Class 11 Physics · Chapter 4: Laws of Motion

Worksheet · 20 marks · about 40 minutes · based on NCERT

Name _____ Class and section _____ Date _____

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1. Which pair of quantities has the same SI unit? [1]

(a) impulse and force
(b) momentum and force
(c) force and rate of change of velocity
(d) impulse and momentum

2. For the action and reaction forces between two bodies, which statement is correct? [1]

(a) Action acts first and reaction follows it.
(b) They act on the same body and cancel each other.
(c) They act at the same instant, on different bodies.
(d) Reaction is smaller than action when one body is much heavier.

3. A hockey puck slides across a smooth, level sheet of ice in a straight line at a steady 4 m s^{-1}. [1] Neglecting air resistance, the net force on the puck is

(a) zero
(b) along its direction of motion
(c) opposite to its direction of motion
(d) equal to its weight, acting downward

4. An artificial satellite moves round the earth in a circular orbit. The centripetal force on it is [1]

(a) a separate force produced by its circular motion
(b) the thrust of its engines
(c) the gravitational pull of the earth on it
(d) zero, since its speed is constant

5. A bar magnet lying on a table pulls a small iron nail held near it with a force of 0.2 N. The force exerted [1] by the nail on the magnet is

(a) 0.2 N, directed away from the nail
(b) 0.2 N, directed towards the nail
(c) less than 0.2 N, since the nail is lighter
(d) zero, since the nail is not a magnet

6. A 0.1 kg ball, at rest, is struck by a stick. The force on the ball rises uniformly from zero to 600 N in [2] 0.01 s and then falls uniformly to zero in the next 0.01 s. Find the speed of the ball just after the blow.

7. Which two of the fundamental forces of nature are relevant in mechanics? What is the origin of [2] contact forces such as friction and normal reaction?

8. A 50 kg girl stands on a weighing scale in a lift. While the lift is moving, the scale reads 400 N (g = 10 [2] m s^{-2}). Find the magnitude and direction of the acceleration of the lift.

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9. A block is placed on a plank inclined at 37° to the horizontal (sin 37° = 0.6, cos 37° = 0.8). The coefficients of friction are $\mu_s = 0.5$ and $\mu_k = 0.25$ ($g = 10\ m\ s^{-2}$). (a) Will the block start sliding from rest? (b) If it does, find its acceleration down the plank. [3]

10. Using the idea of impulse, explain why (a) a high jumper lands on a thick foam bed, and (b) cars are built with front parts that crumple in a collision. [3]

11. A 4 kg trolley moving at $3\ m\ s^{-1}$ on a smooth track runs into a 2 kg trolley at rest, and the two couple together. Find (a) their common velocity, (b) the impulse on each trolley during the coupling, and (c) show that these impulses agree with the third law. [3]