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Sahi Prep Hai Toh Life Set Hai

BOAT & STREAM

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Agenda

Boat & Stream → (74-76) Min

(10 Questions)

Homework (15Q) →

+ Left over Part of Train Accident → (20-22) Min

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BOAT & STREAM

B → Speed of Boat in still water

S → Speed of stream

Downstream (with the flow of water)

⟶ (B+S)

Upstream (against the flow)

⟶ (B-S)

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BASIC CONCEPT OF BOAT & STREAM

B = Speed of Boat in still water

S = Speed of Stream

Downstream = B + S

Upstream = B – S

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i) B ✓ S ✓

D → B+S

U → B−S

ii) D = ✓

U = ✓

$B = \frac{D+U}{2}$ $S = \frac{D-U}{2}$

E.g. 1:

If B = 20 km/hr ; S = 8 km/hr

Find D and U.

D = 20 + 8 = 28 Km/hr

U = 20 − 8 = 12 Km/hr

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E.g. 2:

If D = 20 km/hr ; U = 8 km/hr

Find B and S.

$$B = \frac{D+U}{2} = 14 \text{ Km/H}$$

$$S = \frac{D-U}{2} = 6 \text{ Km/H}$$

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$$D = \frac{1}{\frac{7\frac{1}{2}}{60}} = 8 \text{ km/h}$$

$$U = 5 \text{ km/h}$$

$$B = \frac{D+U}{2} = 6\frac{1}{2} \text{ km/h}$$

Q1. A boat moves downstream at the rate of 1 km in 7½ minutes and upstream at the rate of 5 km an hour. What is the speed of the boat in the still water?

(a) 2 km/hour
(b) 6½ km/hour
(c) 4 km/hour
(d) 3½ km/hour

Time → 60sec

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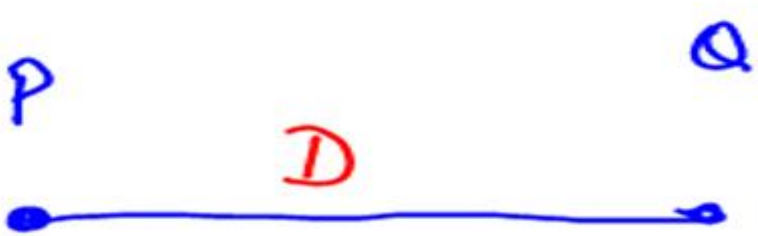
Ans. (b)

Concept

Flow of water →



Total Distance = D + D = 2D

$$T_{PQ} = \frac{D}{B+S}$$

$$T_{QP} = \frac{D}{B-S}$$

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Time → 5 hrs

$$\frac{D}{14} + \frac{D}{6} = 5$$

$$\frac{2 \cancel{10} D}{42} = \cancel{5}$$

$$D = 21 \text{ Km}$$

Q2. A man goes downstream with a boat to some destination and returns upstream to his original place in 5 hours. If the speed of the boat in still water and the stream are 10 km/hr and 4 km/hr respectively, the distance of the destination from the starting place is

(a) 16 km **(b) 18 km**

(c) 21 km **(d) 25 km**

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Ans. (c)

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Q3. Speed of a boat is 5 km/hr in still water and the speed of the stream is 3 km/hr. If the boat takes 3 hours to go a place and come back, the distance of the place is:

(a) 3.75 km **(b) 4 km**

(c) 4.8 km **(d) 4.25 km**

$B = 5\ km/hr$

$S = 3\ km/hr$

$$\frac{D}{8} + \frac{D}{2} = 3$$

$$\frac{5D}{8} = 3$$

$$D = 4.8\ Km$$

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Ans. (c)

