

c) How many pupils in all 4 forms have been on a plane?

2. The pictograph shows how many pupils prefer a type of fruit.

☺ = 2 pupils

Fruit
- Apple ☺☺☺☺☺☺☺☺☺☺
- Banana ☺☺☺☺☺
- Orange ☺☺☺
- Grapes ☺☺☺☺☺☺☺☺
- Peach ☺☺☺☺
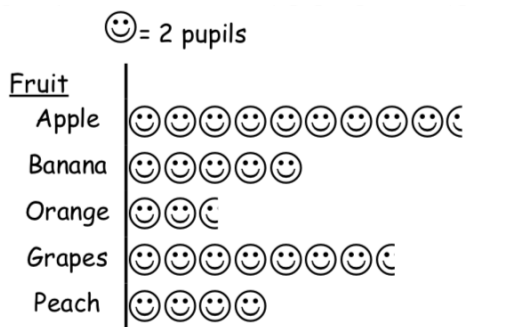
a) How many pupils prefer oranges?

b) Which fruit is the most popular?

c) Which fruit is the least popular?

3. The pictograph shows the types of books pupils like to read.

📖 = 2 pupils

Type of Book
- Thriller 📖📖📖📖
- Adventure 📖📖📖📖📖📖📖
- Sci.Fiction 📖📖📖📖📖
- Romance 📖
- Drama 📖📖
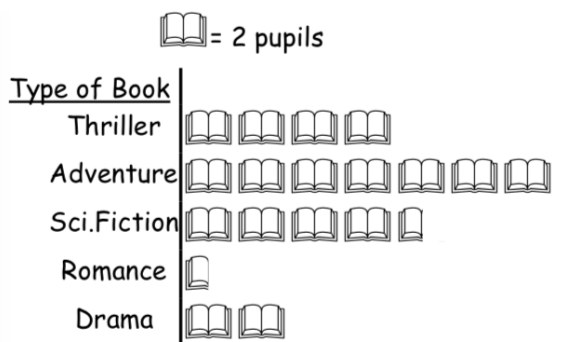
a) How many pupils prefer Science fiction?

b) Which type of book is the least popular?

c) How many pupils took part in this survey?

Draw a pictograph to show the information given:

4. The number of people who prefer certain drinks:

	Tea	Coffee	Coke	Lemonade	Orange	Water
Number of people	20	14	10	8	16	2

Use a symbol like ♀ to represent 2 people.
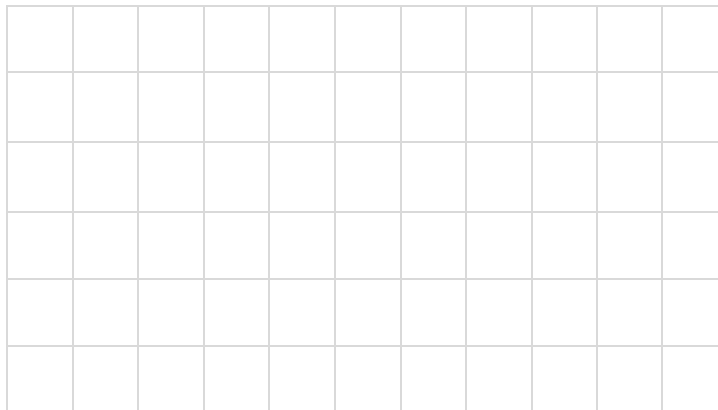
Key:

5. The number of people who prefer a certain sport:

	Football	Netball	Rounders	Swimming	Golf	Cricket
Number of people	20	10	3	12	5	15

Use a symbol like ☺ to represent 2 people.
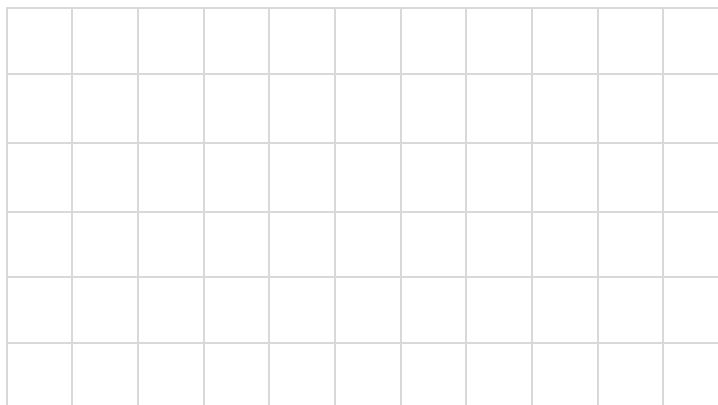
Key:

