RK VISION ACADEMY

PHYSICS

XI – MOTION IN A PLANE

SECTION A

1. **A bullet is fired from a gun at the speed of 280 ms^{-1} in the direction 30° above the horizontal. The maximum height attained by the bullet is: (g = 9.8 ms^{-2}, sin30° = 0.5)**
   (1) 1000 m
   (2) 3000 m
   (3) 2800 m
   (4) 2000 m

2. **A ball is projected with a velocity 10 ms^{-1}, at an angle of 60° with the vertical direction. Its speed at the highest point of its trajectory will be:**
   (1) 10 ms^{-1}
   (2) Zero
   (3) $5\sqrt{3}$ ms^{-1}
   (4) 5 ms^{-1}

3. **A car starts from rest and accelerates at 5 m/s^2. At t = 4 s, a ball is dropped out of a window by a person sitting in the car. What is the velocity and acceleration of the ball at t = 6s?**
   (1) 20 m/s, 0
   (2) $20\sqrt{2}$ m/s, 0
   (3) $20\sqrt{2}$ m/s, 10 m/s^2
   (4) 20 m/s, 5 m/s^2

4. **A ball is thrown vertically downward with a velocity of 20 m/s from the top of a tower. It hits the ground after some time with a velocity of 80m/s. The height of the tower is:(g = 10 m/s^2)**
   (1) 340 m
   (2) 320 m
   (3) 300 m
   (4) 360 m

5. **A person sitting in the ground floor of a building notices through the window of height 1.5 m, a ball dropped from the roof of the building crosses the window in 0.1 s. What is the velocity of the ball when it is at the topmost point of the window? (g = 10 m/s^2)**
   (1) 14.5 m/s
   (2) 4.5 m/s
   (3) 20 m/s
   (4) 15.5 m/s

6. **The speed of a swimmer in still water is 20 m/s. The speed of river water is 10 m/s and is flowing due east. If he is standing on the south bank and wishes to cross the river along the shortest path, the angle at which he should make his strokes w.r.t. north is given by:**
   (1) 30° west
   (2) 0°
   (3) 60° west
   (4) 45° west

7. **A ship A is moving Westwards with a speed of 10 km/h and a ship B 100 km South of A, is moving Northwards with a speed of 10 km/h. The time after which the distance between them becomes shortest, is:**
   (1) 5 h
   (2) $5\sqrt{2}$ h
   (3) $10\sqrt{2}$h
   (4) 0 h

8. **A large number of bullets are fired in all directions with same speed. What is the maximum area on the ground on which these bullets will spread**
   (1) $\pi \frac{v^2}{g}$
   (2) $\pi \frac{v^4}{g^2}$
   (3) $\pi^2 \frac{v^4}{g^2}$
   (4) $\pi^2 \frac{v^2}{g^2}$

9. **A bomber plane moves horizontally with a speed of 500 m/s and a bomb released from**

it, strikes the ground in 10 sec. Angle at which it strikes the ground will be

(1) $\tan^{-1}\left(\frac{1}{5}\right)$

(2) $\tan\left(\frac{1}{5}\right)$

(3) $\tan^{-1}\left(\frac{1}{1}\right)$

(4) $\tan^{-1}\left(\frac{5}{1}\right)$

10. At the height 80 m, an aeroplane is moving with 150 m/s. A bomb is dropped from it so as to hit a target. At what distance from the target should the bomb be dropped (given $g = 10\ m/s^2$)

(1) 605.3 m

(2) 600 m

(3) 80 m

(4) 230 m

11. A body is thrown horizontally from the top of a tower of height 5 m. It touches the ground at a distance of 10 m from the foot of the tower. The initial velocity of the body is ($g = 10\ ms^{-2}$)

(1) 2.5 ms^{-1}

(2) 5 ms^{-1}

(3) 10 ms^{-1}

(4) 20 ms^{-1}

12. An aeroplane is flying horizontally with a velocity of 600 km/h at a height of 1960 m. When it is vertically at a point A on the ground, a bomb is released from it. The bomb strikes the ground at point B. The distance AB is