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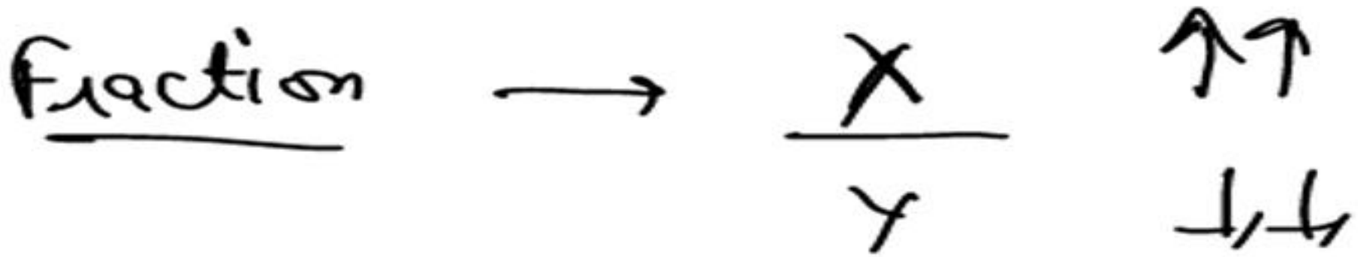
When variables are in denominator, sometimes it is time consuming to solve equations.



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I II

$\frac{36}{B+2} + \frac{40}{B-2}$

4 8

$B = 7$

Eg(i). $\frac{36}{B+2} + \frac{40}{B-2} = \mathbf{12}$

$B = 7$

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I II

Eg(ii). $\frac{50}{B-5}+\frac{40}{B+5}=7$

$\frac{50\uparrow}{B-5\downarrow}+\frac{40\uparrow}{B+5}=7$

4 3

5 2

$B=15$

$B-5=10$

$B=15$

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Eg(iii). $\frac{24}{B+2} + \frac{32}{(B-2)} = 11$

3 8

$B - 2 = 4$

$B = 6$

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Eg(iv). $\frac{120}{B+2}+\frac{120}{B-2}=11$

4

5 6

$B-2=20$

$B=22$

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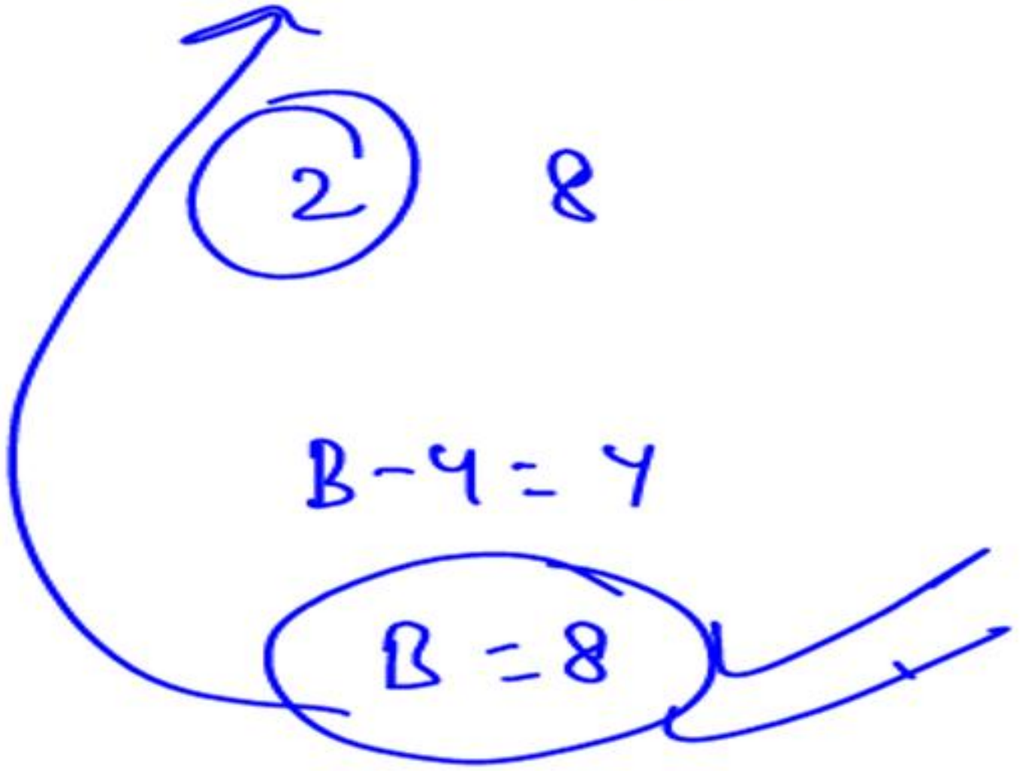
Eg(v). $\frac{24}{B+4}+\frac{32}{B-4}=10$



