KD LIVE
STUDY CONTENTS THAT GET YOU SELECTED
5 LAKH+ STUDENTS
Already enrolled with our selection focused courses.
30+ EXPERT INSTRUCTORS
Our instructors are the best In the industry
10000+ HOURS OF VIDEOS
All videos are well-explained for you to get every bit out of the videos
FREE PDF

In today's blog. we will be looking over some basic terminology, problems on Boats and specific cases of Boat problems and tricks.

Let's get start our topic boats and streams and discuss different types of questions.

Case 1: Suppose you are in a motorboat that is running at some speed in the serene ocean so all the speed will be from a boat.

Case 2: Now your boat is in some river and trying to go opposite to the stream, difficult task? In this case the speed of the boat is reduced to some extent because the stream is pushing you backside.

Case 3: Like in case -2 you are in the river but the stream is in the same direction to you you will face immense speed because the speed of the stream is adding to the boat.

Now let's get back to reality, if you were able to imagine all three scenarios then congrats your class is over, all is now a piece of cake. So let's begin.

E.g. man can row with a speed of 6 km/h in still water. How much distance would he cover in 2 hours? Sol: After reading this question you would know that it is case 1. v = 6 km/h, t = 2 h Distance = speed × time = 6 × 2 = 12 km (Ans.)

Problem on boats

Upstream Motion: If the speed of a boat is against the direction of motion.

Downstream Motion: If the speed of the boat is in the same direction of motion.

Let the speed of a boat in still water be x m/s, speed of the stream be y m/s, speed of downstream motion be D and speed of upstream motion be U.

1. Speed downstream (D) = (x + y) m/s
2. Speed upstream(U) = (x – y) m/s
3. Speed of boat in still water (x) = (D + U)/2
4. Speed of stream (y) = (D – U)/2

These four are the utmost important formulas of this unit funda to clear, put the value and find the answer.

E.g. A man can row with a speed of 6 km/h in still water. What will be his speed with the stream, if the speed of the stream is 2 km/h? Sol: x = 6 km/h and y = 2 km/h Here the speed of the stream is in the same direction of motion, there would be downstream motion. D = x + y = 6 + 2 = 8 km/h (Ans.)

E.g. Shantanu can row upstream at 10 km/h and downstream at 18 km/h. Find the man's speed. Sol: In still water and the rate of the current. ⇒ U = 10 km/h, D = 18 km/h (given) Speed in still water = (D + U)/2 = (10 + 18)/2 = 14 km/h (Ans.) Speed of current = (D – U)/2 = (18 – 10)/2 = 4 km/h (Ans.)

Follow us on
Address : 1997, Mukherjee Nagar, 110009
Email : online@kdcampus.org
Call : +91 95551 08888
Download the App
GET IT ON Google Play

STUDY CONTENTS THAT GET YOU SELECTED
5 LAKH+ STUDENTS Already enrolled with our selection focused courses.
30+ EXPERT INSTRUCTORS Our instructors are the best In the industry
10000+ HOURS OF VIDEOS All videos are well-explained for you to get every bit out of the videos
FREE PDF

As we know x = v / t For fix distance speed will be inversely proportional to time, ⇒ **Time is taken by boat in Downstream / Time taken in Upstream = Upstream speed / Downstream speed**

E.g. A man can row 9 km/h in still water. It takes him twice as long to row up than to row downstream. Find the rate of the stream for the river. Sol: Let he takes t time to row downstream so he would take 2t time to row upstream and the rate of stream be x km/h According to formula, t/2t = (9 − x)/(9 + x) ⇒ 1/2 = (9 − x)/(9 + x) ⇒ 18 − 2x = 9 + x ⇒ 3x = 9 □x = 3 km/h (Ans.)

E.g. A man can row 12 km/h in still water. When the river is running at 2.4 km/h, it takes him 1 h to row to a place and to come back. How far is the place? Sol: In this situation first, he travels d distance upstream then he returns d distance downstream. D = 12 + 2.4 = 14.4 km/h and U = 12 − 2.4 = 9.6 km/h Total time = time in upstream motion + time in downstream motion. ⇒ d/ 9.6 + d/14.4 = 1 ⇒ d [1/ 9.6 + 1/14.4] = 1 ⇒ d = 28.8/(2 + 3) = 5.76 km (Ans.)

