



DELHI PUBLIC SCHOOL NEWTOWN
SESSION 2022-23
HALF HEARLY EXAMINATION

CLASS: IX

FULL MARKS: 80

SUBJECT: PHYSICS (SET A)

TIME: 2 HOURS

Candidates are allowed additional 15 minutes for only reading the paper.

They must NOT start writing during this time.

The intended marks for questions or parts of questions are given in brackets []

Section A is compulsory. Attempt any four questions from Section B

This paper consists of four printed pages

SECTION A

(Attempt all questions from this section)

1. [15 × 1 = 15]
- (i) A seconds' pendulum has a frequency
(a) 2 s^{-1} (b) 5 s^{-1} (c) 0.5 s^{-1} (d) 4 s^{-1}
- (ii) Which part of the vernier scale is used to measure the depth of a beaker?
(a) Inside jaws (b) Fixed jaws (c) Strip (d) Movable jaw
- (iii) Which of the following unit is not a fundamental unit?
(a) metre (b) litre (c) kilogram (d) second
- (iv) If a man goes 15 m towards North 20 m towards East, then his displacement is nearly equal to
(a) 22.5 m (b) 25 m (c) 25.5 m (d) 30 m
- (v) Which physical quantity is represented by the slope of force (Y axis) vs mass (X axis) graph?
(a) Speed (b) Acceleration (c) Velocity (d) Displacement
- (vi) A body starts from rest and travels with uniform acceleration on a straight line. If its velocity after making a displacement of 32 m is 8 m/s, its acceleration is
(a) 1 ms^{-2} (b) 2 ms^{-2} (c) 3 ms^{-2} (d) 4 ms^{-2}
- (vii) The inertia of motion of an object causes the object to
(a) decrease its speed (b) increase its speed
(c) resist any change in the state of its motion (d) decelerate due to friction
- (viii) The magnitude of the net force acting on a car of mass 300 kg moving with a constant velocity of 20 m/s is
(a) 0 N (b) 1500 N (c) 3000 N (d) 6000 N
- (ix) The pressure P1 at a certain depth in river water and P2 at the same depth in sea water are related as
(a) $P_1 < P_2$ (b) $P_1 > P_2$ (c) $P_1 = P_2$ (d) can't be determined

- (x) Which of the following is true for the third law of motion?
- Action-Reaction pair always acts on the same body.
 - Action-Reaction pair always acts on different bodies in opposite directions
 - Action-Reaction pairs have the same magnitudes and directions
 - Action-Reaction pair always acts on different bodies in same directions
- (xi) Two particles are placed at some distance. If the masses of each of the two particles are doubled, keeping the distance between them unchanged, the value of gravitational force between them will be
- 1/4 times
 - 4 times
 - 1/2 times
 - double
- (xii) When a rubber sucker is pressed on a surface it sticks to the surface and it is hard to pull it off. Find the incorrect statement with respect to the given statement.
- A vacuum is created between the sucker and the wall
 - The surface attracts the rubber sucker
 - Atmospheric pressure presses it on to the surface
 - The surface of the wall should be smooth
- (xiii) Atmospheric pressure decreases as we go up from sea-level due to ____.
- increase in the density of air as well as decrease in the height of the air column
 - decrease in the density of air as well as decrease in the height of the air column
 - decrease in the density of air as well as increase in the height of the air column
 - increase in the density of air as well as increase in the height of the air column
- (xiv) A body of density d sinks in a liquid of density d_L . The density d and d_L are related as:
- $d = d_L$
 - $d < d_L$
 - $d > d_L$
 - nothing can be concluded
- (xv) The unit torr is related to the barometric height as :
- 1 torr = 1 cm of Hg
 - 1 torr = 0.76 m of Hg
 - 1 torr = 1 mm of Hg
 - 1 torr = 76 m of Hg

Question 2

- (i) Two objects A and B of same mass M and velocity V and $3V$ respectively are in motion. On application of a resistive force both of them come to rest.
- Which of the objects had greater initial momentum?
 - Which of the objects would come to rest first? Justify your answer. [3]
- (ii) What is the relation between the following units?
- micrometre and metre
 - astronomical unit and metre [2]
- (iii) Mention two demerits of using water as a barometric liquid [2]
- (iv) Two objects of different masses are dropped from same height. Compare the time taken by them to reach the ground. Justify your answer. [2]
- (v) Two spheres of same radius made of iron and wood are placed on the surface of water. State which of the two will sink? Give reason. [2]
- (vi) Draw a speed versus time graph of a stone thrown vertically upwards and then coming downwards after attaining the maximum height. [2]
- (vii) A particle is moving in a circular path of radius r . Find the ratio between distance and displacement when the object moved quarter portion of the entire circle. [2]

