



5. An artillery shell has a mass of 75 kg. The projectile is fired from the weapon and has a velocity of 670 m/s when it leaves the barrel. The gun barrel is 2.7 m long. (a) Assuming the force and therefore the acceleration is constant while the projectile is in the barrel, what is the force that acted on the projectile? (b) If the elevation angle is  $52^\circ$ , what is the horizontal range of the projectile?
6. A ball is attached to a string and hangs from the ceiling. Draw a FBD of the system. Label the vectors.
7. The space shuttle has a mass of  $2.0 \times 10^6$  kg. At lift off the engines generate an upward thrust of  $1.3 \times 10^8$  N. (a) Draw a FBD of the space shuttle system. (b) What is the weight of the space shuttle? (c) What is the acceleration of the shuttle when it is launched? (d) The average acceleration of the shuttle during its 7.5 minute run is  $18 \text{ m/s}^2$ . What velocity does it theoretically achieve at the end of that time?

8. A 3.45 g hockey puck rests on a flat, smooth table. A horizontal net force of 85.0 N acts on it for 1.10 seconds. The puck slides across the table at the end of that time and then falls off the table. The table's top surface is 85.0 cm above the deck. Find (a) the acceleration of the puck, (b) the speed of the puck after the 1.10 s, (c) the horizontal distance from the table edge to where the puck impacts the deck.