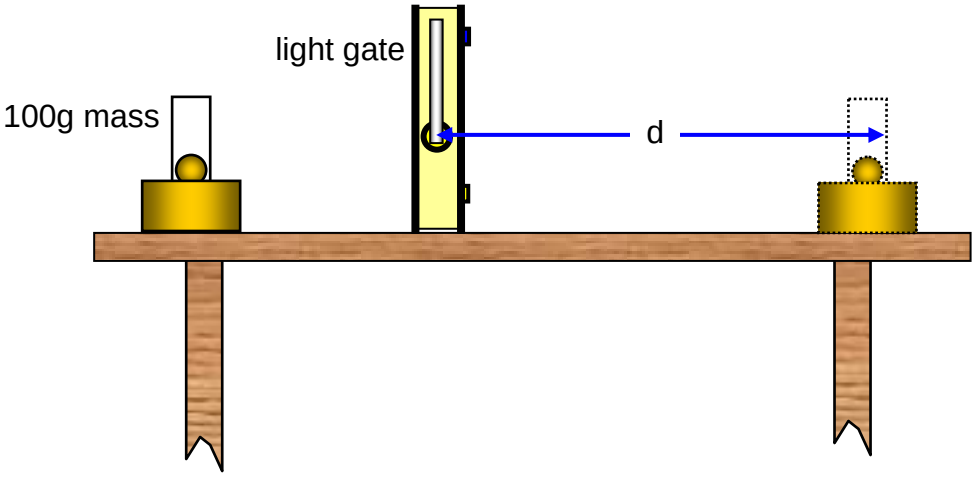
# TAP 216- 1: Braking distance and velocity

**Apparatus:**

- ✓ Light gate assembly (to measure velocity) plus datalogger/computer
- ✓ 100g mass
- ✓ metre rule
- ✓ suitable surface (e.g. bench top)




**Procedure**

- Push the 100 g mass so that it slides freely through the light gate and measure the distance it travels until rest.
- Repeat this process for as many different speeds as possible.
- Record your results in a suitable table or spreadsheet.
- Draw a graph of velocity against stopping distance.
- Draw a graph of velocity squared against stopping distance.

**Safety**

The metre rule can be used as a barrier to prevent the mass flying off the end of the bench when pushed too violently.

**Questions:**

What can you conclude from the graphs you have drawn?

Estimate the frictional force on the mass.

**Practical advice**

A cylinder of dark-coloured paper can be attached to the mass to ensure that it breaks the light beam. (The diameter of the cylinder will be needed by the software)

Fs = ½ $mv^2$ so a graph of $v^2$ against s should have gradient ½ m/F. Knowing the mass (in kg) enables an average frictional force to be calculated from the gradient.

**External references**

This activity is taken from Resourceful Physics http://resourcefulphysics.org/