6. The number of people who prefer the following flavours of milkshake:

	Strawberry	Banana	Chocolate	Vanilla
Number of people	30	25	35	50

Use a symbol like ♀ to represent 5 people.
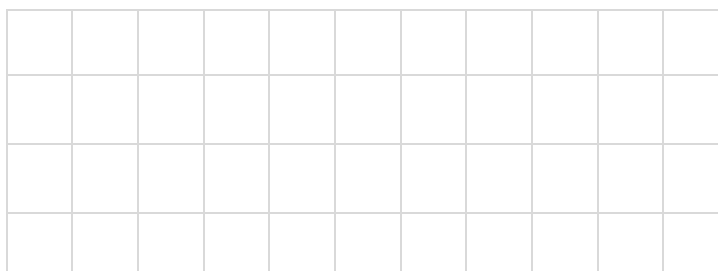
Key:

Line Graphs

When we have continuous data we use a line graph.

Example
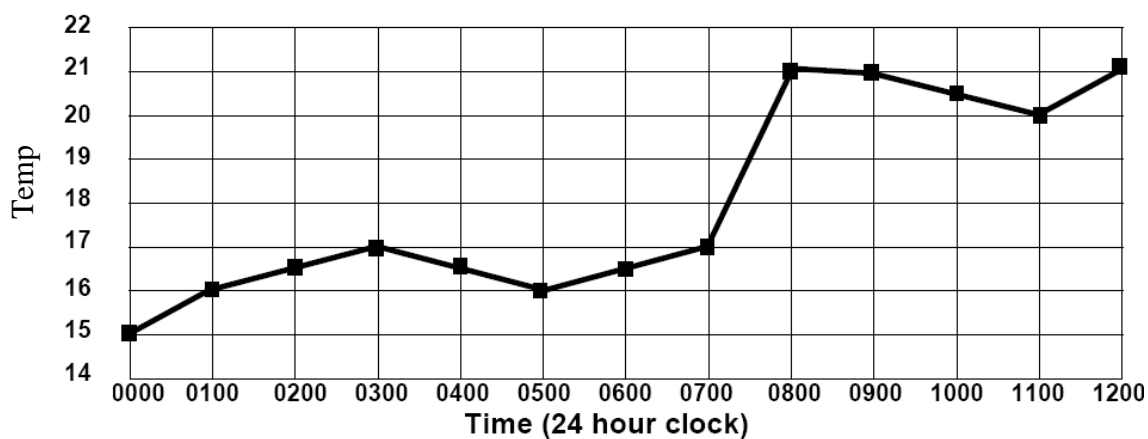
This graph shows the temperature in a room over a twelve hours. Answer the questions below.

1) What was the lowest temperature recorded on the chart.

2) What was the temperature at 3 o'clock am?

3) What was the temperature at 11.00?

4) Which hour shows the biggest rise in temperature?

5) For how long was the temperature between 16 and 17 degrees?

6) Can you estimate the temperature at 07.30?

7) Can you estimate the temperature at 10.00?

8) Complete the table below using the line graph.

