

**How Science works:**

# **Graphs**

Cedar International School

9<sup>th</sup> Grade Science

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# Learning Objectives

You should learn :

- About different types of graphs,
- How to draw them when you are doing your practical work,
- How to interpret the different shapes.

# Drawing a graph



...and when  
should I draw a  
**line-graph?**

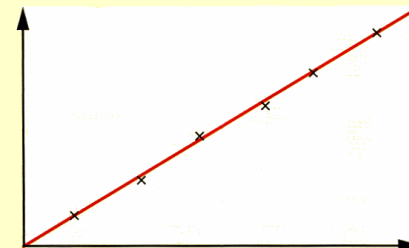
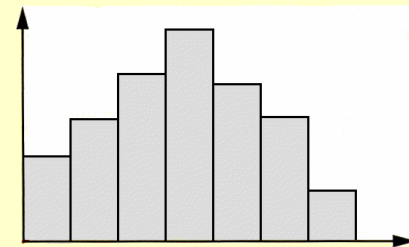
# Drawing a graph

Look at the table of your results:

independent variable	dependent variable			
	1st reading	2nd reading	3rd reading	Mean (average)

If **this** column has

- only certain fixed values, use a **bar-chart**:
- a continuous range of values, use a **line-graph**:



# Drawing a graph



What is the best way to draw a **line-graph**?

# 5 steps in drawing a graph

## 1. Choose simple scales.

For example:

1 large square = 1 newton (1 N)

or

1 large square = 2 N, or 5 N, or 10 N



But never choose an awkward scale,  
like 1 square = 3 N or 7 N

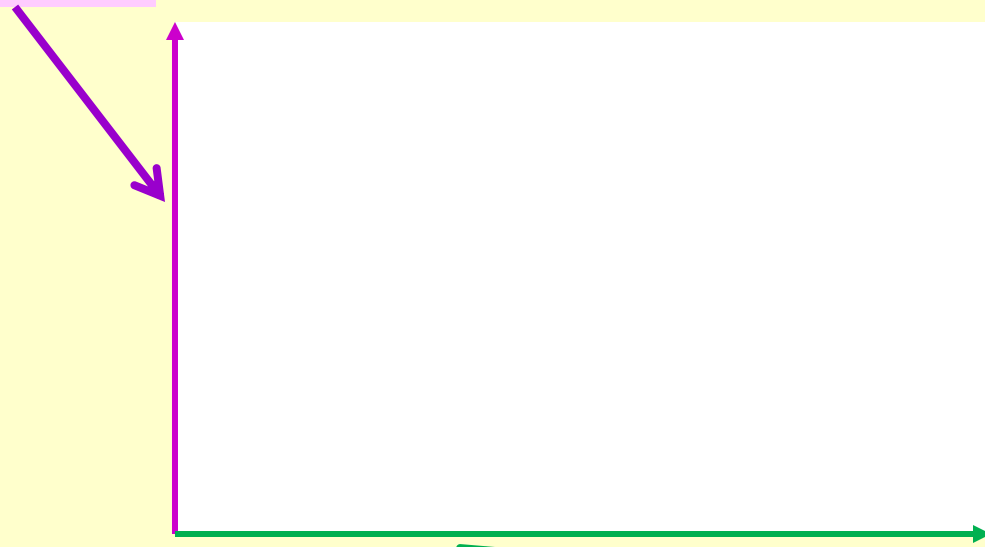


Choose a scale that will make your graph use most of the sheet of paper.

# 5 steps in drawing a graph

## 1. Choose simple scales.

Put the dependent variable  
on the 'y-axis'



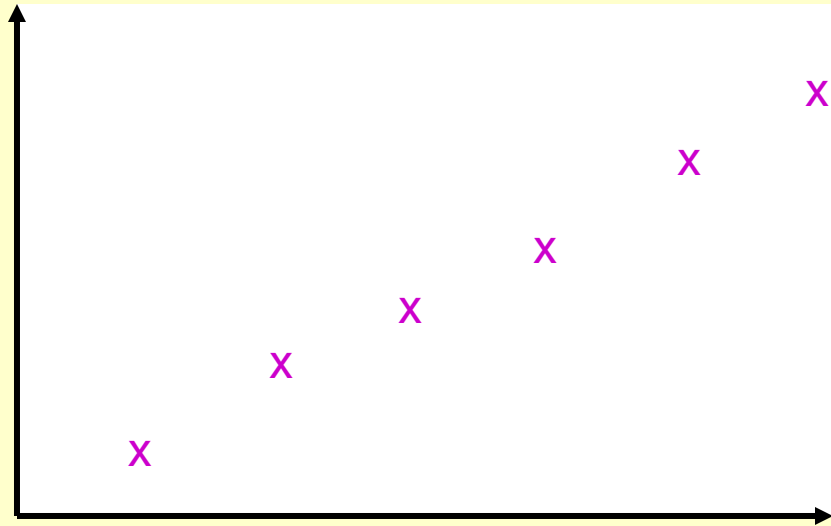
and  
the independent variable on the 'x-axis'

