DCAM classes
Dynamic Classes for Academic Mastery

DPP - Daily Practice Problems

Chapter-wise Sheets

Date : | Start Time : | End Time :

PHYSICS CP02

SYLLABUS : Motion in a Straight Line

Max. Marks : 120 **Marking Scheme :** (+4) for correct & (–1) for incorrect answer **Time : 60 min.**

INSTRUCTIONS : This Daily Practice Problem Sheet contains 30 MCQs. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

1. The co-ordinates of a moving particle at any time 't' are given by $x = \alpha t^3$ and $y = \beta t^3$. The speed of the particle at time 't' is given by

(a) $3t\sqrt{\alpha^2+\beta^2}$ (b) $3t^2\sqrt{\alpha^2+\beta^2}$

(c) $t^2\sqrt{\alpha^2+\beta^2}$ (d) $\sqrt{\alpha^2+\beta^2}$

2. A goods train accelerating uniformly on a straight railway track, approaches an electric pole standing on the side of track. Its engine passes the pole with velocity u and the guard's room passes with velocity v. The middle wagon of the train passes the pole with a velocity

(a) $\frac{u+v}{2}$ (b) $\frac{1}{2}\sqrt{u^2+v^2}$

(c) $\sqrt{uv}$ (d) $\sqrt{\left(\frac{u^2+v^2}{2}\right)}$

3. A particle starts moving rectilinearly at time t = 0 such that its velocity v changes with time t according to the equation $v = t^2 - t$ where t is in seconds and v is in m/s. Find the time interval for which the particle retards.

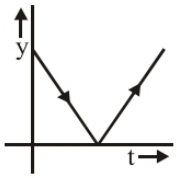
(a) $\frac{1}{2} < t < 1$ (b) $\frac{1}{2} > t > 1$

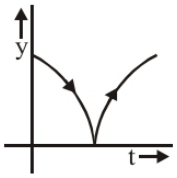
(c) $\frac{1}{4} < t < 1$ (d) $\frac{1}{2} < t < \frac{3}{4}$

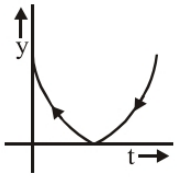
RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ

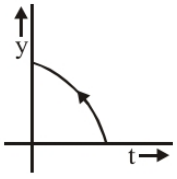
Space for Rough Work

4. A ball is dropped on a floor and bounces back to a height somewhat less than the original height. Which of the curves depicts its motion correctly?

(a) 

(b) 

(c) 

(d) 

5. 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 police man to catch the thief?

(a) 1 second (b) 19 second

(c) 90 second (d) 100 second

6. The displacement x of a particle varies with time according to the relation $x = \frac{a}{b}(1 - e^{-bt})$. Then select the false alternative.

(a) At $t = \frac{1}{b}$, the displacement of the particle is nearly $\frac{2}{3}\left(\frac{a}{b}\right)$

(b) The velocity and acceleration of the particle at t = 0 are a and –ab respectively

(c) The particle cannot go beyond $x = \frac{a}{b}$

(d) The particle will not come back to its starting point at $t \to \infty$

7. A metro train starts from rest and in five seconds achieves a speed 108 km/h. After that it moves with constant velocity and comes to rest after travelling 45m with uniform retardation. If total distance travelled is 395 m, find total time of travelling.

(a) 12.2 s (b) 15.3 s

(c) 9 s (d) 17.2 s

8. The deceleration experienced by a moving motor boat after its engine is cut off, is given by $dv/dt = -kv^3$ where k is a constant. If v_0 is the magnitude of the velocity at cut-off, the magnitude of the velocity at a time *t* after the cut-off is

(a) $\frac{v_0}{\sqrt{(2v_0^2 kt + 1)}}$ (b) $v_0\, e^{-kt}$

(c) $v_0 / 2$ (d) v_0

9. A ball is dropped from the top of a tower of height 100 m and at the same time another ball is projected vertically upwards from ground with a velocity 25 ms^{-1}. Then the distance from the top of the tower, at which the two balls meet is

(a) 68.4m (b) 48.4m

(c) 18.4m (d) 78.4m

10. A person moves 30 m north and then 20 m towards east and finally $30\sqrt{2}$ m in south-west direction. The displacement of the person from the origin will be

