

Chapter 9 Extra Problem

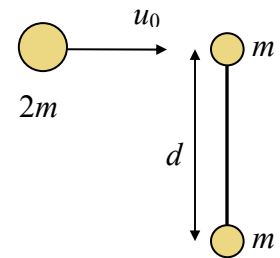
X9.1 Aiming Right.

A gun is placed at the origin and can fire a point mass across a frictionless horizontal table with fixed muzzle speed 50 m/s. The gun can swivel and point at any angle between zero and 360° . It is desired to fire the gun so as to hit a second point mass which, at the time of firing, is at location (40, 30) meters moving with constant velocity (-30, 10) m/s.

At what angle must the gun be fired?

X9.2 Inelastic Dumbbell

Mass $2m$ moving at speed u_0 collides with mass m that is part of a dumbbell as shown. The collision is perfectly inelastic and the projectile mass sticks to the target mass after the collision.



- Derive an equation for the trajectory of the two stuck masses as a function of time. Ignore gravity and the mass of the connecting rod. Hint: Where is the center of mass after the collision and how is it moving?
- What fraction of the initial kinetic energy is lost in the collision?