Practical 3 Momentum and momentum conservation using a linear air track

Purpose

The aim of this experiment is to study momentum and its conservation in an inelastic collision between two riders using a linear air track.

You will need:

- Linear air track
- Air blower
- Two riders
- Two light gates and suitable interface
- Additional masses
- Pin attachment
- Plasticene®

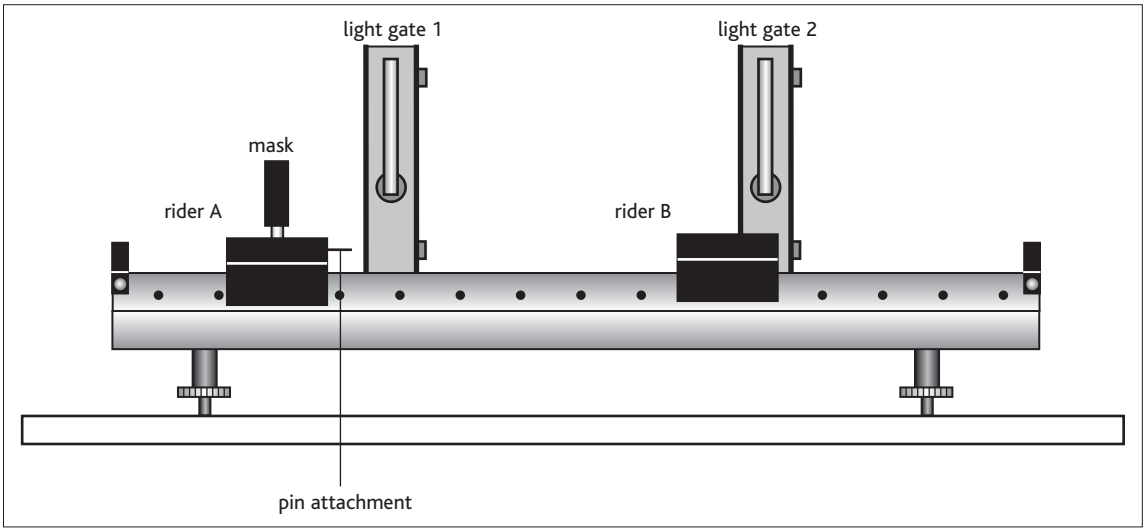

Figure 1: Using a linear air track to investigate momentum and momentum conservation

Experimental instructions

Set up the apparatus as shown in the diagram. Compensate for friction by tilting the air track slightly. Check by giving one rider a small push and confirming that it runs along the air track with constant speed.

Put some Plasticene® in the hole on one rider and fix the pin attachment to the other rider.

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

Put rider A at one end of the linear air track and rider B just before light gate 2 and switch on the air blower.

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

Repeat the experiment for differing initial speeds and rider masses. The mass of the rider can be changed by fitting additional masses to it.

Practical 3 (cont.) Momentum and momentum conservation using a linear air track

Analysis and conclusions

Calculate the total momentum of both riders before and after the collision. Use your results to test the law of conservation of momentum.

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