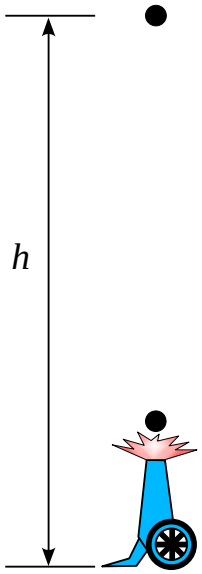
Physics 10310
Discussion Section Questions

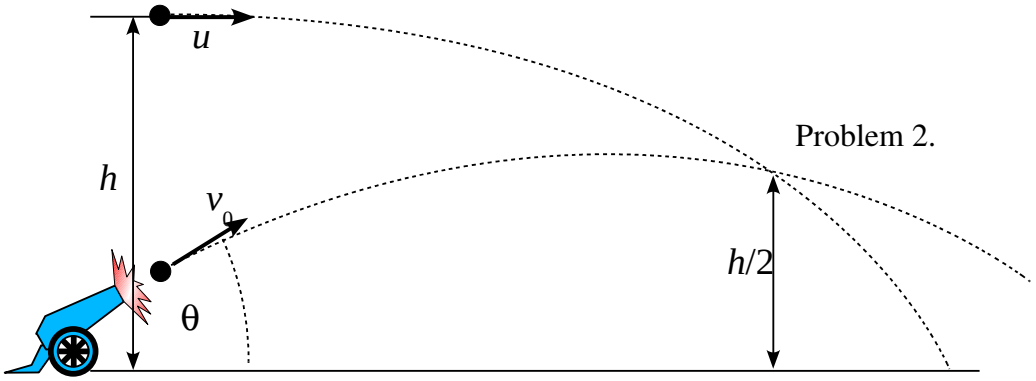
Set 2

Directions: One person in your group should act as "scribe" to record your group's solution on a sheet of paper. Please make sure your answers are legible and comprehensible.

1. A cannonball is dropped from a cliff of height *h*. Simultaneously, another cannonball is fired straight up from the bottom of the cliff in such a manner that its maximum height will eventually be *h*. Assume the cannon has negligible height.



A.) Answer, *in words only*, the following question: At what height do the cannonballs collide? Below *h*/2, at *h*/2, or above *h*/2. Explain why.
B.) What is the initial velocity of the cannonball shot from the cannon?
C.) Now, solve for the height at which they collide.



Problem 2.

2. Now, in a more complicated problem, the cannonballs move in two dimensions. The upper cannonball is shot horizontally with an initial velocity *u*, which is a given muzzle velocity. You are asked to find the neccessary muzzle velocity v_0 and the angle this initial velocity makes with the horizontal, θ, such that the cannonballs will collide when they each reach a height of *h*/2.
A.) What condition must be true of the horizontal velocities in order for the cannonballs to collide?
B.) Now, find an expression for the angle θ in terms of the given constants and *g*, the acceleration due to gravity.
C.) In terms of θ, what is the neccessary initial velocity v_0?
D.) Why don't the cannonballs collide at the same height in this problem as they do in Problem 1?