Experiment on Work and Energy

Name

Projectile Motion

The goal of this activity is for you to:

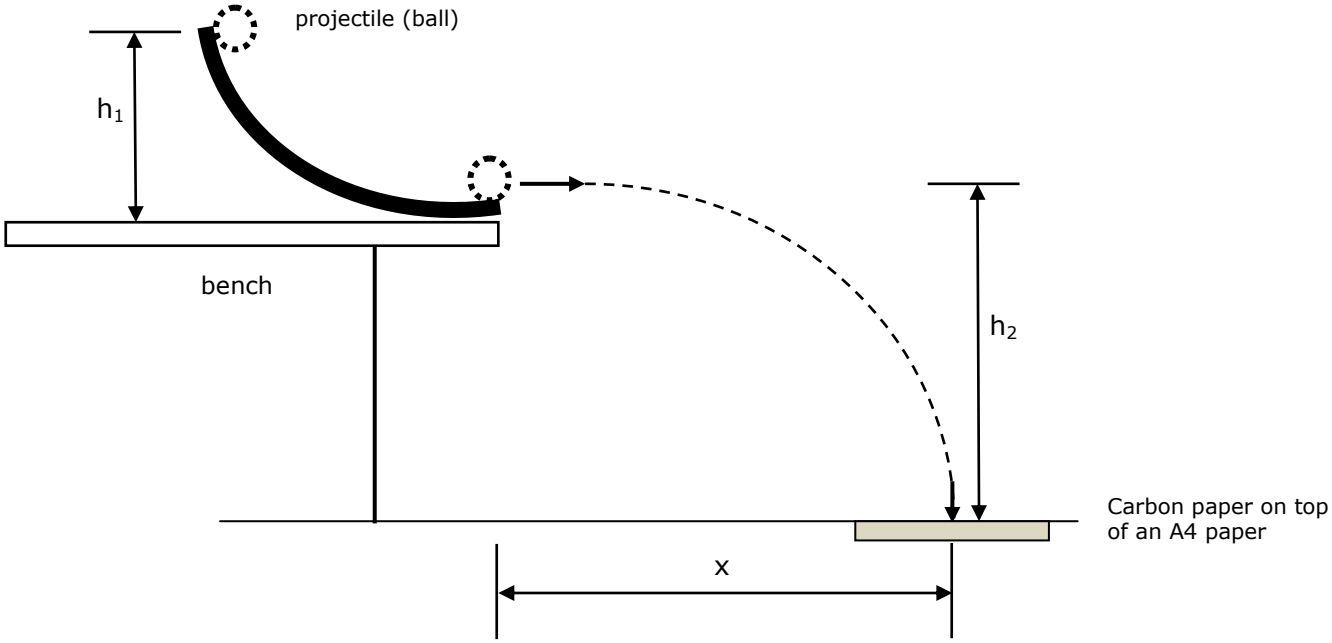
1. Use projectile motion equations to determine the speed of take-off of the projectile.
2. Use the work-energy theorem to determine if the work done against resistance in launching the projectile is negligible.

Idea:

When a body is released from the top of a track, its potential energy decreases while its kinetic energy increases. If non-conservative forces are negligible then, the amount of potential energy loss should be equal to the gain in kinetic energy.

Procedure:

1. You are going to use the projectile apparatus as shown. Release the ball and estimate where it would land on the floor. Secure the carbon paper and A4 paper in that place by taping them to the floor.



2. Determine the mass of projectile and the height h_2.

Mass, m =_____kg

Height 2, h_2 =_____m

3. Measure the height h_1 and determine the initial potential energy of the ball.

Height 1, h_1 =_____m

Potential energy, E_p =_____J

4. Using h_2 and x and the equations for projectile motion, derive the equation for the speed of the projectile as it leaves the track.

5. Release the ball from the top of the projectile track and measure the distance x.

x =_____m

6. Using the formula derived in (4), determine the take-off speed of the ball and hence, the kinetic energy of the ball at the end of the track.

Speed, v =_____ms^{-1}

Kinetic Energy, E_k =_____J

7. Using the calculated energies in (3) and (6) determine the energy lost as the ball moves down the track.

Energy Lost =_____J

8. Repeat (5) until you have 8 trials altogether. For each trial, calculate the speed, kinetic energy and the energy loss. Record all of these in a table that includes the a column for the initial potential energy.

9. Based on your data, is it alright to assume that friction is negligible on the projectile track? Explain.