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Eg(vi). $\frac{25}{B+3}+\frac{36}{B-3}=$ **11.5**

$$\frac{25}{B+3}+\frac{36}{B-3}=\frac{23}{2}$$

I II

$$\frac{50}{B+3}+\frac{72}{B-3}=\frac{23}{1}$$

11 12

5 18

$B-3=4$

$B=7$

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Eg(vii). $\frac{20}{B+2}+\frac{40}{B-2}=\frac{26}{3}$

$\frac{60}{B+2}+\frac{120}{B-2}=26$

8 — 15

6 — 20

$B-2=6$

$B=8$

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I II

Eg(viii). $\frac{3}{4.5-B}+\frac{5}{4.5+B}=\frac{7}{4}$

$\frac{12}{4.5-B}+\frac{20}{4.5+B}=7$

3 4

$4.5+B=5$

$B=0.5$

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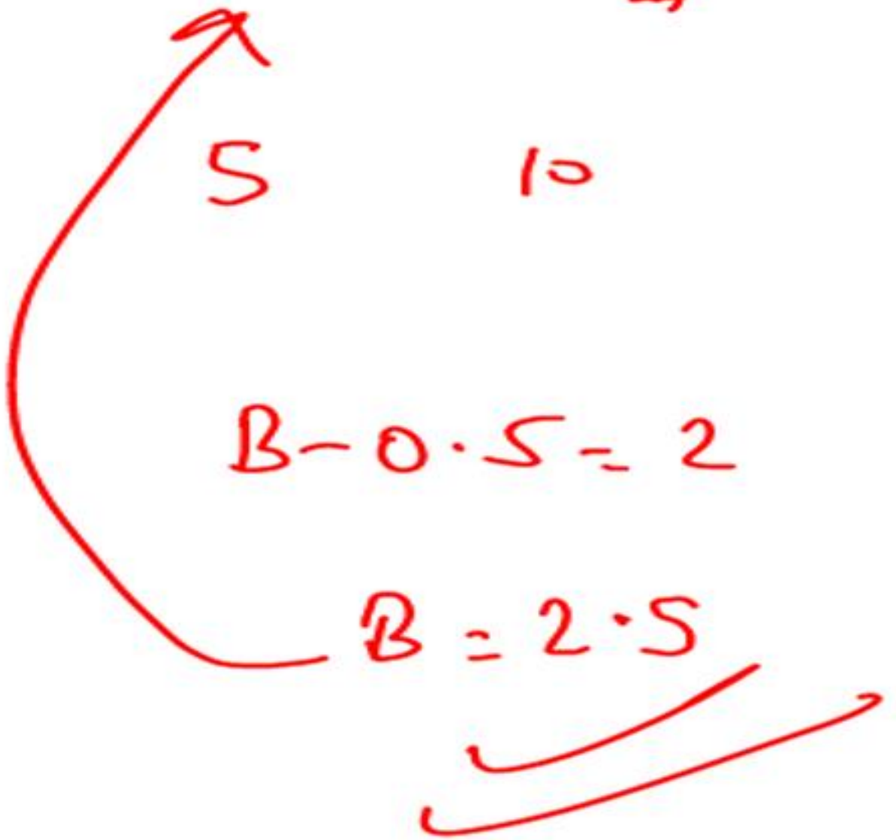
Eg(ix). $\frac{15}{B+0.5}+\frac{20}{B-0.5}=15$



