LEVEL # 1

Questions based on **Distance, Displacement, Average Speed, Velocity and Acceleration**

Q.1 A runner completes one round of a circular path of radius r in 40 seconds. His displacement after 2 minutes 20 seconds will be -
(A) Zero (B) $2\pi r$
(C) 2r (D) $7\pi r$

Q.2 A particle covers half of the circle of radius r. Then the displacement and distance of the particle are respectively -
(A) $2\pi r$, 0 (B) 2r, πr
(C) $\frac{\pi r}{2}$, 2r (D) πr, r

Q.3 A car travels from place A to the place B at 20 km/hour and returns at 30 km/hour. The average speed of the car for the whole journey is –
(A) 25 km/hour (B) 24 km/hour
(C) 50 km/hour (D) 5 km/hour

Q.4 A car travels a distance of 2000 m. If the first half distance is covered at 40 km/hour and the second half at velocity v and if the average velocity is 48 km/hour, then the value of v is -
(A) 56 km/hour (B) 60 km/hour
(C) 50 km/hour (D) 48 km/hour

Q.5 A car travels the first half of the journey at 40 km/hour and the second half at 60 km/hour. The average speed of a car is -
(A) 40 km/hour (B) 48 km/hour
(C) 52 km/hour (D) 60 km/hour

Q.6 A particle is moving east-wards with a velocity of 5 m/sec. In 10 seconds its velocity changes to 5 m/sec north-wards. The average acceleration during this time is -
(A) $1/\sqrt{2}$ m/sec^2 in N-W direction
(B) $1/\sqrt{2}$ m/sec^2 in the N-E direction
(C) 1/2 m/sec^2 in N-W direction
(D) 1/2 m/sec^2 towards east

Q.7 A truck travelling due to North at 20 m/s turns East and travels at the same speed. The change in its velocity is-
(A) $20\sqrt{2}$ m/s North-East
(B) $20\sqrt{2}$ m/s South-East
(C) $40\sqrt{2}$ m/s North-East
(D) $20\sqrt{2}$ m/s North-West

Q.8 A truck travelling due north at 20m/s turns west and travels with the same speed. What is the change in velocity ?
(A) 40 m/s north-west
(B) $20\sqrt{2}$ m/s north-west
(C) 40 m/s south-west
(D) $20\sqrt{2}$ m/s south-west

Q.9 A car covers half of the distance with speed 60 km/hr and rest of the half with speed 30 km/hr. The average speed of the car is –
(A) 45 km/hr (B) 40 km/hr
(C) 20.0 km/hr (D) 50 km/hr

Q.10 A motor car covers 1/3rd part of total distance with v_1 = 10 km/hr, second 1/3rd part with v_2 = 20 km/hr and rest 1/3rd part with v_3 = 60 km/hr. What is the average speed of the car?
(A) 18 km/hr (B) 45 km/hr
(C) 6 km/hr (D) 22.5 km/hr

Q.11 A particle travels A to M along a straight line with a velocity of 8 m/s and M to A with a velocity of 2 m/s, then the average velocity for the whole journey is –
(A) 3.2 m/s (B) –5 m/s
(C) –3.2 m/s (D) 0 m/s

Q.12 A car travels first 1/3 of the distance AB at 30 km/hr, next 1/3 of the distance at 40 km/hr, last 1/3 of the distance at 24 km/hr. Its average speed in km/hr for the whole journey is -
(A) 40 (B) 35 (C) 30 (D) 28

Q.13 A particle is moving towards East with a velocity 10 m/sec. In 10 seconds the velocity changes to 10 m/sec Northwards. The average acceleration during the period is -

(A) $\sqrt{2}$ m/sec^2 along North -East direction

(B) $\sqrt{2}$ m/sec^2 along North -West direction

(C) $1/\sqrt{2}$ m/sec^2 along North-East direction

(D) $1/\sqrt{2}$ m/sec^2 along North-West direction

Q.14 A train travels from one station to another at a speed of 40 km/hour and returns to the first station at the speed of 60 km/hour. Calculate the average speed and average velocity of the train