(a) 10 m along north (b) 10 m along south

(c) 10 m along west (d) zero

11. The velocity of a particle is $v = v_0 + gt + ft^2$. If its position is $x = 0$ at $t = 0$, then its displacement after unit time ($t = 1$) is

(a) $v_0 + g/2 + f$ (b) $v_0 + 2g + 3f$

(c) $v_0 + g/2 + f/3$ (d) $v_0 + g + f$

12. A car, moving with a speed of 50 km/hr, can be stopped by brakes after at least 6 m. If the same car is moving at a speed of 100 km/hr, the minimum stopping distance is

(a) 12m (b) 18m

(c) 24m (d) 6m

RESPONSE GRID					
	4. ⓐⓑⓒⓓ	**5.** ⓐⓑⓒⓓ	**6.** ⓐⓑⓒⓓ	**7.** ⓐⓑⓒⓓ	**8.** ⓐⓑⓒⓓ
	9. ⓐⓑⓒⓓ	**10.** ⓐⓑⓒⓓ	**11.** ⓐⓑⓒⓓ	**12.** ⓐⓑⓒⓓ	

Space for Rough Work

13. The water drops fall at regular intervals from a tap 5 m above the ground. The third drop is leaving the tap at an instant when the first drop touches the ground. How far above the ground is the second drop at that instant? (Take g = 10 m/s^2)
(a) 1.25 m (b) 2.50 m
(c) 3.75 m (d) 5.00 m

14. Two trains each of 50 m long are moving parallel towards each other at speeds 10 m/s and 15 m/s respectively. After what time will they pass each other?
(a) $5\sqrt{\frac{2}{3}}$ sec (b) 4 sec
(c) 2 sec (d) 6 sec

15. The displacement 'x' (in meter) of a particle of mass 'm' (in kg) moving in one dimension under the action of a force, is related to time 't' (in sec) by $t = \sqrt{x} + 3$. The displacement of the particle when its velocity is zero, will be
(a) 2m (b) 4m
(c) zero (d) 6m

16. A particle moves in a straight line with a constant acceleration. It changes its velocity from 10 ms^{-1} to 20 ms^{-1} while passing through a distance 135 m in t second. The value of t is:
(a) 10 s (b) 1.8 s
(c) 12 s (d) 9 s

17. An automobile travelling with a speed of 60 km/h, can brake to stop within a distance of 20m. If the car is going twice as fast i.e., 120 km/h, the stopping distance will be
(a) 60 m (b) 40 m
(c) 20 m (d) 80 m

18. A stone is dropped into a well in which the level of water is h below the top of the well. If v is velocity of sound, the time T after which the splash is heard is given by
(a) T = 2h/v (b) $T = \sqrt{\left(\frac{2h}{g}\right)} + \frac{h}{v}$
(c) $T = \sqrt{\left(\frac{2h}{v}\right)} + \frac{h}{g}$ (d) $T = \sqrt{\left(\frac{h}{2g}\right)} + \frac{2h}{v}$

19. Two cars are moving in the same direction with the same speed 30 km/hr. They are separated by a distance of 5 km. The speed of a car moving in the opposite direction if it meets these two cars at an interval of 4 minutes, will be
(a) 40 km/hr (b) 45km/hr
(c) 30 km/hr (d) 15 km/hr

20. A particle moves along a straight line OX. At a time t (in seconds) the distance x (in metres) of the particle from O is given by $x = 40 + 12t - t^3$. How long would the particle travel before coming to rest?
(a) 40m (b) 56m
(c) 16m (d) 24m

21. A body moving with a uniform acceleration crosses a distance of 65 m in the 5 th second and 105 m in 9th second. How far will it go in 20 s?
(a) 2040 m (b) 240 m
(c) 2400 m (d) 2004 m

22. A particle moving along x-axis has acceleration f, at time t, given by $f = f_0\left(1 - \frac{t}{T}\right)$, where f_0 and T are constants. The particle at t = 0 has zero velocity. In the time interval between $t = 0$ and the instant when f = 0, the particle's velocity (v_x) is
(a) $\frac{1}{2}f_0T^2$ (b) f_0T^2
(c) $\frac{1}{2}f_0T$ (d) f_0T

