

Folder: Science P4-7
Topic: 'Forces 2' Friction
Level: C/D

LO3 The less the friction, the further and faster an object can move

You will need:

Toy car
10cm wide piece of black card
Some Blutak or similar
Torch
Something to make a slope
Surfaces to put on the slope, eg carpet sample, pieces of fabric, coarse sandpaper
LogIT Explorer datalogger

Tip:

This experiment is much more easily done without the computer.

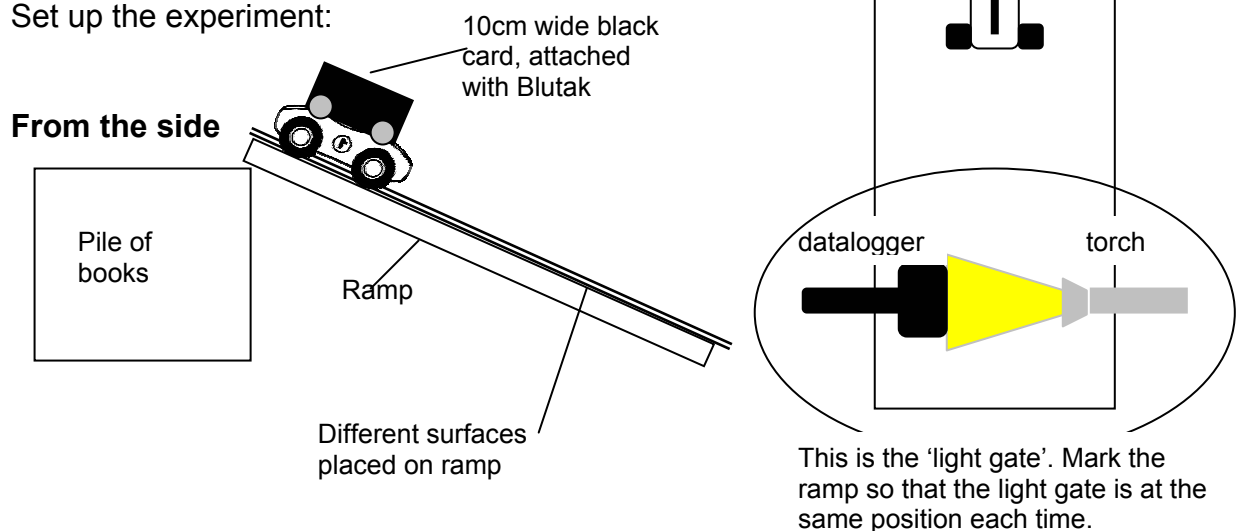
Summary of experiment:

By making a simple 'light gate' pupils can use the datalogger to measure the speed of the car as it travels down the ramp. The datalogger works out the speed by measuring how long a 10cm piece of black card (fixed onto the car with blutak) takes to pass through the 'light gate'. Different surfaces placed on the ramp will cause more or less friction and thus affect the speed of the car. This is called **remote logging**, because the datalogger is **not** connected to the computer.

Now here's what to do:

Step 1

Set up the experiment:



Step 2

If you have science clamps to hold the datalogger and torch in place, these are ideal. Otherwise it is fine for them to be held in position by hand BUT it must be a fair test, so the datalogger and torch should be held at the same distance down the ramp each time. (Mark the position by drawing a line across the slope with chalk, for example).

Make sure that:

- The torch is shining directly onto the middle light sensor of the datalogger.
- There is enough room for the car to pass below the light gate.
- The 10cm card will pass in front of the light sensor, thus breaking the light beam.

Press the green start button to switch on the datalogger



Step 3

Press the blue menu button until it says 'Press Green to measure speed >'. Press the green start button.

Making sure that the torch is shining directly at the light sensor, pass your hand swiftly between the torch and the light sensor. If the light gate is working properly, you will see 'Speed of card 3.05 m/s' or whatever speed it has recorded. If no speed is recorded, you will have to adjust the light gate – move the torch nearer to the light sensor or try a brighter torch.

Step 4

Once the light gate is working, you can start the experiment. Press the blue menu button until it says 'Press Green to measure speed >'. Then press the green start button.

Roll the car ('fair test' – it should not be pushed) down the slope. The 10cm black card should break the light gate and a speed should be recorded on the digital display. The result can be checked by repeating the experiment.

Step 5

Put a different surface on the slope and predict whether there will be more or less friction. Roll the car again and record the speed this time. Is there more or less friction? What effect does friction have on how fast the car can move? Record results on the pupil worksheet at the end of these notes.

Remember to switch off the datalogger at the end of the experiment.

