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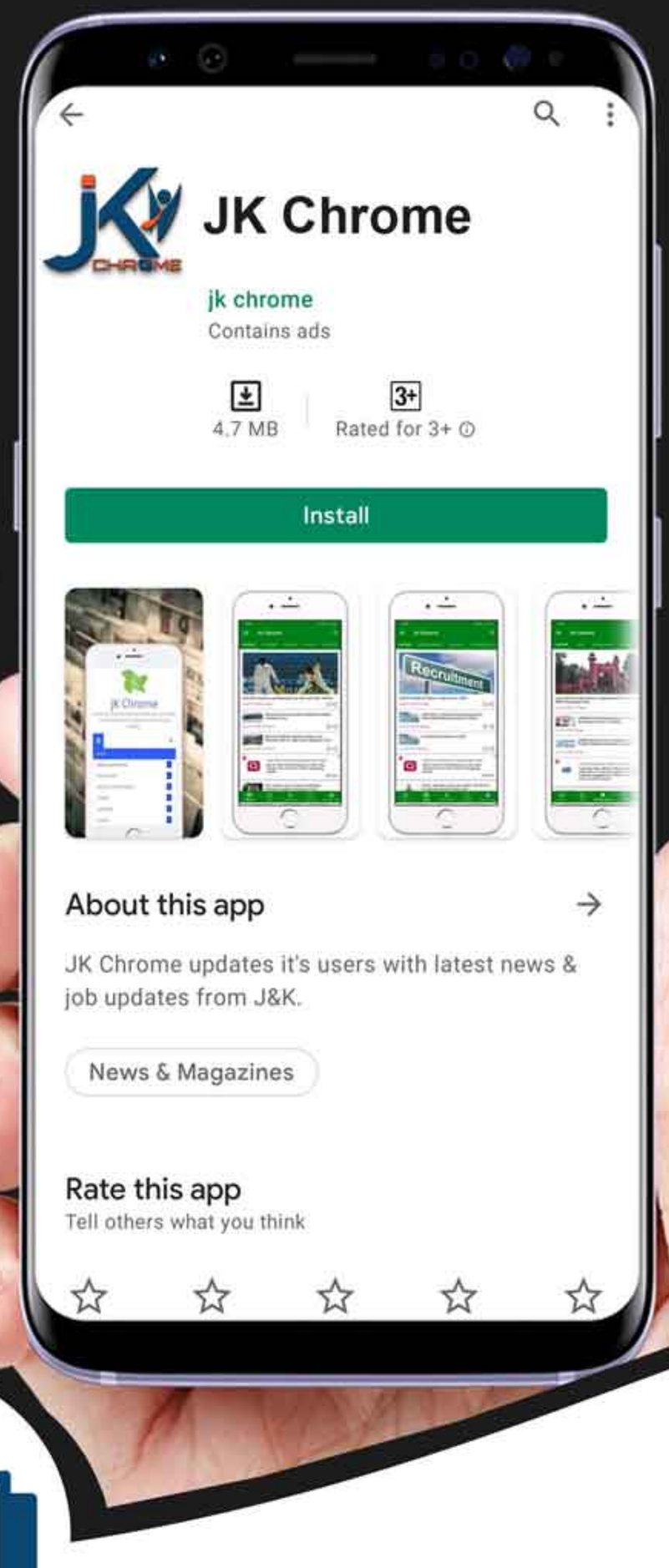

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BOATS & STREAMS

Downstream Movement

When the direction of the movement of a river and a boat is the same, their collective movement is known as the downstream movement. And the distance covered by boat is known as downstream distance.

If the speed of the river = S and the speed of the boat = B, hen downstream speed = B + S

Upstream Movement

When the direction of the movement of the river and a boat is opposite, they are said to be in upstream movement. The distance covered in this case is known as upstream distance.

If the speed of the river = S and the speed of the boat = B, then upstream speed = B – S (Conventionally, the speed of one boat is taken more than the speed of river; otherwise, the boat would not be able to go back.)

Now, speed of boat = 1/2 (downstream speed + upstream speed) = 1/2 (B + S +B – S) = B

And speed of river = 1/2 (downstream speed – upstream speed) = 1/2 (B + S – B + S) = S

Hence, if downstream speed and upstream speed are given as 20 km/h and 10 km/h, respectively, then the speed of the boat = 15 km/h and speed of the river = 5 km/h.

In most cases of boats and streams, the distances covered downstream and upstream are the same. In those cases, the ratio of the time taken becomes inverse of the ratio of the speeds.

Time taken downstream: time taken upstream = upstream speed: downstream speed.

Approaches

Using STD table

Advantages of tabular form

Table helps to organize complex information given in the question.

It increase speed and accuracy while solving TSD questions

Further, we can apply tabular form in all types of questions like trains, boats etc.