Question 3

- (i) Draw a graph between 'l' and 'T', for a simple pendulum. [2]
- (ii) Mention the general characteristics of non-contact forces. [2]
- (iii) Does the value of acceleration due to gravity remains the same at all places of earth? Explain your answer. [2]
- (iv) Two objects of different masses are thrown upward with same initial velocity. Compare the maximum height attained by them. Give reason. [2]
- (v) Draw the velocity-time graph for following situations:
 - (i) When a body is moving with a uniform velocity.
 - (ii) When a body is moving with variable velocity, but uniform acceleration. [2]

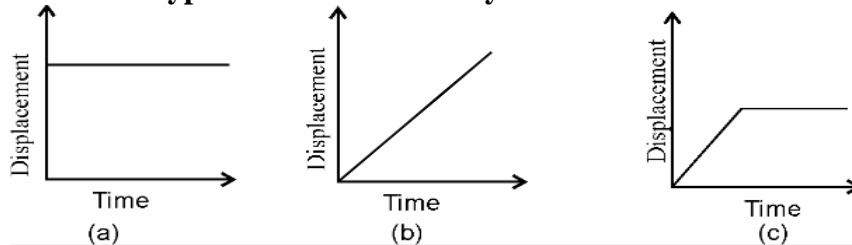
SECTION B

(Attempt any four questions)

Question 4

[3+3+4]

- (i) Define 1 kgf. Derive the relation between 1 kgf and newton.
- (ii) Mention the types of motion of a body with reference to the following graphs:



- (iii) A stone is dropped from the edge of a roof at a height 4.9 m from the ground. Consider $g = 9.8 \text{ ms}^{-2}$.
 - (a) How long does it take to fall?
 - (b) How fast does it move at the end of the fall?
 - (c) What is its acceleration after 2 s.

Question 5

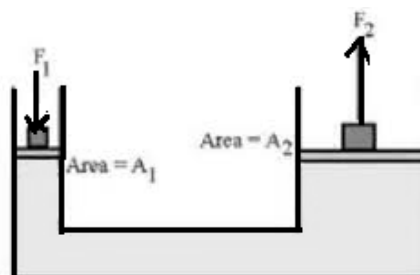
[3+3+4]

- (i) A stone of density 3000 kgm^{-3} is lying submerged in water of density 1000 kgm^{-3} . If the mass of the stone in air is 150 g, calculate the force required to lift the stone inside water.
- (ii) Why does the volume of a bubble increase as it rises up from the bottom of a lake? Comment on the value of mechanical advantage of any hydraulic machine?
- (iii) Draw a graph to illustrate this variation of atmospheric pressure of a place with altitude above the sea level. State the principle of an altimeter.

Question 6

[3+4+3]

- i) In the following diagram $A_1 = 25 \text{ m}^2$ and $A_2 = 100 \text{ m}^2$. How much force is required to be applied on the smaller piston to generate a force of 1500 N on the bigger piston? State the principle that you have used here.



- ii) State any two laws of liquid pressure. Why do the fountain pens leak at the higher altitude?
- iii) Two pendulums A and B have effective lengths 2 m and 0.5 m respectively. Find the ratio of their time periods. Which pendulum will make more oscillations in one minute?

Question 7

[4+3+3]

- i) Prove that the upthrust exerted by a liquid is equal to the weight of the displaced liquid. Why does a rectangular lamina sink into a liquid?
- ii) Derive the equation $s = ut + 0.5(at^2)$ for uniformly accelerated motion by graphical method.
- iii) A bunch of feathers and a pebble of same mass are allowed to fall from a height. Which one will reach the ground fast? Give reason to your answer.

Question 8

[3+4+3]

- i) Calculate the equivalent height of water barometer, if the pressure recorded by mercury barometer is 60 cm of mercury. [Density of mercury is 13600 kgm^{-3}]
- ii) An object is fully immersed inside a liquid. Name the forces acting on it. Draw a labelled diagram to show
 - a) the forces
 - b) centre of gravity and
 - c) centre of buoyancy.
- iii) A golfer hits a ball at rest, such that the contact between the ball and golf stick is for 0.1 s. If the ball covers a linear distance of 400 m in 2 s after the force is withdrawn, find the magnitude of the force applied. The mass of the ball is 50 g.

Question 9

[3+3+4]

- i) Establish the relation between G and g. Why is the gravitational force insignificant for the ordinary bodies?
- ii) The pressure of water on the ground floor is 160000 Pa. Calculate the pressure at the fifth floor, at a height of 15 m. (density of water = 1000 kgm^{-3} , $g = 10 \text{ ms}^{-2}$)
- iii) The following graph shows the velocity of a moving object over a period of 10 s.
 - a) Determine the distance traveled by the object between $t = 2 \text{ s}$ and $t = 10 \text{ s}$.
 - b) Find the maximum retardation of the object.
 - c) Calculate the acceleration of the object.

