

Name _____

Class _____ Date _____

Photographic Analysis of Motion

Aim

To obtain and analyse multiple-image photographs of different motions.

To determine the acceleration of a ball in free fall.

To contrast the motion of a falling golf ball with a falling ping pong ball.

Equipment

Stroboscope lamp (NB dangers to epileptics of flashing lights)

Polaroid camera with film

Room that can be darkened

Tripod

Film

Dark background

Retort stand and clamp

Metre rule (with white tape at 10 cm intervals)

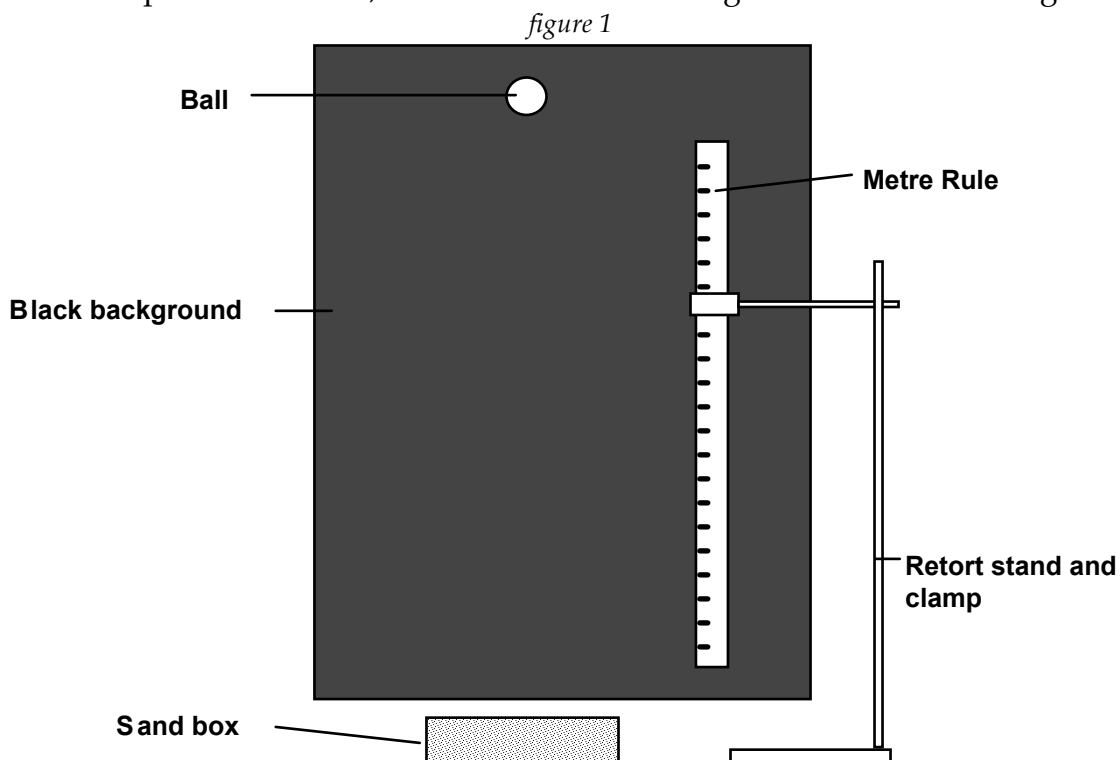
Graph paper

Golf ball and ping pong ball

Shoe box containing sand

Method

1. Set up the metre rule, sand box and dark background as shown in Fig. 1.



Name_____

Class_____Date_____

2. Drop the ball about 2 metres into the sand box (which prevents any bounce) and take a multiple-image photograph of the motion. Make sure the metre rule is in the photograph.
3. Record the rate at which images are being produced on the film (e.g. strobe-lamp flash rate). From this determine the time between images. (Note: a suitable rate is 10 per second, and the best photographs result from side illumination by the stroboscope.)
4. After the photograph develops, use a photocopier to enlarge the image. Mark in the images of the ball and metre rule scale.
5. Calculate the average speeds in the intervals. We assume that the average speeds calculated are the actual speeds half way through the respective time intervals. [Think about why]
6. Determine the average acceleration, from a velocity/time graph if there is enough data.
7. Compare this value with the correct value for acceleration due to gravity (9.8 ms^{-2}). Comment on possible causes of any difference.
8. Repeat the procedure with the other ball.

Interpretation

Show your results, and the calculations. I am really interested in your conclusions, and how you justify them.