(A) 48 km/hr, zero   (B) 84 km/hr, 10 km/hr

(C) 84 km/hr, zero   (D) 48 km/hr, 10 km/hr

Q.15 A passenger travels along a straight line with velocity v_1 for first half time and with velocity v_2 for next half time, then the mean velocity v is given by -

(A) $v = \dfrac{v_1 + v_2}{2}$ (B) $v = \sqrt{v_1 v_2}$

(C) $v = \sqrt{\dfrac{v_2}{v_1}}$ (D) $\dfrac{2}{v} = \dfrac{1}{v_1} + \dfrac{1}{v_2}$

Questions based on **Instantaneous Velocity & Acceleration**

Q.16 At an instant t , the co-ordinates of a particle are $x = at^2$, $y = bt^2$ and $z = 0$, then its velocity at the instant t will be

(A) $t\sqrt{a^2 + b^2}$ (B) $2t\sqrt{a^2 + b^2}$

(C) $\sqrt{a^2 + b^2}$ (D) $2t^2\sqrt{a^2 + b^2}$

Q.17 A particle is moving so that its displacement s is given as $s = t^3 - 6t^2 + 3t + 4$ meter. Its velocity at the instant when its acceleration is zero will be -

(A) 3 m/s   (B) –12 m/s

(C) 42 m/s   (D) –9 m/s

Q.18 If y denotes the displacement and t denote the time and the displacement is given by $y = a \sin \omega t$, the velocity of the particle is-

(A) a cos ωt   (B) – a cos ωt

(C) aω cos ωt   (D) (a cos ωt) /ω

Q.19 The displacement y (in meters) of a body varies with time (in seconds) according to the equation $y = -\dfrac{2}{3} t^2 + 16t + 2$. How long does the body come to rest ?

(A) 8 seconds   (B) 10 seconds

(C) 12 seconds   (D) 14 seconds

Q.20 The displacement x of a particle moving along a straight line is related to time by the relation $t = \sqrt{x} + 3$. The displacement of the particle when its velocity is zero is given by-

(A) 0   (B) – 2

(C) 2   (D) 1

Q.21 The displacement-time relationship for a particle is given by $x = a_0 + a_1 t + a_2 t^2$. The acceleration of the particle is -

(A) a_0 (B) a_1 (C) a_2 (D) $2a_2$

Q.22 The initial velocity of a particle (at t = 0) is u and the acceleration of particle at time t is given by f = at, where a is a constant. Which of the following relation for velocity v of particle after time t is true?

(A) $v = u + at^2$ (B) $v = u + at^2/2$

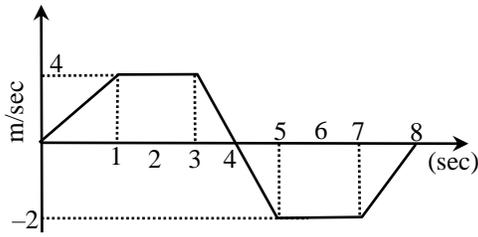(C) $v = u + at$ (D) None of these

Questions based on **Graphs**

Q.23 The variation of velocity of a particle moving along straight line is shown in figure. The distance traversed by the body in 4 seconds is –
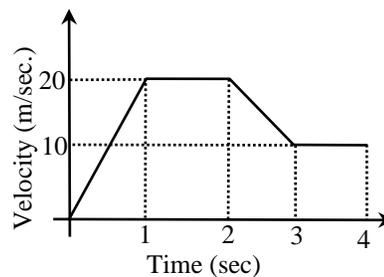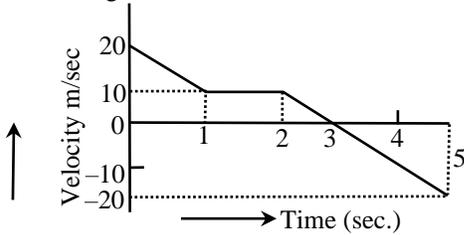