# 5 steps in drawing a graph

## 2. Plot the points neatly.

To mark the points we usually use an X

Usually you need 5 or more points for the graph.



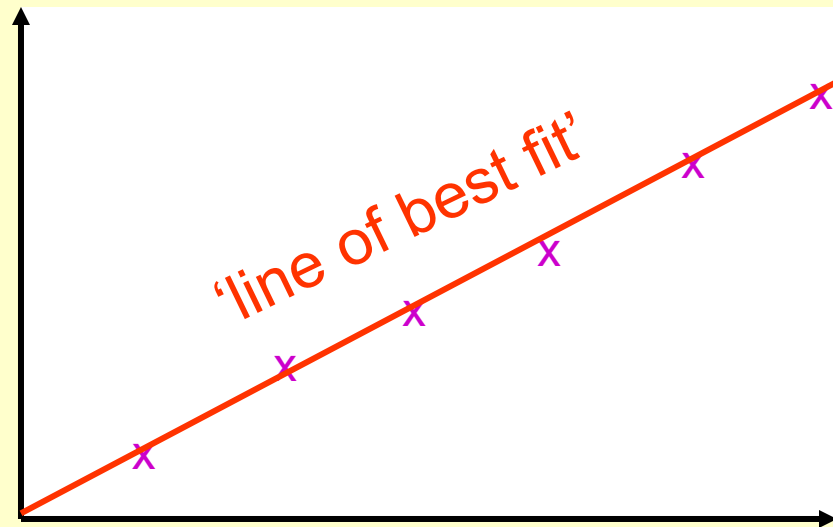
Re-check each one before your next step.



## 5 steps in drawing a graph

### 3. If the points form a straight line...

...draw the best straight line through them

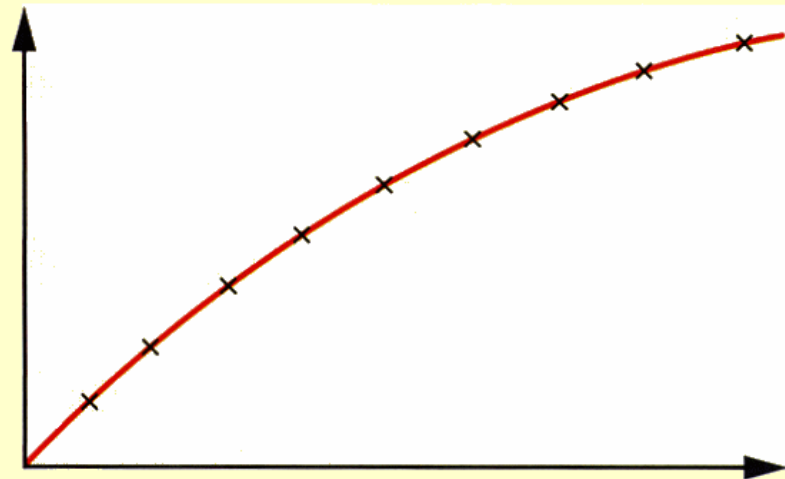


Check that it looks the **best** straight line.