Making a STD table

B = speed of boat in still water

S = speed of water or stream

B+S = speed of boat in direction of water

B-S = speed of boat in opposite direction of water

	Speed (S)	Time (T)	Distance(D)
B			
S			
B+S (→)			
B-S (↔)			

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

Let distance = x km

	S	T = 5/6	D
B+S (→)	9	x/9	X
B-S (↔)	6	x/6	x

Total time → x/9+x/6 = 5/6

On simplification x= 3

1. A man rows a boat 18 kilometers in 4 hours down-stream and returns upstream in 12 hours. The speed of the stream (in km per hour) is :
   (a) 1 (b) 1.5
   (c) 2 (d) 1.75
2. A boat goes 20 km downstream in one hour and the same distance upstream in two hours. The speed of the boat in still water is
   (a) 15 km/hr (b) 10 km/hr
   (c) 5 km/hr (d) 7.5 km/hr
3. A man rows 750 m in 675 seconds against the stream and return in 15/2 minutes. Find his rowing speed in still water.
   (a) 3 kmph (b) 4 kmph
   (c) 5 kmph (d) 6 kmph
4. A boat goes 6 km an hour in still water, it takes thrice as much time in going the same distance against the current comparison to direction of current. The speed of the current (in km/hour) is
   (a) 4 (b)5
   (c)3 (d) 2
5. A boat goes 40 km in the stream in 8 hours 36 km downstream in 6 hours. The speed of the boat in still water is
   (a) 6.5 km/hour (b) 5.5 km/hour
   (c) 6 km/hour (d) 5 km/hour
6. A man can row boat at 5 kmph in still water. If the velocity of current is 1 kmph and he takes 1 hour to row to a place and come back, how far is the place ? ?
   (a) 2.5 km (b) 3 km
   (c) 2.4 km (d) 3.6 km
7. A motorboat in still water travels at a speed of 36 kmph. It goes 56 km upstream in 1 hour 45 minutes. The time taken by it to cover the same distance down the stream will be :
   (a) 2 hrs 25 min. (b) 3 hrs
   (c) 1 hrs 24 min. (d) 2hrs 21 min
8. A man Can row at speed of 9/2 km/hr in still water if he takes 2 times as long to row the same distance downstream , then the speed off stream (in km/hr) is
   (a) 1 (b) 1.5
   (c) 2 (d) 2.5
9. The speed of a motor-boat is that of the current of water as 36 : 5 The boat goes along with the current in 5 hours 10 minutes. It will come back in

(a) 5 hrs 50 min (b) 6 hrs
(c) 6 hrs 50 min (d) 12 hrs 10 min

10. A man can row 15 km/hr downstream and 9 km/hr upstream. The speed of the boat in still water is :
(a) 8 km/hr. (b) 10 km/hr.
(c) 15 km/hr. (d) 12 km/hr

11. In a fixed time, a boy swims double the distance along the current that he swim against the current. If the speed of the speed current is 3 km/ hr, the speed of the boys in still water is :
(a) 6 km/hr (b) 9 km/hr
(c) 10 km/hr (d) 12 km/hr

12. 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

13. Two boats A and B start towards each other from two places, 108 km apart. Speed of the boat A and B in still water are 12 km/hr and 15 km/ hr respectively. If A proceeds down and B up the stream, they will meet after
(a) 4.5 hours (b) 4 hours
(c) 5.4 hours (d) 6 hours

14. Speed of motorboat in still water is 45 kmph. If the motorboat travels 80 km along the stream in 1 hour 20 minutes, then the time taken by it to cover the same distance against the stream will be :
(a) 3 hrs (b) 1 hrs 20 min
(c) 2 hrs 40 min (d) 2 hrs 55 min

15. A boat running rows downstream covers a distance of 20 km in 2 hrs while it covers the same distance upstream in 5 hrs. Then speed of the boat in still water is
(a) 7 km/hr (b) 8 km/hr
(c) 9 km/hr (d) 10 km/hr

16. A boatman rows 1 km in 5 minutes, along the stream and 6 km in 1 hour against the stream. The speed of the stream is
(a) 3 kmph. (b) 6 kmph
(c) 12 kmph. (d) 12 kmph

17. A boat covers 24 km upstream and 36 km downstream in 6 hours, while it covers 36 km upstream and24 km down-stream in 13/2, hours. The speed of the current is :
(a) 1 km/hr (b)5 km/hr
(c) 1.5 km/hr (d)2.5 km/h r

18. The speed of boat in still water is 10 km/hr it covers (upstream) a distance of 45km in 6 hours, The speed (in km/hr) of the stream is :
(a) 2.5 km/h (b) 3 km/h
(c) 3.5 km/h (d) 4 km/h

19. A boat goes 12 km downstream and comes back to the starting point in 3 hours . if the speed of the current is 3 km/hr, then the speed of the boat in still water is
(a) 12 km/h (b) 9 km/h
(c) 8 km/h (d) 6 km/h

20. A sailor goes 12 km downstream in 48 minutes and returns in 1 hour 20 minutes. The speed of the sailor in still water is :
(a) 12 km/hr (b) 12.5 km/hr
(c) 13 km/hr (d) 15 km/hr

