NEET ANSWER KEY & SOLUTIONS

SUBJECT :- PHYSICS

CLASS :- 11th **PAPER CODE :- CWT-3**

CHAPTER :- KINEMATICS

ANSWER KEY

1.	(B)	**2.**	(D)	**3.**	(D)	**4.**	(C)	**5.**	(C)	**6.**	(A)	**7.**	(A)
8.	(A)	**9.**	(B)	**10.**	(D)	**11.**	(A)	**12.**	(D)	**13.**	(C)	**14.**	(A)
15.	(C)	**16.**	(B)	**17.**	(A)	**18.**	(B)	**19.**	(B)	**20.**	(B)	**21.**	(C)
22.	(C)	**23.**	(B)	**24.**	(D)	**25.**	(A)	**26.**	(A)	**27.**	(C)	**28.**	(B)
29.	(A)	**30.**	(C)	**31.**	(D)	**32.**	(A)	**33.**	(A)	**34.**	(C)	**35.**	(C)
36.	(B)	**37.**	(C)	**38.**	(C)	**39.**	(A)	**40.**	(C)	**41.**	(B)	**42.**	(A)
43.	(B)	**44.**	(B)	**45.**	(B)	**46.**	(A)	**47.**	(D)	**48.**	(C)	**49.**	(C)
50.	(C)												

SOLUTIONS

SECTION-A

1. (B)

Sol. Total time of motion is 2 *min* 20 *sec* = 140 *sec*.

As time period of circular motion is 40 *sec* so in 140 *sec*. athlete will complete 3.5 revolution *i.e.,* He will be at diametrically opposite point *i.e.,* Displacement = 2*R*.

2. (D)

Sol. As the total distance is divided into two equal parts therefore distance averaged speed $=\dfrac{2v_1v_2}{v_1+v_2}$

3. (D)

Sol. $\dfrac{v_A}{v_B}=\dfrac{\tan\theta_A}{\tan\theta_B}=\dfrac{\tan 30^\circ}{\tan 60^\circ}=\dfrac{1/\sqrt{3}}{\sqrt{3}}=\dfrac{1}{3}$

4. (C)

Sol. From given figure, it is clear that the net displacement is zero. So average velocity will be zero.

5. (C)

Sol. Acceleration $=\dfrac{d^2x}{dt^2}=2a_2$

6. (A)

Sol. $S_n=u+\dfrac{a}{2}[2n-1]$

$S_{5th}=7+\dfrac{4}{2}[2\times 5-1]=7+18=25m$.

7. (A)

Sol. $S\propto u^2 \therefore \dfrac{S_1}{S_2}=\left(\dfrac{u_1}{u_2}\right)^2\Rightarrow$

$\dfrac{2}{S_2}=\dfrac{1}{4}\Rightarrow S_2=8\text{ m}$

8. (A)

Sol. $S_n=u+\dfrac{a}{2}(2n-1)=\dfrac{a}{2}(2n-1)$

because $u=0$ Hence $\dfrac{S_4}{S_3}=\dfrac{7}{5}$

9. (B)

Sol. Here $v=144\text{ km/h}=40\text{m/s}$

$v=u+at\Rightarrow 40=0+20\times a\Rightarrow a=2\text{ m/s}^2$

$\therefore\ s=\dfrac{1}{2}at^2=\dfrac{1}{2}\times 2\times(20)^2=400\text{ m}$

10. (D)

Sol. $s=3t^3+7t^2+14t+8\ m$

$a=\dfrac{d^2s}{dt^2}=18t+14$ at $t=1\text{ sec}\Rightarrow a=32m/s^2$

11. (A)

Sol. The velocity of the particle is

$\dfrac{dx}{dt}=\dfrac{d}{dt}(2-5t+6t^2)=(0-5+12t)$

For initial velocity $t=0$, hence $v=-5\ m/s$.