(A) 70 m   (B) 60 m

(C) 40 m   (D) 55 m

**Q.24** The v-t graph of a linear motion is shown in adjoining figure. The distance travelled in 8 seconds is –

(A) 18 meters   (B) 16 meters
(C) 8 meters   (D) 6 meters

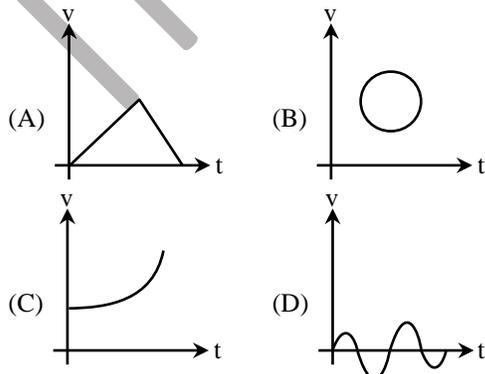**Q.25** From figure the distance travelled in 5 second is -

(A) 10m   (B) 30m   (C) 50m   (D) 0

Q.26 A girl walks along an east-west street, and a graph of her displacement from home is as shown in figure. Her average velocity for the whole time interval is-
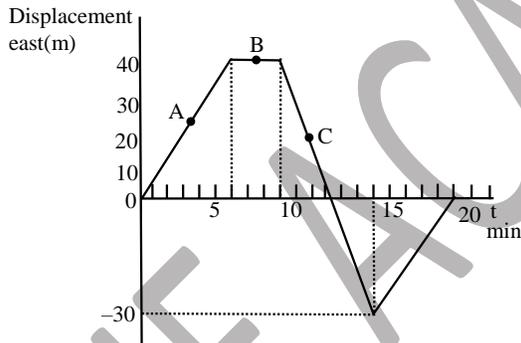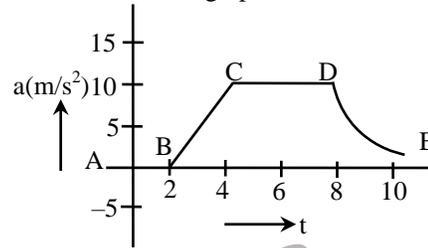

(A) Zero   (B) 6 m/min
(C) 11 m/min   (D) 15 m/min

Q.27 Which one of the following curves do not represent motion in one dimension-
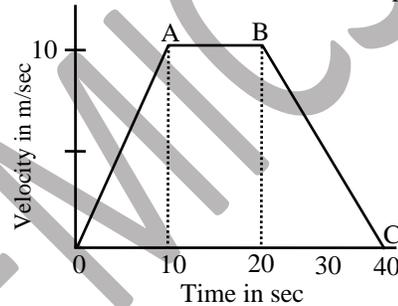

Q.28 The uniform motion in the following acceleration-time graph is-
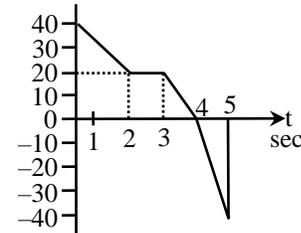

(A) AB   (B) BC   (C) CD   (D) DE

Q.29 The adjoining curve represents the velocity-time graph of a particle, its acceleration values along OA, AB and BC in metre/sec^2 are respectively-

(A) 1, 0, –0.5   (B) 1, 0, 0.5
(C) 1, 1, 0.5   (D) 1, 0.5, 0

Q.30 In the following velocity-time graph of a body, the distance and displacement travelled by the body in 5 second in meters will be -