(1) 1200 m

(2) 0.33 km

(3) 3.33 km

(4) 33 km

13. A projectile fired with initial velocity at some angle has a range. If the initial velocity be doubled at the same angle of projection, then the range will be

(1) 2R

(2) R//2

(3) R

(4) 4R

14. If the initial velocity of a projectile be doubled, keeping the angle of projection same, the maximum height reached by it will

(1) Remain the same

(2) Be doubled

(3) Be quadrupled

(4) Be halved

15. A ball is thrown upwards and it returns to ground describing a parabolic path. Which of the following remains constant

(1) Kinetic energy of the ball

(2) Speed of the ball

(3) Horizontal component of velocity

(4) Vertical component of velocity

16. The range of a particle when launched at an angle of $15°$ with the horizontal is 1.5 km. What is the range of the projectile when launched at an angle of $45°$ to the horizontal

(1) 1.5 km

(2) 3.0 km

(3) 6.0 km

(4) 0.75 km

17. The position vector of particle changes with time according to the relation $r(t) = 15t^2\,\hat{i} + (4 - 20t^2)\,\hat{j}$. What is the magnitude of the acceleration (in ms^{-2}) at t =1?

(1) 50

(2) 100

(3) 25

(4) 40

18. Buses A and B are moving in the same direction with velocities $20\,\hat{i}\ ms^{-1}$ and $15\,\hat{i}\ ms^{-1}$, respectively. Then, relative velocity of A w.r.t. B is

(1) $35\,\hat{i}$

(2) $5\,\hat{i}$

(3) 5 $\hat{j}$
(4) 35 $\hat{j}$

19. Rain is falling vertically with a speed of 35 ms^{-1}. A woman rides a bicycle with a speed of 12 ms^{-1} in east to west direction. The direction in which she should hold her umbrella is
(1) at $\cos^{-1}$ (0.343) with vertical towards east
(2) at $\tan^{-1}$ (0.343) with vertical towards west
(3) at $\cos^{-1}$ (0.343) with vertical towards west
(4) at $\tan^{-1}$ (0.343) with vertical towards east

20. A car driver is moving towards a fired rocket with a velocity of 8 $\hat{i}$ ms^{-1}. He observed the rocket to be moving with a speed of 10 ms^{-1}. A stationary observer will see the rocket to be moving with a speed of
(1) 5 ms^{-1}
(2) 6 ms^{-1}
(3) 7 ms^{-1}
(4) 8 ms^{-1}

21. A girl can swim with speed 5kmh $^{-1}$ in still water. She crosses a river 2 km wide, where the river flows steadily at 2 kmh^{-1} and she makes strokes normal to the river current. Find how far down the river she go when she reaches the other bank.
(1) 1 km
(2) 2 km
(3) 800 m
(4) 750 m

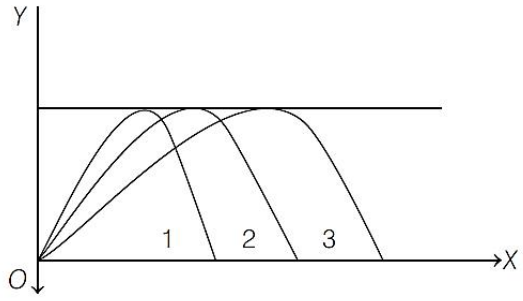
22. The stream of a river is flowing with a speed of 2 km/h. A swimmer can swim at a speed of 4 km/h. What should be the direction of the swimmer with respect to the flow of the river to cross the river straight ?
(1) 60°
(2) 120°
(3) 90°
(4) 150°

23. What is the range of a projectile thrown with velocity 98 ms^{-1} with angle 30° from horizontal?
(1) 490 $\sqrt{3}$ m
(2) 245 $\sqrt{3}$ m
(3) 980 $\sqrt{3}$ m
(4) 100m

24. Time taken by a stone to reach the maximum height is 5.8 s, then total time taken by the stone during which it was in flight is
(1) 5.8 s
(2) 11.6 s
(3) 2.9 s
(4) 4.2 s

25. A man can throw a stone to a maximum distance of 80 m. The maximum height to which it will rise, is
(1) 30 m
(2) 20 m
(3) 10 m
(4) 40 m

26. Given below figure show three paths of a rock with different initial velocities. The correct increasing order for the respective initial horizontal velocity component (ignoring the effect of air resistance) is



(1) 1< 2< 3
(2) 3< 2< 1
(3) 2< 1< 3
(4) 3< 1< 2

27. The ceiling of a long hall is 25 m high. What is the maximum horizontal distance that a ball thrown with a speed of 40 ms^{-1} can go without hitting the ceiling of the

hall?

(1) 150.5 m

(2) 250.5 m

(3) 130.2 m

(4) 100.5

28. A cricketer can throw a ball to a maximum horizontal distance of 100 m. How much high above the ground can the cricketer throw the same ball?

(1) 100 m

(2) 50 m

(3) 25 m

(4) 200 m

29. An aircraft executes a horizontal loop of radius 1 km with a speed of 900 kmh $^{-1}$. What is the ratio of its centripetal acceleration with the acceleration due to gravity?

(1) 6.38

(2) 3.19

(3) 12.76

(4) 5.38

30. The horizontal range of a projectile fired at an angle of 15° is 50 m. If it is fired with the same speed at an angle of 45°, its range will be

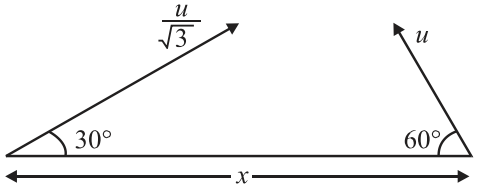
(1) 60 m

(2) 71 m

(3) 100 m

(4) 141 m

31. Two particle are separated by a horizontal distance x as shown in figure. They are projected as shown in figure with different initial speeds. The time after which the horizontal distance between them becomes zero is :



(1) x/u

(2) u/2x

(3) 2u/x

(4) none of these

32. A particle is moving with a velocity of 10 m/s towards east. After 10 s its velocity changes to 10 m/s towards north. Its average acceleration is:-

(1) Zero

(2) $\sqrt{2}$ m/s^2 towards N-W

(3) $\frac{1}{\sqrt{2}}$ m/s^2 towards N-E

(4) $\frac{1}{\sqrt{2}}$ m/s^2 towards N-W

33. A river is flowing at the rate of 6 km/h. A swimmer swims across the river with a velocity of 9 km/h w.r.t. water. The resultant velocity of the man will be in (km/h):-

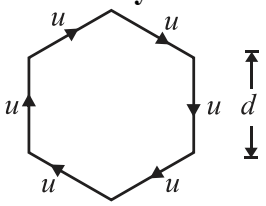
(1) $\sqrt{117}$

(2) $\sqrt{340}$

(3) $\sqrt{17}$

(4) $33\sqrt{40}$

34. Six persons of same mass travel with same speed u along a regular hexagon of side 'd' such that each one always faces the other. After how what will they meet each other?



(1) d/u

(2) 2d/3u

(3) 2d/u

(4) d $\sqrt{3}$u

35. A train is moving towards East with a speed 20 m/s. A person is running on the roof of the train with a speed 3 m/s against the motion of train. Velocity of the person as seen by an observer on ground will be :

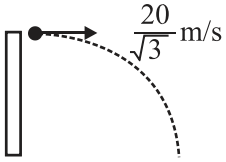
(1) 23 m/s towards East

(2) 17 m/s towards East

(3) 23 m/s towards West
(4) 17 m/s towards West

SECTION B

36. A particle is projected horizontally with a speed of $20/\sqrt{3}$m/s, from some height at t = 0. At what time will its velocity make 60° angle with the initial velocity