12. (D)

Sol. Relative velocity

$=10+5=15\ m/sec$

$\therefore\ t=\dfrac{150}{15}=10\ sec$

13. (C)

Sol. $h=\dfrac{1}{2}gt^2\Rightarrow t=\sqrt{2h/g}$

$t_a=\sqrt{\dfrac{2a}{g}}$ and $t_b=\sqrt{\dfrac{2b}{g}}\Rightarrow\dfrac{t_a}{t_b}=\sqrt{\dfrac{a}{b}}$

14. (A)

Sol. $h=\dfrac{1}{2}gt^2=\dfrac{1}{2}\times 10\times(4)^2=80\ m$

15. (C)

Sol. $t=\sqrt{\dfrac{2h}{g}}$ and *h* and *g* are same.

16. (B)

Sol. Time taken by first drop to reach the ground $t=\sqrt{\frac{2h}{g}}$

$\Rightarrow t=\sqrt{\frac{2\times 5}{10}}=1\text{ sec}$

As the water drops fall at regular intervals from a tap therefore time difference between any two drops $=\frac{1}{2}\text{ sec}$

In this given time, distance of second drop from the tap $=\frac{1}{2}g\left(\frac{1}{2}\right)^2=\frac{5}{5}=1.25\ m$

Its distance from the ground $=5-1.25=3.75\ m$

17. (A)

Sol. $S_n=u+\frac{g}{2}(2n-1)$; when $u=0$,

$S_1:S_2:S_3=1:3:5$

18. (B)

Sol. The time of fall is independent of the mass.

19. (B)

Sol. $t=\sqrt{\frac{2h}{g}}\Rightarrow \frac{t_1}{t_2}=\sqrt{\frac{h_1}{h_2}}$

20. (B)

Sol. Let particle thrown with velocity *u* and its maximum height is *H* then $H=\frac{u^2}{2g}$

When particle is at a height $H/2$, then its speed is 10 *m/s*

From equation $v^2=u^2-2gh$

$(10)^2=u^2-2g\left(\frac{H}{2}\right)=u^2-2g\frac{u^2}{4g}\Rightarrow u^2=200$

Maximum height $\Rightarrow H=\frac{u^2}{2g}=\frac{200}{2\times 10}=10\ m$

21. (C)

Sol. (C) Speed of the object at reaching the ground $v=\sqrt{2gh}$

If heights are equal then velocity will also be equal.

22. (C)

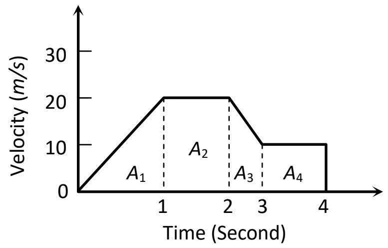
Sol.

$\frac{dx}{dt}=2at-3bt^2\Rightarrow \frac{d^2x}{dt^2}=2a-6bt=0\Rightarrow t=\frac{a}{3b}$

23. (B)

Sol. Distance = Area under *v* – *t* graph

$=A_1+A_2+A_3+A_4$



$=\frac{1}{2}\times 1\times 20+(20\times 1)+\frac{1}{2}(20+10)\times 1+(10\times 1)$

$=10+20+15+10=55\ m$

24. (D)

Sol. Up to time t_1 slope of the graph is constant and after t_1 slope is zero *i.e.* the body travel with constant speed up to time t_1 and then stops.

25. (A)

Sol. Slope of velocity-time graph measures acceleration. For graph (A) slope is zero. Hence $a=0$ *i.e.* motion is uniform.

26. (A)

Sol. Motion of rocket is based on action reaction phenomena and is governed by rate of fuel burning causing the change in momentum of ejected gas.

27. (C)

Sol. Due to constant velocity along horizontal and vertical downward force of gravity stone will hit the ground following parabolic path.

28. (B)

Sol.

$S=u\times\sqrt{\frac{2h}{g}}=100\times\sqrt{\frac{2\times 490}{9.8}}=1000\ m=1\ km$

29. (A)

Sol. For both cases $t=\sqrt{\frac{2h}{g}}=$ constant.

30. (C)

31. (D)

Sol. $R=\frac{u^2\sin 2\theta}{g}\ \therefore R\propto u^2$. If initial velocity be doubled then range will become four times.

32. (A)

Sol. An external force by gravity is present throughout the motion so momentum will not be conserved.

