**Chapter – 1**

1. **What mass of a material with density ρ is required to make a hollow spherical shell having inner radius r1 and outer radius r2?**

Solution:

**2. Two spheres are cut from a certain uniform rock. One has radius 4.50 cm. The mass of the other is five times greater. Find its radius.**

**Solution:**

**3. The position of a particle moving under uniform acceleration is some function of time and the acceleration. Suppose we write this position as x = kamtn, where k is a dimensionless constant. Show by dimensional analysis that this expression is satisfied if m=1 and n=2. Can this analysis give the value of k?**

**Solution:**

**Chapter – 2**

1. **An electron in a cathode-ray tube accelerates uniformly from 2.00 3 104 m/s to 6.00 3 106 m/s over 1.50 cm.  
   (a) In what time interval does the electron travel this 1.50 cm?  
   (b) What is its acceleration?**

**Solution:**

1. **A ball is thrown upward from the ground with an initial speed of 25 m/s; at the same instant, another ball is dropped from a building 15 m high. After how long will the balls be at the same height above the ground?**

**Solution:**

**3. A person takes a trip, driving with a constant speed of 89.5 km/h, except for a 22.0-min rest stop. If the person’s average speed is 77.8 km/h, (a) how much time is spent on the trip and (b) how far does the person travel?**

Solution:

**Chapter – 3**

1. **Two points in the *xy* plane have Cartesian coordinate (2.00, -4.00) m and (-3.00, 3.00) m. Determine (a) the distance between these points and (b) their polar coordinates.**

**Solution:**

1. A picture containing diagram

   Description automatically generated**A force** **of magnitude 6.00 units acts on an object at the origin in a direction *Ɵ* = 30.0° above the positive x axis (Fig. P3.7). A second force**  **of magnitude 5.00 units acts on the object in the direction of the positive y axis. Find graphically the magnitude and direction of the resultant force** .

**Solution:**

**3. Given the displacement vectors = (3î - 4ĵ + 4k̂) m and = (2î + 3ĵ - 7k̂) m, find the magnitudes of the following vectors and express each in terms of its rectangular components. (a) (b)**

Solution

**Chapter – 4**

1. **Diagram

   Description automatically generatedA firefighter, a distance *d* from a burning building, directs a stream of water from a fire hose at angle *ui* above the horizontal as shown in Figure P4.11. If the initial speed of the stream is *vi*, at what height *h* does the water strike the building?**

**Solution:**

1. **The pilot of an airplane notes that the compass indicates a heading due west. The airplane’s speed relative to the air is 150 km/h. The air is moving in a wind at 30.0 km/h toward the north. Find the velocity of the airplane relative to the ground.**

**Solution:**

**3. A projectile is fired in such a way that its horizontal range is equal to three times its maximum height. What is the angle of projection?**

Solution:

**Chapter – 5**

1. **The average speed of a nitrogen molecule in air is about 6.70 3 102 m/s, and its mass is 4.68 3 10226 kg. (a) If it takes 3.00 3 10213 s for a nitrogen molecule to hit a wall and rebound with the same speed but moving in the opposite direction, what is the average acceleration of the molecule during this time interval? (b) What average force does the molecule exert on the wall?**

**Solution:**

1. **If a man weighs 900 N on the Earth, what would he weigh on Jupiter, where the free-fall acceleration is 25.9 m/s2?**

**Solution:**

**3. A 3.00-kg object undergoes an acceleration given by**  **Find (a) the resultant force acting on the object and (b) the magnitude of the resultant force.**

Solution:

**Chapter – 6**

1. **Whenever two *Apollo* astronauts were on the surface of the Moon, a third astronaut orbited the Moon. Assume the orbit to be circular and 100 km above the surface of the Moon, where the acceleration due to gravity is 1.52 m/s2. The  
   radius of the Moon is 1.70 3 106 m. Determine (a) the astronaut’s orbital speed and (b) the period of the orbit.**

**Solution:**

1. **A hawk flies in a horizontal arc of radius 12.0 m at constant speed 4.00 m/s. (a) Find its centripetal acceleration. (b) It continues to fly along the same horizontal arc, but increases its speed at the rate of 1.20 m/s2. Find the acceleration (magnitude and direction) in this situation at the moment the hawk’s speed is 4.00 m/s.**

**3. In the Bohr model of the hydrogen atom, an electron moves in a circular path around a proton. The speed of the electron is approximately 2.20 × 106 m/s. Find (a) the force acting on the electron as it revolves in a circular orbit of radius 0.529 × 10-10 m and (b) the centripetal acceleration of the electron.**

Solution: