

## Yakeen NEET 2.0 2026

## Physics by MR Sir

DPP: 5

## Motion in a Plane

**Q1** 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

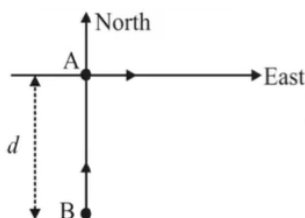
- (A)  $t\sqrt{a^2 + b^2}$  (B)  $2t\sqrt{a^2 + b^2}$   
 (C)  $\sqrt{a^2 + b^2}$  (D)  $2t^2\sqrt{a^2 + b^2}$

**Q2** Two particles A and B, move with constant velocities  $\vec{v}_1$  and  $\vec{v}_2$ . At the initial moment their position vector  $\vec{P}$  are  $\vec{r}_1$  and  $\vec{r}_2$  respectively. The condition for particles A and B for their collision is:



- (A)  $\vec{r}_1 \cdot \vec{v}_1 = \vec{r}_2 \cdot \vec{v}_2$   
 (B)  $\vec{r}_1 \times \vec{v}_1 = \vec{r}_2 \times \vec{v}_2$   
 (C)  $\vec{r}_1 - \vec{r}_2 = \vec{v}_1 - \vec{v}_2$   
 (D)  $\frac{\vec{r}_1 - \vec{r}_2}{|\vec{r}_1 - \vec{r}_2|} = \frac{\vec{v}_2 - \vec{v}_1}{|\vec{v}_2 - \vec{v}_1|}$

**Q3** As shown in figure, the particle  $B$  is south of  $A$  at a distance  $d$ . They start moving simultaneously, such that  $A$  moves with constant speed  $v$  towards east and  $B$  with constant speed  $v$  towards north. Find the minimum separation between them.



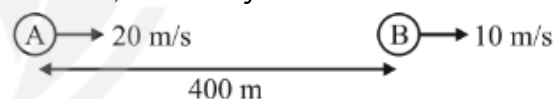
(A)

- $\frac{d}{\sqrt{2}}$   
 (B)  $\frac{d}{\sqrt{3}}$   
 (C)  $\frac{d}{2}$   
 (D)  $\sqrt{2}d$

**Q4** A student is standing at a distance of 50 metres from the bus. As soon as the bus begins its motion with an acceleration of  $1 \text{ ms}^{-2}$ , the student starts running towards the bus with a uniform velocity  $u$ . Assuming the motion to be along a straight road, the minimum value of  $u$ , so that the student is able to catch the bus is:

- (A)  $5 \text{ ms}^{-1}$  (B)  $8 \text{ ms}^{-1}$   
 (C)  $10 \text{ ms}^{-1}$  (D)  $12 \text{ ms}^{-1}$

**Q5** Find time, when they will meet.



- (A) 40 sec (B) 20 sec  
 (C) 10 sec (D) 25 sec

**Q6** Find relative velocity of B w.r.t. A



- (A) 30 m/s (B) 40 m/s  
 (C) 60 m/s (D) 10 m/s

**Q7** Ball A is projected downward with speed  $10 \text{ m/s}$  and ball B is dropped from same height then separation between them after 2 sec



- (A) 20 m (B) 5 m  
(C) 15 m (D) 8 m

**Q8** 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  $\alpha$  such that  $\tan \alpha$  is:

- (A)  $\frac{1}{7}$   
(B)  $\frac{3}{4}$   
(C)  $\frac{4}{3}$   
(D)  $\frac{3}{5}$

**Q9** A helicopter is flying south with a speed of  $50\text{kmh}^{-1}$ . A train is moving with the same speed towards east. The relative velocity of the helicopter as seen by the passengers in the train will be towards.

- (A) North east (B) South east  
(C) North west (D) South west

**Q10** A boat is sent across a river with a velocity of 8 km/hr. If the resultant velocity of boat is 10 km/hr, then velocity of the river is:

- (A) 10 km/hr  
(B) 8 km/hr  
(C) 6 km/hr  
(D) 4 km/hr

**Q11** 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 ?

- (A)  $60^\circ$  (B)  $120^\circ$   
(C)  $90^\circ$  (D)  $150^\circ$

**Q12** The velocity of water in a river is 2kmph, while width is 400 m. A boat is rowed from a point rowing always aiming opposite point of 8kmph

of still water velocity. On reaching the opposite bank the drift obtained is

- (A) 93 m  
(B) 100.8 m  
(C) 112.4 m  
(D) 100 m

**Q13** A man standing on a road hold his umbrella at  $30^\circ$  with the vertical to keep the rain away. He throws the umbrella and starts running at 10 km/hr. He finds that raindrops are hitting his head vertically, the speed of raindrops with respect to the road will be

- (A) 10 km/hr  
(B) 20 km/hr  
(C) 30 km/h  
(D) 40 km/hr

**Q14** A standing man observes rain falling with velocity of 20 m/s at an angle of  $30^\circ$  with the vertical. Find the velocity with which the man should move so that rain appears to fall vertically to him.

- (A) 10 m/s  
(B) 20 m/s  
(C) 30 m/s  
(D)  $10\sqrt{2}$  m/s



## Answer Key

Q1 (B)

Q2 (D)

Q3 (A)

Q4 (C)

Q5 (A)

Q6 (A)

Q7 (A)

Q8 (A)

Q9 (D)

Q10 (C)

Q11 (B)

Q12 (D)

Q13 (B)

Q14 (A)



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