33. (A)

Sol. Range $= \frac{u^2 \sin 2\theta}{g}$; when $\theta = 90°$, $R = 0$ *i.e.* the body will fall at the point of projection after completing one dimensional motion under gravity.

34. (C)

Sol. $\frac{2u\sin\theta}{g} = 2\text{ sec} \Rightarrow u\sin\theta = 10$

$\therefore\ H = \frac{u^2\sin^2\theta}{2g} = \frac{100}{2g} = 5m$

35. (C)

Sol. $v_y = \frac{dy}{dt} = 8 - 10t$, $v_x = \frac{dx}{dt} = 6$

at the time of projection *i.e.* $v_y = \frac{dy}{dt} = 8$ and $v_x = 6$

$\therefore v = \sqrt{v_x^2 + v_y^2} = \sqrt{6^2 + 8^2} = 10\ m/s$

SECTION-B

36. (B)

Sol. Range is given by $R = \frac{u^2 \sin 2\theta}{g}$

On moon $g_m = \frac{g}{6}$. Hence $R_m = 6R$

37. (C)

Sol. For greatest height $\theta = 90°$

$H_{\max} = \frac{u^2\sin^2(90°)}{2g} = \frac{u^2}{2g} = h$ (given)

$R_{\max} = \frac{u^2\sin^2 2(45°)}{g} = \frac{u^2}{g} = 2h$

38. (C)

Sol. $R = 4H\cot\theta$, if $R = 4H$ then $\cot\theta = 1 \Rightarrow \theta = 45°$

39. (A)

Sol. $H = \frac{u^2\sin^2\theta}{2g}$ and $T = \frac{2u\sin\theta}{g}$

So $\frac{H}{T^2} = \frac{u^2\sin^2\theta/2g}{4u^2\sin^2\theta/g^2} = \frac{g}{8} = \frac{5}{4}$

40. (C)

41. (B)

Sol. As $H = \frac{u^2\sin^2\theta}{2g}$ $\therefore$ $\frac{H_1}{H_2} = \frac{\sin^2\theta_1}{\sin\theta_2} = \frac{\sin^2 30°}{\sin^2 60} =$

$\frac{1/4}{3/4} = \frac{1}{3}$

42. (A)

Sol. $T = \frac{2u\sin\theta}{g} = 10\text{ sec} \Rightarrow u\sin\theta = 50\ m/s$

$\therefore\ H = \frac{u^2\sin^2\theta}{2g} = \frac{(u\sin\theta)^2}{2g} = \frac{50\times 50}{2\times 10} = 125\,m$

43. (B)

Sol. For complementary angles range will be equal.

44. (B)

Sol. Range $= \frac{u^2\sin 2\theta}{g}$. It is clear that range is proportional to the direction (angle) and the initial speed.

45. (B)

Sol. Only horizontal component of velocity $(u\cos\theta)$.

46. (A)

Sol. For complementary angles range is same.

47. (D)

Sol. Average speed $= \frac{\text{Total distance}}{\text{Total time}}$

$= \frac{x}{t_1 + t_2}$

$= \frac{x}{\frac{x/3}{v_1} + \frac{2x/3}{v_2}} = \frac{1}{\frac{1}{3\times 20} + \frac{2}{3\times 60}} = 36\ km/hr$

48. (C)

Sol. $\tan\theta = \frac{v^2/r}{g} = \frac{v^2}{rg}$

$\therefore\ \theta = \tan^{-1}\left(\frac{v^2}{rg}\right) = \tan^{-1}\left(\frac{10\times 10}{10\times 10}\right)$

$\therefore\ \theta = \tan^{-1}(1) = 45°$

49. (C)

Sol. $R = \frac{u^2\sin 2\theta}{g}$ $\therefore$ $R_{\max} = \frac{u^2}{g}$ when $\theta = 45°$ $\therefore$ $R_{\max} \propto u^2$

Height $H = \frac{u^2\sin^2\theta}{2g} \Rightarrow H_{\max} = \frac{u^2}{2g}$ when $\theta = 90°$

It is clear that $H_{\max} = \frac{R_{\max}}{2}$

50. (C)