Time	Temperature
00.00	
01.00	
02.00	
03.00	
04.00	
05.00	
06.00	
07.00	
08.00	

We can also use line graphs to compare data.
Example

This graph shows the cost of phone calls in the daytime and in the evening.
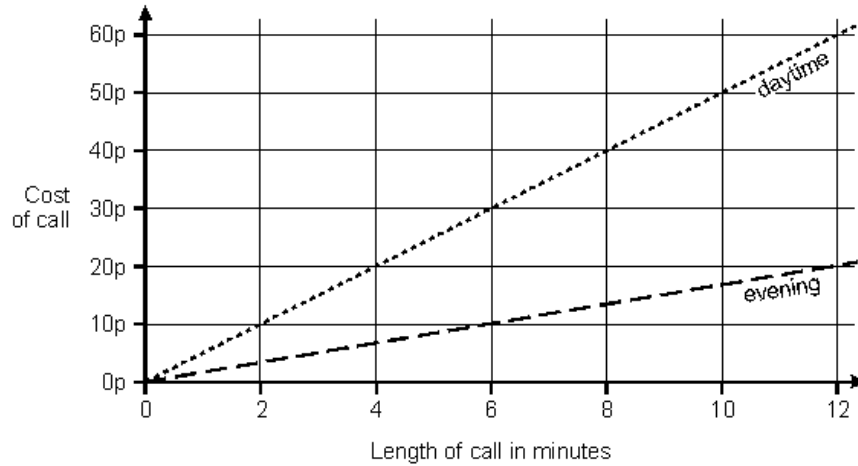
How much does it cost to make a 9 minute call in the daytime?

How much more does it cost to make a 6 minute call in the daytime than in the evening?

Drawing a line graph

Owen made a cup of tea and placed a thermometer in to measure the temperature. Owen recorded the temperature every minute for 12 minutes. Draw a graph of his results and draw a curve through the points to show the pattern

You will need:
A sharp pencil
A ruler
A rubber

Time (minutes)	Temperature (°C)
0	70
1	65
2	60
3	56
4	51
5	47
6	44
7	42
8	41
9	40
10	39
11	39
12	39

Don't forget a title!

Step 1
Label the axis

x-axis - _____

y-axis - _____

Step 2
Decide on a scale

Step 3
Plot your points

1) Write a sentence to explain the pattern shown in the graph

2) What is the possible explanation for this pattern?

Exercise 5

1.

Lava emissions from Vesuvius
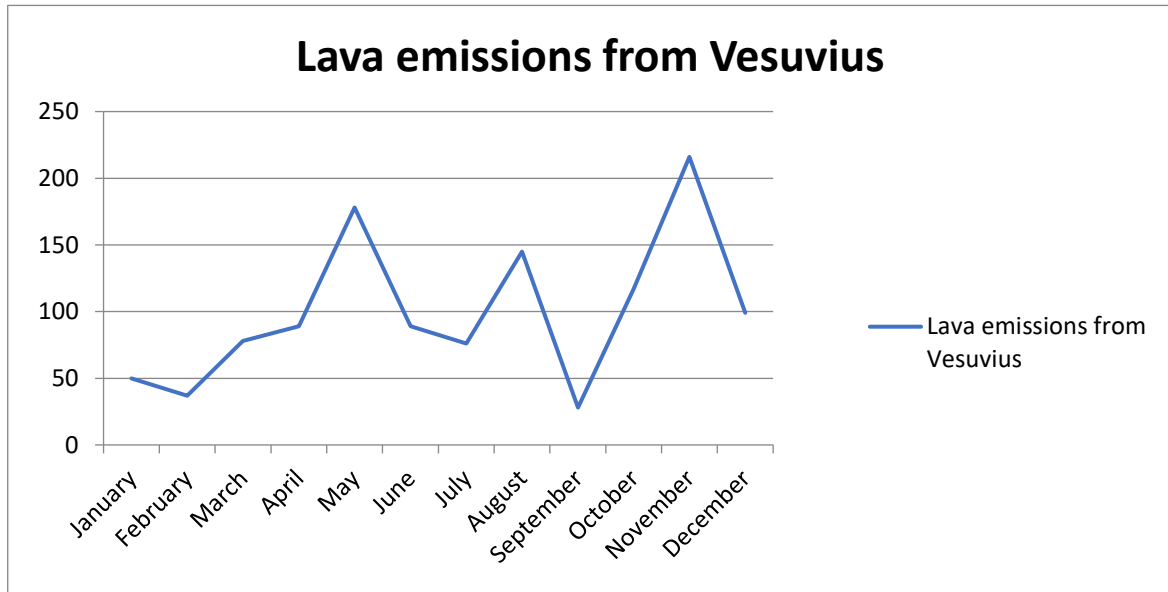
a.   In how many months was the lava production over 100?

b.   What is the range of lava production?

c.   How much lava was produced mid June?

d.   What is the total amount of lava produced in May, July and November?

e.   What was the greatest rise in lava production?

f.   In which two months did the volcano produce the same amount of lava?

g.   What is the total amount of lava produced for the year?

