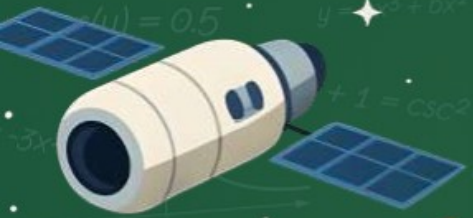
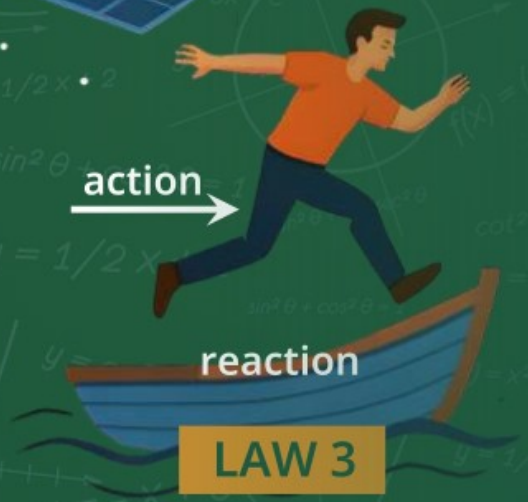
LAW 1

INERTIA





LAW 3

ACTION-REACTION

LAW 2

F = ma

CLASS – 11

PHYSICS

Chapter – 4

Laws of Motion

Part – 8

Practice Questions

Alok Gaur

PRACTICE QUESTIONS

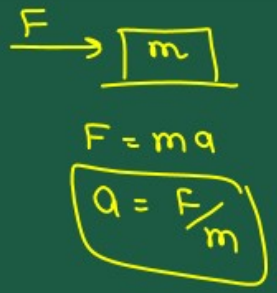
1 A force acts on an object which is free to move. If we know the magnitude of the force and the mass of the object, Newton's Second Law of Motion enables us to determine the object's.

A weight

B speed

C acceleration

D position



PRACTICE QUESTIONS

2 A body at rest breaks into two pieces of equal masses. The parts will move -

A in the same direction

B along different lines

C in opposite directions with equal speeds

D in opposite directions with unequal speeds

PRACTICE QUESTIONS

3 When a bus starts suddenly, the passengers standing inside leans backwards. This is an example of —

A Newton's First Law of Motion

B Newton's Second Law of Motion

C Newton's Third Law of Motion

D Law of Conservation of Momentum

PRACTICE QUESTIONS

4 The law of conservation of momentum states that the momentum of a system—

A can not be changed

B can not be constant

C can be changed by any force

D can be changed by external force

PRACTICE QUESTIONS

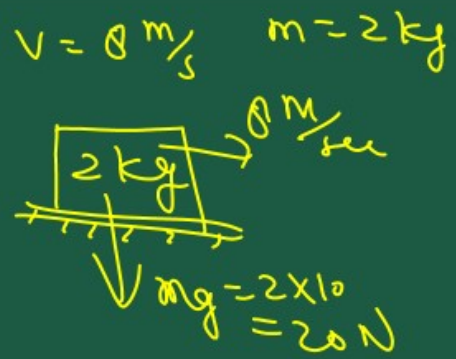
5 A block of mass 2kg is sliding with a constant velocity of 8 m/s on a frictionless horizontal surface. The force exerted on the horizontal surface is nearly—

A 20 N

B 10 N

C 40 N

D 16 N



PRACTICE QUESTIONS

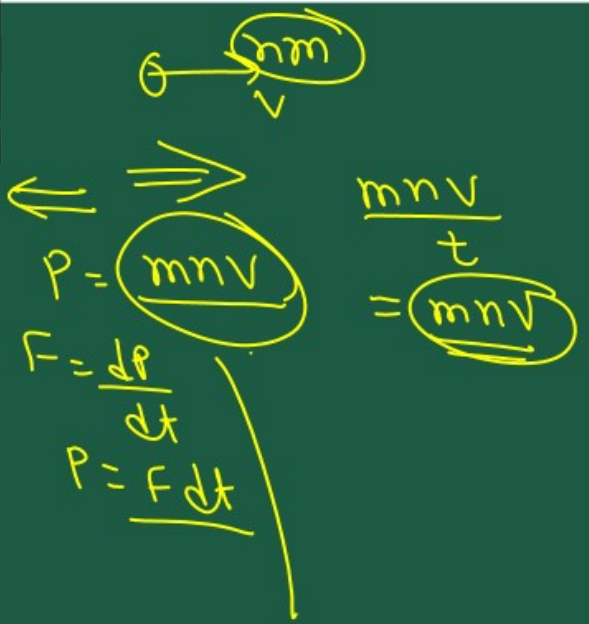
6 A machine gun fires n bullets per second, each of mass m. If the speed of each bullet is v, then the force of recoil is —

