3.7 The variation of quantity A with quantity B, plotted in Fig. 3.2 describes the motion of a particle in a straight line.

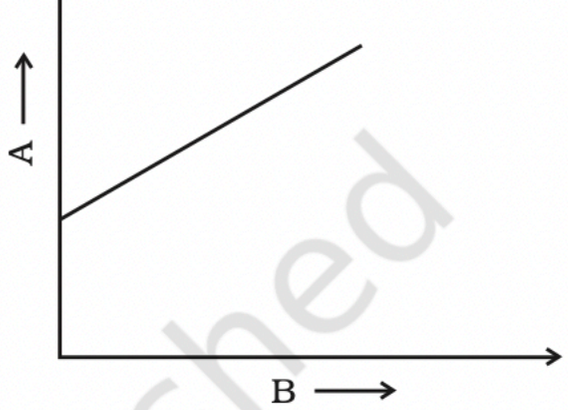

Fig. 3.2

(a) Quantity B may represent time.

(b) Quantity A is velocity if motion is uniform.

(c) Quantity A is displacement if motion is uniform.

(d) Quantity A is velocity if motion is uniformly accelerated.

3.8 A graph of x versus t is shown in Fig. 3.3. Choose correct alternatives from below.

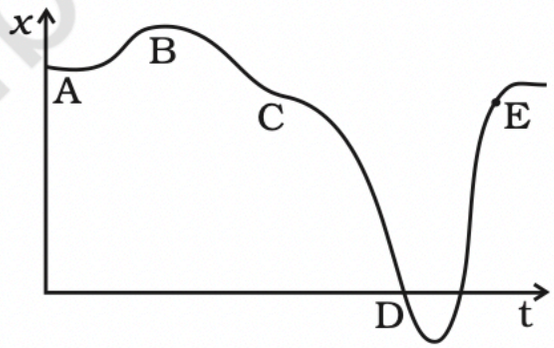

Fig. 3.3

(a) The particle was released from rest at $t = 0$.

(b) At B, the acceleration $a > 0$.

(c) At C, the velocity and the acceleration vanish.

(d) Average velocity for the motion between A and D is positive.

(e) The speed at D exceeds that at E.

3.9 For the one-dimensional motion, described by $x = t - \sin t$

(a) $x\,(t) > 0$ for all $t > 0$.

(b) $v\,(t) > 0$ for all $t > 0$.

(c) $a\,(t) > 0$ for all $t > 0$.

(d) $v\,(t)$ lies between 0 and 2.

3.10 A spring with one end attached to a mass and the other to a rigid support is stretched and released.

(a) Magnitude of acceleration, when just released is maximum.

(b) Magnitude of acceleration, when at equilibrium position, is maximum.

(c) Speed is maximum when mass is at equilibrium position.

(d) Magnitude of displacement is always maximum whenever speed is minimum.

3.21 A ball is dropped from a building of height 45 m. Simultaneously another ball is thrown up with a speed 40 m/s. Calculate the relative speed of the balls as a function of time.

3.22 The velocity-displacement graph of a particle is shown in Fig. 3.5.

(a) Write the relation between v and x.

(b) Obtain the relation between acceleration and displacement and plot it.

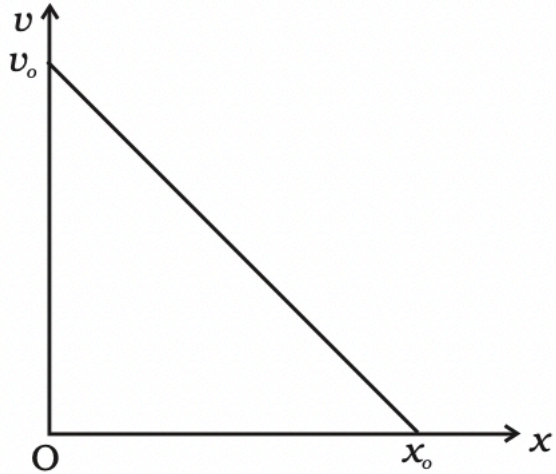

Fig. 3.5

2.39 In the expression $P = E\,l^2\,m^{-5}\,G^{-2}$, E, m, l and G denote energy, mass, angular momentum and gravitational constant, respectively. Show that P is a dimensionless quantity.

2.40 If velocity of light c, Planck's constant h and gravitational contant G are taken as fundamental quantities then express mass, length and time in terms of dimensions of these quantities.

2.7 Measure of two quantities along with the precision of respective measuring instrument is

$A = 2.5\ \text{m s}^{-1} \pm 0.5\ \text{m s}^{-1}$
$B = 0.10\ \text{s} \pm 0.01\ \text{s}$

The value of AB will be

(a) (0.25 ± 0.08) m
(b) (0.25 ± 0.5) m
(c) (0.25 ± 0.05) m
(d) (0.25 ± 0.135) m

2.8 You measure two quantities as $A = 1.0\ \text{m} \pm 0.2\ \text{m}$, $B = 2.0\ \text{m} \pm 0.2\ \text{m}$. We should report correct value for $\sqrt{AB}$ as:

(a) $1.4\ \text{m} \pm 0.4\ \text{m}$
(b) $1.41\text{m} \pm 0.15\ \text{m}$
(c) $1.4\text{m} \pm 0.3\ \text{m}$
(d) $1.4\text{m} \pm 0.2\ \text{m}$