2. The graph shows the journey of a hot-air balloon.

At what height above the ground was the balloon after 10 minutes?

After how many minutes of the journey did the balloon begin to go down?

3. Nik uses this graph to change between pounds (£), dollars and euros.
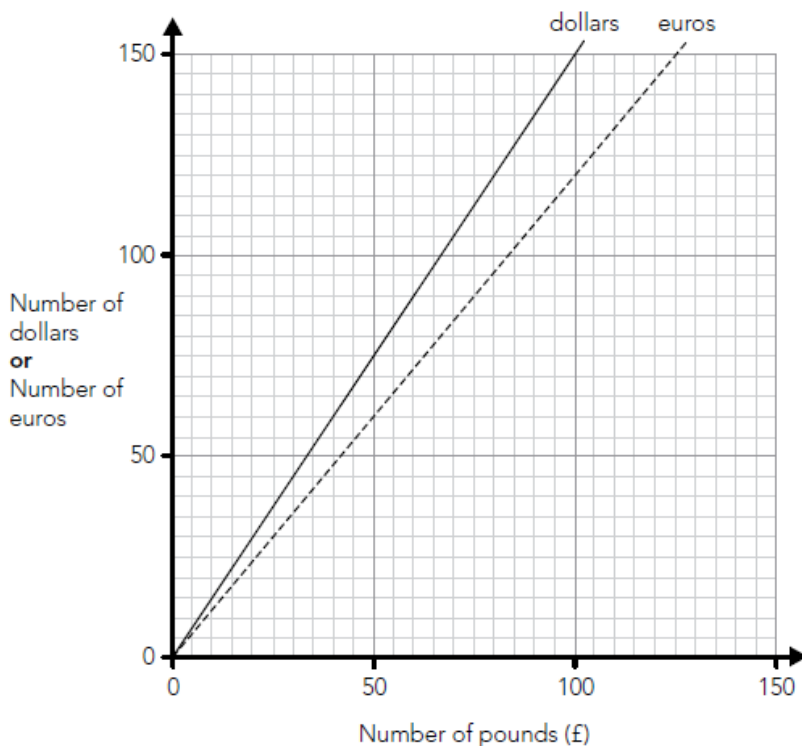
Use the graph to work out the missing numbers below.

a. £50 is about the same as 60 euros

b. £70 is about the same as _____ dollars

c. 120 dollars is about the same as _____ pounds.

d. 100 euros is about the same as _____ pounds.

e. £100 is about the same as _____ dollars.

20

4. The table below shows how quickly a beaker of water was heated up using a Bunsen Burner.

Time (minutes)	Temperature (°C)
0	10
1	20
2	30
3	50
4	60
5	60
6	70
7	80
8	80
9	90
10	100

Plot the information on this line graph.

Temperature (°C)

