CBSE TEST PAPER-02

CLASS - XI PHYSICS (Kinematics)

Topic: - Motion in Straight Line [ANSWERS]

Ans1: Yes, because length of the train is smaller as compared to the distance between New Delhi and Kanpur.

Ans2: Displacement = 0
Distance = 2.5km + 2.5km = 5.0km.

Ans3: No speed of an object can never be negative because distance is also always positive.

Ans4: Velocity of a particle changes
(1) If magnitude of velocity changes
(2) If direction of motion changes.

Ans5: (1) Both the curves are representing uniform linear motion.
(2) Uniform velocity of II is more than the velocity of I because slope of curve (II) is greater.

Ans6: $x = 3t^2 + 7t - 9$

$v = \dfrac{dx}{dt} = 6t + 7$ m/s

$a = \dfrac{d\vartheta}{dt} = 6m/s^2$

Ans7: $s = ut + \dfrac{1}{2}at^2$

As the particle comes to the same point as 9s where it was at 5s. The net displacement at 4s is zero.

$0 = v \times 4 - \dfrac{1}{2}(g) \times (4)^2$

$4v = \dfrac{1}{2} \times 9.8 \times 16$

$v = 2 \times 9.8$

$\boxed{v = 19.6m/s}$

Ans8: V_{PJ} = 54km/hr = 15m/s V_{TC} = 126km/hr = 35m/s
Muzzle speed of the bullet $v_b = 100m/s$.

V_{CP} = 35 – 15 = 20m/s. V_{CP} = Velocity of car w.r.t. police
V_{BC}= 100 – 20 = 80 m/s V_{BC} = Velocity of bullet w.r.t car
Thus bullet will hit the car with a velocity 80m/s.

Ans9: $Snth = Sn - Sn_{-1}$

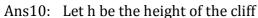$$S_n = un + \frac{1}{2}an^2$$

$$S_{n-1} = u(n-1) + \frac{1}{2}a(n-1)^2$$

$$Snth = un + \frac{1}{2}an^2 - u(n-1) - \frac{1}{2}a(n-1)^2$$

$$\cancel{un} + \frac{\cancel{1}}{\cancel{2}}\cancel{an^2} - \cancel{un} + u - \frac{\cancel{1}}{\cancel{2}}\cancel{an^2} - \frac{1}{2}a + na$$

$$Snth = u - \frac{1}{2}a + na$$

$$= u + \frac{a}{2}(2n-1)$$

Hence proved.

Ans10: Let h be the height of the cliff
n be the total time taken by the stone while falling
u = 0
A = g = 9.8m/s²
$$Snth = u + \frac{a}{2}(2n-1)$$

$$44.1 = 0 + \frac{9.8}{2}(2n-1)$$

$$n = \frac{10}{2} = 55$$

Height of the cliff

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

$$h = un + \frac{1}{2}gn^2$$

$$h = 0 \times 5 + \frac{1}{2} \times 9.8 \times (5)^2$$

$$h = 4.9 \times 25$$

$$\boxed{h = 122.5m}$$