PHYS UN1601 Recitation Worksheet 2

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Problem 1

A ball is dropped from rest at height h. Directly below on the ground, a second ball is simultaneously thrown upward with speed v_0. If the two balls collide at the moment the second ball is instantaneously at rest, what is the height of the collision? What is the relative speed of the balls when they collide? Draw the v vs. t plots for both balls.

Problem 2

A ball is thrown at an angle θ up to the top of a cliff of height L, from a point a distance L from the base, as shown in Fig. 1.

a) As a function of θ, what initial speed causes the ball to land right at the edge of the cliff?
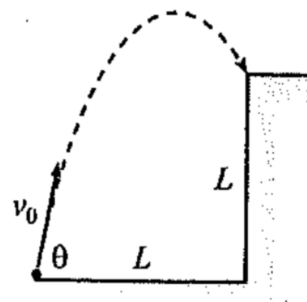

Figure 1

b) There are two special values of θ for which you can check your result. Check these.

Problem 3

You throw a ball from a plane inclined at angle θ. The initial velocity is perpendicular to the plane, as shown in Fig. 2. Consider the point P on the trajectory that is farthest from the plane. For what angle θ does P have the same height as the starting point? (For the case shown in the figure, P is higher.) Answer this in two steps:

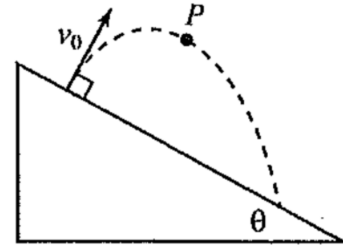a) Give a continuity argument that explains why such a θ should in fact exist.

b) Find θ. In getting a handle on where (and when) P is, it is helpful to use a tilted coordinate system and to isolate what is happening in the direction perpendicular to the plane.

Figure 2