## 5 steps in drawing a graph

### 4. If the points form a curve...

...draw a free-hand curve of best fit



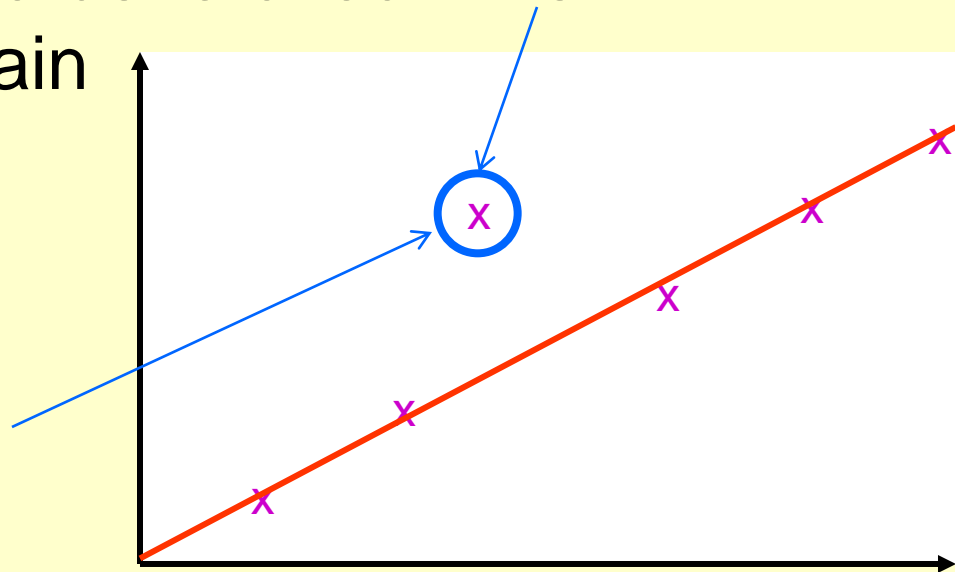
Do **not** join the points like a 'dot-to-dot'.

## 5 steps in drawing a graph

### 5. If a point is not on the line...

...use your apparatus to check this measurement again

This is called an **anomalous** point.



You can decide to ignore anomalous points.

# 5 steps in drawing a graph

In summary:

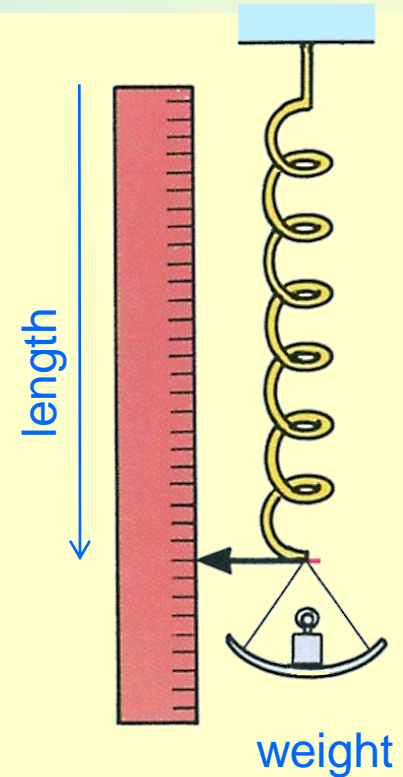
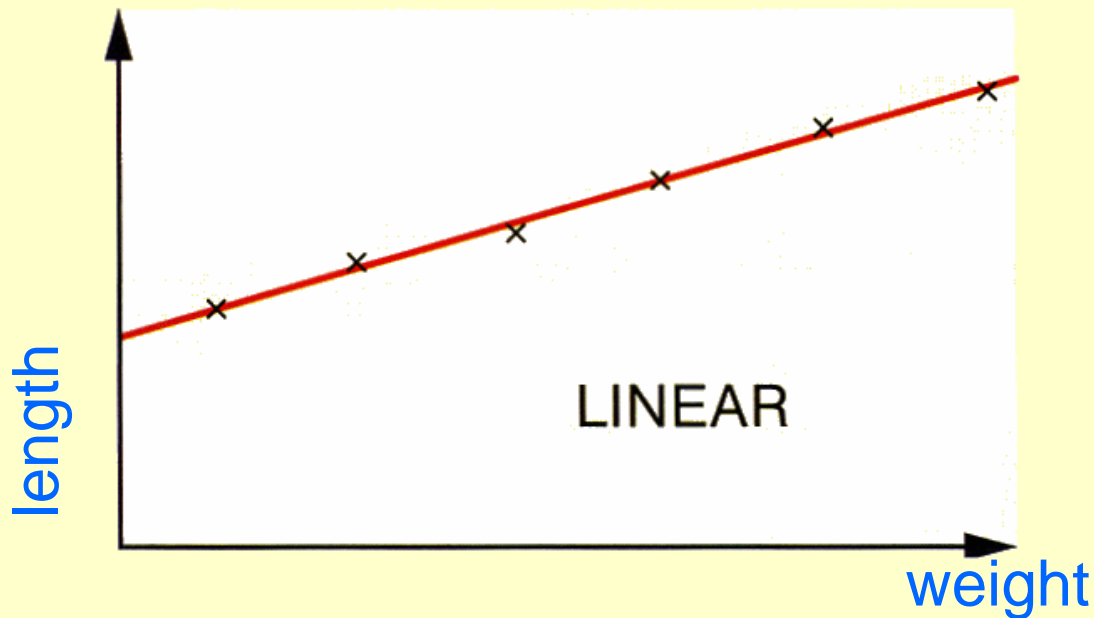
1. Choose good scales, with the dependent variable on the y-axis
2. Plot the points carefully
3. Draw a line of best fit using a ruler for a straight line graph,
4. or draw free-hand for a curved graph
5. Check anomalous points.