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$S = 5 \text{ km/h}$

$$\frac{10}{B-5} + \frac{10}{B+5} = \frac{5}{6}$$

$$\frac{60}{B-5} + \frac{60}{B+5} = 5$$

3 2

$B - 5 = 20$

$B = 25$

Q4. The speed of the current is 5 km/hr. A motorboat goes 10 km upstream and back again to starting point in 50 minutes. The speed (in km/hr) of the motorboat in still water is

(a) 20 **(b) 26**

(c) 25 **(d) 28**

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Ans. (c)

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E.g. A boat covers a certain distance downstream in T_1 hours and the same distance, when covered upstream it takes T_2 hours. Then find the ratio of (Speed of boat in still water): (Speed of stream).

$$\frac{B+S}{B-S} = \frac{T_2}{T_1}$$

$$\boxed{\frac{B}{S} = \frac{T_2+T_1}{T_2-T_1}}$$

Downstream Upstream

Time T_1 T_2 $(T_2 > T_1)$

Speed T_2 : T_1

$$\boxed{\frac{B}{S} = \frac{T_2+T_1}{T_2-T_1}}$$

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eg Downstream Upstream

Time 5 : 11

$$\frac{B}{S} = ?\quad \frac{11+5}{11-5} = \frac{8}{3}$$

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$B = 4\frac{1}{2}$ km/hr

D U

Time 1 : 2

$$\frac{4\frac{1}{2}}{S} = \frac{2+1}{2-1}$$

$$\frac{4\frac{1}{2}}{S} = \frac{3}{1}$$

$$S = \frac{4\frac{1}{2}}{3}$$

Q5. A man can row at a speed of 4½ km/hr in still water. If he takes twice the time to row a distance upstream as to row the same distance downstream, then the speed of stream (in km/hr) is

(a) 1 **(b) 1.5**

(c) 2 **(d) 2.5**

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Ans. (b)

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Q6. A man can row 6 km/hr in still water. If the speed of the current is 2 km/hr, it takes 4 hours more upstream than in the downstream for the same distance. The distance is:

(a) 30 km (b) 24 km

(c) 20 km (d) 32 km

$B = 6$ Km/h $S = 2$ Km/h

Upstream Downstream

Speed 4 Km/h 8 Km/h

1 : 2

Time 2 : 1

8 hrs 4 hrs

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Ans. (d)

B

6 Km/h

S

2 Km/h

$T_{upstream} = \frac{D}{4}$

$T_{downstream} = \frac{D}{8}$

$\frac{D}{4} - \frac{D}{8} = 4$

$\frac{D}{8} = 4$

$D = 32\ Km$

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Down	Upstream	Time
44 Km	30 Km	10 Hr
55 Km	40 Km	13 Hr

Q7. A boatman goes 44 km downstream and 30 km upstream and takes 10 hrs. While it takes 13 hrs. to go 55 km downstream and 40 km upstream. Find the speed of boat and stream.

$$\frac{44}{B+S} + \frac{30}{B-S} = 10 \quad \times 4$$

$$\frac{55}{B+S} + \frac{40}{B-S} = 13 \quad \times 3$$

$B-S=5$

$\frac{11}{B+S} = 1$

$B+S=11$

PYQ of SSC

$$\frac{175}{B+S} + \frac{120}{B-S} = 40$$

$$\frac{165}{B+S} + \frac{120}{B-S} = 39$$

$B = 8$ Km/Hr

$S = 3$ Km/Hr

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Ans. B = 8 km/hr
S = 3 km/hr

D	U	T	
44 km	30 km	10 hr	x4
55 km	40 km	13 hr	x3

D = 11

U = 5

D
11 km ⟶ 1 hr

B = 8
S = 3

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Q8. A boat covers 12 km upstream and 18 km downstream in 3 hours, while it covers 36 km upstream and 24 km downstream in 6½ hours. What is the speed of the current?

