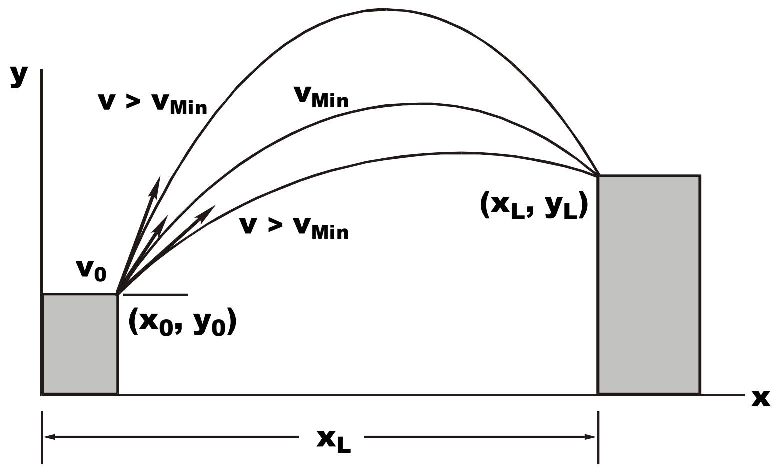
Projectile Paths Due to Different Launch Velocities



To launch a projectile from a known (x_0, y_0) to a specified (x_L, y_L), many trajectories are possible.

The minimum launch velocity, v_{Min}, has a unique trajectory.

For each launch velocity greater than v_{Min}, two trajectories are possible.

Projectile Problem Variables:

Launch Location: (x_0, y_0)

Launch Velocity and Angle: (v_0 at θ)

Landing Location and Time: (x_L, y_L) at time, t_L .

Class B Projectile Problems:

For these, you are given the launch location (x_0, y_0), the landing location (x_L, y_L), and *one* of (v_0, θ, t_L).

Find: The *remaining* two of (v_0, θ, t_L)

⑥ Given: [(x_0, y_0), (x_L, y_L), and θ] Find: (v_0, t_L)

(This is the most common, and the easiest, of these cases. Write the two position equations,

$$\boxed{x = x_0 + v_x t} \qquad \boxed{y = y_0 + v_{0y} t - \tfrac{1}{2} g t^2}$$

and solve for v_0 and t_L.

⑦ Given: [(x_0, y_0), (x_L, y_L), and t_L] Find: (v_0, θ)

⑧ Given: [(x_0, y_0), (x_L, y_L)]

Find: Minimum v_0, and corresponding θ and t_L.

⑨ Given: [(x_0, y_0), (x_L, y_L), and v_0]

Find: Two θ's and two t_L's for this v_0.