TIME, SPEED AND DISTANCE- ADVANCE

Q 1. A railway track runs parallel to an unpaved road. The milestones adjacent to the track indicates the distance (in miles) the train has travelled from the nearby station. Shewta rides her bicycle at a speed of 12 mph to the city every day and meets the train running in the same direction at 12th milestone when the train is as per schedule and she is in time. However one day when Shewta is running late by 25 min, she meets the train (on time) at 6th milestone. The speed of the train is

(a) 60 mph   (b) 72mph   (c) 880 mph   (d) 96 mph

Directions for questions 2 and 3:
Sachin, Ramesh and Tendulkar decides to watch Dilwale. They have one motorcycle that can be driven by any one of them and due to strict traffic rules only 2 are allowed on a motorcycle. All 3 can walk with a speed of 10 km/h. The distance between their home to theatre is 210 km.

Q 2: If the speed of the motorcycle is 40 km/h, then what is the shortest possible time in which all three of them can reach theatre from home?

(a) 8.35 hours   (b) 11.55 hours   (c) 9.5 hours   (d) 10.35 hours

Q 3: If the speed of the motorcycle is 70 km/h, then what is the total distance that the motorcycle travels if they travel such that all three of them reach theatre simultaneously?

(a) 446 km   (b) 514 km   (c) 462 km   (d) 420 km

Q 4. A man in a speed boat, which could travel only at 50 km/hr, was driving his boat up a river which flowed with a constant speed. As he was driving, his spare life jacket fell of the boat. Twenty minutes later, the man noticed that his jacket was gone, and he turned to get it back as soon as possible. He found it 3 km downstream where he lost it. How fast was the river flowing?

(a) 4.5 km/hr   (b) 4.13 km/hr   (c) 4.8 km/hr   (d) 5 km/hr

Directions for Question 5 and 6
Two friends P and Q start jogging from the vertex A of a regular polygon ABCD in the same direction. P completes one round and meets Q at a point S, while Q is yet to complete his first round. Upon meeting at S, P reverses his direction and both of them meet again, this time at A. The other vertices of the polygon are B, C and D that order

Q5: What is the ratio of speeds of P and Q?

(a) $\sqrt{2} : 1$ (b) $\sqrt{2} + 1 : 1$ (c) $1 : \sqrt{2} - 1$ (d) Either [b] or [c]

Q6: Point S lies between

(a) A and B   (b) B and C   (c) C and D   (d) Cannot be determined

Q 7: Two fielders, Kohli and Raina, run behind a ball moving at 0.8 m/s. Raina, which is 6 m behind Kohli at time t = 0, runs 1.5 times faster than Kohli. When the first one to reach the ball out of Kohli and Raina, reaches the ball, the two fielders are 3 m apart. How far ahead of Kohli was the ball to start with (at t = 0)? The first one to reach the ball, out of Kohli and Raina, reaches the ball at time t = 5 seconds

(a) 1 m   (b) 2 m   (c) 17 m   (d) either 2 m or 17 m

Q 8: A man rows a boat from point A against current for 10 minutes and then come back with the current for next 10 minutes and reaches to a point B. if distance between A and B is 1 km, find the speed of the current.

(a) 2.5 km/hour   (b) 3 km/hour   (c) 3.5 km/hour   (d) 4 km/hour

Q 9: 2 cyclist A and B cover a distance of 110 km, A reaches the destination one hour before B. even if B had given a start of 8 km, he would have reached 12 minutes late. Find the speed of A.

(a) 5.5 km/hour   (b) 22 km/hour   (c) 11 km/hour   (d) 33 km/hour

Q 10: Sharukh climb 11 stairs in the same time as Salmaan climbs 8 stairs. If Salmaan starts climbing the stairs 5 seconds before Sharukh starts climbing them, both of them reach the top of the stairs simultaneously. What is the number of stairs in the staircase?

(a) 33   (b) 24   (c) 19   (d) Indeterminate

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SOLUTION

Solution 1: (b)
Speed of Shweta is 12 mph.
Everyday Shweta reaches at 6th milestone 30 minutes before. But today she is late by 25 minutes and meets the train at 6th milestone. Hence the train has to cover a distance of 6 miles in 5 minutes.
Speed of train would be 72 mph.