(a) 1.5 km/hour
(b) 1 km/hour
(c) 2 km/hour
(d) 2.5 km/hour

U D T

12 18 3hr ×3

36 24 $6\frac{1}{2}$ hr

30 D → $2\frac{1}{2}$ hr

D = 12

U = 8

S = ??

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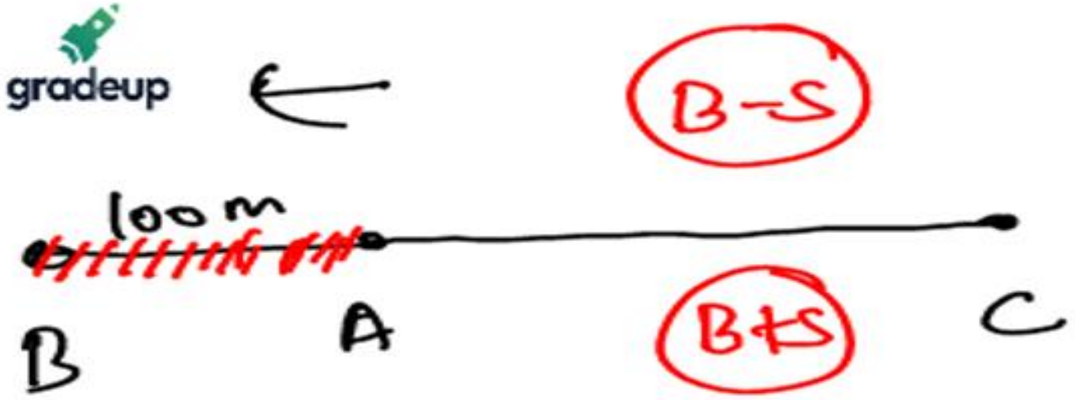
Ans. (c)



Q9. A swimmer swims from a point A against a current for 5 minutes and then swims backwards in favour of the current for next 5 minutes and comes to the point B. If AB is 100 metres, the speed of the current (in km/hr) is:

(a) 0.4 (b) 0.2

(c) 1 (d) 0.6

$0.1 = \frac{5 \cdot 5}{60}$

$0.6\ \text{km/h} = S$

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Ans. (d)

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QUESTIONS BASED ON ACCIDENT OF TRAINS

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Q15. A train meets with an accident after travelling 30 kms, after which it moves with 4/5 of its original speed and arrives at the destination 45 minute late. Had the accident occurred 18 kms farther, it would have reached 9 minute earlier. Find the distance of the journey and original speed of the train.

(a) 120 km, 25kmph (b) 125km, 25kmph

(c) 130km, 30kmph (d) 120km, 30kmph

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Ans. (d)

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Q16. A train starts from Delhi at 8:00 am. After 6 Hrs. there was a breakdown in the train, due to which it travels 2/3 of its normal speed and hence becomes 40 mins late. If the breakdown occurred 200 Km farther then it would have reached its destination 30 min late. Find the distance covered by the train ?

(a) 2800 km
(b) 3600 km
(c) 4400 km
(d) 5200 km

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Ans. (c)

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PRACTICE QUESTIONS

Boat & Stream

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Q1. A man swims downstream a distance of 15 km in 1 hour. If the speed of the current is 5 km/hour, the time taken by the man to swim the same distance upstream is

(a) 1 hour 30 min. (b) 45 min.

(c) 2 hours 30 min. (d) 3 hours

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Ans. (d)

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Q2. A boat goes downstream in one third the time it takes to go upstream. Then, the ratio between the speed of boat in still water and that of the stream is

(a) 3 : 1
(b) 1 : 3
(c) 1 : 2
(d) 2 : 1

gradeup

Ans. (d)

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Q3. A boat covers a certain distance upstream in 45 hours. It covers the same distance downstream in 36 hours. If the speed of boat is 36 km/hr. Find the difference between speed of boat in still water and the speed of stream?