(A) 70,110   (B) 110, 70
(C) 40, 70   (D) 90, 50

Q.31 The following figures show some velocity v versus time t curves. But only some of these can be realised in practice. This are-
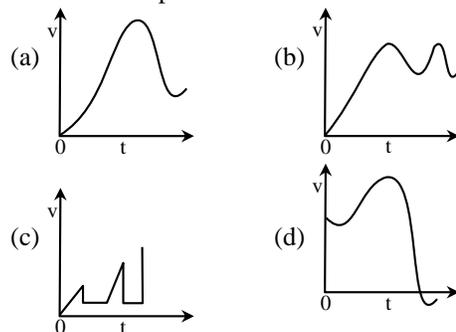
(A) only a, b and d   (B) only a , b , c
(C) only b and c   (D) all of them

Q.32 The velocity-time graph of a linear motion is shown below. The displacement from the origin after 8 seconds is -

(A) 18m (B) 16 m

(C) 6m (D) 6 cm

Q.33 The following shows the time-velocity graph for a moving object. The maximum acceleration will be-

(A) 1 m/sec^2 (B) 2m/sec^2
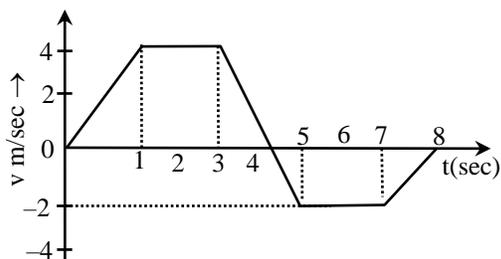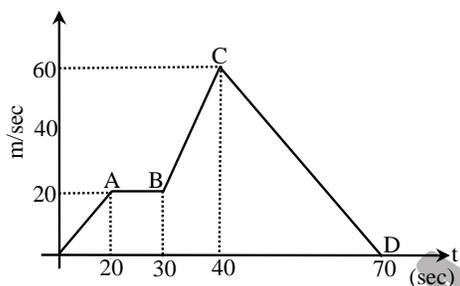
(C) 3m/sec^2 (D) 4m/sec^2

Questions based on **Equations of Motion**

Q.34 A particle moves from the position of rest and attains a velocity of 30 m/sec after 10sec. The acceleration will be

(A) 9 m/sec^2 (B) 18 m/sec^2

(C) 3 m/sec^2 (D) 4 m/sec^2

Q.35 The relation between time t and displacement x is expressed by $x = 2 - 5t + 6t^2$. What will be the initial velocity of the particle ?

(A) –5m/sec (B) –3m/sec

(C) 6m/sec (D) 3m/sec

Q.36 A particle, after starting from rest , experiences, constant acceleration for 20 seconds. If it covers a distance of S_1, in first 10 seconds and distance S_2 in next 10 sec, then

(A) $S_2 = S_1/2$ (B) $S_2 = S_1$

(C) $S_2 = 2S_1$ (D) $S_2 = 3S_1$

Q.37 A body sliding on a smooth inclined plane requires 4sec to reach the bottom after starting from rest at the top. How much time does it take to cover one fourth the distance starting from the top

(A) 1sec (B) 2 sec

(C) 0.4sec (D) 1.6 sec

Q.38 The initial velocity of a particle is 10 m/sec and its retardation is 2 m/sec^2. The distance covered in the fifth second of the motion will be

(A) 1m (B) 19m

(C) 50m (D) 75m

Q.39 A moving train is stopped by applying brakes. It stops after travelling 80m. If the speed of the train is doubled and retardation remains the same, it will cover a distance

(A) same as earlier

(B) double the distance covered earlier

(C) four times the distance covered earlier

(D) half the distance covered earlier

Q.40 If u is the initial velocity of a body and a the acceleration , the value of distance travelled by nth second is :

