Sample Question on FORCE, LAW OF MOTION and Linear Momentum Conservation for CLASS IX(9^{th}) CBSC Board

Question-01: A bullet of mass 0.04 kg moving with a speed of 90 m s-1 enters a heavy wooden block and is stopped after a distance of 60 cm. What is the average resistive force exerted by the block on the bullet?
Answer: 270N

Question-02: A constant retarding force of 50 N is applied to a body of mass 20 kg moving initially with a speed of 15 m s-1. How long does the body take to stop?
Answer: $a = -2.5\ \text{m}s^{-2}$

Question-03: Constant force acting on a body of mass 3.0 kg changes its speed from 2.0 m s-1 to 3.5 m s-1 in 25 s. The direction of the motion of the body remains unchanged. What is the magnitude and direction of the force?
Answer: $a = 1.5/25 = 0.06\ \text{m}\ s^{-2}$
$F = 3 \times 0.06 = 0.18$ N in the direction of motion.

Question-04: The driver of a three-wheeler moving with a speed of 36 km/h sees a child standing in the middle of the road and brings his vehicle to rest in 4.0 s just in time to save the child. What is the average retarding force on the vehicle? The mass of the three-wheeler is 400 kg and the mass of the driver is 65 kg. 5.8
Answer: $a = -2.5\ \text{m}s^{-2}$, Retarding force = $465 \times 2.5 = 1.2 \times 103$ N

Question-05: A rocket with a lift-off mass 20,000 kg is blasted upwards with an initial acceleration of 5.0 m s-2. Calculate the initial thrust (force) of the blast.
Answer: $F = 3.0 \times 10^5$ N

Question-06: A force of 625 N acts on a body of mass 25 kg. Find the acceleration of the body.
Answer: Acceleration = 25 m/s^2

Question-07: What force will produce an acceleration of 7m/s^2 in a body of 10 kg?
Answer: Force = 70 N

Question-08: Calculate the mass of a body when a force of 225 N produces an acceleration of 2.5 m/s^2?
Answer: Mass of the body = 90 kg

Question-09: A mass of 4 kg is moving at a speed of 10 m/s in a frictionless surface. It collides with a 3kg mass moving in the same direction at 5 m/s. What is the final velocity of the system after the collision?

Answer: 7.857 m/s

Question-10: There are two cars moving at a speed of 50 km/s and 70 km/s with mass of 100 kg and 60 kg respectively. Find the final speed of both after collision?
Answer: 57.5 km/s

Question-11: A bullet of mass 10 g was hit in a block of wood whose mass is 5 kg. Immediately after the collision the speed of the wood and bullet combination is 0.6 m/s. Calculate the original speed of the bullet?
Answer: 300 m/s

Question-12: A man of mass m_1 is standing on a platform of mass m_2 kept on a smooth horizontal surface. Suppose the man is starting moving on the platform with a velocity v_r relative to the platform. So calculate the velocity of recoil of the platform?
Answer: $v = m_1 vr / m_1 - m_2$

Question-13: Due to residual stresses, a body at rest is suddenly burst into two places of mass 4 kg and 2 kg respectively. Assuming that the places fly apart in opposite directions with a relative velocity of 25 m/s, determine the speed of each. Neglect air resistance.
Answer: 16.66 m/sec

Question-14: The equation of motion of a particle moving in a straight line is given by $s = 18t + 3t^2 - 2t^3$ where s is the total distance covered from the starting point in meters at the end of t seconds. Find:

(1) Velocity and acceleration at the start.

(2) The time, when the particle reaches its maximum velocity

(3) The maximum velocity of the particle.

Answer: 18 m/s, 6 m/s^2, t = 1/2 sec, 19.5 m/s

Question-15: From a rifle of mass 4 kg a bullet of mass 50 gm is fired with an initial velocity of 35 ms-1. Calculate the initial recoil velocity of the rifle.
Answer: – 0.44 m/s, the negative sign indicates the direction of recoil (backward).