21. A man rows boat - 40 km upstream in 8 hours and a distance of 36 km. downstream in 6 hours, Then speed of stream is :
(a) 0.5 km/hr (b) 1.5 km/hr
(c) 1 km/hr (d)3 km/hr

22. A boat travels 24 km upstream in 6 hours and 20 km downstream in 4 hours. Then the speed of boat in still water and the speed of water current are respectively
(a)4 kmph and 3 kmph (b) 4.5 kmph and 0.5kmph
(c) 4 kmph and 2 kmph (d)5 kmph and 2 kmph

23. If a boat goes 100 km down-stream in 10 hours and 75 km upstream in 15 hours, then the speed of the stream is :
(a) 2 km/hr (b) 2.5 km/hr
(c) 3 km/hr (d) 3.5 km/hr

24. The speed of the current is 5 km/ hour. A motorboat goes 10 km upstream and back again to the starting point in 50 minutes. The speed (in km/hour) of the motorboat in still water is
(a) 20 (b) 26
(c) 25 (d) 28

25. The current of a stream runs at the rate of 4 k an hour. A boat goes 6 km and comes back to the starting point in 2 hours. the speed (in km/ hr) of the boat in still water is :
(a) 6 km/hr (b) 8 km/hr
(c) 7.5 km/hr (d) 6.8 km/hr

26. A man swims downstream a distance of 15 km in 1 hour. If the speed of the current is 5 km/hr, the time taken by the man to swim the same distance upstream is :
(a)1 hr 30 min (b) 45 min
(c)2 hr 30 min (d) 3 hrs

27. A man can row 30 km down-stream and return in a total of 8 hours. If speed of the boat in still water iš four times the speed of the current, then the speed of the current is
(a) 1 km/hr (b) 2 km/hr
(c) 4 km/hr (d) 3 km/hr

28. A person can row 15/2 km an hour in still water and he finds that it takes him twice as long to row up as to row down the river. The speed of the stream is :
(a) 2 km/hr (b) 3 km/hr
(c) 5/2 km/hr (d) 7/2 km/hr

29. 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 in upstream than in the downstream than in the downstream for the same distance. The distance is
(a) 30 km (b) 24 km
(c) 20 km (d) 32 km

30. Speed of a boat is 5 km per hour in still water and the speed of the stream is 3 km per hour. If the boat takes

3 hours to go to 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

31. A boat covers 12 km upstream and18 km downstream in 3 hours, while it covers 36 km upstream and 24 km downstream in 13/2 hours, what is the speed of the current ?
(a) 1.5 km/hr (b) 1 km/hr
(c) 2 km/hr (d) 2.5 km/hr

32. A boy can swim in still water at a speed of 10 km/hr. If the speed of the current would have been 5 km/h , then the boy could swim 60 km.
(a) upstream in 4 hours (b) downstream in 12 hours
(c) upstream in 6 hours (d) downstream in 4 hours

33. A man can swim at the rate of 4 km/hr in still water. If the speed of the water is 2 km/hr, then the time taken by him to swim 10 km upstream
(a)5/2 hrs (b) 7/2 hrs
(c) 5 hrs (d) 4 hrs

34. The speed of a stream is 3 km/hr and the speed of a man in still water is 5 km/hr. the time taken by the man to swim 26 km downstream is :
(a) 26hrs (b) 13/4 hrs
(c) 13hrs (d) 26hrs

35. The speed of a boat along the stream is 12 km/hr and against the stream is 8 km/hr . the time taken by the boat to sail 24 km in still water is
(a) 2 hrs (b) 3 hrs
(c) 2.4 hrs (d) 1.2 hrs

36. The speed of a boat along and against the current are 12 km/hr and 8 km/hr respectively .then the speed of the current in km/hr is :
(a) 5 (b) 4
(c) 3 (d) 2

37. A man can swim 3 km/hr in still water . if the velocity of the stream is 2 km/hr the time taken by him to swim to place 18 km upstream and back is :
(a) 28/3 hr (b) 10 hr
(c) 12 hr (d) 25/3 hr

38. 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

39. A person can row a distance of one km upstream in ten minutes and downstream in four minutes. What is the speed of the stream ?
(a) 4.5 km/hr , (b) 4 km/hr
(c) 9 km/hr (d) 5.6 km/hr

40. 40.A man rows down a river 15 km in 3 hrs. with the stream and returns in 15/2 , hrs. The rate at which he rows in still water is:
(a) 2.5 km/hr (b) 1.5 km/hr
(c) 3.5 km/hr (d) 4.5 km/hr

41. A boats downstream at the rate of 1 km in 15/2 minutes and upstream at the rate of 5 km an hour, What is the speed of the boat in the still water?
(a) 8 km/hour (b) 13/2 km/hour
(c) 4 km/hour (d)7/2 km/hour

