



Brain International School

Vikas Puri, New Delhi

ASSIGNMENT NO. 1

SUBJECT: PHYSICS

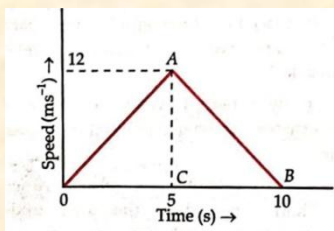
CLASS-XI

APRIL, 2025

CH: 1- (UNITS AND MEASUREMENT)

1. Find the dimensions of a/b in the equation: $F = a\sqrt{x} + bt^2$, where F is force, x is distance and t is time.
2. Find the dimensions of a/b in the relation: $P = \frac{a-t^2}{bx}$, where P is pressure, x is distance and t is time.
3. The vander wall's equation for a gas is $(P + \frac{a}{V^2})(V - b) = RT$. Determine the dimensions of a and b . Hence write the SI units of a and b .
4. In the equation: $y = a \sin(\omega t - kx)$, t and x stand for time and distance respectively. Obtain the dimensional formula for ω and k .
5. Consider a simple pendulum, having a bob attached to a string, that oscillates under the action of the force of gravity. Suppose that the period of oscillation of the simple pendulum depends on (i) mass m of the bob (ii) length l of the pendulum and (iii) acceleration due to gravity g at the place. Derive the expression for its time period using method of dimensions.
6. The velocity ' v ' of water waves depends on the wavelength ' λ ', density of water ' ρ ' and the acceleration due to gravity ' g '. Deduce by the method of dimensions the relationship between these quantities.
7. A body of mass m is moving in a circle of radius r with angular velocity ω . Find expression for centripetal force acting on it by the method of dimensions.
8. A lift is coming from 8th floor and is just about to reach 4th floor. Taking ground floor as origin and positive direction upwards for all quantities, which one of the following is correct?
(a) $x < 0, v < 0, a > 0$ (b) $x > 0, v < 0, a < 0$ (c) $x > 0, v < 0, a > 0$ (d) $x > 0, v > 0, a < 0$
9. The displacement of a particle is given by $x = (t - 2)^2$ where x is in metres and t in seconds. The distance covered by the particle in first 4 seconds is
(a) 4 m (b) 8 m (c) 12 m (d) 16 m

10. The speed time graph of a particle moving along a fixed direction is shown in figure. Obtain the distance travelled by the particle between (i) $t = 0$ to 10 s (ii) $t = 2$ to 6 s. What is the average speed of the particle in intervals in (i) and (ii) ?



11. The acceleration of a particle in ms^{-2} is given by $a = 3t^2 + 2t + 2$, where time t is in second. If the particle starts with a velocity $v = 2 ms^{-1}$ at $t = 0$, then find the velocity at the ends of 2 s.
12. The displacement x of a particle at time t along a straight line is given by $x = \alpha - \beta t + \gamma t^2$. Find the acceleration of the particle.
13. The displacement x of a particle is dependent on time t according to the relation: $x = 3 - 5t + 2t^2$. If t is measured in seconds and x in meters, find its (i) velocity at $t = 2$ s and (ii) acceleration at $t = 4$ s.
14. The displacement x of a particle along X-axis is given by $x = 3 + 8t + 7t^2$. Obtain its velocity and acceleration at $t = 2$ s.

For question numbers **13, 14 and 15**, two statements are given- one labeled **Assertion (A)** and the other labeled **Reason (R)**. Select the correct answer to these questions from the codes (a), (b), (c) and (d) as given below:

- a) Both A and R are true, and R is correct explanation of the assertion.
 - b) Both A and R are true, but R is not the correct explanation of the assertion.
 - c) A is true, but R is false.
 - d) A is false, but R is true.
15. **Assertion:** A body may be accelerated even when it is moving uniformly.
Reason: When direction of motion of the body is changing, the body must have acceleration.
16. **Assertion:** Displacement of a body may be zero when distance travelled by it is not zero.
Reason: The displacement is the longest distance between initial and final position.
17. **Assertion:** Displacement of a body is vector sum of the area under velocity– time graph.
Reason: Displacement is a vector quantity.