Time (minutes)
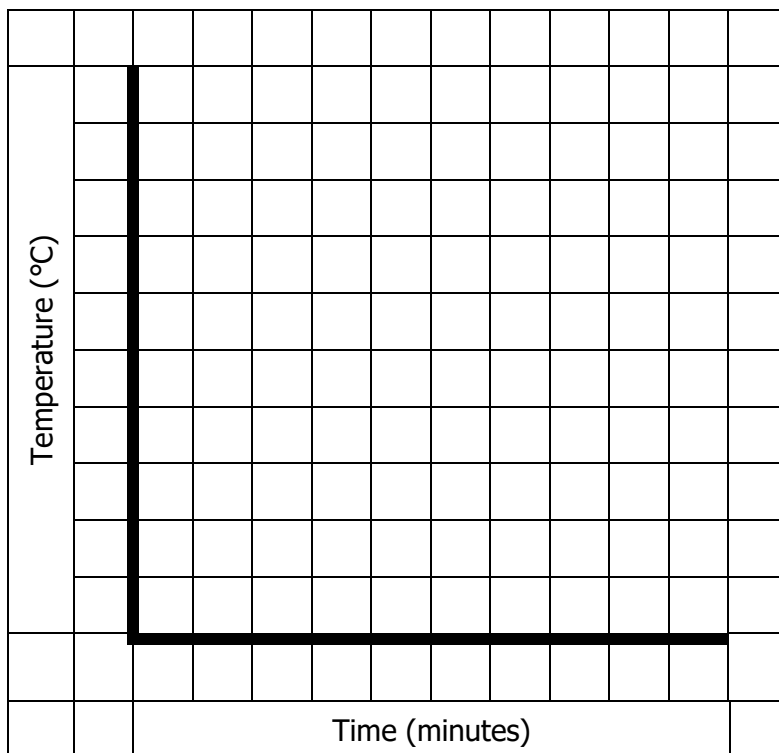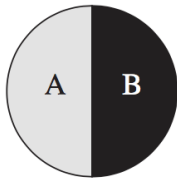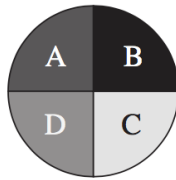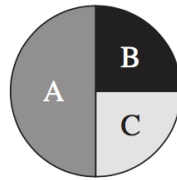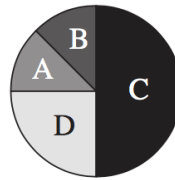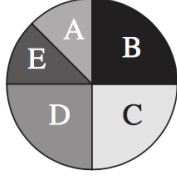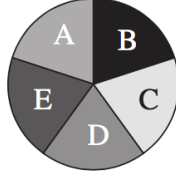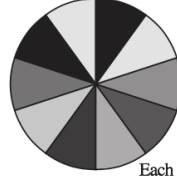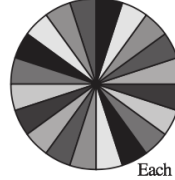
a. What was the starting temperature?

b. What might the temperature have been at 5 minutes?

c. What was the finishing temperature?

d. What might the temperature have been after 5 and a half minutes?
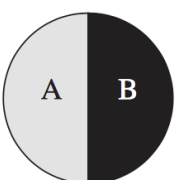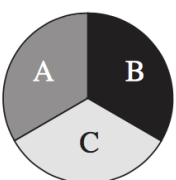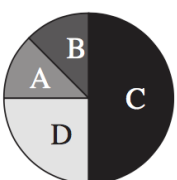
Pie Charts

Interpreting Pie Charts

All sections in a pie chart add up to _____%

All sections in a pie chart add up to _____°

The pie chart below shows how children travel to school.
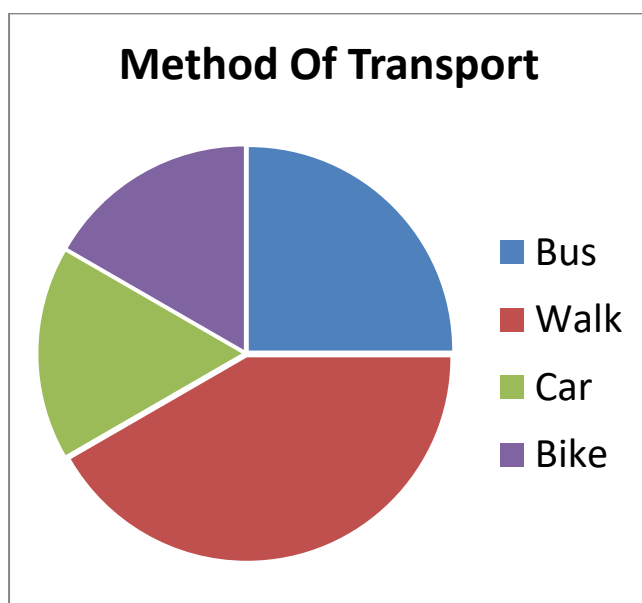
1. How many different methods of transport were given?

