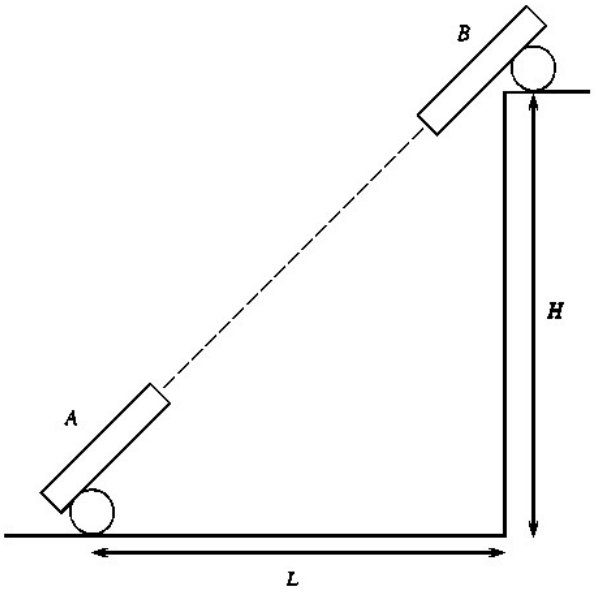
FP1

Cannon A is located on a plain a distance L from a wall of height H. On top of thise wall is an identical cannon (cannon B). Ignore air resistance throughout this problem. Also ignore the size of the cannons relative to L and H.



a) (3 points) The two groups of gunners aim the cannons directly at each other. They fire at each other simultaneously, with equal muzzle speeds v_0. What is the value v_{min} of v_0 for which the two cannon balls collide just as they hit the ground?

b) (3 points) Describe what happens for muzzle velocities greater than v_{min} and less than v_{min}?

c) (2 points) Cannon B breaks, and the gunners don't know how to fix it, so they decide to use a large sling, which hurls rocks. The sling has a radius of 5 m, rotates at 10 revolutions/minute, and hurls objects out in the direction of cannon A with a purely horizontal velocity. If $H = 1$km, where will the projectiles from this sling land?

d) (2 points) The rocks from the sling fall short of the location of cannon A, hitting the plain at a distance only 1/4 of the way from the base of the wall to cannon A. Assuming that the sling can only hurl rocks with a horizontal velocity, but has an angular velocity adjustable smaller or larger by a factor of two and a radius adjustable smaller or larger by the same factor, how can the sling be adjusted so that the rocks hit cannon A, or is this impossible to do with the sling?