42. A boat takes half time in moving a certain distance downstream than upstream. The ratio of the speed of the boat in still water and that of the current is
(a) 2 : 1 (b) 4: 3
(c) 1 : 2 (d) 3 : 1

43. A man rows upstream 36 km and downstream 48 km taking 6 hours each time. The speed of the current is:
(a) 0.5 km/hour (b) 1 km/hour
(c) 2 km/hour (d) 1.5 km/hr

44. A man rows 12 km in 5 hours against the stream and the speed of current being 4 kmph. What time will be taken by him to row 15 km with the stream?
(a) 1 hour 358/13 minutes (b) 1 hour 319/13 minutes
(c) 1 hour 332/13 minutes (d) 1 hour 345/13 minutes

45. A man rows to a place 60 km distance and back in 13 hours 30 minutes. He finds that he can row 5 km with the stream in the same time as he can row 4 km against the stream. Find the rate of the stream.
(a) 8km/hr (b) 1/2 km/hr
(c) 10km/hr (d) 1 km/hr

46. A motor boat covers a certain distance downstream in a river in 3 hours. It covers the same distance upstream in 3 hours and half. If the speed of the water is 1.5 km/h then the speed of the boat in still water is:,
(a) 17 km/h (b) 17.5 km/h
(c) 19.5 km/h (d) 19 km/h

Detailed Solution

1. (b) Let the speed of boat in still water = x km/h
Speed of stream = y km/h
Speed of boat in the downstream, D = (x + y) km/h
Speed of boat in the upstream, U
= (x - y) km/h
distance to be covered = 18 km
D = x + y = 18 km/4h = 9/2 km/h …….. (i)
U = x - y = 18km/ 12h = 3/2 km/h …….. (ii)
On solving (i) and (ii)

y =[(9/2 – 3/2) /2] = 1.5 km/hr.
Alternate:
Speed of stream = ½ (D - U)
Speed of boat = ½ (D + U)
Now, By using those above Formula's
Speed of Stream
= (1/2) (9/2 – 3/2) = 1.5

2. (a) Note : for detailed solution check earlier question.
Downstream speed, D = 20 km/ 1 hr. – 20 km/hr
Upstream speed, U = 20 km/ 2hr. = 10 km/hr
Speed of the boat in still water , x
= (D + U)/2
= (20 + 10)/2 = 30/2 = 15 km/hr.

3. (c) Speed of the Upstream, U
= 750/675 = 10/9 m/s
Time of downstream
= 15/2 minutes = 450 seconds
(Thus, boat will return in the downstream)
Speed of downstream, D = 750/450 m/s = 5/3 m/s.
Thus, Speed of man in still water = (D + U)/2
= (5/3 + 10/9)/2 = (15 + 10) /(2 × 9) = 25/18 m/s
= 25/18 × 18/5 = 5 km/hr.

4. (c) Speed of boat in still water, x
= 6 km/h
Let speed of the stream = y km/h
Downstream speed = (6 + y) km/h
Upstream speed =
6 – y km/h
According to Question,
3 [(Distance/6 + y) = (Distance/(6 - y)]
3/(6 + y) = 1/(6 - y)
(6 + y) = (18 – 3y)
4y = 12
y = 3
Thus, Speed of stream
= 3 km/h.

5. (b) Speed of upstream, U = 40/8 = 5 km/h
Speedo of Downstream, D
= 36/6 = 6 km/h
Speed of boat in still water, x = (D + U)/2
= (5 + 60)/2 = 11/2 = 5.5 km/h.

6. (c) Speed of man in still water, x = 5 km/h
Speed of currant, y
= 1 km/h
Speed of downstream
= x + y = 5 + 1 = 6 km/h.
Speed of upstream
= x – y= 5 – 1 = 4 km/h
According to the question,
D/6 + D/4 = 1
(2D + 3D)/12 = 1
5D = 12
D = 12/5 = 2.4 km.

7. (c) Speed of motar boat in still water,
x = 36 km/h
Speed of upstream, U
= 56 km/(1 + 3/4) = 56 × 4/7 = 32 km/hr
According to the question,
x – y = U
36 – y = 32
y = 4 km/h
Speed of Downstream, D
= x + y
= 36 + 4
= 40 km/h
Time taken to cover the distance downstream
= 56/40 h
1 hours 24 minutes

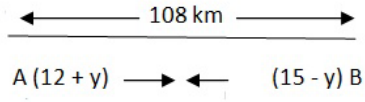
8. (b) Speed of man in still water, x
= 9/2 km/hr
Let speed of stream = y km/h
Downstream speed
= (9/2 + y)
Upstream speed = (9/2 - y)
According to the question,
2 [Distance/(9/2 + y)] = Distance/ (9/2 - y)
2/ (9/2 + y) = 1/(9/2 - y)
(2 × 2) /(9 + 2y) = 2/(9 – 2y)
2/(9 + 2y) = 1 / (9 – 2y)
18 – 4y = 9 + 2y
6y = 9
y = 9/6 = 3/2 = 1.5 km/h

9. (c) Since the ratio is given 36 : 5
Let the speed of boat in still water = 36 km/h.
and the speed of the stream = 5 km/h
Downstream speed = 41 km/h
Upstream speed = 31 km/h
Distance = Downstream speed ×
Downstream time = (41 × 31/6) km.
Upstream time
= Distance/ Upstream = [41 × (31/6)]/31 = (41 × 31)/6 × 3
= 41/6 = 6 hrs. 50 min.
Alternate:
$V \propto 1/T$
$V_1/V_2 = T_2/T_1$
= 36 + 5/(36 - 5) = x/(31/6)
x = 41/6 hours
= 6hrs . 50 min.

