Boat & Stream

Solution

1. Answer: (B):
The correct answer is Option 2 i.e. 24 km/hr
The ratio of the downstream and upstream speed = 7 : 5
Suppose,
Downstream speed = 7x
Upstream speed = 5x
Time taken by a Boat to go 56 km downstream and 60 km upstream is 5 h:
So,
56/7x + 60/5x = 5
8/x + 12/x = 5
20/x = 5
x = 4
Speed of the boat in still water = [7x + 5x]/2 = 6x
Speed of the boat in still water
= 6x = 24 km/hr

2. Answer: (B)
Let us assume X is the one – way distance.
Then Upstream speed = 10 – 5 = 5 kmph
Downstream speed = 10 + 5 = 15 kmph
According to Problem,
X/15 + X/5 = 16
⇒ 20X/75 = 16
⇒ X = (15/4) × 16 = 60 km
∴ total distance = 2X = 120 km

3. Answer: (D)
Total distance covered = 270 km
Speed of Boat in still water = 12 km/hr
Speed of stream = x km/hr
Travelling Upstream takes 200/3% more
Upstream speed = (12 – x) km/hr
Downstream speed = (12 + x) km/hr
So, 270/(12 – x)
= 270/(12 + x) × (100 + 200/3)%
⇒ 270/(12 – x) = 270/(12 + x) × (5/3)
⇒ 36 + 3x = 60 – 5x
⇒ 8x = 24
⇒ x = 3
∴ The speed of the stream is 3 km/hr

4. Answer: (D)
The ratio of speed of boat in still water to speed of stream is 8 : 1. It take 4 hours by boat to cover 54 Km in downstream and 42 km in upstream.
Let the speed of boat in still water and speed of stream be '8x' and 'x' km/hr respectively
⇒ Upstream speed = 8x – x = 7x
⇒ Downstream speed = 8x + x = 9x
⇒ 54/9x + 42/7x = 4
⇒ (2/x) = 4/6
⇒ x = 3 km/hr
∴ required Downstream speed
= 9x = 27 km/hr

5. Answer: (B)
Given,
$S_{UP} : S_{Sown} = 3 : 5$ ……(i)
$\therefore \frac{D+9}{3} = 2\left[\frac{D}{5}\right]$
⇒ D = 45
Speed of boat in still water
$= \frac{D-5}{2} = 20km/hr$
Let speed of currently km/hr.
∴ from (i)
$\frac{20-y}{20+y} = \frac{3}{5}$
⇒ y = 5 km/hr.

6. Answer: (C)
ATQ, $\frac{D-11}{2x} = \frac{4D}{16x}$
Or, D = 22 km
Also, $\frac{D-2}{2} = 2x$
or, D – 2 = 4*x*
or, *x* = 5
Speed of boat = 9x = 45 km/hr.

7. Answer: (C)
$Downstream \quad Upstream$
$Speed \rightarrow 7xkm/hr : 3xkm/hr$
$\left(\frac{D+11}{3x}\right) = 3\left(\frac{D-3}{7x}\right)$
⇒ D = 52

$7x = \frac{D+18}{2.5}$
$\Rightarrow x = 4$
Speed of current = $2x = 8\ km/hr$

8. Answer: (B)
Distance covered along the stream = 3d
Distance covered against the stream = 2d
Let speed of boat in still water = x km/hr.
Let speed of current = y km/hr.
$\therefore \frac{21}{x+y} = \frac{7}{5}$
$x + y = 15$ ……..(i)
And $\frac{3d}{(x+y)} = \frac{90}{100} \times \frac{2d}{x-y}$
$x - y = 9$ …….(ii)
$\therefore x = 12$
y = 3
∴ Rate of current = 3km/hr.

9. Answer: (C)
Let the distance be d kms
Speed of the current be x km/ph
d/ (10-x) = 5d/(10+x)
Solving for x, we get x = 20/3 km/hr.

10. Answer: (A)
Distance = 15 km
Let speed of boat = x km/hr
Speed of current = y km/hr
ATQ
$\frac{15}{x-y} - \frac{15}{x+y} = 2$……..(i)
Now = x = 4y ……(ii)
x = 4 km/hr
y = 1 km/hr
Distance covered in downstream
$= (4 + 1) \times 5 \Rightarrow 25$ km

11. Answer: (A)
Let speed of upstream = $x\ km/hr$
Speed in downstream = $2x\ km/hr$
ATQ,
$\frac{32}{x} + \frac{32}{2x} = 12$
$x = 4$
Speed of boat in still water
$= \frac{8+4}{2} = 6\ kmph$