Solution 2: (c)

Home ←――――――→ D ←――――――――――→ C ←――――――→ Theatre

Let Sachin take Ramesh with him on the motorcycle and drop him at C and return to find Tendulkar (who already started walking when both of them left) at D and by the time Sachin and Tendulkar reach theatre Ramesh would travel from C to theatre implies all three reach theatre simultaneously.
Let the distance from Home to D be x and C to D be y and C to theatre be z.
Now since the motorcycle travels four times as fast as they walk, you can get the following ratios:
(x/x + 2y) = 10/40
x = 2y/3.
Similarly, z = 2y/3.
Or x = z.
This relation gives x = 60, y = 90 and z = 60.
Total time = Tendulkar walks from Home to D and travels in the motorcycle from D to theatre.
i.e. = $\frac{60}{10} + \frac{150}{40}$ = 6 + 3 $\frac{3}{4}$ = 9$\frac{3}{4}$ hours

Solution 3: (c)
If speed of motorcycle = 70 km/hour i.e., the motorboat travels 7 times as fast as they walk
(x/x + 2y) = 10/70
x = y/3.
Similarly, z = y/3.
Or x = z.
This relation gives x = 42, y = 126 and z = 42.
Hence motorcycle will travel x + 3y + z = 462

Solution 4: (a)
Let the speed of water be s km/hour. Relative speed while travelling upstream = (50 – s) km/hour.
As he was driving, his spare life jacket fell of the boat (at P say), 20 minutes
Distance travelled by man in 20 minutes = 1/3 hour. Upstream = (50 – s)/3 km (let this is PQ).
Distance travelled by jacket in 20 minutes downstream = s/3 km (let this is PR)
Hence initial distance of separation = d = PQ + PR = s/3 + (50 - s)/3 = 50/3 km.
Later the man noticed the jacket was gone and turned back to get it.
Time taken to get it = d/relative speed travelling downstream between man and jacket = d/(50 + s –s) = d/50 =50/(3 × 50) = 1/3 hours.
Distance travelled by him in this time = QT = (50 + s)/ 3
He found it 3 km away from where he lost it.
PT = 3 km = QT – PQ = [(50 + s)/3] – [(50 – s)/3]
50 + s – 50 + s = 9
S = 4.5 km/hour.

Solution for questions 5 and 6
Let the length of each side of the square is x.

As P completes one round and meet Q somewhere at the track. Let that distance be y from the starting point.

$\frac{speed_P}{speed_Q} = \frac{4x+y}{y}$. Now, P returns back to the starting point and meet Q there.

$\frac{speed_P}{speed_Q} = \frac{y}{4x-y}$. Equating both the equations, we get $y = \sqrt{2}x$. Substitute this value in the equation

gives $\frac{speed_P}{speed_Q} = \frac{\sqrt{2}+1}{1} = \frac{1}{\sqrt{2}-1}$

Solution 5: (d)

Solution 6: (d)
We do not know the direction of running. Hence cannot be determined.

Solution 7: (d)
Let d be the distance between Raina and the ball at t = 0 also suppose that K and R = 1.5 K are the respective speeds of Kohli and Raina.

Case 1: Raina catches the ball and Kohli is 3 m behind Raina. We get the following 2 equations:

(1.5 K − 0.8) × 5 = d

d − 6 − 3 = (K − 0.8) 5

Solving the above 2 equations, we get K = 3.6 m/sec and d − 6 (which is the distance between the ball and Kohli at t = 0) = 17

Case 2:
Kohli catches the ball and Raina is 3 m behind Kohli. We get the following 2 equations:

(1.5 K − 0.8) × 5 = d - 3

d − 6 = (K − 0.8) 5

Solving the above 2 equations, we get K = 1.2 m/sec and d − 6 (which is the distance between the ball and Kohli at t = 0) = 2

Solution 8: (b)
Going with current and against current for the same time means speed of the boat in still water is neutralized.

Speed of current only moves the boat.

Boat is moved 1 km by the current in (10 + 10) minutes = 20 minutes = $\frac{1}{3}$ hour.

Therefore, speed of current = 1 × 3 = 3 km/h.

Solution 9: (c)
In first case, B is late by 60 min's

In second case B, after getting a start of 8 km, he reaches 12 min's late.

Therefore, time taken by B travel 8 km = 60 − 12 = 48 min's

Therefore, B's speed = $\frac{8}{48} \times 60 = 10\ km/h$

Therefore, time taken by B = $\frac{110}{10}$ = 11 hours

Therefore, time taken by A = 11 − 1 = 10 hours

Therefore, A's speed = $\frac{110}{10}$ = 11 km/h

Solution 10: (d)
In the question, only relative values are given. Hence, we can't determine the actual value.

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