To measure the average speed of an object you will need:

A trolley with a card attached. This is your object.

A ramp for the trolley to roll down.

Two light gates. These need to be held at the right height to ensure that the card cuts the light beams as it passes.

The light gates are connected to an electronic timer, and you need a ruler or metre stick to measure the distance between the two light gates.

It's best to carry out the experiment a number of times, so draw up a table to record your results.

The table should have headings of: trial number, distance between light gates (d) in metres, time for the trolley to pass between the light gates (t) in seconds.

Let's start the experiment:

Measure (d) the distance between the light gates using a ruler or metre stick.

If you measured the distance in centimetres, you will need to divide it by one hundred to show this in metres.

Select the timing function on the timer so that it will record the time for the trolley to pass between light gate 1 and light gate 2.

This will be time (t).

The trolley must be released from the same point for each run.

When it passes passing through light gate 1, the card cuts the beam and it starts the timer.

When the trolley passes through light gate 2, the card cuts through this light beam and stops the timer.

This will give us the time (t) in seconds, that it took the trolley to travel the distance (d) between the light gates. Repeat the experiment to make it more reliable.

Put your results in your table.

To work out an average time, add the three recorded times together and then divide by three.

You can then use this time to calculate the average speed, using the equation: Average speed, v bar, equals distance, (d) divided by time, (t).

In this case, v bar equals zero point five zero divided by one point one eight one, which is an average speed of zero point four two metres per second, correct to two significant figures.

Let's recap the key steps involved in the experiment.

Set up a ramp with two light gates that are attached to a timer.

Measure the distance between the light gates in metres.

Send a trolley down the ramp.

The timer records the time in seconds it takes the trolley to travel between the light gates.

You can then use the equation v bar equals d divided by t the to calculate the average speed in metres per second.

Key points.

Remember always look at the units before you put values into the equation.

Make sure centimetres are converted into metres.

Sources of errors in this experiment are due to human error in measuring the distances.