**1.*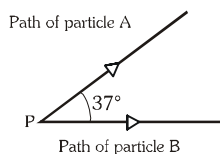* Two particles A and B start moving simultaneously from a point P on straight-line paths. Their paths make an angle of 37° with each other as shown in the figure. One of them moves with uniform speed of 10 m/s and the other with 8 m/s.


Distance between the particles 40 s after they leave point P is closest to

(A) 192 m   (B) 240 m   (C) 320 m   (D) 426 m

2. Velocity of a boat relative to river current and river current velocity are equal in magnitude. Starting from point A on the southern bank, the boatman wants to reach a point B on the northern bank in north–east from A. In which direction he has to steer the boat ?
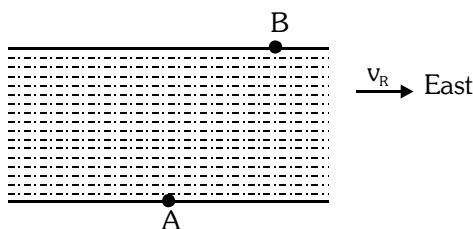

(A) North–east   (B) North   (C) North–west   (D) Not possible.

3. A boy holding a flag when is standstill, the flag flutters in 53° north of west and when he starts running westwards with velocity 6 m/s, the flag flutters in the north. Wind velocity is closest to

(A) 8 m/s, 53° north of west   (B) 8 m/s, 53° east of south

(C) 10 m/s, 53° north of west   (D) 10 m/s, 53° east of south

4. A helicopter is flying due south with constant velocity 80 km/h and a train is running with the same speed due east. Direction of velocity of the helicopter relative to the train as observed by the passengers in the train is

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

5. A boat which is moving downstream passes a raft and moves 10 km ahead of raft in next one hour and then returns upstream with same speed relative to river and meets the raft after the raft has moved 10 km. If the same boat wishes to cross the river without any drift then the angle boat should row with stream velocity is

(A) $\dfrac{\pi}{2} + \tan^{-1}(2)$ (B) $\dfrac{\pi}{2} + \tan^{-1}\left(\dfrac{1}{2}\right)$ (C) $\dfrac{\pi}{2} + \sin^{-1}\left(\dfrac{2}{3}\right)$ (D) 120°

6. A ship X moving due north with a velocity v observes that another ship Y is moving due west with velocity v. The actual velocity of Y is

(A) v due east.   (B) $\sqrt{2}v$ towards northwest

(C) v towards southeast   (D) $\sqrt{2}v$ towards northeast

7. A river is flowing with a speed of 1 m/s. A swimmer wants to go to point C starting from A. He swims with a speed of 5 m/s, at an angle θ w.r.t. river flow. If AB = BC = 1000 m. Then the value of θ is
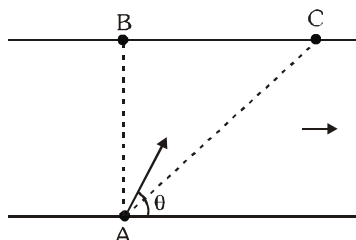
(A) 30° (B) 37° (C) 45° (D) 53°

8. A man can swim in still water with a speed of 25 m/min. If the speed of the stream is 15 m/min, and its width is 100 m, the time taken to cross the stream by shortest route and the quickest route is

(A) 3 min, 5 min (B) 5 min, 4 min (C) 3 min, 4 min (D) 4 min, 5 min

9. A monkey is climbing up a tree at a speed of 3 m/s. A dog runs towards the tree with a speed of 4 m/s. What is the relative speed of the dog as seen by the monkey?

(A) > 7 m/s (B) between 5 m/s and 7 m/s

(C) 5 m/s (D) < 5 m/s

10. As two boats approach the mumbai, the velocity of boat 1 relative to boat 2 is $10\sqrt{3}$ kmhr^{-1} in a direction of 60° north of east. If boat 2 has a velocity of 15 kmhr^{-1} due south. What is the velocity of boat 1 ?

(A) $5\sqrt{3}$ kmhr^{-1} due south-east (B) 5 kmhr^{-1} due east

(C) 10 kmhr^{-1} due north (D) $5\sqrt{3}$ kmhr^{-1} due east

11. A bus starts moving with acceleration 1m/s² at the same time a person who is 11 m behind the bus starts chasing it with velocity 5m/s find how long will it take him to catch the bus

(A) 5+√3sec (B) 5–2√3sec (C) 15–√3sec (D) 5–√3sec

12. Two trains, which are moving along different tracks in opposite directions towards each other, are put on the same track by mistake. Their drivers, on noticing the mistake, start slowing down the trains when the trains are 300 m apart. Graphs given below show their velocities as function of time as the trains slow down. The separation between the trains after both have stopped, is:
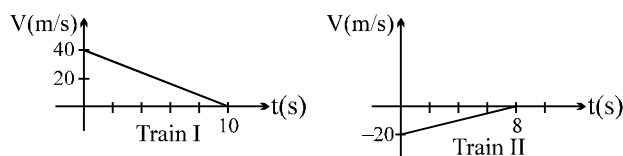
(A) 120 m (B) 280 m (C) 60 m (D) 20 m

13. A man is running up the inclined plane (making an angle α from the horizontal) with a constant velocity. Rain is falling perpendicular to the incline plane. During motion man observes that rain is falling in vertical direction, when man doubles his velocity he observes that rain is making an angle α from the incline. Value of α is

(A) tan^{-1}(0) (B) tan^{-1}(√2) (C) tan^{-1}(1/√2) (D) tan^{-1}(1/2)

Answers

1. (B) 2. (B) 3. (C) 4. (B) 5. (D) 6. (B) 7. (D) 8. (B) 9. (C) 10. (D)
11. (D) 12. (D) 13. (C)