Practical 2 Momentum and momentum conservation – small trolleys

Purpose

The aim of this experiment is to study momentum and its conservation in an inelastic collision.

Safety

Lift the wooden support board with care.

You will need:

- Two trolleys
- Two light gates and suitable interface
- Eight washers
- Plastic runway
- Wooden support board
- Two pieces of Velcro® strip
- Means of compensating the runway for friction

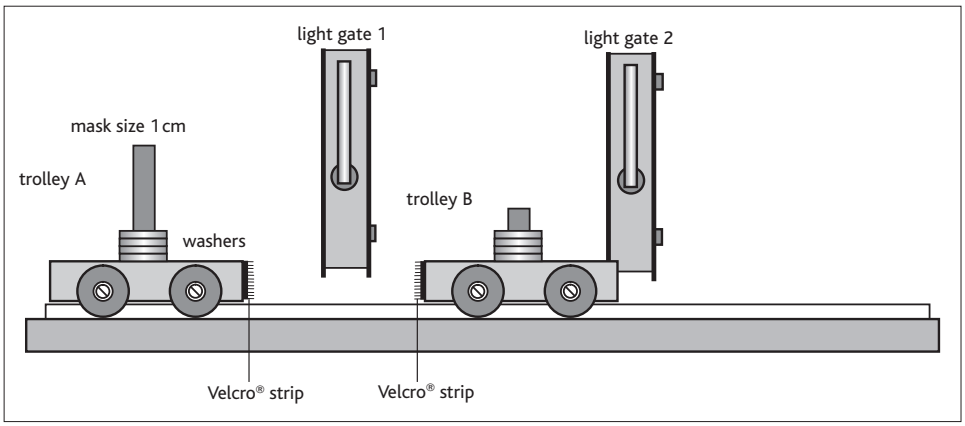

Figure 1: Arrangement of small trolleys to investigate momentum and momentum conservation

Experimental instructions

Set up the apparatus as shown in the diagram with four washers on each trolley. Compensate for friction by tilting the runway slightly. Check by giving one trolley a small push and confirming that it runs down the runway with constant speed.

Mount a piece of Velcro® on each trolley so that the trolleys stick together when they collide.

Set the interface unit to record the speed of trolley A before the collision and the speed of the two trolleys (A and B joined together) after the collision.

Put trolley A at one end of the runway and trolley B just before light gate 2.

Give trolley A a push (not too large) so that it runs down the runway, cutting through the light beam of light gate 1 and colliding with, and sticking to, trolley B. The two trolleys will now travel on, the mask on trolley A cutting through the light beam of light gate 2.

Repeat the experiment for differing initial speeds and trolley masses.

Analysis and conclusions

Use your results to test the law of conservation of momentum.

Calculate the total momentum of both trolleys before and after the collision.

Comment on the most important sources of error in your experiment and how they might be reduced.