# Types of graphs

Let's look at some examples of graphs

# Types of graphs 1

A **straight line** graph:



An example would be the **length** of a spring against the **weight** on it.

## Types of graphs 2

A **curved** graph, rising :

The dependent variable rises quickly at first

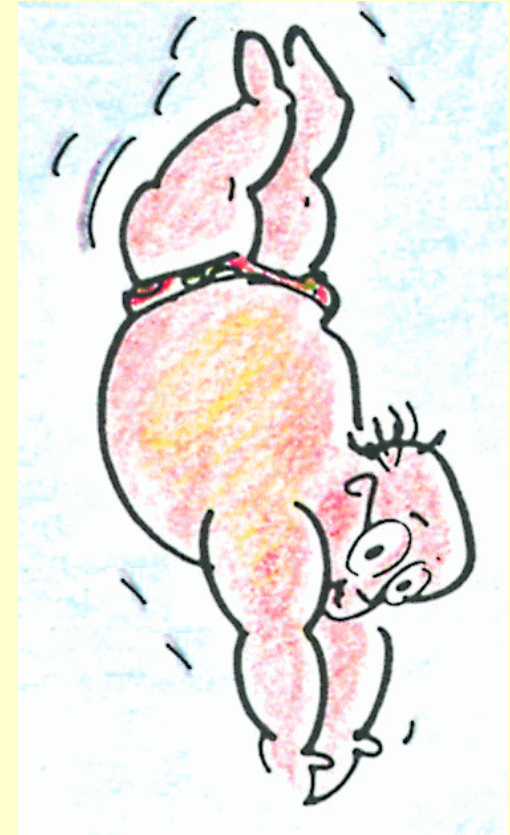
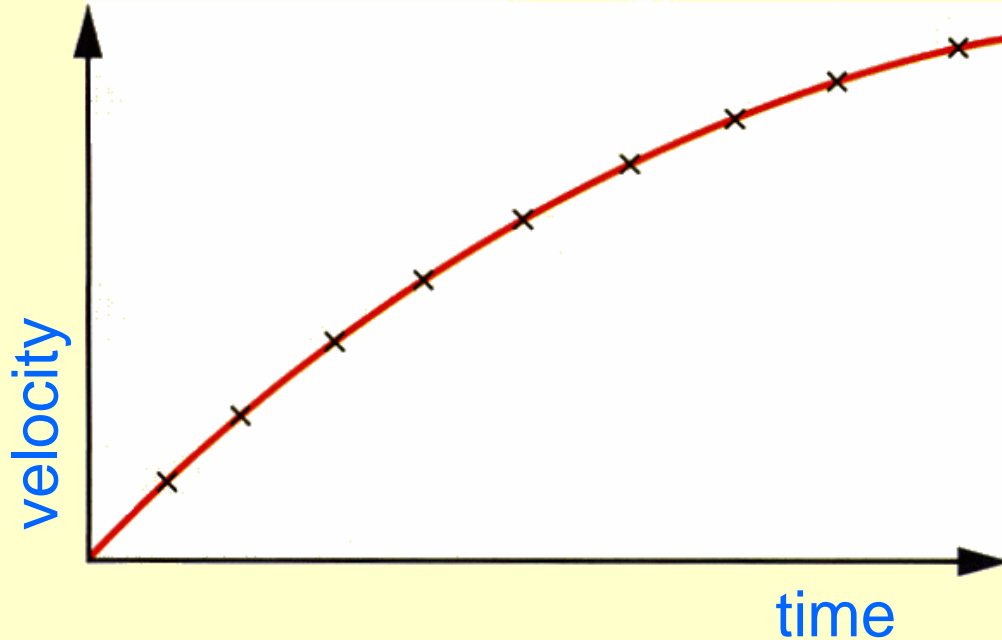


and then more slowly

Here are some examples:

## Types of graphs 2

Example 1: the **velocity** of a falling object against the **time**.