12. Answer: (E)
Quantity I:
Let speed of current = x
Speed of boat = x + 5x
Downstream speed = 7x
$\frac{63}{7x} = 3$
$x = 3$
Upstream speed = $6x - x$
$= 5x$
$= 15\ km/hr$Quantity I = Quantity II

13. Answer: (E)
Let v km/hr be the speed of current
Upstream speed = 21 – v
Downstream speed = 21 + v
Upstream speed is 6km/hr less than the downstream stream speed
(21 + v) – (21 – v) = 6
⇒ v = 6/2 = 3 km/hr
Time to cover the distance of 108 km in upward direction = 108/(21 – 3) = 108/18
= 6 hr

14. Answer: (C)
Let the speed of boat in still water and the speed of current be 10x km/hr and x km/hr respectively
ATQ
$\frac{\left(\frac{D}{11x}\right)}{\frac{D-45}{9x}} = \frac{3}{2}$
$D = 99\ km$

15. Answer: (D)
Ratio of speed of boat in downstream and speed of stream is 9 : 1
Given Speed of current = 3 km/ h
Speed of boat in downstream = 9 × 3 = 27 km/h
Speed of boat in still water = Speed of boat in downstream – Speed of current
= 27 – 3 = 24 km/h
Speed of boat in upstream = 24 – 3 = 21 km/h
Distance travelled by boat in upstream in 5 hours = 21 × 5 = 105 km

16. Answer: (D)
Given:
Time taken to row 52 km upstream and 42 km downstream = 10 hours

Time taken to row 66 km downstream and 60 km upstream = 13 hours

Formula used:

Downstream speed = Speed of boat + Speed of stream

Upstream speed = Speed of boat – Speed of stream

Calculation:

Let the speed of boat and speed of stream be x km/hr and y km/hr respectively

So, downstream speed = (x + y) km/hr

Upstream speed = (x – y) km/hr

According to the question,

$[52/(x – y)] + [42/(x + y)] = 10$

$\Rightarrow 94x + 10y = 10x^2 – 10y^2$ – – – – (i)

$[66/(x + y)] + [60/(x – y)] = 13$

$\Rightarrow 126x – 6y = 13x^2 – 13y^2$ – – – – (ii)

Now, multiplying equation (i) by 13 and equation (ii) by 10

$1260x – 60y = 130x^2 – 130y^2$ – – – – (iii)

$1222x + 130y = 130x^2 – 130y^2$ – – – – (iv)

Subtracting equation (ii) by (i)

$38x – 190y = 0$

$\Rightarrow 38x = 190y$

$\Rightarrow x = 5y$

Now, putting value of x = 5y

$[52/(5y – y)] + [42/(5y + y)] = 10$

$\Rightarrow (52/4y) + (42/6y) = 10$

$\Rightarrow (13/y) + (7/y) = 10$

$\Rightarrow (20/y) = 10$

$\Rightarrow y = 2$

Speed of man in still water = (2 × 5) km/hr

$\Rightarrow$ 10 km/hr

$\therefore$ The speed of man in still water is 10 km/hr

17. Answer: (B)

Let the speed of boat in still water be x km/hr and the speed of the current be y km/hr.

Speed of the boat in downstream = (x + y) km/hr

Speed of boat in upstream = (x – y) km/hr

Acc. to the question,

$12/(x + y) + 6/(x – y) = 3$ ..... (1)

And, $10/(x + y) + 16/(x – y) = 4.5$ ..... (2)

On solving both equations, we get (x + y) = 44/7 km/hr and (x – y) = 11/2 km/hr

For option B, time taken to travel 20km downstream and 4.5km upstream

= 20/(44/7) + 4.5/(11/2) = 4 hours

18. Answer: (B)

$\frac{21}{x+12} - \frac{21}{x+13} = \frac{6}{60}$

$x^2 + 25 - 54 = 0$

$x = -27, +2$

Required speed = 2km/hours

19. Answer: (B)

Speed of boat A in upstream

$= \frac{62.5}{2.5} = 25\ km/hr$

Speed of boat A in downstream

$= 25 + 2 \times 2.5 = 30\ kn/hr$

Speed of boat B in still water

$= 30 \times \frac{80}{100} = 24\ kn/hr$

Required distance = (24 – 2.5) × 4 = 86 km

20. Answer: (A)

Speed of boat A on downstream = $\frac{185}{\frac{37}{10}}$

$= 50\ km/hr$

Speed of boat B in downstream

$= 50 - 7.5 - 5 = 37.5\ km/hr$

Speed of boat B in upstream

$= 37.5 - 2 \times 7.5 = 22.5\ km/hr$

Required distance = 22.5 × 2 + 37.5 × 2

= 120 km/hr