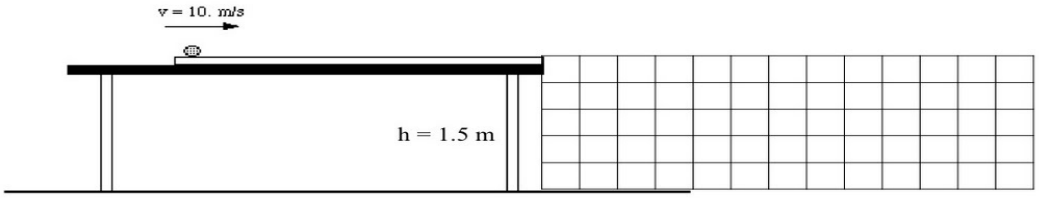
Particle Models in Two Dimensions Worksheet 2:
Horizonally Launched Projectiles

1. Given the following situation of a marble in motion on a rail with negligible $F_{friction}$:

a. Sketch a motion map showing the motion of the marble after it leaves the rail, using the grid to help you carefully locate the marble's positions. Show both horizontal and vertical velocity vectors on each dot.



b. Sketch and label force diagrams for the marble both when it is on the rail and off the rail. Describe the horizontal and vertical motion of the ball in each case.

c. Once the ball leaves the table, calculate how long it will take for the ball to hit the floor.

d. In the time you have calculated in part c, how far will the ball travel horizontally before hitting the floor?

e. Suppose the table was doubled in height to 3.0 m. Determine the horizontal range of the marble as it falls to the floor. What effect does doubling the height have on range of the marble? What other factors affect the range of the sphere?