(a) 30 km/hr (b) 32 km/hr

(c) 36 km/hr (d) 48 km/hr

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Ans. (b)

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Q4. A man rows to a place 35 km in distance and comes back in 10 hours 30 minutes. He found that he could row 5 km with the stream in the same time as he can row 4 km against the stream. Find the rate of flow of the stream.

(a) 1 km/hour (b) 0.5 km/hour

(c) 0.75 km/hour (d) 1.5 km/hour

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Ans. (c)

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Q5. A boat has to travel a distance of 12 km starting from point P to point Q. It covers 8 km downstream from point P in 20 min and remaining 4 km upstream to reach the point Q. If the downstream speed was twice the upstream speed, what is the average speed of boat throughout the journey?

(a) 16 km/hour (b) 15 km/hour

(c) 18 km/hour (d) 20 km/hour

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Ans. (c)

gradeup

Q6. The ratio of speed of motorboat to that of current water is 13 : 4. If boat takes 4hr 32 min against the current, it will come back in

(a) 2hr 24min
(b) 2hr 28min
(c) 2hr 58min
(d) 3hr 16min

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Ans. (a)

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Q7. A boatman goes 39 km downstream and 25 km upstream and takes 8 hrs. While it takes 10 hrs. to go 52 km downstream and 30 km upstream. Find the speed of boat.

(a) 9 km/hour (b) 4 km/hour

(c) 6 km/hour (d) 8 km/hour

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Ans. (a)

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Q8. A boat sails downstream from point A to point B, which is 20 km away from A, and then returns to A. If the actual speed of boat (in still water) is 3 km/hr then the trip from A to B takes 16 hrs less than that from B to A. What must be the speed of the boat for the trip to take exactly 80 minutes in travelling from A to B.

(a) 12 km/hour (b) 13 km/hour

(c) 10 km/hour (d) 9 km/hour

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Ans. (b)

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Q9. At his usual rowing rate, Amit can travel 12 km downstream in a certain river in 6 hours less than it takes him to travel the same distance upstream. But if he could double his usual rowing rate for his 24 km round trip, the downstream 12 km would then take only one hour less than the upstream 12 km. What is the speed of the current in kmph hour?

(a) $1\frac{1}{3}$ **kmph**

(b) $1\frac{2}{3}$ **kmph**

(c) $2\frac{1}{3}$ **kmph**

(d) $2\frac{2}{3}$ **kmph**

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Ans. (d)

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Q10. A boat went downstream for 160 km and returned immediately. It took the boat 20 hr. to complete the round trip. If the speed of the river were twice as high, the trip to downstream and back would take 32 hours. What is the speed of boat in still water?

A. 15 km/hour B. 16 km/hour

C. 14 km/hour D. 18 km/hour

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Ans. (d)

Q11. A man travels by a motor boat down a river to his office and back. With the speed of the river unchanged, if he doubles the speed of his motor boat, then his total travel time gets reduced by 75%. The ratio of the original speed of the motor boat to the speed of the river is:

(a) $\sqrt{6} : \sqrt{2}$ (b) $\sqrt{7} : 2$

(c) $2\sqrt{5} : 3$ (d) $3 : 2$

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Ans. (b)

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Q12. A fisherman can row his boat to the market for 80 km along the stream. For this he takes 1 hour 20 minutes. His son says that, his father's rowing speed in still water is 45 km/hr. How much time should he take to row the same distance back, against the stream?

(a) 2 hours 30 minutes
(b) 2 hours 40 minutes
(c) 3 hours 10 minutes
(d) 4 hours

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Ans. (b)

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Q13. Amit can row a boat d km upstream and the same distance downstream in 5 hours 15 minutes. Also, he can row the boat 2d km upstream in 7 hours. How long will it take to row the same distance 2d km downstream for Amit?