A mng

B mnv

C mnvg

D (mnv)/g



PRACTICE QUESTIONS

7 A force of 6 N acts on a mass of 1 kg which acquires a velocity 30 m/s. The time for which the force acts is—

A 26 sec

B 6 sec

C 5 sec

D 2 sec

$F = 6\ N \quad m = 1\ kg$

$v = 30\ m/s$

$a = F/m = 6/1 = 6\ M/s^2$

$30 = 0 + 6(t)$

$t = \frac{30}{6} = 5\ sec$

PRACTICE QUESTIONS

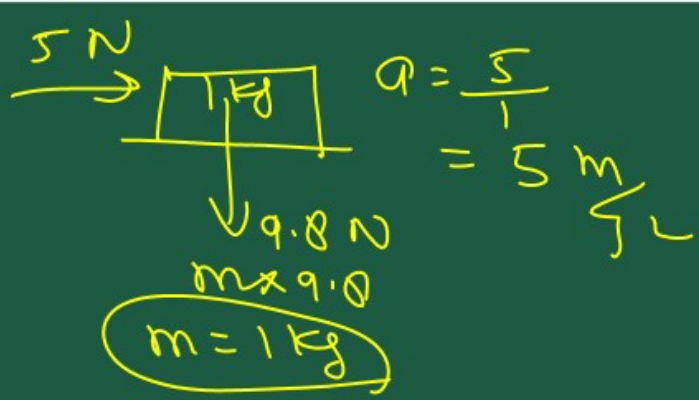
8 A force of 5 N acts on a body of weight 9.8 N. What is the acceleration produced in m/s^2 —

A 0.51

B 1.96

C 5.00

D 49.00



PRACTICE QUESTIONS

9 The engine of a car produces an acceleration of 6 m/s^2 in the car. If this car pulls a block of the same mass, then the acceleration would be —

A 6 m/s^2

B 12 m/s^2

C 3 m/s^2

D 1.5 m/s^2

$a = 6\ m/s^2$

$m \rightarrow 6\ m/s^2$ $\quad F = 6m$

$m\ m \rightarrow 6m$

$a = \frac{6m}{2m} = 3\ m/s^2$

PRACTICE QUESTIONS

10 The action and reaction forces referred to in Newton's Third Law of Motion —

A must act on the same body

B must act on different bodies

C need not be equal in magnitude but must have the same line of action

D must be equal in magnitude but need not have the same line of action

PRACTICE QUESTIONS

11 Choose the wrong statement out of the following —

A 1 kg wt9.8 N

B Momentum is a vector quantity

C Force is always conserved

D Momentum is conserved in the absence of an external force

PRACTICE QUESTIONS

12 A long-jumper runs before jumping because —

A he covers a greater distance.

B he maintains momentum conservation.

C he gains energy by running.

D he gains momentum.

PRACTICE QUESTIONS

13 A man is standing on a boat in still water. If he walks towards the shore the boat will —

A move away from the shore

B remain stationary

C move towards the shore

D sink

PRACTICE QUESTIONS

14 A body of mass 300 gm is at rest. What force in Newton will you have to apply to move it through 200 cm in 1 sec.?

A Zero

B 12 Newton

C 1.2 Newton

D 0.12 Newton

$m = 300\ gm = 0.3\ kg$

$u = 0$

$S = 200\ cm = 2\ m$

$t = 1\ sec \quad F = ?$

$S = ut + \frac{1}{2}at^2$

$2 = 0 + \frac{1}{2}(a)(1)^2$

$a = 4$

$F = 0.3 \times 4 = 1.2\ N$

PRACTICE QUESTIONS

15 A boat of mass 3000 kg, initially at rest is pulled by a force of 1.8×10^3 newton through a distance of 3 m. Assuming that the resistance due to water is negligible, velocity of the boat is —

