# Determining a value for the acceleration of free fall

## Transcript

Objects fall due to the influence of gravity.

In this simple experiment we are going to investigate the rate of acceleration of an object in free fall.

A metre rule is fixed to a wall at a height of 2m.

A plumb line is used to ensure the metre rule is aligned vertically.

The bottom of a ball is lined up with the 1.50 m mark.

The ball is dropped and a stopwatch is used to measure the time from the release of the ball until it reaches the ground.

This is repeated twice so an average can be taken. The result for each repeat is recorded.

The ball is now dropped from 1.40 m and the time is recorded.

For each new height three repetitions are carried out so that an average can be recorded.

The displacement of the ball and the time taken to fall are both known. It is therefore possible to calculate a value for the acceleration of free fall, using the equation $s = ut + 1/2\ at^2$.

Initially the ball is stationary, so $u = 0$ and the equation can be expressed as $s = 1/2\ at^2$.

$a$ represents acceleration due to gravity, so it can be replaced with a $g$.

In a graph of $s$ against $t^2$, the gradient is therefore equal to $1/2g$.

A graph is plotted of $s$ against $t^2$. A line of best fit is drawn.

The gradient of the line of best fit represents $1/2g$.

Your measured value may be different to the expected value of 9.81 m $s^{-2}$.

Although the method shown can produce reasonably accurate value for the acceleration of free fall, there are large measurement errors involved.

Some of these can be minimised through the use of data logging equipment.

This experiment has shown how basic equipment can be used to determine a value for the acceleration of free fall.