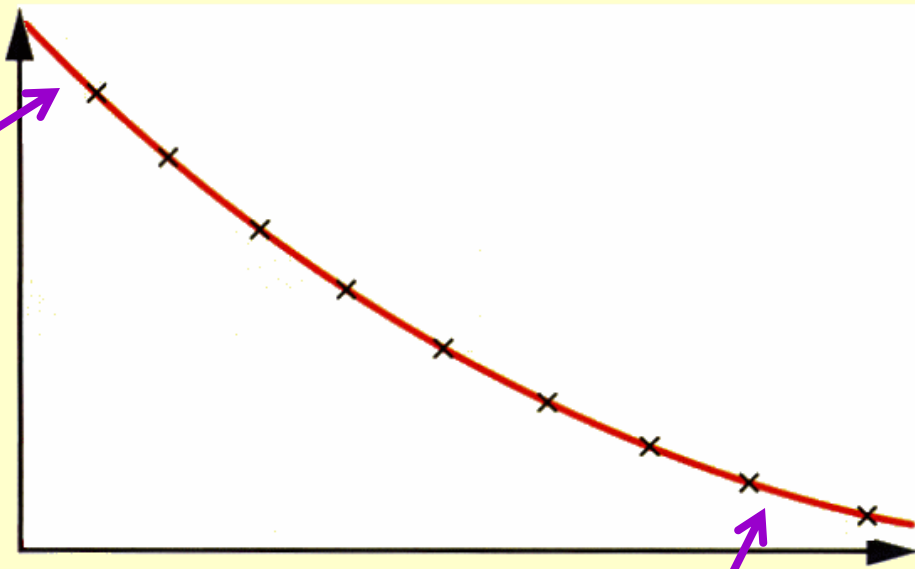
Eventually the object will reach its terminal velocity.



# Types of graphs 3

A **curved** graph, falling :

The dependent variable falls quickly at first

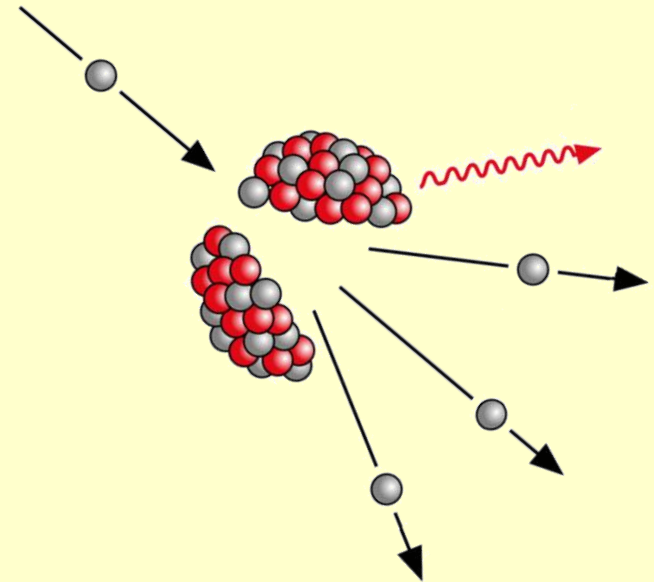
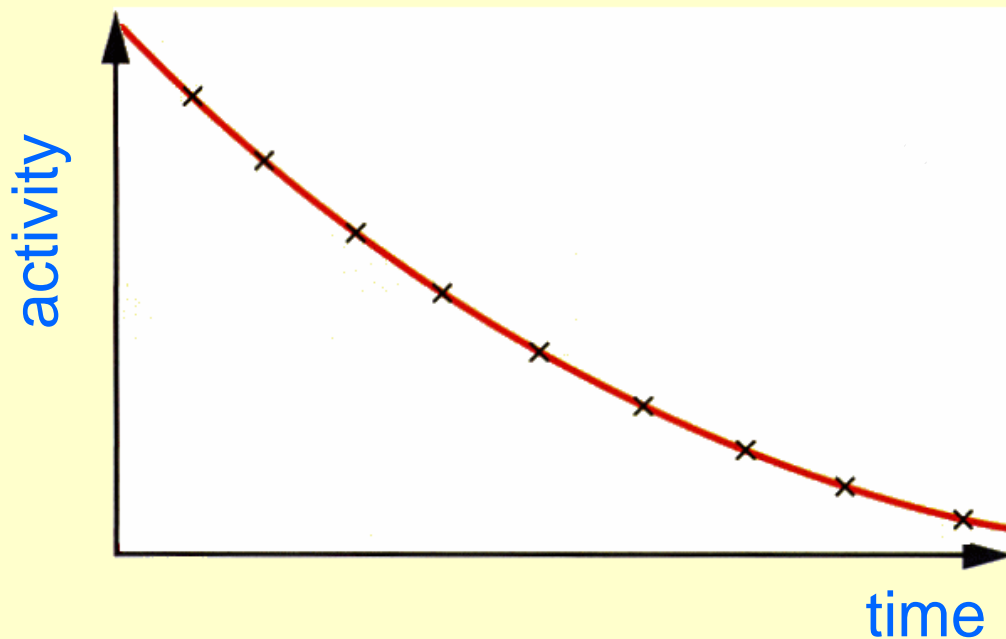


