

The Coefficient of Restitution

1. **Preparation:** a) Make sure you know what is meant by *relative* velocity.
b) See part 4 below.

2. When two objects collide, their coefficient of restitution gives a measure of the elasticity of the collision. An elastic collision is one in which kinetic energy is conserved. In practice some k.e. is always converted into other forms. Which other forms?

If we compare the relative velocity of the two objects *just* before the collision (velocity of approach, v_a) with their relative velocity *just* after the collision (velocity of separation, v_s) we can see “how elastic” the collision was.

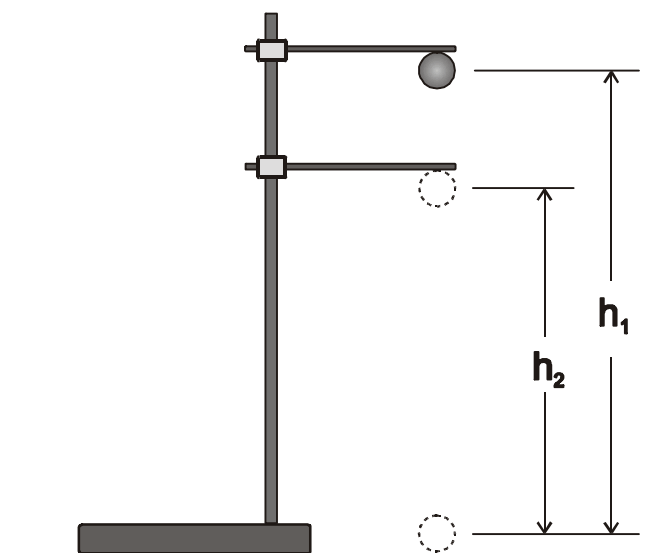
Coefficient of restitution = e

$$e = v_s/v_a$$

$e = 1$ for totally elastic collision

$e = 0$ for totally inelastic collision

3. **Experiment to estimate the Coefficient of Restitution for a ball bouncing on the laboratory bench**



Two horizontal rods will be found helpful in estimating the heights h_1 and h_2 (as shown in the diagram).

4. Your final value for e must be taken from a suitable graph.