(a) 3 hrs 15 min
(b) 3 hrs 30 min
(c) 4 hrs 12 min
(d) 4 hrs 10 min

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Ans. (b)

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Q14. A man went downstream for 28 km in a motor boat and immediately returned. It took the man twice as long to make the return trip. If the speed of the river flow were twice as high, the trip downstream and back would take 672 minutes. Find the speed of the boat in still water and the speed of the river flow.

(a) 8 km/hr, 2 km/hr

(b) 9 km/hr, 6 km/hr

(c) 12 km/hr, 3 km/hr

(d) 9 km/hr, 3 km/hr

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Ans. (d)

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Q15. A boat takes 38 hours for travelling downstream from point A to point B and coming back to point C midway between A and B. If the velocity of the stream is 4 kmph and the speed of the boat in still water is 14 kmph, what is the distance between A and B?

(a) 120 km
(b) 180 km
(c) 240 km
(d) 360 km

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Ans. (d)

* How many of you find the PPT on Grade up App

* Telegram

Dugg → Calculation Scie

How many of you are interested

→ 

→ 1 month

T S D

Doubts → 6th July (Tue)

Sunday evening Till 8 pm

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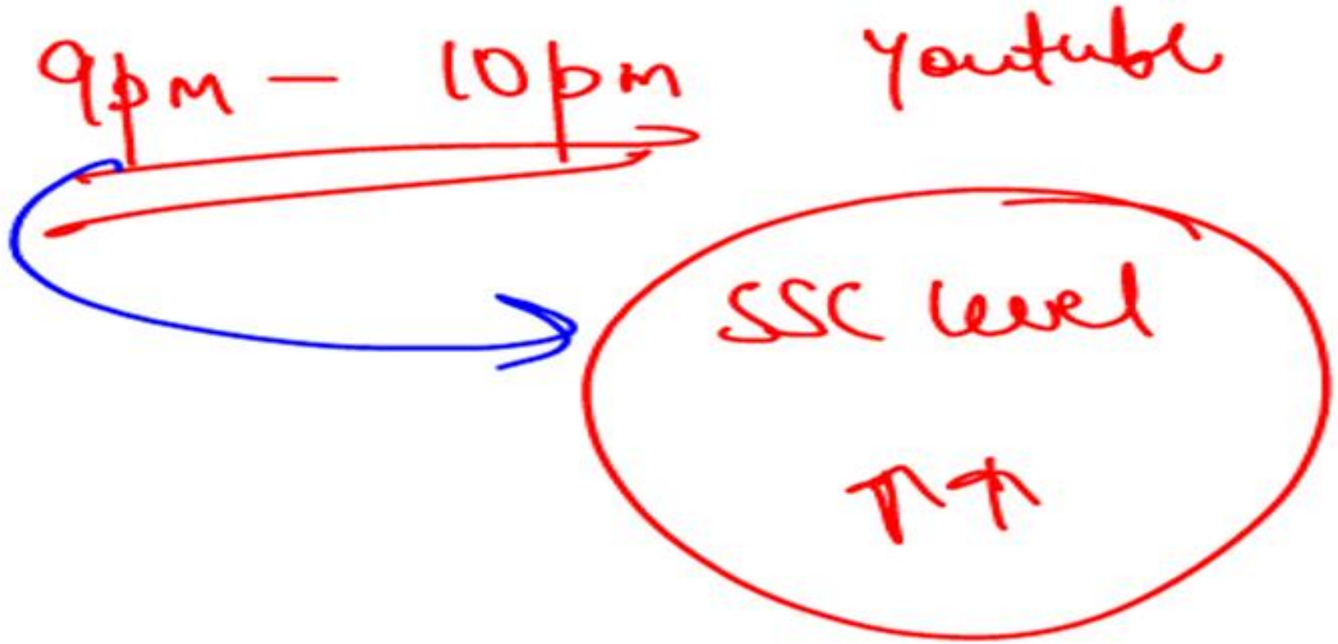
9pm – 10pm
Youtube
SSC level
TT