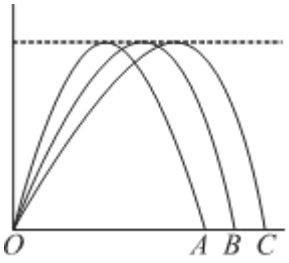
(1) 1 sec
(2) 2 sec
(3) 1.5 sec
(4) 2.5 sec

37. At what angle to the horizontal should a ball be thrown so that its range R is related to the time of flight T as R = 5T2? Take g = 10 ms^{-2}.
(1) 30°
(2) 45°
(3) 60°
(4) 90°

38. A particle is fired with velocity u making θ angle with the horizontal. What is the change in velocity when it is at the highest point?
(1) u cos θ
(2) u
(3) u sin θ
(4) (u cos θ – u)

39. A projectile is projected with initial velocity (6i + 8j) m/s. If g = 10 ms^{-2}, then horizontal range is:
(1) 4.8 metre
(2) 9.6 metre
(3) 19.2 metre
(4) 14.0 metre

40. Three projectiles A, B and C are thrown from the same point in the same plane. Their trajectories are shown in the figure. Which of the following statements is true?



(1) The time of flight is the same for all the three
(2) The launch speed is largest for particle C
(3) The horizontal velocity component is largest for particle C
(4) All of the above

41. A student is able to throw a ball vertically to a maximum height of 40 m. The maximum distance to which he can throw the ball in the horizontal direction is:
(1) 40 $(2)^{1/2}$
(2) 20 $(2)^{1/2}$
(3) 20 m
(4) 80 m

42. A particle is projected with a velocity u making an angle θ with the horizontal. At any instant, its velocity v is at right angle to its initial velocity u; then v is:
(1) u cos θ
(2) u tan θ
(3) u cot θ
(4) u sec θ

43. The range of a particle when launched at An angle of 15° with the horizontal is 1.5 km. What is the range of the projectile when launched at an angle of 45° to the horizontal?
(1) 1.5 km
(2) 3 km
(3) 6 km
(4) 0.75 km

44. A body is thrown horizontally from the top of a tower of height 5 m. It touches the ground at a distance of 10 m from the foot

of the tower. The initial velocity of the body is ($g=10ms^{-2}$)

(1) 2.5 ms^{-1}

(2) 5 ms^{-1}

(3) 10 ms^{-1}

(4) 20 ms^{-1}

45. The speed of boat is 5 kmh-1 in still water. It crosses a river of width 1 km along the shortest possible path in 15 min. Then, velocity of river will be

(1) 4.5 kmh^{-1}

(2) 4 kmh^{-1}

(3) 1.5 kmh^{-1}

(4) 3 kmh^{-1}

46. At the height 80 m, an aeroplane is moving with 150 ms^{-1}. A bomb is dropped from it so as to hit a target. At what distance from the target should the bomb be dropped (Given g =10 ms^{-2})

(1) 605.3 m

(2) 600m

(3) 80 m

(4) 230 m

47. A stone is projected in air. Its time of flight is 3 s and range is 150 m. Maximum height reached by the stone is (Take, g=10 ms^{-2})

(1) 37.5m

(2) 22.5 m

(3) 90m

(4) 11.25 m

48. Three balls of same masses are projected with Equal speeds at angle 15^o, 45^o, 75^o, and their ranges are respectively R_1, R_2 and R_3, then

(1) $R_1 > R_2 > R_3$

(2) $R_1 < R_2 < R_3$

(3) $R_1 = R_2 = R_3$

(4) $R_1 = R_3 < R_2$

49. Two paper screens A and B are separated by a distance of 100 m. A bullet pierces A and then B. The hole in B is 10 cm below the hole in A. If the bullet is travelling horizontally at the time of hitting A, then the velocity of the bullet at A is

(1) 100 ms^{-1}

(2) 200 ms^{-1}

(3) 600 ms^{-1}

(4) 700 ms^{-1}

50. The equation of projectile is $y = \sqrt{3}x - \frac{9}{2}x^2$ the angle of its projection is

(1) 90^o

(2) zero

(3) 60^o

(4) 30^o

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