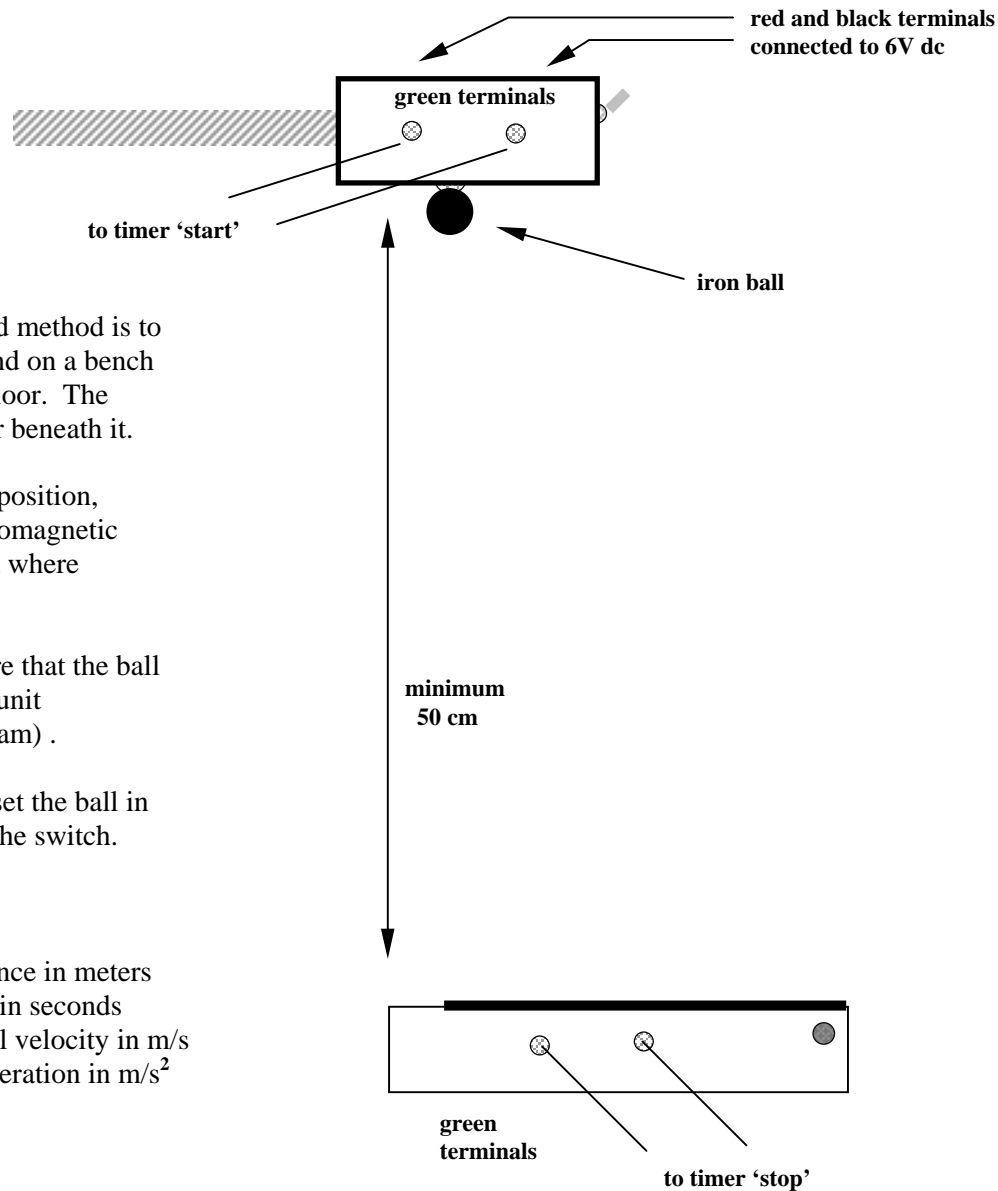


'g' by Free Fall Apparatus



Instructions

1. Set up as shown. A suggested method is to mount the top unit in a clamp stand on a bench so that it drops the ball onto the floor. The switch unit is then set on the floor beneath it.
2. With the switch set in the up position, carefully set the ball on the electromagnetic cup. Throw the switch and check where the ball hits the switch unit.
3. Care should be taken to ensure that the ball drops onto the area of the switch unit furthest from the hinge (see diagram) .
4. When everything is aligned, set the ball in the cup, reset the timer and flick the switch.
5. The calculation is as follows:

$$S = ut + \frac{gt^2}{2}$$

S = distance in meters
t = time in seconds
u = initial velocity in m/s
g = acceleration in m/s²

$$g = \frac{2S}{t^2}$$

Notes

1. Ensure that the ball used is made of soft iron. Failure to do this will result in magnetic hysteresis causing the ball to 'stick' and extend the time.
2. Measure the distance 'S' from the bottom of the ball to the top of the switch platform.
3. The switch takes a finite time to operate and uses some of the ball's kinetic energy. This will result in a small error in the timing. By taking readings from different drop heights, this error may be analysed.
4. If a digital stopclock is used for the timing operation, it may be unreliable as many digital stopclocks are unable to detect very short start/stop pulses. If this occurs, we are able to supply a pulse stretcher unit which overcomes the problem. Alternatively, we can supply a competitively priced led display, centisecond timer which is capable of detecting extremely short pulses. For further details on either of these products, please contact the sales office.

N.B. Do not leave the electromagnet running for prolonged periods (i.e. switch in up position) as this will cause overheating of the electromagnet windings.