10. (d) Downstream speed of boat, D = 15 km/h
Upstream speed of boat, U = 9 km/h
Speed of boat in still water, x = (D + U)/2
= (15 + 9)/2 = 12 km/h

11. (b) Let the speed of boy in still water = x km/h.
Let the speed of current, y = 3 km/h
Downstream speed = (x + 3) km/h
Upstream speed = (x - 3) km/h
According to the question,
Let the time = t hours.
(x + 3) × t = 2 (x + 3) × t
(x + 3) × t = 2 (x - 3) × t
x + 3 = 2x – 6
x = 9km/h

12. (c) Speed of the boat in sill water,
= 10 km/h
Speed of the steam = 4 km/h
Thus, Downstream speed = 6 km/h
Let Distance = M km.
M/14 + M/6 = 5 hours
(3m + 7M)/42 = 5
10M = 42 × 5
M = 42 × 5/10 = 21 km.
Alternate:
T = 2xD/(x^2- y^2)
D = (10^2 - 4^2)5/ (2 × 10) = 84× 5/20 = 21 km

13. 

(b)
Let the speed of stream
= y km/h

Since Boat is moving downstream with 12 km/h
Speed of boat A = (12 + y) km/h
Since Boat is moving upstream with 15 km/h
Speed of Boat B = (15 - y) km/h
thus, Both the boats are moving in opposite direction,
Relative speed of A and B
= 12 + y + 15 – y = 27 km/h
Time = Distance / Relative Speed = 108/27 = 4 hours

14. (c) The speed of motorboat in still water, x = 45 km/h
Downstream speed
= 80/ [1 + (20/60)] = 80/[(1 + 1/3)]
= (80 × 3)/4 = 60 km/h
x + y = 60
45 + y = 60
y = 15 km/h
Upstream speed,
= x – y = 45 – 15
= 30 km/h
Time = Distance/ Upstream speed
= 80/30 = 8/3 h = 2 hours 40 minutes

15. (a) Downstream speed, D = 20 km/2hrs = 10 km/h
Upstream speed, U
= 20 km/5hr = 4 km/h
Speed of boat in still water
= D + U/2
= 10 + 4/2 = 7 km/h

16. (a) Downsteam speed , D = 1 km/ (5/60 h) = 60/5 = 12 km/hr
Upstream speed, U
= 6 km/1hr = 6 km/h
Speed of the stream,
(D - U)/2 = (12-6)/2 = 6/2 = 3 km/hr

17. (b) Let speed of boat in still water = x km/h
Speed of stream current = y km/h
ATQ
24/(x - y) + 36/(x + y) = 6h ……. (i)
36/(x - y) + 24/(x + y) = 13/2 h …….. (ii)
In these type of Questions, make factor of 24 and 36 and choose the common values which satisfy the avobe equations.
24 = 2 , 3 , 4 , 6 , 8 , **[12]**
36 = 3 , 4 , 9, **[12]**
Choose the common factor i.e-
Put this value in equation (i)
24/(x - y) + 36/12 = 6
24/(x - y) + 3 = 6
x – y = 8
x + y = 12
Thus x + y = 12
x = 10, y = 2
Speed of current, y
= 2 km/h.

18. (a) The speed of the boat in still water, x = 10 km/h
Upstream speed, U = 45/6 km/h
Thus, x – y = 45/6
10 – y = 45/6
y = 10 – 45/6
= 60 – 45/6 = 15/6 = 2.5 km/h
Thus, Speed of the stream, y = 2.5 km/h

19. (b) 12/(x + y) + 12/(x - y) = 3
Speed of the current, y = 3 km/h
12/(x + 3) + 12/(x - 3) = 3
In such type of question take help from the options to save your valuable time.
Take option (b) x = 9
12/(9 + 3) + 12/(9 - 3) = 12/12 + 12/6 = 1 + 2 = 3
Thus, Option (b) is the answer
Alternate:
T = 2xD/($x^2 – y^2$),
3 = 2 × x × 12/(x^2 - 3^2)
3 (x^2 - 9) = 24x
x^2 – 8x – 9 = 0
x = 9 – 1
x = 9 km/hr

