THE SCIENTIFIC METHOD

STEPS INVOLVED IN THE SCIENTIFIC METHOD

Step 1: The first step in the scientific method is the **asking of question**. The question is often the result of the observation of something, particularly if what is observed is not understood. Observation is the most important processes in science.

Step 2: This involves **researching** the question that has been asked and can include searching for information in books, journals, on the internet or through any other source.

Step 3: This is the formulation of a **hypothesis**. A hypothesis is a reasonable answer to the question asked in step 1. It is not just a guess, but a well thought answer to the question.

Step 4: This step involves the **testing** of the hypothesis. This means designing experiments to find out if the hypothesis is true or not.

Step 5: If step 4 does not support the hypothesis then the hypothesis could be wrong and would need to be **revised**. It could also mean that the tests and experiments in step 4 were not accurate ad need to be redesigned. Step 5 allows for either to happen.

Step 6: This is where the scientist draws up a **conclusion**. It is a report that includes what has been learnt during the investigation, the importance of the results as well as any changes and improvements that can be made to testing the hypothesis.

VARIABLES

- In any one experiment there are usually many factors that can be changed.
- These factors are called **variables**.
- The investigator will change one variable and see what effect has on another variable. For example a scientist may want to investigate how temperature affects the speed of a chemical reaction.
- The variable that is changed on purpose is called the **independent variable**. In this case it would be temperature.
- The variable that the investigator observes is called a **dependent variable.** In the example it would be the speed of the reaction.
- The third type of variable is called **the fixed variable**. This variable must remain the same otherwise it will affect the outcome of the result. For example the amount of chemicals in the reaction must remain the same throughout the experiment.
- A fair test is the term that scientists use to describe an investigation in which there is only one dependent variable. There are no other factors that interfere with the investigation.

RECORDING RESULTS

- When carrying out scientific investigation, it is important to record observations accurately.
- From observations a scientist will obtain results and depending on the nature of the result, the scientist will record them in different ways.
- A diagram is a good way of recording observations.
- Two ways of recording results is using tables and graphs.
- Whenever the results need to be presented as a table or graph work **accurately**, **neatly** and provide a **descriptive heading**.

TABLES

- Tables show information or **data** in a clear simple way.
- They can include numbers, words and pictures
- Tin foods and boxes of cereals provide information about the nutrients in the food.

Nutrition Facts

Serving Size 1 cup (228g)
Servings Per Container 2

Amount Per Serving	
Calories 260	Calories from Fat 120
	% Daily Value*
Total Fat 13g	**20%**
Saturated Fat 5g	**25%**
Trans Fat 0g	
Cholesterol 30mg	**10%**
Sodium 660mg	**28%**
Total Carbohydrate 31mg	**10%**
Dietary Fiber 0g	**0%**
Sugars 5g	
Protein 5g	
Vitamin A 4% •	Vitamin C 2%
Calcium 15% •	Iron 4%

*Percent Daily Values are based on a 2,000 calorie diet. Your daily values may be higher or lower depending on your calorie needs:

	Calories:	2,000	2,500
Total Fat	Less than	65g	80g
Sat Fat	Less than	20g	25g
Cholesterol	Less than	300mg	300mg
Sodium	Less than	2,400mg	2,400mg
Total Carbohydrate		300g	375g
Dietary Fiber		25g	30g

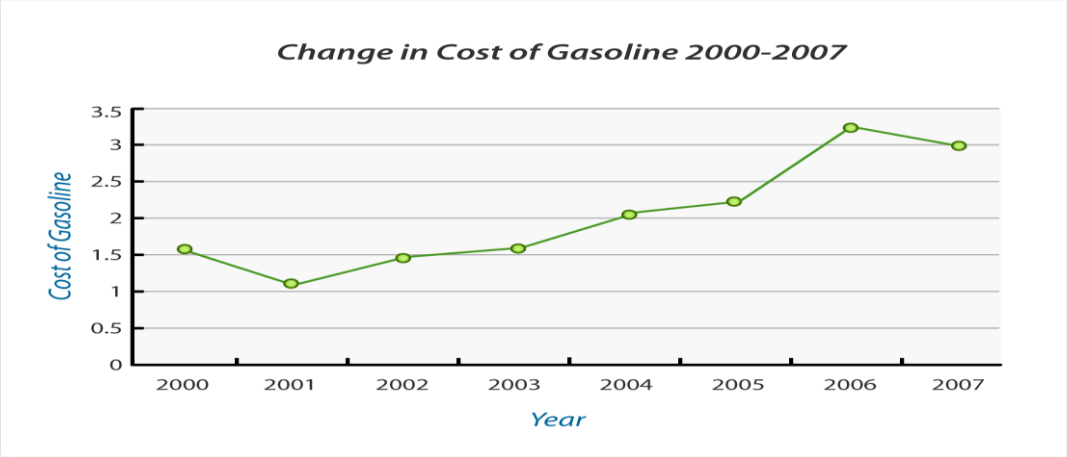
Calories per gram:
Fat 9 • Carbohydrate 4 • Protein 4