2. How do most children get to school?

3. Which two methods of transport are roughly the same?

4. What fraction of pupils get the bus to school?

5. 15 pupils get the bus, how many pupils were asked in the survey?

Drawing Pie Charts
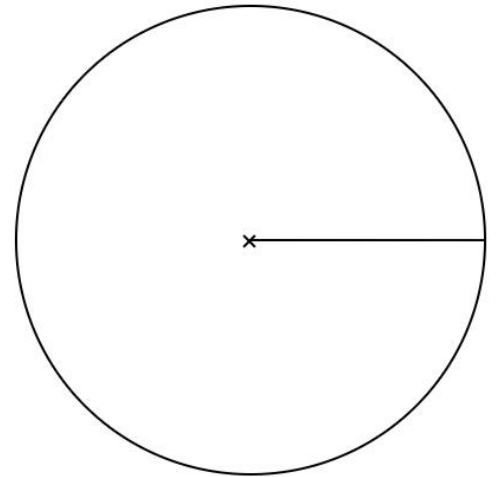
The favourite subject of 36 pupils

Subject	Frequency	Working	Angle
Maths	12		
English	7		
Science	8		
Languages	4		
Other	5		
Total			

There are _____ people in the survey.

To show these results in a pie chart we need to share _____ between _____.

Calculation: _____

Each person gets _____ of the pie chart.

The type of food that 40 people usually eat for breakfast

Food	Frequency	Working	Angle
Cereal	11		
Toast	8		
Fruit	6		
Cooked	9		
Other	2		
None	4		

There are _____ people in the survey.
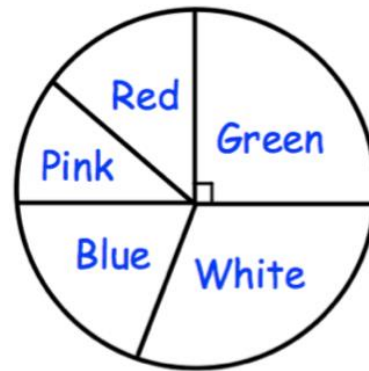
Calculation: _____

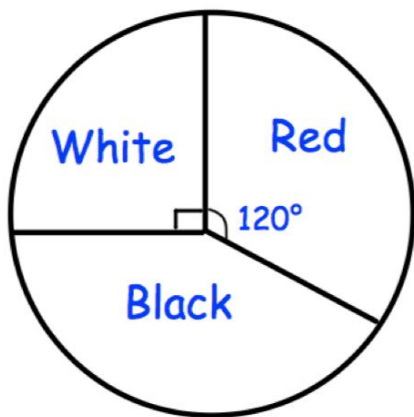Each person gets _____ of the pie chart.
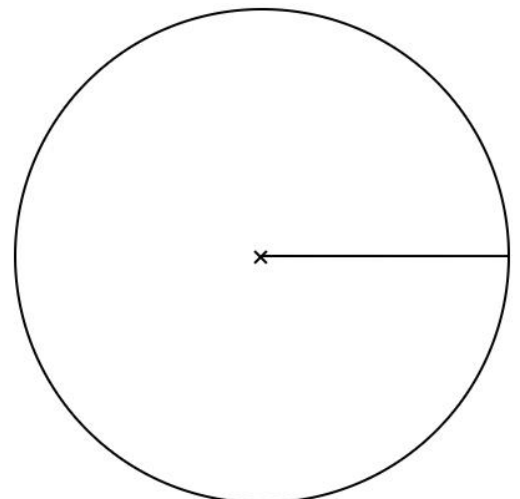
Exercise 6

1. The pie chart shows the colours of 32 beads.

   How many green beads are there?

2. The pie chart shows the colours of counters in a bag.

   a. What fraction of the counters are white?

   b. What fraction of the counters are red?

   c. What fraction of the counters are black?

   d. There are 24 counters in the bag. Work out how many are white.

