01-08a Independence of Vectors *Name:* _____

Adapted from Take-Home Physics by Michael Horton

Objectives

- Which factors determine how long a projectile hangs in the air?

Materials

- Ruler
- 2 washers
- Pushpin
- Corkboard

Procedure

A classic physics problem asks if a gun is fired perfectly horizontally and a bullet is dropped from rest at the same height at the same time, which bullet will hit the ground first? Today you get to try to test this (without using a gun).

1. Use a pushpin to attach one end of the ruler into the corkboard so the end hangs over the corkboard. The ruler should be able to pivot on the pushpin.
2. Place one washer on the ruler so that it hangs over the edge of the corkboard. The other washer should be placed near the edge of the corkboard.
3. Make sure the apparatus is flat. Flick the ruler so that the washer on the ruler falls straight down and the ruler hits the other washer to launch it. Record which washer hit the ground first. _____
4. Use books to change the height and try again. _____
5. Use more books to change the height and try again. _____
6. In general, which washer hit the ground first or was it the same time? _____
7. Did the height of the apparatus make any difference? _____
8. Explain this result using the concept of gravity. _____
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