A 6 m/s

B 8 m/s

C 9 m/s

D 11 m/s

$m = 3000\ kg,\ u = 0$

$F = 1.8 \times 10^3,\ S = 3\ m$

$V = ?$ | $a = \frac{1800}{3000}$

$V^2 = 0 + 2 \times \frac{1800}{3000} \times 3$

$V = \sqrt{36}$

$V = 6\ m$

PRACTICE QUESTIONS

$a = \frac{F}{m_1}$

$F = m_1 \times 15$

$F = m_2 \times 10$

$m_1 \times 15 = m_2 \times 10$

$m_1 = \frac{2}{3} m_2$

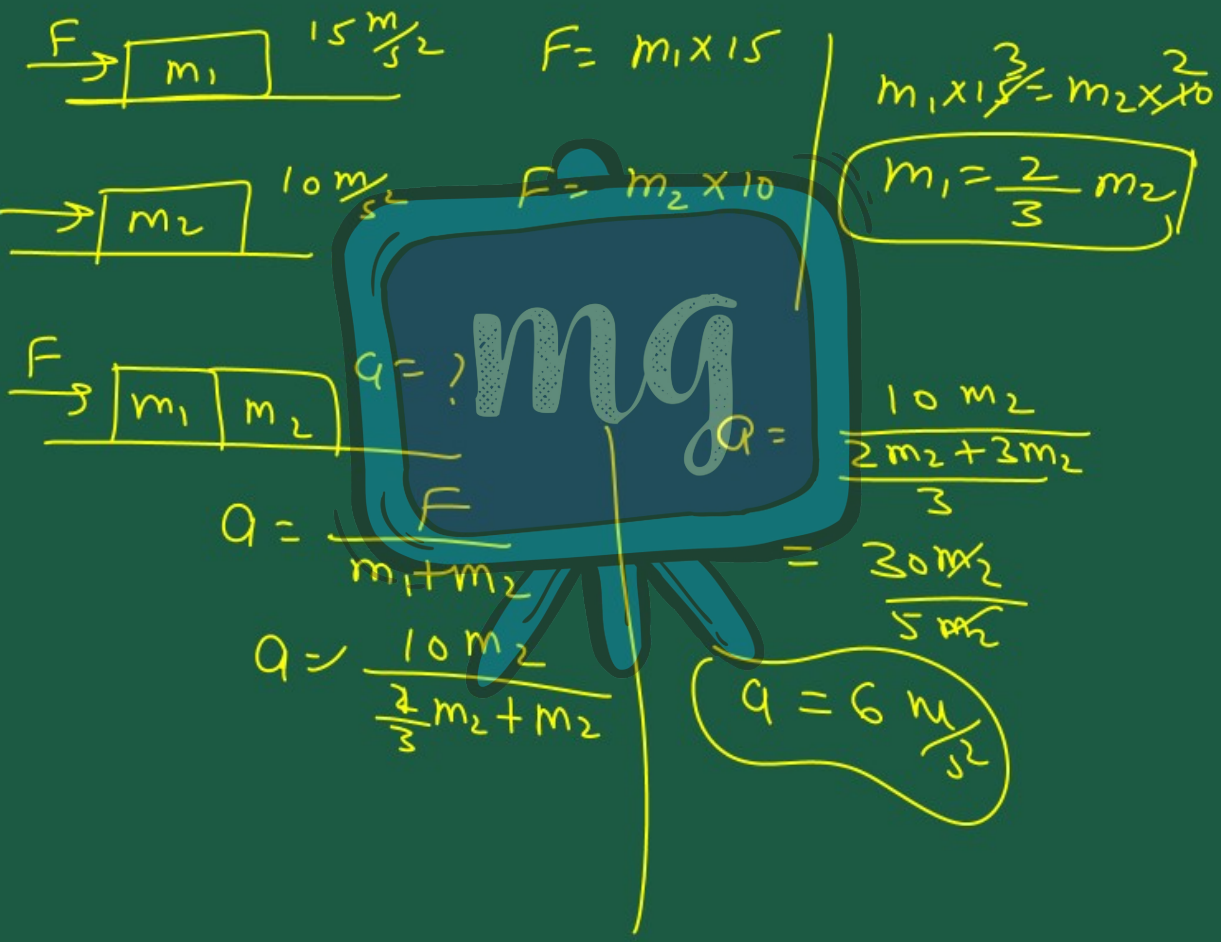
16 A certain force applied to mass m, gives it an acceleration of 15 m/s^2. The same force is applied on m_2 to give it acceleration of 10 m/s^2, if the two masses are fixed together and the same force is applied to the combination, then the acceleration will be —

