

Boats and Streams: 8 Important Shortcuts & Tricks Explained with Examples

Stream: Moving water of the river is called stream.

Still Water: If the water is not moving then it is called still water.

Upstream: If a boat or a swimmer moves in the opposite direction of the stream then it is called upstream.

Downstream: If a boat or a swimmer moves in the same direction of the stream then it is called downstream.

Points to remember

i. When speed of boat or a swimmer is given then it normally means speed in still water.

ii. If speed of boat or swimmer is x km/h and the speed of stream is y km/h then,

Speed of boat or swimmer upstream = $(x - y)$ km/h

Speed of boat or swimmer downstream = $(x + y)$ km/h

iii. Speed of boat or swimmer in still water is given by

= $\frac{1}{2}(\text{Downstream} + \text{Upstream})$

Speed of stream is given by

= $\frac{1}{2}(\text{Downstream} - \text{Upstream})$

Some Shortcut Methods

Trick-1:

A man can row certain distance downstream in t_1 hours and returns the same distance upstream in t_2 hours. If the speed of stream is y km/h, then the speed of man in still water is given by

$$= \frac{y(t_2 + t_1)}{t_2 - t_1}$$

Ex: A man can row certain distance downstream in 2 hours and returns the same distance upstream in 4 hours. If the speed of stream is 5 km/h, then the speed of man in still water ?

a. 15 b. 10 c. 12 d. 20

Sol: = $5 \cdot (4+2)/(4-2) = 15$ km/hr

Trick-2:

A man can row certain distance downstream in t_1 hours and returns the same distance upstream in t_2 hours. If the speed of stream is y km/h, then the speed of man in still water is given by

$$= y \cdot (t_2 - t_1) / (t_2 + t_1)$$

Ex : Ramesh can row a certain distance downstream in 6 hours and returns the same distance in 9 hours. If the speed of Ramesh in still water is 12 kmph. Find the speed of the stream?

- a. 2.4 b. 10 c. 1.2 d. 20

Sol : Speed of the stream =
 $12 (9-6) / (9+6)$
 = 2.4 kmph

Trick-3:

A man can row in still water at x km/h. In a stream flowing at y km/h, if it takes him 't' hours to row to a place and come back, then the distance between two places is given by

$$= [t \cdot (x^2 - y^2)] / (2 \cdot x)$$

Ex: A man can row in still water at 4 km/h. In a stream flowing at 2 km/h, if it takes him '5' hours to row to a place and come back, then the distance between two places ?

- a. 15 b. 10 c. 12 d. 7.5

Sol : $[5 \cdot (16-4)] / (2 \cdot 4) = 7.5$ km

Trick-4:

A man can row in still water at x km/h. In a stream flowing at y km/h, if it takes t hours more in upstream than to go downstream for the same distance, then the distance is given by

$$= [t \cdot (x^2 - y^2)] / (2 \cdot y)$$

Ex: A man can row in still water at 4 km/h. In a stream flowing at 2 km/h, if it takes 3 hours more in upstream than to go downstream for the same distance, then the distance swims by person ?

- a. 15 b. 9 c. 12 d. 7.5

Sol : $[3 \cdot (16-4)] / (2 \cdot 2) = 9$ km

Trick-5:

A man can row in still water at x km/h. In a stream flowing at y km/h, if he rows the same distance up and down the stream, then his average speed is given by

$$= (x^2 - y^2) / x$$

= (Downstream * Upstream) / man speed in still water.

Ex: A man can row in still water at 4 km/h. In a stream flowing at 2 km/h, if he rows the same distance up and down the stream, then his average speed ?

a. 6 b. 9 c. 3 d. 7.5

Sol : $(16-4)/4 = 3$ km/hr

Trick-6:

A man can row a distance 'D' upstream in t1 hrs. If he rows the same distance down the stream in t2 hrs. then speed is given by

Stream speed = $[D*(t1-t2)]/(2*t1*t2)$

Ex: A man can row a distance 30 km upstream in 5 hrs. If he rows the same distance down the stream in 3 hrs. then speed of stream ?

a..8 b. 4 c. 2 d. 6

Sol : $[30*(5-3)]/(2*5*3) = 2$ km/hr

Trick-7:

A man can row a distance 'D' upstream in t1 hrs. If he rows the same distance down the stream in t2 hrs. then speed is given by

Man speed = $[D*(t1+t2)]/(2*t1*t2)$

Ex: A man can row a distance 30 km upstream in 5 hrs. If he rows the same distance down the stream in 3 hrs. then speed of man ?

a. 8 b. 4 c. 2 d. 6

Sol : $[30*(5+3)]/(2*5*3) = 8$ km/hr