Laws of Motion DPP - 1

1. **a)** Define force.

b) State four effects which a force can bring about. Give two examples in each case.

2. What do you understand by the following terms?

a) Contact forces

b) Forces at distance.

3. **a)** What do you understand by the term inertia?

b) What are its kinds?

c) Given two examples of each kind, stated in (b).

4. What do you understand by the term momentum?

5. State two factors which determine the momentum of a body.

6. State units of momentum in **i)** CGS system **ii)** SI system.

7. Define Newton's Second Law of motion.

8. Prove mathematically F = ma.

9. Define absolute units of force in CGS as well as SI system.

10. Derive the relation between newton and dyne.

11. State Newton's third law of motion and give two examples.

12. Explain the following:

i) Why do we jerk wet clothes before spreading tem on a line?

ii) Why does dust fly off, when carpet is hit with a stick?

iii) Why do fruits fall off the branches in the strong wind?

iv) Why does a pillion rider fall forward, when the driver of two-wheeler suddenly applies the brakes?

v) Why does a boatman push the bank backward with a long bamboo pole, on launching his boat in water?

vi) Why is it difficult to walk on marshy ground?

vii) Why is it dangerous to jump out of moving vehicles? How can the danger be minimised?

viii) Why does a boat-man push water backward with the oars, while rowing a boat?

Laws of Motion DPP - 2

Select the correct option.

1. The mass of earth is 6 X 10^{24} kg and radius of earth is 6.4 X 10^{6} m. The magnitude of force between the mass of 1 kg and the earth is:

a) 9,77, N
b) 9,810 N
c) 9.830 N
d) 9.790 N

2. A man is walking from east to west on a rough surface, The force on the man is directed:

a) from west to east
b) from east to west
c) along the north
d) along the west

3. inertia is the property of a body by virtue of which the body is:

a) unable to change by itself the state of rest
b) unable to change by itself the state of uniform motion.
c) unable to change by itself the direction of motion.
d) unable to change by itself the state of rest or uniform motion.

4. The impulse of a body is equal to:

a) rate of change of its momentum
b) change in its momentum
c) the product of force applied on its and the time of application of force.
d) both (b) & (c).

5. A force acts on a body of mass 3 kg such that its velocity changes from 4 ms-1 to 10 ms^{-1}. The change in momentum of the body is

a) 42kg ms^{-1}
b) 2kg ms^{-1}
c) 18 kg ms^{-1}
d) 14 kg ms^{-1}

6. Action- reaction forces

a) act on the same body
b) act on different bodies
c) act along different lines
d) act in same direction

7. Which of the following are vector quantities?

a) Momentum
b) Velocity
c) Force
d) All of these

8. A woman drawing water from village well, falls backward, when the rope snaps. This is on account of

a) Newton's third law of motion
b) Newton's law of gravitation
c) Newton's second law of motion
d) Newton's first law of motion

9. When you kick a stone, you get hurt. Due to which property this happens?

a) Inertia of stone
b) Velocity of the kick
c) Momentum of the kick
d) Reaction of the stone

Subjective Questions

10. State Newton's law of gravitation

11. How is acceleration due to gravity related to

i) mass of a planet

ii) distance of body from the centre of earth?

12. a) what do you understand by the term mass?

b) State two important characteristics of mass.

c) State units of mass in CGS and SI systems.

d) Name of device used for measuring mass.

13. a) What do you understand by the term weight?

b) State two important characteristics of weight.

c) State the units of weight in DGS and SI system.

d) Name the device used for measuring weight.

14. State four differences between mass and weight

15. Does a body weigh same at all places of the Earth? Give a reason for your answer.

16. Why is gold not weighed by a spring balance?

17. A man sits in a machine which generates acceleration five times more than acceleration due to gravity. If the mass of man is 80 kg. What is his weight? Take g= 10 ms^{-2}.

18. A man weighs 800 N the at the equator. How does the weight of man change at the following places?

a) At poles

b) 100 km up in space

c) 10 km down in a mine

19. How is weight affected in the following cases, when initially the body is weighed in Delhi with a spring balance?

d) Body is taken to Moscow

e) Body is taken to Ceylon

f) Body is taken to sea level.

g) Body is taken to a high mountain

h) Body is taken deep inside a mine.

20. Describe, briefly how can you calculate the value of 'g' with a simple pendulum.

Laws of Motion – Numerical DPP - 3

1. A body has a linear momentum of 5 Ns. If the velocity of the body is 200 ms^{-1} , find the mass of the body.
2. Calculate the velocity of a body of mass 0-5 kg, when it has a linear momentum of 5 Ns,
3. An electron of mass 9 x 10^{-31} kg is moving with a linear velocity of 6 x 10^{7} ms^{-1}. Calculate the linear momentum of electron.
4. A body of mass 200 g is moving with a velocity of 5ms^{-1}. If the velocity of the body changes to 17 ms^{-1}, calculate the change in linear momentum of the body.
5. A motorcycle of mass 100 kg is running at 10 ms^{-1}. If its engine develops an extra linear momentum of 2000 Ns, calculate the new velocity of motorcycle.
6. A hockey ball at rest, is hit by a hockey stick, such that the force acts on the ball for 0.08 s. If the ball is of mass 100 g and covers a distance of 80 m in 1.6 seconds, find the magnitude of force.
7. A car initially at rest, picks up a velocity of 72 kmh^{-1} in 20 seconds. If the mass of the car is 1000ks, find
   (i) Force developed by its engine
   (ii) Distance covered by the car.
8. A golfer hits a ball at rest, such that the contact between the ball and golf stick is for 0.1 s. If the golf ball covers a linear distance of 400 m in 2s. Find the magnitude of force applied. Mass of golf ball is 50 g.
9. A motor cyclist along with the machine weighs 160 kg. While driving at 72 kmh^{-1}, he stops his machine over a distance of 8m. Find the retarding force of the brakes.
10. A car of mass 800 kg, moving at 54 kmh^{-1} is brought to rest over a distance of 15m. Find the retarding force developed by the brakes of the car.
11. A cricket player holds a cricket ball of mass 100g by moving his hands backward by 0.75 m. If the initial velocity of the ball is 108 kmh^{-1}, find the retarding force applied by the player.
12. A force of 500 dynes acts on a mass of 0.05 kg over a distance of 20m. Assuming that the mass is initially at rest, find the final velocity and time for which the force acts.
13. A force of 600 dynes acts on a glass ball of mass 200g for 12s. If initially the ball is at rest, find
    i) Final velocity
    ii) Distance covered.
14. A bullet of mass 30g, and moving with a velocity x hits a wooden target with a force of 187.5 N. If the bullet penetrates 80 cm, find the value of x.
15. A car of mass 1000 kg develops a force of 500 N over a distance of 49 m. If initially the car is at rest find
    i) Final velocity
    ii) Time for which it accelerates.

Laws of Motion DPP - 2

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