20. (a) Downstream speed, D = (12/4)/5 = (12 × 5)/4 = 15 km/h
Upstreeam speed, U = 12/(1 + 1/3) = (12 × 3)/4 = 9 km/h
Speed of the boat in still water = 15 + 9/2 = 24/2 = 12 km/hr

21. (a) Let the speed of boat in still water = x km/h
Speed of a stream = y km/h
Speed of boat in Downstream = x + y km/h
Speed of boat in Upstream = x – y km/h
Upstream = 40/8 = 5 km/hr
Downstream = 36/6 = 6 km/hr
Speed of stream = (6 – 5)/2 = 0.5 km/h

22. (b) Upstream speed, U = 24/6 = 12/3 = 4 km/h
Downstream speed , D = 20/4 = 5 km/h
Thus, Speed of boat in still water, x = (D + U)/2
= 9 / 2 = 4.5 km/h
Speed of water current, y
= (D - U)/2 = ½ = 0.5 km/h

23. (b) Downstream speed, D 100/10 = 10 km/h
Upstream speed, U = 75/15 = 15 km/h
Speed of the stream, y
= (D-U)/2 = (10 - 5)/2 = 5/2 = 2.5 km/h

24. (c) Speed of the current
y = 5 km/h
Let the speed of the motor boat in still water = x km/h
ATQ
10/(x + 5) + 10/(x - 5) = 5/6
Take option (c) 10/(25 + 5) + 10/(25 - 5) = 10/30 + 10/20
= 1/3 + ½ = 5/6
Thus, Option c is the answer.
Alternate:
T = 2xD/($x^2 – y^2$)
50/60 = 2 × x × 10/(x^2 - 5^2)
5/6 = 20x / (x^2 – 25)
x^2 – 24x – 25 = 0
x = 25, – 1
x = 25 km/h

25. (b) Speed of the stream, y = 4 km/h

Let the speed of the boat in still water = x km/h
Downstream speed = (x + y) km/h
Upstream speed = (x + y) km/h
ATQ
$6 / (x + 4) + 6 / (x - 4) = 2$
Take option (b)
$6 / (8 + 4) + 6 / (8 - 4) = 6/12 + 6/4$
$= ½ + 3/2 = 4/2 = 2$
Thus, Option (b) is the answer.
Alternate:
$T = 2xD/(x^2 - y^2)$
$2 = (2 \times x \times 6)/(x^2 - 4^2)$
$2(x^2 - 16) = 12s$
$x^2 - 6x - 16 = 0$
$x = 8, -2$
$x = 8$ km/h

26. (d) Let the speed of boat in still water = x km/h
The speed of current, y = 5 km/h
Downstream speed = 15 km/h.
$x + y = 15$
$x = 10$ km/h
Upstream speed, U
$= x - y = 10 - 5$
$= 5$ km/h
Upstream time = Distance/ Upstream speed
$= 15/5 = 3$ hours

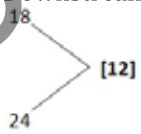
27. (b) Let the speed of stream current = y km/h
and the speed of boat in still water=x km/h
$= 4y$
$30/(x + y) + 30 (x - y) = 8$
$30/5y + 30/3y = 8$
$6/y + 10/y = 8$
$y = 2$ km/h
Alternate:
$T = 2xD/(x^2 - y^2)$
Given, $x = 4y$
$8 = (2 \times 4y \times 30)/ (4y^2) - (y)^2$
$8 (16y^2 - y^2) = 240 y$
$120y^2 = 240 y$
$y = 2$ km/hr.

28. (c) Speed of person in stilll water = 15/2 km/h
Let the speed in current/ stream = y km/h
ATQ
Upstream time = 2 × (Downstream time)
Distance/ upstream speed
= 2 × (Distance / Downstream speed)
$2/(15 - 2y) = 2 \times [2/(15 + 2y)$
On solving y = 5/2 km/h

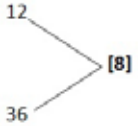
29. (d) Speed of man in still water, x = 6 km/h
Speed of current, y = 2 km/h
Let Distance = M
ATQ
Upstream time = Downstream tim + 4
$M/4 = M/(8 + 4)$
$M/4 = (M + 32)/8$
$M/1 = (M + 32)/2$
$M = 32$
Thus, Distance = 32 km.
Alternate :
$x = 6$ km/hr.
$y = 2$ km/hr.
$D : U = (6 + 2) : (6 - 2) = 2 : 1$
$T^D : T^U = 1 : 2 \rightarrow$ (1 unit)
1 unit = 4 hours
$T^D = 1 \times 4 = 4$ hours
$T^U = 2 \times 4 = 8$ hours
Distance = $D \times T_D$
$= (6 + 2) \times 4 = 32$ km

30. (c) Speed of boat in still water, x = 5 km/h
Speedo of stream y = 3 km/h
ATQ
Distance/8 + Distance/2
= 3 hours
On applying,
Distance = 4.8 km
Alternate:
$T = 2xD/x^2 - y^2$
$3 = (2 \times 5 \times D)/ (5^2 - 3^2)$
$3 \times 16 = 10 \times D$
$= D = 4.8$ km

31. (c) **ATQ**
$18/(x + y) + 12/(x - y) = 3$ ..... (i)
$24/ (x + y) + 36/(x - y) = 13/2$ ..... (ii)
Note: In such type of Question, take common values of same types of distance and satisfy the given equation.
Downstream distance:



Upstream distance:



On putting x + y = 12
and = x – y = 8
both the equation are satisfied.
Therefore, $y = (12 - 8)/2 = 4/2$ km/hr.