Specific types of Boat problems

Let's see some specific types of concepts and problems.

Type 1: If speed of the boat in still water is S_{Still} and it takes n times as long to row up the boat to row down the river, then $\mathbf{S_{Stream} = S_{Still} \times (n - 1)/(n + 1)}$ Let's understand this type of problem with an example.

E.g. Ramu can row 9 km/hr in still water. It takes him twice as long to row up as to row down. Find the rate of stream. Sol: Here, S_{Still} = 9 km/hr and n = 2 Let, the rate of stream be a km/hr and total distance be x km/ hr. Then, Speed downstream = (a + 9) km/hr Speed upstream = (9 − a) km/h Time taken to row down = 2 × Time taken to row up ⇒x/(a + 9) = 2 × x/(9 − a) ⇒ 1/(a + 9) = 2/(9 − a) ⇒ 2 × (a + 9) = (9 − a) ⇒ 2a + 18 = 9 − a ⇒ 3a = -9 ⇒ a = -3 Since, speed is a scalar quantity, it cannot be negative. ⇒Speed of the Stream = 3 km/hr (Ans). By formula, $S_{Stream} = S_{Still} \times (n - 1)/(n + 1)$ = 9 × (2 − 1)/(2 + 1) km/hr = 9 × 1/3 km/hr = 3 km/hr (Ans.)

E.g. A man can row up his boat the speed of 4 km/hr and he finds that the time taken rowing upstream is double to that taken downstream. Find the speed of the stream. Sol: Here, S_{Still} = 4 km/hr and n = 2 By formula, $S_{Stream} = S_{Still} \times (n - 1)/(n + 1)$ = 4 × (2 − 1)/(2 + 1) km/hr = 4 × 1/3 km/h = 1.33 km/h (Ans).

Type 2: If the speed of the stream is S_{Stream} and a man rows a boat to a certain distance downstream in x h and returns the same distance in y h, then speed of the man in still water-$\mathbf{S_{Still} = S_{Stream} \times (x + y)/(y - x)}$

Let's understand this type with an example.

E.g. Aditya can row a certain distance downstream in 9 hrs and can come back the same distance upstream in 12 hr. If the speed of the stream is 3 km/hr, then find the speed of Aditya in still water. Sol: SStream = 3 km/hr Let, the speed in still water be x km/hr. Then, Speed Downstream = (x + 3) km/hr & Speed Upstream = (x − 3) km/hr Distance travelled downward = Distance travelled upward ⇒ 9 × (x + 3) = 12 × (x − 3) ⇒ 9x + 27 = 12x − 36 ⇒ 12x − 9x = 27 + 36 ⇒ 3x = 63⇒ x = 21 ⇒ Speed of Aditya in still water = 21 km/hrs (Ans). By formula: $S_{Still} = S_{Stream} \times (x + y)/(y - x)$ = 3 × (9 + 12)/(12 − 9) km/hrs = 3 × 21/3 km/h = 3 × 7 km/h = 21 km/h (Ans).

Follow us on
Address : 1997, Mukherjee Nagar, 110009
Email : online@kdcampus.org
Call : +91 95551 08888
Download the App
GET IT ON Google Play

STUDY CONTENTS THAT GET YOU SELECTED
5 LAKH+ STUDENTS
Already enrolled with our selection focused courses.
30+ EXPERT INSTRUCTORS
Our instructors are the best In the industry
10000+ HOURS OF VIDEOS
All videos are well-explained for you to get every bit out of the videos
FREE PDF

Mostly questions will revolve around some formulas and concepts of Speed, Time and Distance, here we end our series of Speed, Time and Distance. Practice questions so that you can prepare well.

Follow us on
Address : 1997, Mukherjee Nagar, 110009
Email : online@kdcampus.org
Call : +91 95551 08888
Download the App
GET IT ON Google Play