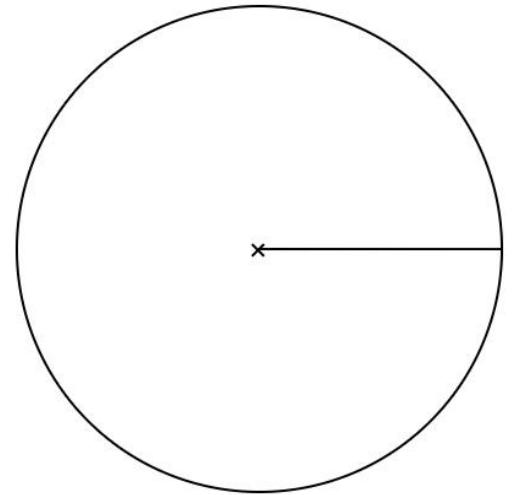3. A group of rugby fans were asked who they supported.
Use the pie chart to complete the table

Team	Angle of sector	Number of fans
England	120°	
Scotland		
Wales	45°	
France	45°	
Ireland	90°	12
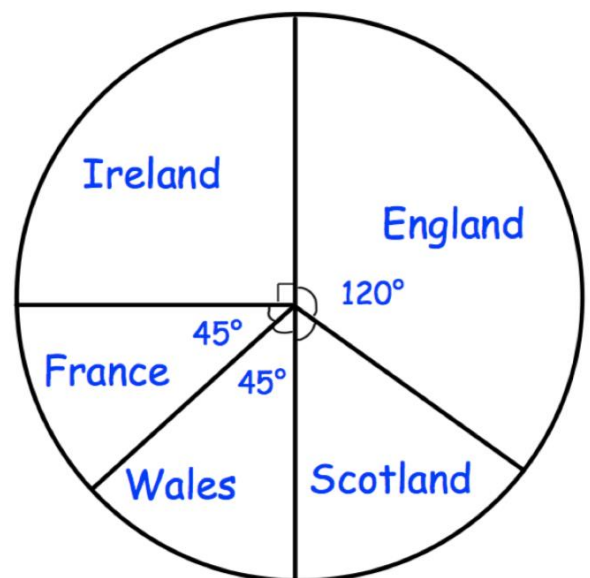
4. The instruments played by 90 school children.

Instrument	Frequency	Working	Angle
Guitar	25		
Violin	10		
Piano	15		
Recorder	18		
Drum	5		
Other	6		
None	11		
Total			

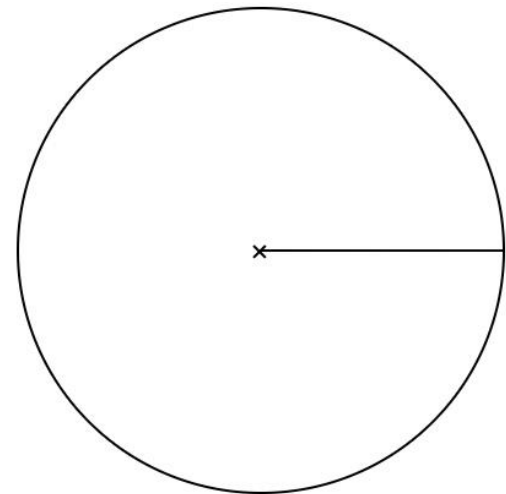Calculation: _____

Each child gets _____ of the pie chart.

5. The number of goals scored by an ice-hockey team in 24 matches.

Goals	Frequency	Working	Angle
0	3		
1	4		
2	7		
3	5		
4	4		
5 or more	1		
Total			

There are _____ matches altogether.

Calculation: _____

Each match gets _____ of the pie chart.

Project

In groups, we are going to put our statistic knowledge to the test.

We are going to record our own data and then display it using the most appropriate graph/chart.

You must decide the best way to record the data (a table? what headings?)

Don't forget about units if they are needed!

Data to record:

- eye colour
- hair colour
- shoe size
- height
- arm span
- stride length
- time taken for 20 star jumps

What apparatus do we need?