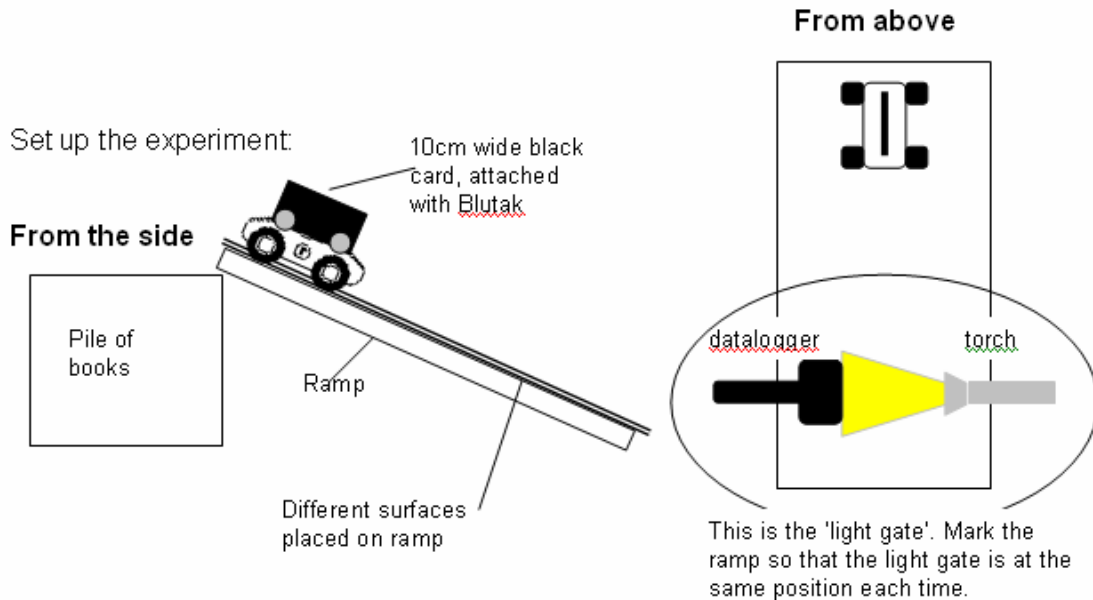
Pupils could turn their results into a graph if wanted.

Pupil Worksheet

You will need: equipment as below

Measuring the speed of a car down a ramp to see if friction has an effect on how fast a car travels

Preparation

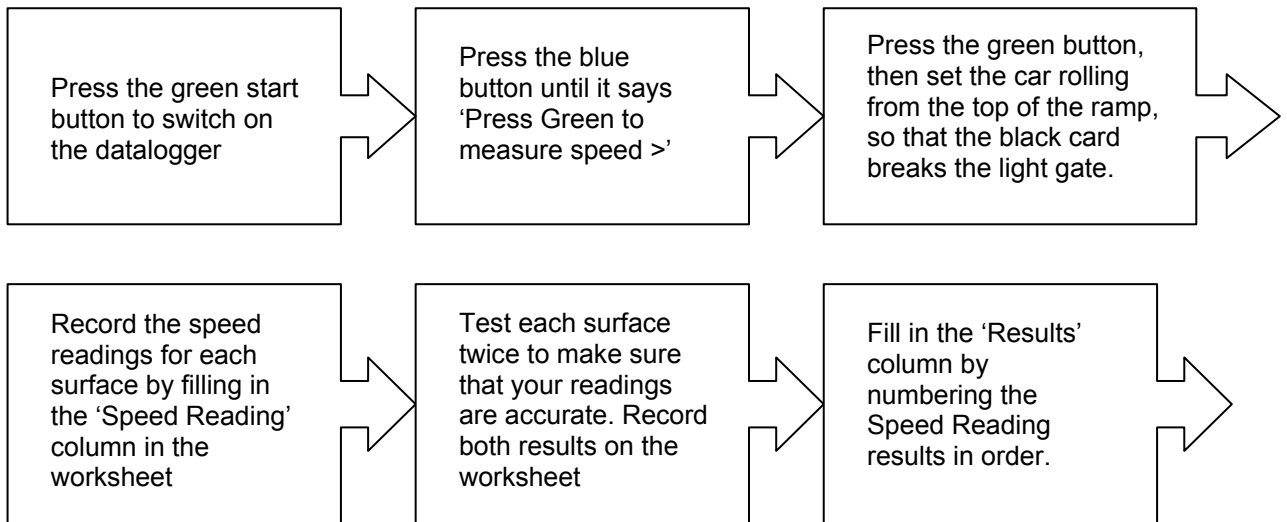


Predicting Results

1. Fill in the 'Description' column in the table below
2. Decide which surface you think will cause the most friction and fill in the 'Prediction' column. Number the one with the most friction 1 and the least friction 4. Number the other surfaces in order.

	Description <i>Describe what the surface is like. Use a few words like 'rough sandpaper' or 'cord carpet'</i>	Prediction <i>Decide which surface will provide the most friction. Number them all in order – most friction 4, least friction 1.</i>	Speed Reading <i>Take the readings from the digital display</i>	Results <i>Which surface provides the most friction? Number them all in order – most friction 4, least friction 1.</i>
Surface A			1.	
			2.	
Surface B			1.	
			2.	
Surface C			1.	
			2.	
Surface D			1.	
			2.	

Carrying out the Experiment and Recording the Results



Analysing the Results

Which surfaces provided most and least friction in your experiment?
Complete these sentences: (Use words like 'rougher' and 'smoother')

1. _____ provided most friction because it

2. _____ provided least friction because it

Were your predictions correct?

How do your results compare to other people's results?

Did any of your results surprise you? Why?

Complete these sentences about friction. (Use 'slower' and 'faster')

3. The less the friction, the _____ an object can move.

4. The more the friction, the _____ an object can move.