Day-05

① Ramesh walks → 2km in 30 min

$$S = \frac{d}{t}$$

$$S = \frac{3}{0.5\,hr} = \boxed{6\,km/hr - speed}$$

② Train travels → 50km/hr

3 hrs → ?

$$d = s \times t$$
$$= 50 \times 3$$
$$\boxed{t = 150\,km}$$

③ Train travels at 50 km/hr. How far will it go in 3 hr.

Distance = speed x Time

$$= 50 \times 3$$
$$\boxed{d = 150\,km}$$

④ A cyclist covers 20km in 1hr 30 minutes. What is his speed?

1 hr 30 min = 1.5 hr

Speed = 20/1.5

$$\boxed{S = 13.33\,km/hr}$$

⑤ A boat goes 10 km downstream in 1 hr. What is its speed downstream?

Speed = 10 km / 1 hr

$$\boxed{S = 10\,km/hr}$$

⑥ If a boat's speed in still water is 15km/hr and stream speed is 5km/hr, what is its speed upstream?

upstream speed = 15 - 5 = ~~10km~~

$$= 10\,km/hr$$

⑦ A man walks 4km upstream in 2 hrs. What is his upstream speed?

Speed = 4/2.

$$= 2\,km/hr$$

8) Downstream speed = 24/2
= 12km/hr
Stream speed = 12 - 10 = 2km/hr.

9) Speed = 300/5
S = 60km/hr.

10) speed = 60/3.
S = 20km/hr.

11) Time = Distance ÷ speed.
= 240/60
t = 4 hrs.

12) Upstream speed = 30/3
= 10km/hr.
Downstream speed = 30/2
= 15km/hr
Boat speed = (15+10)/2
= 12.5km/hr.
Stream speed = (15-10)/2

= 2.5 km/hr.

13) Upstream = 20 - 5 = 15 km/hr.
= 15km/hr
Downstream = 20+5
= 25km/hr.

14) Speed = Distance ÷ Time.
= 120 ÷ 9.
= 13.33 m/s.
Convert to km/hr = 13.33 x 18/5.
= 48km/hr.

15) Relative speed = (120+140)/10 = 260/10
= 26m/s

16) Upstream speed = 20/4 = 5km/hr.
Downstream speed = 20/3
= 6.67km/hr.
Boat speed = (5+6.67)/2 =
= 5.8km/hr.

· Stream speed = (6.67 − 5)/2
= 0.83 km/hr.

(17) Downstream speed = 5 + 2
= 7 km/hr
· Time = 10/7 = 1.43 hr ≈
1 hour 26 minutes.

(18) Let total distance = 60 + 60
= 120 km.
Time for 1st part = 60/40
= 1.5 hr
Time for 2nd part = 60/60
= 1 hr
Total time = 2.5 hrs.
Avg speed = Total distance ÷ Total time.
= 120 ÷ 2.5
= 48 km/hr

(19) Downstream speed = 48/3 =
= 16 km/hr.

upstream speed = 48/4
= 12 km/hr.
Speed of boat = (16 + 12)/2 =
= 14 km/hr.
Speed of stream = (16 − 12)/2
= 2 km/hr.

(20) Total distance = 100 + 200
= 300 m.
· speed = 60 km/hr = (60 × 1000)/3600
= 16.67 m/s.
· Time = 300/16.67 ≈ 18 seconds.

(21) Let the boat speed = x km/hr.
Then downstream = x + 2, upstream = x − 2.
Time = 30/(x+2) + 20/(x−2) =
= 5.
Solve:-

$$\frac{30}{x+2} + \frac{20}{x-2} = 5.$$

LCM = (x+2)(x-2)

Multiply throughout:

$30(x-2) + 20(x-2) = 5(x^2-4)$

$30x - 60 + 20x + 40 = 5x^2 - 20$

$50x - 20 = 5x^2 - 20$

$5x^2 - 50x = 0$

$x(x-10) = 0$

$x = 10$

Speed of boat = 10km/hr

(22) Relative speed = 60 + 40

= 100 km/hr

$= 100 \times 1000 / 3600$

= 27.28 m/s

(23) Let boat speed = x km/hr.

Then upstream speed = x-2

Downstream = x+2

Time diff = 2hrs.

$\frac{20}{x-2} - \frac{20}{x+2} = 2$

Multiply by $(x-2)(x+2)$:

$20(x+2) - 20(x-2) = 2(x^2-4)$

$20x + 40 - 20x + 40 = 2x^2 - 8$

$80 = 2x^2 - 8$

$88 \Rightarrow x^2 = 44$

$x = \sqrt{44} \approx 6.63$

(24) Speed = 72km/hr.

$= (72 \times 1000)/3600 = 20$ m/s.

- Length of train = $20 \times 12 = 240$m.
- Total length (train + platform).

$= 20 \times 18$

= 360m.

- Platform length = 360 - 240

= 120m

(25) Let stream speed = x km/hr.

Then upstream = 20-x

Downstream = 20+x

$$\frac{40}{20+x} - \frac{40}{20+x} = 1$$

Multiply by $(20-x)(20+x)$:

$$40(20+x) - 40(20-x)$$
$$= (20^2 - x^2).$$
$$800 + 40x - 800 + 40x$$
$$= 400 - x^2.$$
$$80x = 400 - x^2$$
$$= x^2 + 80x - 400$$
$$= 1$$

Solve quadratic:-

$$x = \frac{-80\hat{A} \pm \sqrt{80^2 + 4 \times 400}}{2}$$

$$= \frac{-80\hat{A} \pm \sqrt{8000}}{2} - \frac{80\hat{A} \pm 89.44}{2}$$

Speed of stream $\approx$ 4.72 km/hr.