(A) $u + \dfrac{1}{2} a (2n +1)$ (B) $u + \dfrac{1}{2} a (2n-1)$

(C) $u - \dfrac{1}{2} a (2n + 1)$ (D) $u - \dfrac{1}{2} a(2n-1)$

Q.41 A body starts from rest, the ratio of distances travelled by the body during 3rd and 4th seconds is :

(A) 7/5 (B) 5/7 (C) 7/3 (D) 3/7

Q.42 A body starting from rest and has uniform acceleration 8 m/s^2. The distance travelled by it in 5th second will be

(A) 36m (B) 40m (C) 100m (D) 200m

Q.43 Which one of the following equations represent the motion of a body with finite constant acceleration. In these equations y denotes the position of the body at time t and a, b, and c are the constant of the motion

(A) y = a/t +bt (B) y = at

(C) $y = at + bt^2$ (D) $y = at + bt^2 + ct^3$

Q.44 A particle initially at rest moves for 40 seconds under the influence of a constant force. If the distance travelled by the particle is S_1 in the first twenty seconds and S_2 in the next twenty second, then

(A) $S_2 = S_1$ (B) $S_2 = 2S_1$

(C) $S_2 = 3S_1$ (D) $S_2 = 4S_1$

Questions based on **Motion under gravity**

Q.45 A rocket is projected vertically upwards and its time-velocity graph is shown in the figure. The maximum height attained by the rocket is –
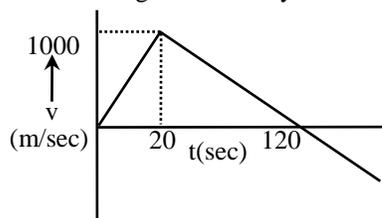
(A) 1km   (B) 10km

(C) 100km   (D) 60km

Q.46 An object is released from some height. Exactly after one second, another object is released from the same height. The distance between the two objects exactly after 2 seconds of the release of second object will be:

(A) 4.9 m   (B) 9.8 m

(C) 19.6 m   (D) 24.5 m

Q.47 A stone is thrown vertically upwards from the top of a tower with a velocity u and it reaches the ground with a velocity 3u. The height of the tower is

(A) $3u^2/g$ (B) $4u^2/g$ (C) $6u^2/g$ (D) $9u^2/g$

Q.48 A ball is thrown from the ground with a velocity of 80 ft/sec. Then the ball will be at a height of 96 feet above the ground after time

(A) 2 and 3sec   (B) only 3 sec

(C) only 2sec   (D) 1 and 2 sec

Q.49 A body is dropped from a height h under acceleration due to gravity g. If t_1 and t_2 are time intervals for its fall for first half and the second half distance, the relation between them is

(A) $t_1 = t_2$ (B) $t_1 = 2t_2$

(C) $t_1 = 2.414 t_2$ (D) $t_1 = 4t_2$

Q.50 A stone is dropped from a bridge and it reaches the ground in 4 seconds The height of the bridge is:

(A) 78.4m   (B) 64m

(C) 260m   (D) 2000m

Q.51 A rocket is launched form the earth surface so that it has an acceleration of $19.6 m/s^2$. If its engine is switched off after 5 seconds of its launch, then the maximum height attained by the rocket will be

(A) 245 m   (B) 490 m

(C) 980 m   (D) 735 m

Q.52 Two bodies of different masses m_a and m_b are dropped from two different heights, viz a and b. The ratio of times taken by the two to drop through these distances is

(A) a : b   (B) $\dfrac{m_a}{m_b} : \dfrac{b}{a}$

(C) $\sqrt{a} : \sqrt{b}$ (D) $a^2 : b^2$

Q.53 A body thrown up with a finite speed is caught back after 4 sec. The speed of the body with which it is thrown up is

(A) 10 m/sec   (B) 20 m/sec

(C) 30 m/sec   (D) 40 m/sec

Q.54 A stone is thrown vertically upwards with an initial velocity of 30 m/s. The time taken for the stone to rise to its maximum height is

