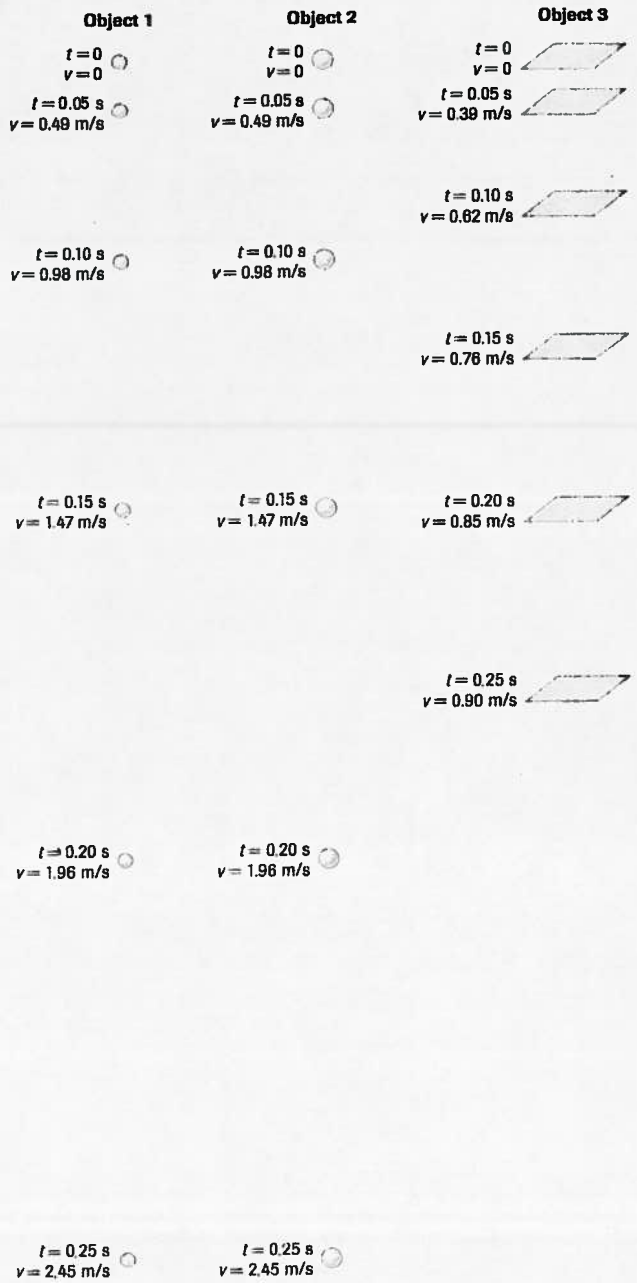
Activity: Acceleration Due to Gravity

Three objects are released from the same height and fall through the air. Object 1 is a small steel ball of mass 12.0 g, object 2 is another small steel ball of mass 24.0 g, and object 3 is a large, flat piece of cardboard of mass 25.0 g. The figure below shows the relative position of each object at the time indicated. The velocity at each of these times has been measured by a motion detector and recorded. Some people have misconceptions about the motion of objects when falling. The purpose of this activity is to identify some misconceptions and clear them up. Use the figure to complete the following questions:



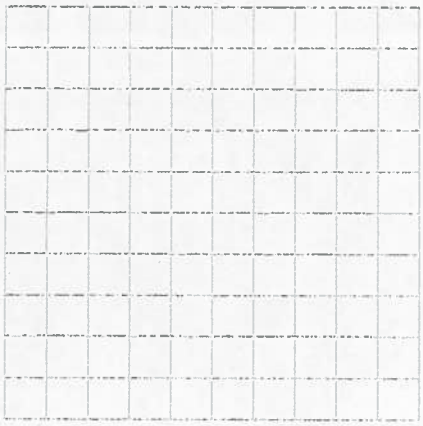
1. Examine the velocities of objects 1, 2, and 3 as they fall. What kind of motion is represented? How can you tell?

2. Is each object moving with constant acceleration? Explain.

3. Without calculating anything, determine which object has the lowest acceleration. How can you tell?

4. Find the average acceleration of each object.

5. Sketch the velocity-time graph of each object on the same grid below, and draw the line of best fit. Use a different colour for object 2.



6. Find the slope of each of the lines on the graph above. What do these slopes represent?

7. How can you tell which object has a lower acceleration by using the velocity-time graph?

8. (a) Which object has the largest mass? Does mass determine the acceleration due to gravity? Explain.

(b) Why does one object have a lower acceleration than the others?