

Boats and Streams

Boats and Streams



OnlineStudy4u

Placement for All. All for Placement

This Video Completely covers the "Boats and Streams" which is more than sufficient for all kind of placement Exams eg: TCS/WIPRO/AMCAT/ELITMUS/CoCubes and all other placement Exams.

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Boats & streams

Speed of boat (u), Speed of stream (v)

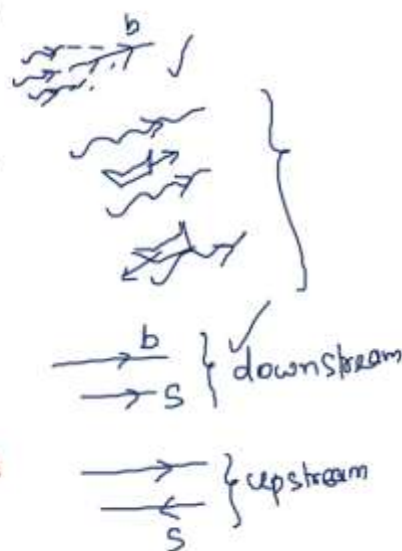
✓ downstream speed (a) = $u + v$ ✓ - (1)

✓ upstream speed (b) = $u - v$ ✓ - (2)
 $u > v$ ✓

(1) + (2) $\Rightarrow u + v + u - v = 2u = \frac{1}{2} \times 2u = u$ ✓

$\frac{1}{2}(a + b) = u$ ✓

(1) - (2) $\Rightarrow \frac{1}{2}(a - b) = v$ ✓ — speed of stream

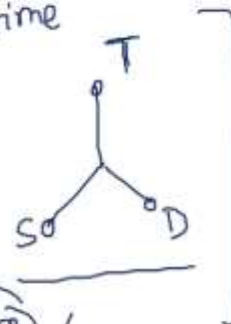


(1) $D = S \times t \Rightarrow \text{distance} = \text{speed} \times \text{time}$

(2) $\frac{\text{km}}{\text{hr}} \xrightarrow{\times \frac{5}{18}} \frac{\text{m}}{\text{s}}$
 $\frac{\text{m}}{\text{s}} \xrightarrow{\times \frac{18}{5}} \frac{\text{km}}{\text{hr}}$

$1 \text{ km} = 1000 \text{ m}$
 $1 \text{ hr} = 3600 \text{ s}$

$\frac{10}{36} \times \frac{5}{18} \frac{\text{m}}{\text{s}} \checkmark$



Boats and Streams

Q1. A can row upstream at 7km/hr and downstream at 10km/hr. find man's rate in still water and the rate of current respectively?

a. 5.5km/hr, 7.5km/hr b. 8.5km/hr, 1.5km/hr c. 7.5km/hr d. none

upstream speed (b) = 7 km/hr

downstream speed (a) = 10 km/hr

speed of man / speed of boat

$$u = \frac{1}{2}(a+b) = \frac{1}{2}(10+7) = \frac{17}{2} = 8.5 \text{ km/hr}$$

$$v = \frac{1}{2}(a-b) = \frac{1}{2}(10-7) = \frac{3}{2} = 1.5 \text{ km/hr}$$

→
Stream
current
River

Boats and Streams

Q2. A man can row upstream at 8 kmph and downstream at 13 kmph. The speed of the stream is;

A) 2.5 km/hr B) 4.2 km/hr

C) 5 km/hr

D) 10.5 km/hr

B) E) 11 km/hr

Solution:

$$b = 8 \text{ km/hr}$$

$$a = 13 \text{ km/hr}$$

$$\begin{aligned} \text{speed of stream (v)} &= \frac{1}{2}(a-b) \\ &= \frac{1}{2}(13-8) \\ &= \frac{5}{2} = 2.5 \text{ km/hr} \end{aligned}$$

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Q3. 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:

A. 8.5 km/hr B. 9 km/hr C. 10 km/hr D. 12.5 km/hr

Solution:



$$\text{downstream speed} = 15 \text{ km/hr}$$

$$\text{speed of current (v)} = 2.5 \text{ km/hr}$$

$$\text{speed of man (b)} = \frac{1}{2}(a-b)$$

$$2.5 = \frac{1}{2}(15-b)$$

$$5 = 15 - b$$

$$b = 10 \text{ km/hr}$$

$$\text{upstream speed (b)} = 9$$

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Q4. The speed of a boat in still water is 15 km/hr and the rate of current is 3 km/hr. The distance travelled downstream in 12 minutes is:

A. 1.2 km B. 1.8 km C. 2.4 km **D. 3.6 km**

Solution:

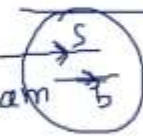
Info: $u = 15 \text{ km/hr}$
 $v = 3 \text{ km/hr}$ ✓

distance $\xrightarrow{12 \text{ min}}$

1 hr = 60 min
 $\frac{1}{60} = 1 \text{ min}$ ✓
 $t = 12 \text{ min}$
 $= \frac{12}{60} \text{ hr}$

down stream Speed
 $a = u + v$
 $= (15 + 3)$
 $= 18 \text{ km/hr}$

$d = s \times t$
 $d = 18 \text{ km/hr} \times \frac{12}{60}$
 $d = 3.6 \text{ km}$ ✓



Boats and Streams

Q5 A man takes twice as long to row a distance against the stream as to row the same distance in favour of the stream. The ratio of the speed of the boat (in still water) and the stream is:

A. 2 : 1 B. 3 : 1 C. 3 : 2 D. 4 : 3

Solutions: against the stream =
 $2 \times t$ along the stream

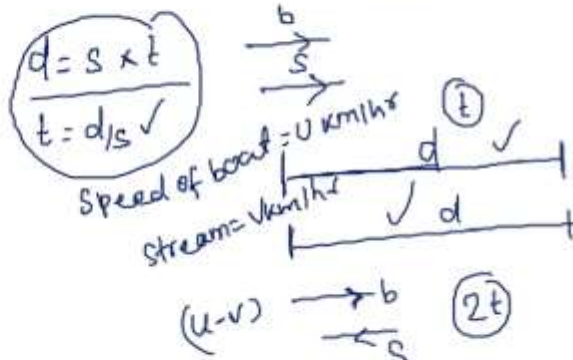
$$\frac{d}{(u-v)} = 2 \times \frac{d}{(u+v)}$$

$$2u - 2v = u + v$$

$$2u - u = 3v$$

$$u = 3v$$

$$u : v = 3 : 1$$



Boats and Streams

Q6 In a fixed time, a boy swims double the distance along the current that he swims against the current. If the speed of the current is 3 km/hr, the speed of the boy in water is:

a) 6 km/hr b) 9 km/hr c) 10 km/hr d) 12 km/hr

Solutions:

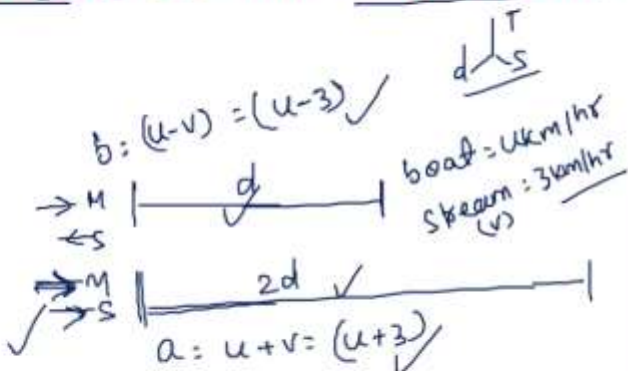
Info: $d = s \times t$
 $t = \frac{d}{s}$

$$t_d = t_u$$

$$\frac{2d}{u+3} = \frac{d}{u-3}$$

$$2u - 6 = u + 3$$

$$u = 9 \text{ km/hr}$$



Boats and Streams

Q7. A man can row 18kmph in still water. It takes him thrice as long to row up as to row down the river. Find the rate of stream

a) 5km/hr b) 7km/hr c) 9km/hr d) 10km/hr

Solutions:

Info ✓
 $u = 18 \text{ km/hr}$
 $t_u = 3 \times t_d$
 $d = s \times t$
 $t = d/s$
 $b = u - v = 18 - v$
 $d \text{ upstream} = \frac{3t}{\cancel{3}} \checkmark$
 $d \text{ downstream} = t \checkmark$
 $a = u + v = 18 + v$
 $\Rightarrow \frac{d}{18 - v} \times \frac{3 \times d}{18 + v}$
 $\Rightarrow 54 - 3v = 18 + v$
 $= 36 = 4v$
 $v = 9 \text{ km/hr} \checkmark$

Boats and Streams

Q8. Speed of a boat in standing water is 9 kmph and the speed of the stream is 1.5 kmph. A man rows to a place at a distance of 105 km and comes back to the starting point. The total time taken by him is:

A. 16 hours B. 18 hours C. 20 hours D. 24 hours

Solutions:

$u = 9 \text{ km/hr}$
 $v = 1.5 \text{ km/hr}$
 $d = 105 \text{ km}$
 $d = s \times t$
 $t = d/s$
 $t_d + t_u$
 $\frac{105}{(9 + 1.5)} + \frac{105}{(9 - 1.5)} \Rightarrow \frac{105}{10.5} + \frac{105}{7.5}$
 $= 10 + 14 = 24 \text{ hours} \checkmark$

Boats and Streams

Q9. A man can row 7.5 kmph in still water. If in river running at 1.5 km an hour, it takes him 50 minutes to row to place and back, how far off is the place?

a) 1km b) 2km c) 3km d) 4km

Solutions:

$u = 7.5 \text{ km/hr}$
 $v = 1.5 \text{ km/hr}$
 $d = s \times t$
 $t_d + t_u = 50 \text{ min}$
 $\Rightarrow \frac{d}{(7.5 + 1.5)} + \frac{d}{(7.5 - 1.5)} = \frac{50 \text{ min}}{60}$
 $\frac{d}{9} + \frac{d}{6} = \frac{5}{6} \Rightarrow \frac{2d + 3d}{18} = \frac{5}{6} \Rightarrow 5d = 15$
 $d = 3 \text{ km}$

Boats and Streams

Q10. A motor boat, whose speed is 15km/hr in still water goes 30km downstream and comes back in a total of 4hours 30minutes. The speed of the stream (in km/hr)
a) 4km/hr b) 5km/hr c) 6km/hr d) 10km/hr

Solutions:

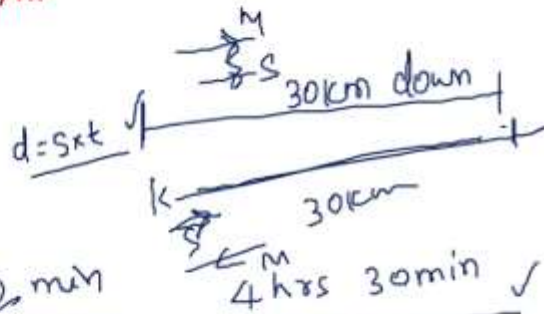
$$u = 15 \text{ km/hr } \checkmark, v = x \text{ km/hr}$$

$$\Rightarrow t_d + t_u = 4 \text{ hrs } 30 \text{ min}$$

$$\Rightarrow \frac{30}{(15+x)} + \frac{30}{(15-x)} = 4.5 \text{ hr}$$

$$\frac{30}{20} + \frac{30}{10}$$

$$1.5 + 3 = 4.5 \checkmark$$



LCM - (4-5) Quadratic eqⁿ ✓