and then more slowly

Here are some examples:

# Types of graphs 4

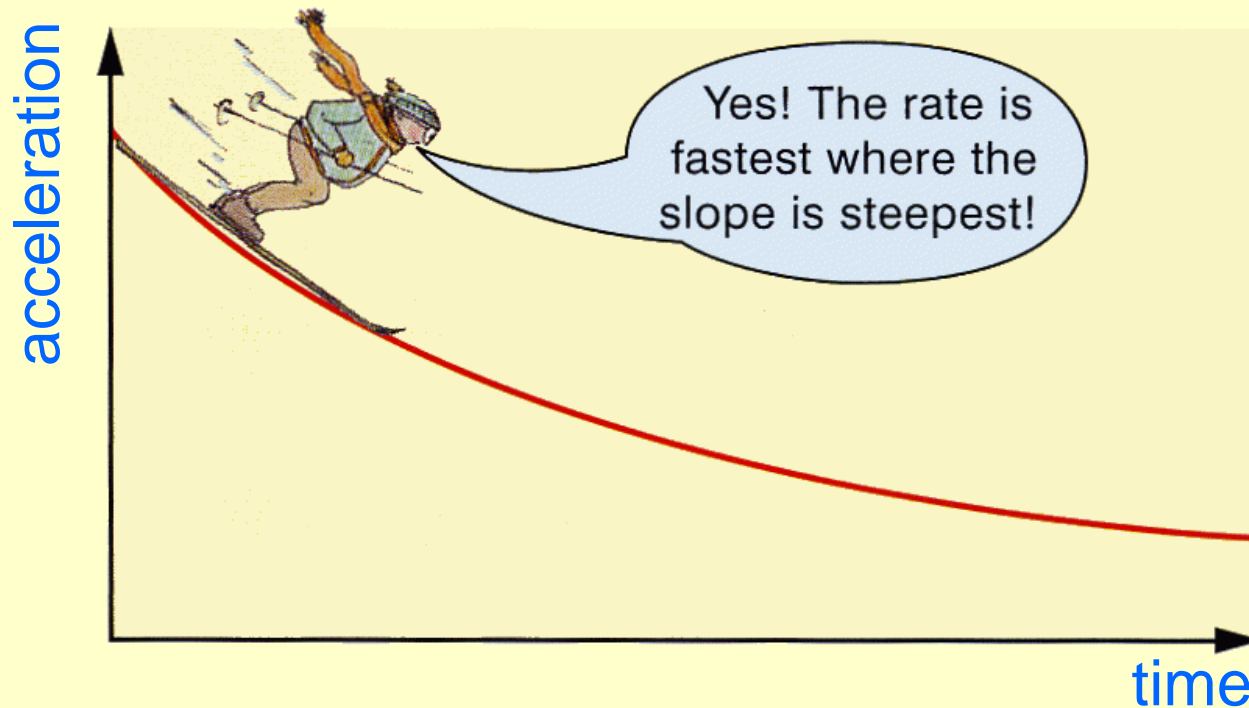
Example 1: the **activity** of a radioactive source against the **time**.



The time to fall to half is called the half-life.

# Types of graphs 4

Example 2: the **rate of change** is shown by the **gradient** of the graph.



This is discussed in the next PowerPoint.

# Learning Outcomes

You should now:

- Know how to draw a line-graph correctly,
- Be able to give examples of graphs with different shapes,
- Be able to interpret graphs with different shapes.