(A) 0.326s   (B) 3.26s

(C) 30.6s   (D) 3.06s

Q.55 A ball is thrown upward and reaches a height of 64 feet , its initial velocity should be
($g = 32 ft/sec^2$)

(A) 64 ft/sec   (B) 72 ft/sec

(C) 32 ft/sec   (D) 4096 ft/sec

Q.56 A body is thrown upward and reaches its maximum height. At that position-

(A) its velocity is zero and its acceleration is also zero

(B) its velocity is zero but its acceleration is maximum

(C) its acceleration is minimum

(D) its velocity is zero and its acceleration is the acceleration due to gravity

Questions based on **Relative velocity**

Q.57 Two trains each of length 50 m are approaching each other on parallel rails. Their velocities are 10 m/sec and 15 m/sec. They will cross each other in -
(A) 2 sec   (B) 4 sec
(C) 10 sec   (D) 6 sec

Q.58 A train is moving in the north at a speed 10 m/sec. Its length is 150 m. A parrot is flying parallel to the train in the south with a speed of 5 m/s. The time taken by the parrot to cross the train will be :
(A) 12 sec   (B) 8 sec
(C) 15 sec   (D) 10 sec

Q.59 A thief is running away on a straight road on a jeep moving with a speed of 9 m/s. A police man chases him on a motor cycle moving at a speed of 10 m/s. If the instantaneous separation of jeep from the motor cycle is 100 m, how long will it take for the policemen to catch the thief ?
(A) 1 second   (B) 19 second
(C) 90 second   (D) 100 second

Q.60 A horse rider is moving towards a big mirror with velocity v. The velocity of his image with respect to him is -
(A) 0   (B) 4 v
(C) 2 v   (D) v

Q.61 A space ship going away from the earth at half the speed of light fires from its nose a rocket which travels with a speed of 0.4c with reference to the ship. The speed of the rocket with reference to earth is -
(A) zero   (B) 0.1 c
(C) 0.9 c   (D) c

Q.62 A man is walking on a road with a velocity 3 km/hr. Suddenly rain starts falling. The velocity of rain is 10 km/hr in vertically downward direction. The relative velocity of the rain is -
(A) $\sqrt{13}$ km/hr   (B) $\sqrt{7}$ km/hr
(C) $\sqrt{109}$ km/hr   (D) 13 km/hr

Q.63 A car A is going north-east at 80 km/hr and another car B is going south-east at 60 km/hr. Then the direction of the velocity of A relative to B makes with the north an angle α such that tan α is -
(A) 1/7   (B) 3/4
(C) 4/3   (D) 3/5

Questions based on **Miscellaneous**

Q.64 A particle moves with constant speed v along a regular hexagon ABCDEF in same order (i.e. A to B , B to C, C to D, D to E, E to F, F to A...). Then magnitude of average velocity for its motion from A to C is –
(A) v   (B) v/2
(C) $\sqrt{3}$ v/2   (D) None of these

Q.65 A particle moves with a velocity v in a horizontal circular path. The change in its velocity for covering 60° will be -
(A) v $\sqrt{2}$ (B) v/ $\sqrt{2}$
(C) v $\sqrt{3}$ (D) v

Q.66 A body is dropped from a height h from the state of rest. It covers a distance of 9h/25 in the last second. What is the height from which the body falls? (in meter)
(A) 12.5   (B) 1.25
(C) 125   (D) Zero

ANSWER KEY

LEVEL # 1

Ques.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Ans.	C	B	B	B	B	A	B	D	B	A	D	C	B	A	A	B	D	C	C	A
Ques.	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40
Ans.	D	B	D	A	C	A	B	A	A	B	A	C	D	C	A	D	B	A	C	B
Ques.	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	B	A	C	C	D	D	B	A	C	A	D	C	B	D	A	D	B	D	D	C
Ques.	61	62	63	64	65	66														
Ans.	C	C	A	C	D	C														