BOATS AND STREAMS

S.No	Sub Topic	Details	Formula
1	Downstream	In water, the direction along the stream is called downstream. If boat speed in still water is u km/hr & the stream speed is v km/hr, then:	Speed downstream = (u + v) km/hr.
2	upstream	In water, the direction against stream is called upstream.	Speed upstream = (u - v) km/hr.
3	Speed in still water	If the speed downstream is a km/hr and the speed upstream is b km/hr	Speed in still water= (a + b) / 2 km/hr.
4	Rate of stream	If the speed downstream is a km/hr and the speed upstream is b km/hr	Rate of stream =(a + b) / 2 km / hr.

Problems with solutions

1. A man's speed with the current is 15 km/hr and the speed of the current is 2.5 km/hr. The man's speed against the current is:

Solution

Man's rate in still water = (15 - 2.5) km/hr = 12.5 km/hr.

Man's rate against the current = (12.5 - 2.5) km/hr = 10 km/hr.

2. In one hour, a boat goes 11 km/hr along the stream and 5 km/hr against the stream. The speed of the boat in still water (in km/hr) is:

Solution

Speed in still water = $\frac{1}{2}$(11 + 5) kmph = 8 kmph.

3. The speed of a boat in still water in 15 km/hr and the rate of current is 3 km/hr. The distance travelled downstream in 12 minutes is:

Solution

Speed downstream = (15 + 3) kmph = 18 kmph.

Distance travelled = $\left(18 \text{ x } \frac{12}{60} \right)$ km = 3.6 km.

4. A man can row at 5 kmph in still water. If the velocity of current is 1 kmph and it takes him 1 hour to row to a place and come back, how far is the place?

Solution

Speed downstream = (5 + 1) kmph = 6 kmph.

Speed upstream = (5 - 1) kmph = 4 kmph.

Let the required distance be x km.

Here $\dfrac{x}{6} + \dfrac{x}{4} = 1$

2x + 3x = 12

5x = 12

x = 2.4 km.

5. A boatman goes 2 km against the current of the stream in 1 hour and goes 1 km along the current in 10 minutes. How long will it take to go 5 km in stationary water?

Solution

Rate downstream = $\dfrac{1}{10}$ x 60 km/hr = 6 km/hr.

Rate upstream = 2 km/hr.

Speed in still water = $\dfrac{1}{2}$(6 + 2) km/hr = 4 km/hr.

Required time = $\dfrac{5}{4}$hrs = $1\dfrac{1}{4}$ hrs = 1 hr 15 min.