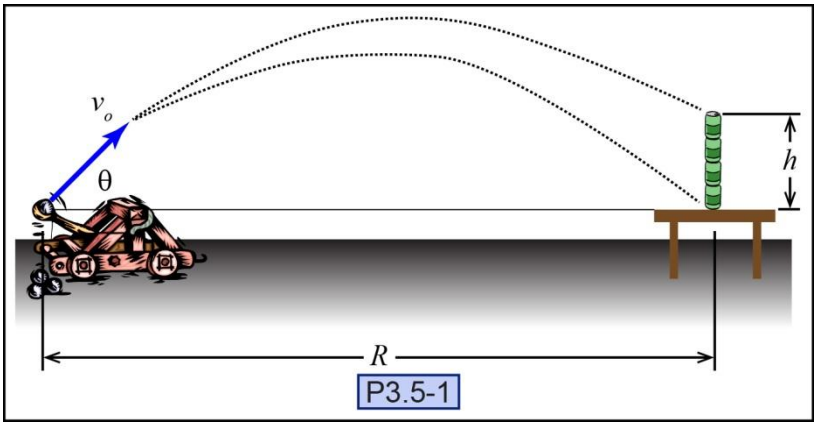
P3.5-1) A student team designed a catapult to launch a ball at a target of stacked cans. If the distance to the target (R = 8 ft) and the initial launch angle (θ = 45°) are known, determine the range of initial launch speeds (v_o) that will enable the ball to hit the target if the height of the stacked cans is h = 2 ft.



P3.5-1

Given:

Find:

Solution:

Calculate the projectiles range.

What is the range as a function of v_0, θ, and t?

R = _____

Calculate the projectile height.

What is the height of the projectile at the end of flight as a function of v_0, θ, and t?

y = _____

Calculate the velocity range.

Combine the range and height equations and solve for the velocity for $y = 0$ and $y = h$.

$v_{0,y=0}$ = _____

$v_{0,y=h}$ = _____