

Physics 111 Session 5

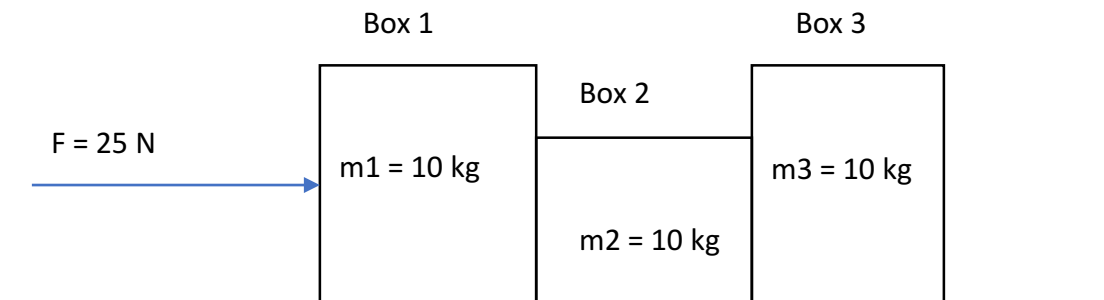
Projectile Motion:

- 1) A catapult launches a 100 kg stone at an angle of 60 degrees with an initial velocity of 10 m/s.
 - a) How far does the stone go?
 - b) How long does it take the stone to get there?
 - c) What is the maximum height of the stone?

- 2) A skydiver jumps out of a plane going 85 m/s at an altitude of 3,500 meters, and his parachute fails. Ignore the effects of air resistance.
 - a) How long does it take the skydiver to reach the ground?
 - b) How far does the skydiver go before he hits the ground?
 - c) If the plane stays in steady, level flight while the skydiver is falling, what is the relative velocity of the plane with respect to the skydiver in the horizontal direction?

Newton's laws:

- 3) Consider the boxes on a frictionless surface below:



- a) Draw a free body diagram for box 1
 - b) Find the acceleration the boxes are experiencing
 - c) What force is box 3 exerting on box 2?
 - d) What force is box 2 exerting on box 1?
- 4) A car with a mass of 2000 kg is going 30 m/s, and takes 6 seconds to come to a stop. What is the force the breaks exert on the car?

 - 5) A person pulls their child on a sled across a frozen lake. If the kid and the sled weigh 50kg together, and the person pulls on the rope at an angle of 20 degrees with a force of 200N, what is the acceleration of the sled across the lake?