

# Vexing Velocity Vectors

Note: Used with permission of P. Robbert

## Procedure

1. Tape a sheet of "vector paper" to a flat board. Arrange the board so that it is elevated at the end with a zero mark. Launch the ball horizontally so that the ball falls in a path of a half parabola down the board. Experiment until you find a launch angle such that the marble passes through all 4 lines before falling off the board.
2. Once you have found a satisfactory launch angle, tape a piece of carbon paper over the "vector paper." Again, launch the ball as above. Repeat for each person in your group.
3. Remove the carbon paper and graph paper. You should see the path of the ball - a half parabola.
4. Draw a perpendicular line at each point the path intersects a time line.
5. The distance between the time lines represent the distance the ball travels between each "tic." For each point that the ball intersects, find the x and y distances in centimeters between each line. Since the lines represent one time interval, the distance you measure is also the velocity of the ball at that point. Record this on your paper.
6. Using the parallelogram or graphical method, sketch the resultant vector for for each pair of x and y components.
7. For each set of the vectors, verify the Pythagorean Theorem below.

Time I used:				
x component				
y component				
Length resultant				

The math work: