St. Lawrence High School

A Jesuit Christian Minority Institution

Term : 1st

Solution of Work Sheet – 14

Class – XI | Subject – Physics | Date – 30.06.20

Chapter – Laws of motion | Topic – Newton's laws and static system

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Choose the correct option for the following questions. $1 \times 15 = 15$

1. When a constant force is applied on a body, it moves with uniform –
   a. Acceleration
   b. Velocity
   c. Speed
   d. Momentum
   Ans: a. acceleration
2. A body of mass 40g is moving with constant velocity 2cm/s on a horizontal frictionless table. The force on the body is –
   a. Zero
   b. 39200dyne
   c. 160dyne
   d. 80dyne
   Ans: a. zero
3. A body of mass 2kg is moving on a horizontal surface with initial velocity of 4m/s comes to rest after 2s. if one wants to keep this body moving on the same surface with a velocity of 4m/s, the force required is -
   a. 8N
   b. 4N
   c. Zero
   d. 2N
   Ans: b. 4N
4. Two bodies of mass 4kg and 5kg are acted upon by the same force. If the acceleration of the lighter body is $2m/s^2$, then the acceleration of the heavier body is –
   a. $4.2m/s^2$
   b. $3.6m/s^2$
   c. $2.4m/s^2$
   d. $1.6m/s^2$
   Ans: d. $1.6m/s^2$
5. An object with mass 10kg moves at a constant velocity of 10m/s. A constant force then acts for 4s on it giving it a speed of 2m/s in the opposite direction. the acceleration produced is –
   a. $3m/s^2$
   b. $-3\ m/s^2$
   c. $0.3\ m/s^2$
   d. $-0.3\ m/s^2$
   Ans: b. $-3\ m/s^2$

6. The velocity acquired by a mass m in travelling a certain distance d starting from rest under the action of a constant fore is directly proportional to –
   a. $\sqrt{m}$
   b. $\frac{1}{\sqrt{m}}$
   c. m
   d. None of these.
   Ans: b. $\frac{1}{\sqrt{m}}$
7. A ship of mass 3×10^7 kg initially at rest is pulled by a force of 5×10^4 N through a distance of 3m. Neglecting friction, the speed of the ship at this moment is –
   a. 3m/s
   b. 1.5m/s
   c. 0.1m/s
   d. 2m/s
   Ans: c. 0.1m/s
8. In Newton's second law $\vec{F} = m\vec{a}$ (for constant mass) $\vec{a}$ is the acceleration of the mass with respect to –
   a. Any observer
   b. Any inertial observer
   c. Any observer at rest only
   d. Any observer moving with constant acceleration
   Ans: b. Any inertial observer
9. A balloon of mass M is descending with a constant acceleration g/3. When a mass m is released from the balloon, it starts rising with same acceleration. The value of m is –
   a. $\frac{M}{2}$
   b. M/4
   c. 4M
   d. 2M
   Ans: a. M/2
10. A ball weighing 10g hits a hard surface vertically with speed of 5m/s and rebounds with same speed . The ball remains in contact with the surface for 0.01sec. the average force exerted by the surface on the ball is –
   a. 100N
   b. 10N
   c. 1N
   d. 0.1N
   Ans: b. 10N
11. Newton's 2nd law of motion connects –
   a. Momentum and acceleration
   b. Change of momentum and velocity
   c. Rate of change of momentum and external force
   d. Rate of change of force and momentum
   Ans: c. Rate of change of momentum and external force
12. A water jet, whose cross sectional area is a strikes a wall making an angle θ with the normal and rebounds elastically. The velocity of water of density d is v. force exerted on the wall is –
   a. $2av^2d\ cos\theta$
   b. $2av^2d\ sin\theta$
   c. $2avd\ cos\theta$
   d. $avd\ cos\theta$
   Ans: a. $2av^2d\ cos\theta$

13. A player catches a 200g ball moving with a speed of 20m/s. If the time taken to complete the catch is 0.5 sec, the force exerted on the player's hand is –
    a. 8N
    b. 4N
    c. 2N
    d. 0N

    Ans: a. 8N
14. A tennis ball is dropped on the floor from a height of 20m. It rebounds to a height of 5m. The ball was in contact with the floor for 0.01 sec. what was its average acceleration during the contact? (g = 10m/s^2)
    a. 3000 m/s^2
    b. 2000 m/s^2
    c. 1000 m/s^2
    d. 500 m/s^2

    Ans: a. 3000 m/s^2
15. A 150g tennis ball coming at a speed of 40 m/s is hit straight back by a bat to speed of 60m/s. The magnitude of the average force F on the ball, when it is in contact for 5ms with the bat is –
    a. 2500N
    b. 3000N
    c. 3500N
    d. 4000N

    Ans: b. 3000N

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