

## 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