GRAPHS

- A graph is a type that shows the relationship between two variables that have been measured.
- The data that is collected during an investigation is used to draw or plot graph

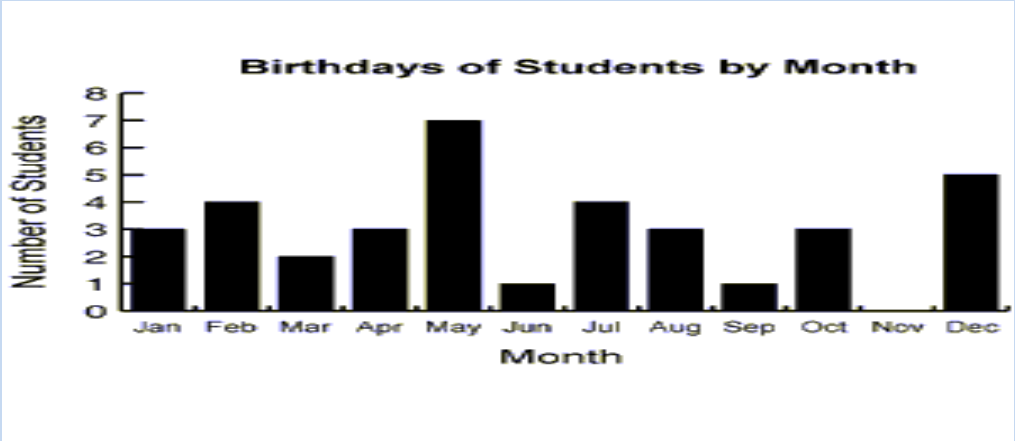
LINE GRAPH

- They are usually drawn from data that has been recorded in a table.
- The data is **quantitative** (it is in the form of numbers)
- The values of the dependent variables are plotted on the y-axis.
- The values for the independent variables are plotted on the x-axis.
- The axes must be labelled with the variable and units
- To interpret the graph, study it carefully.
- The heading and labels on the axes will tell you what is represented in the graph.



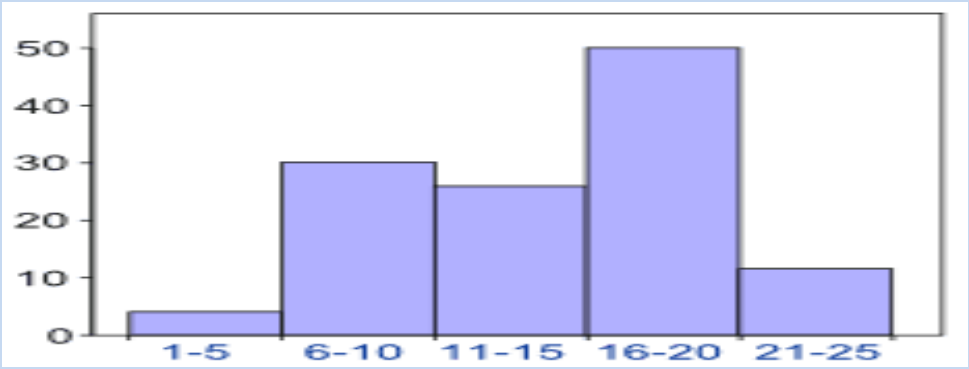
BAR GRAPH

- This type of graph uses bars that are different in lengths to compare data in a clearly visible way.
- In a bar graph, each bar is separate from the next.
- This is because the independent variable on the x-axis is not **quantitative**. It is **qualitative**.



HISTOGRAM

- This type of graph looks like a bar graph except that the bars are touching each other.
- This is because the independent variable on the x-axis is **quantitative**.



PIE CHART OR PIE GRAPH

- This is used to represent information when it is in the form of **percentages**.
- It looks like a pie cut up into different sized pieces.
- The size of the slice represents the **percentage**.
- A pie chart usually has a key that shows what each slices represents.
- You can work out the percentage using the fact that a circle is **360^0**.
- Use the number of degrees that the slice occupies in the circle to calculate what percentage it represents.
- You would need a **protractor** to do this.