32. (d) Speed of boy in still water, x = 10 km/h
Speed of current, y = 5 km/h
Distance = 60 km.
thus, Downstream speed = 15 km/h
Downstream time = 60/15 = 4 hours.
Option (d) is the answer.
Upstream speed = 5 km/h
Upstream time = 60/15 = 4 hours
Option (d) is the answer.
Upstream time
= 60/5 = 12 hours

33. (c) Speed of man in still water, x
= 4 km/h
Speed of water, y = 2 km/h
Upstream speed, U = 4 – 2= 2 km/h
Upstream time,

= Distance/ Upstream speed = 10/2 = 5 hours

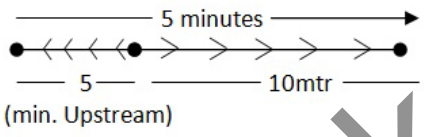
34. (b) Speed of stream, y = 3 km/h
Speed of man in still water, x
= 5 km/h
Downstream speed, D = 8 km/h
Downstream time = Distance / Downstream speed = 26/8
13/4 hours

35. (c) Speed of Downstream, D = 12 km/h
Speed of Upstream, U = 8 km/h
Speed of boat in still water = (D + U)/2 = 10 km/h
Time taken by the boat in still water
= 24 km/ 10 km/h = 4 hours

36. (D) Downstream speed, D = 12 km/h
Upstream speed, U = 8 km/h
Spedd of the current , y
= (D + U)/2
= (12 – 8)/2 = 4 / 2 = 2 km/hr.

37. (c) Speed of man in still water, x = 3 km/h
Speed of the stream, y = 2 km/hr.
Upstream speed = x – y = 1 km/hr.
Upstream time = Distance/ Upstream speed
= 10 km/ 1 km/ hr. = 10 hr.
downstream speed = x + y = 5 km/h
Downstream time = Distance/ Downstream speed
= 10 km / 5 km/h = 2 hours
Total time = U.T + D.T
= 10 hr. + 2 hr
= 12 hours
Alternate:
$T = 2xD/x^2 - y^2$
$T = (2 \times 3 \times 10)/(3^2 - 2^2)$ = 60/5 = 12 hours

38.



(d)
See the figure,
OA distance covered by upstream
Speed in 5 minutes = 5/60 (x - y)
OB = Distance covered by downstream speed in 5 minutes
= 5/60 (x + y)
ATQ
OB - OA = AB
5/60 (x + y) – 5/60 (x - y) = 100 / 1000 km
5/60 [x + y – x + y] = 100/ 1000 km
On solving
y = 0.6 km/hr
Thus, Speed of the current = 0.6 km/hr.

39. (a) Upstream speed, U
= 1 km/ (10/60 hr) = 6 km/hr
Downstream speed, D = 1 km/ (4/60 hr.) = 15 km/hr
Speed of the stream, y = (D - U)/2
= (15- 6)/2 = 9/2 = 4.5 km/hr.

40. (c) Downstream speed, D = 15 km/3 hr. = 5 km/hr
Upstream speed, U
= (15 ×2) /15
= 2 km/h
Speed of man in still water, = (D + U)/2
= (5 + 2)/2 = 7/2 = 3.5 km/hr

41. (b) (Distance) (Time)
Downstream = 1 km 7.5 min
× 8 × 8
8 km 60 min (1 hours)
Upstream = 5 1 hour of speed
(b)
Speed of boat in still water = (Downstream + Upstream)/2
= 8 + 5/2 = 13/2 km/h

42. (d) Downstream speed = x + y
Upstream speed = x – y
Speed = Distance/ time
thus, x + y = D /T ..... (i)
x – y = D / 2T ..... (ii)
Solve equation (i) and (ii)
x = 3D / 4T , y = D / 4T
Thus, x/y = 3D/4T × 4T/D = 3/1 = 3 : 1
Alternate:

	Downstream (D)		Upstream (U)
T →	1	:	2
S →	2	:	1

$S_B = S_D + D_U = (2 + 1)/2 = 3/2$
$S_C = S_D - D_U/2 = 2 - 1/2 = ½$
$S_B : S_c$
= 3/2 : ½
= 3 : 1

43. (b) **ATQ**
Speed = Distanc/time
Downstream Speed = x + y = 48/6 = 8 km/h
Upstream speed = x – y = 36/6 = 6 km/h
x + y = 8 km/h ..... (i)
x – y = 6 km/h ..... (ii)
Solve equation (i) and (ii)
x = 7 km/h
y = 1 km/h.
Thus, Speed of the current is = 1 km/ hr.