A. 6 m/s^2

B. 8 m/s^2

C. 9 m/s^2

D. 11 m/s^2



PRACTICE QUESTIONS

17

A driver accelerates his car first at the rate of 18 m/s² and then the rate of 12 m/s². The ratio of the forces exerted by the engines respectively will be —

A 2 : 3

B 1 : 3

C 2 : 1

D 3 : 2

$\frac{F_1}{F_2} = \frac{a_1}{a_2} = \frac{18}{12} = \frac{3}{2}$ = 3/2

PRACTICE QUESTIONS

18 A body of mass 5kg undergoes a change in speed from 30 to 40 m/s. Its momentum would increase by —

A 50 kg m/s

B 75 kg m/s

C 150 kg m/s

D 350 kg m/s

$u = 30$ $v = 40$

$m = 5\,kg$

$\Delta P = ?$

$\Delta P = m(v-u)$

$= 5(40-30)$

$= 5 \times 10$

$= 50\ kg\ m/s$

PRACTICE QUESTIONS

19 The force needed to produce an acceleration of 6 m/s² in a ball of mass 4 kg will be -

A 24 N

B 30 N

C 32 N

D 36 N

$m = 4\,kg \quad a = 6\,m/s^2$

$F = 4 \times 6$

$= 24\,N$

PRACTICE QUESTIONS

20 A body of mass 5 kg undergoes a change in speed from 20 to 0.20 m/s. The momentum of the body would —

A increase by 99 kg m/s

B decrease by 99 kg m/s

C increase by 101 kg m/s

D decrease by 101 kg m/s

$\Delta P = m(V - u)$

$= 5[0.20 - 20]$

$= -5 \times 19.8$

$\Delta P = -99 \text{ kg } \frac{m}{s}$

PRACTICE QUESTIONS

21 A bullet of mass 0.01 kg is fired from a gun weighing 5.0 kg. If the initial speed of the bullet is 250 m/s, what is the speed with which the gun recoils?

A 0.5 m/s

B 0.25 m/s

C 1 m/s

D 2 m/s

$m_G = 5\ kg, \quad m_B = 0.01\ kg$

$V_G = ? \quad V_B = 250\ m/s$

$0 = P_G + P_B = m_G V_G + m_B V_B$

$-V_G m_G = m_B V_B$

$V_G = -\frac{m_B V_B}{m_G} = -\frac{0.01 \times 250}{5}$

$V_G = 0.5\ m/s$

PRACTICE QUESTIONS

22 A body of mass 100 g is moving with a velocity of 15 m/s. The momentum associated with that ball will be —

- A 0.5 kg m/s
- B 1.5 kg m/s
- C 2.5 kg m/s
- D 3.2 kg m/s

$m = 100\,g = 0.1\,kg$

$V = 15\ m/s$

$P = mV$

PRACTICE QUESTIONS

23 If the momentum of a body is doubled, the kinetic energy is —

A Halved

B Unchanged

C Doubled

D Increased 4 times

$K.E = \frac{p^2}{2m}$

$p' = 2p$

$K.E' = \frac{4p^2}{2m}$

$K.E' = 4\,K.E$

PRACTICE QUESTIONS

24 The combined effect of mass and velocity is taken into account by a physical quantity called —

A torque

B moment of force

C momentum

D moment of momentum

PRACTICE QUESTIONS

25 Momentum is a measure of —

A weight

B mass

C quantity of motion

D velocity

PRACTICE QUESTIONS

26 A rocket works on the —

A first law of motion

B second law of motion

C third law of motion

D law of conservation of energy