23. A body is thrown vertically up with a velocity u. It passes three points A, B and C in its upward journey with velocities $\frac{u}{2}, \frac{u}{3}$ and $\frac{u}{4}$ respectively. The ratio of AB and BC is
(a) 20 : 7 (b) 2
(c) 10 : 7 (d) 1

24. A boat takes 2 hours to travel 8 km and back in still water lake. With water velocity of 4 km h^{-1}, the time taken for going upstream of 8 km and coming back is
(a) 160 minutes (b) 80 minutes
(c) 100 minutes (d) 120 minutes

RESPONSE GRID

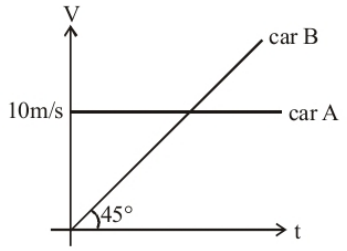
13. ⓐⓑⓒⓓ	**14.** ⓐⓑⓒⓓ	**15.** ⓐⓑⓒⓓ	**16.** ⓐⓑⓒⓓ	**17.** ⓐⓑⓒⓓ
18. ⓐⓑⓒⓓ	**19.** ⓐⓑⓒⓓ	**20.** ⓐⓑⓒⓓ	**21.** ⓐⓑⓒⓓ	**22.** ⓐⓑⓒⓓ
23. ⓐⓑⓒⓓ	**24.** ⓐⓑⓒⓓ			

Space for Rough Work

25. A particle starts its motion from rest under the action of a constant force. If the distance covered in first 10 seconds is S_1 and that covered in the first 20 seconds is S_2, then:
(a) $S_2 = 3S_1$ (b) $S_2 = 4S_1$
(c) $S_2 = S_1$ (d) $S_2 = 2S_1$

26. A body starts from rest and travels a distance x with uniform acceleration, then it travels a distance 2x with uniform speed, finally it travels a distance 3x with uniform retardation and comes to rest. If the complete motion of the particle is along a straight line, then the ratio of its average velocity to maximum velocity is
(a) 2/5 (b) 3/5
(c) 4/5 (d) 6/7

27. Initially car A is 10.5 m ahead of car B. Both start moving at time t = 0 in the same direction along a straight line. The velocity time graph of two cars is shown in figure. The time when the car B will catch the car A, will be



(a) t = 21 sec. (b) $t = 2\sqrt{5}$ sec
(c) t = 20 sec. (d) None of these

28. A stone falls freely under gravity. It covers distances h_1, h_2 and h_3 in the first 5 seconds, the next 5 seconds and the next 5 seconds respectively. The relation between h_1, h_2 and h_3 is
(a) $h_1 = \frac{h_2}{3} = \frac{h_3}{5}$ (b) $h_2 = 3h_1$ and $h_3 = 3h_2$
(c) $h_1 = h_2 = h_3$ (d) $h_1 = 2h_2 = 3h_3$

29. A train of 150 metre length is going towards north direction at a speed of 10 m/s . A parrot flies at the speed of 5 m/s towards south direction parallel to the railway track. The time taken by the parrot to cross the train is
(a) 12 sec (b) 8 sec
(c) 15 sec (d) 10 sec

30. A car, starting from rest, accelerates at the rate f through a distance S, then continues at constant speed for time t and then decelerates at the rate $\frac{f}{2}$ to come to rest. If the total distance traversed is 15 S, then
(a) $S = \frac{1}{6}ft^2$ (b) $S = ft$
(c) $S = \frac{1}{4}ft^2$ (d) $S = \frac{1}{72}ft^2$

RESPONSE GRID	25. ⓐⓑⓒⓓ 26. ⓐⓑⓒⓓ 27. ⓐⓑⓒⓓ 28. ⓐⓑⓒⓓ 29. ⓐⓑⓒⓓ 30. ⓐⓑⓒⓓ

DAILY PRACTICE PROBLEM DPP CHAPTERWISE CP02 - PHYSICS			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	45	Qualifying Score	60
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work