44. (d) ATQ
Speed of current 'y' = 4 km/h
Distance = 12 km
Speed in upstream
= (x + y) km/hr.
Here, 'x' is speed of baot in still water
thus, Speed = Distance/Time
x – 4 = 12/5
5x – 20 = 12
5x = - 20 = 12
5x = 32
x = 64 km/hr
Speed in downstream = (x + y) = 6.4 + 4 = 10.4 km/h
Thus, (x + y) = 6.4 + 4 = 10.4 km/h
∴ Time = Distance/ Speed
time = 15/10.4 = 150/104
= 1 hour 26 minute (approx.)

45. (d) **ATQ**
60/ (x + y) + 60/(x - y) = 27/2 ..... (i)
5/ (x + y) = 4/(x - y)
5x – 5y = 4x + 4y
x = 9y ..... (ii)

Put this in equation (i)
60/10y + 60/8y = 27/2
Or, 27y/2 = 27/2 or y = 1 km/hr

46. (c) **ATQ**
Downstream speed
x + y = d / 3 or d = 3 (x + y) ……. (i)
Upstream speed = x – y = (d × 2)/7
d = 7/2 (x - y)
6x + 6y = 7x – 7y
x = 13
Hence, y = Speed of current 1.5 km/h
x = 13 × 1.5
x = 19.5 km/h (speed of boat in still water)

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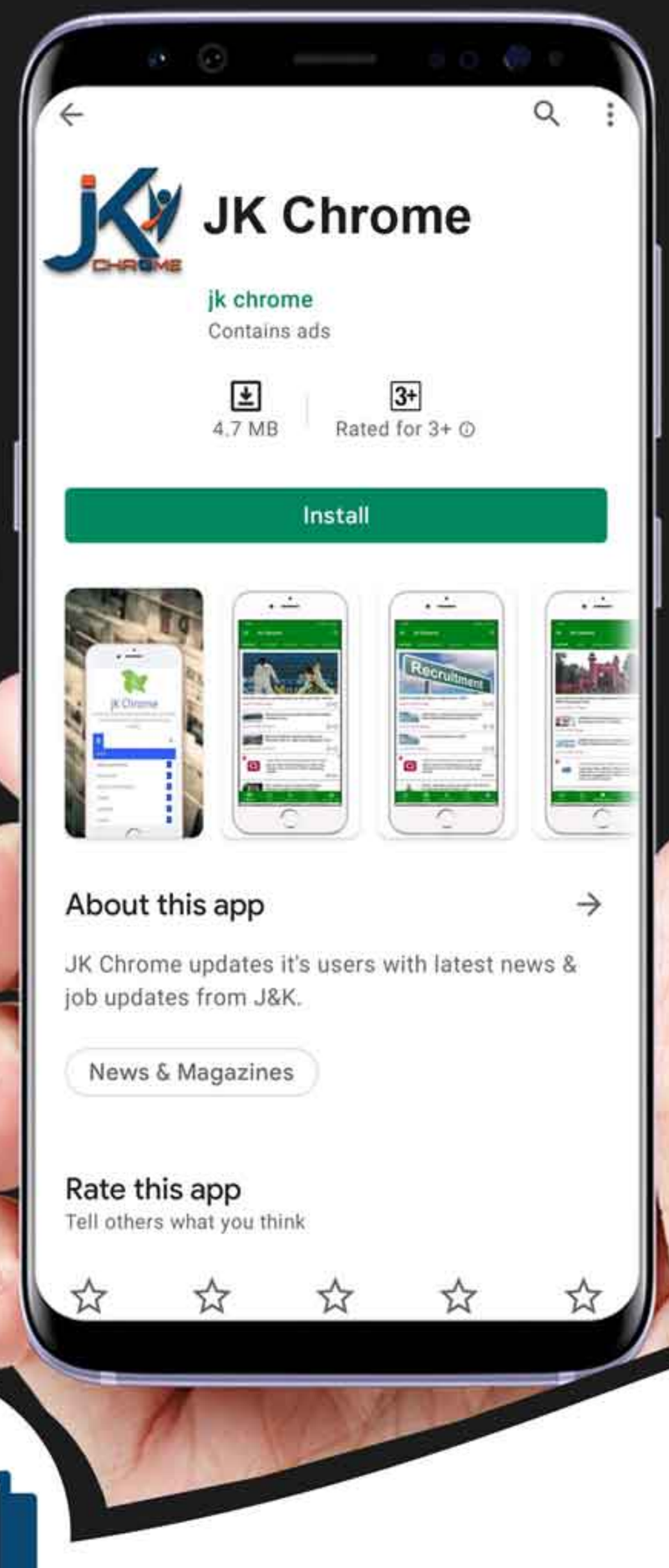

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