30/6/25 Day 5 Aptitude

Time, Speed & Distance + Boats & Stream

1) Ramesh walks 3km, Time = 30min

speed = $\frac{3}{0.5} = \frac{30}{5} =$ 6 km/hr Time = $\frac{30}{60} = 0.5$hr

2) Car covers 60km, Time = 2hrs

Avg speed = $\frac{60}{2} =$ 30 km/hr

3) train travels 50km/hr. How far go 3hrs.

Distance = 50 × 3 = 150 km

4) Cyclist covers 20km in 1hr. 30min

speed = $\frac{20}{1.5} = \frac{200}{15} =$ 13.33 km/hr Time = 1½ = 1.5hr

5) Boat goes 10 downstream 1hr.

speed ↓ = $\frac{10}{1} =$ 10 km/hr.

6) Boat speed still water = 15km/hr. stream speed = 5km/hr

speed upstream = 15 − 5 = 10 km/hr

7) Man walks 4km upstream 2hr.

upstream speed = $\frac{4}{2} =$ 2 km/hr

8) Boat goes 24km downstream 2hrs. stream speed if boat speed still water is 10km/hr

Downstream = $\frac{24}{2} = 12$ km/hr

stream speed = 12 − 10 = 2 km/hr

9) Train takes 5hr cover 300km.

speed = $\frac{300}{5} =$ 60 km/hr

10) Man travels 60km 3hr.

Speed $= \frac{60}{3} =$ 20km/hr.

11) Car travels 240km speed 60km/hr.

Time $= \frac{240}{60} =$ 4hr

12) Boat covers 30km upstream 3hr & same distance downstream 2hr.

upstream $= \frac{30}{3} = 10$ km/hr.

downstream $= \frac{30}{2} = 15$ km/hr.

speed of boat $= \frac{15+10}{2} = \frac{25}{2} =$ 12.5 km/hr

speed of stream $= \frac{15-10}{2} = \frac{5}{2} =$ 2.5 km/hr

13) Swimmer swim 20km/hr still water. stream speed 5 km/hr.

upstream $= 20 - 5 =$ 15 km/hr

downstream $= 20 + 5 =$ 25 km/hr.

14) train 120m long cross pole in 9 sec.

speed $= \frac{120}{9} = 13.33$ m/s

convert km/hr.

$13.33 \times \frac{18}{5} =$ 48 km/hr

15) Two trains running opposite direction cross each other 10sec. Length = 120m, 140m, speed = 54 km/hr & x km/hr

Total length $= 120 + 140 = 260$m.

Total speed $= 54 + x = \frac{(54+x) \times 1000}{3600}$ m/s.

$\frac{(54+x) \times 10^{26}}{36_{18}} = \frac{260}{10} = \frac{(54+x)}{3.6} = 26 \Rightarrow 54 + x = 26 \times 3.6$

$x = 93.6 - 54$

$x = 39.6$

16) Boat takes 4hr to go 20km upstream & 3hrs downstream.

upstream $= \frac{20}{4} = 5$ km/hr

downstream $= \frac{20}{3} = 6.6$ km/hr.

Boat speed $= \frac{5+6.67}{2} = \boxed{5.83 \text{ km/hr}}$

stream speed $= \frac{6.67-5}{2} = \boxed{0.833 \text{ km/hr}}$

17) person walks 5km/hr still water. long he take swim 10km downstream if stream speed is 2.5km/hr.

Downstream $= 5+2 = 7$ km/hr

Time 10km $= \frac{10}{7} = 1.4285$ hrs.

$\boxed{1.43 \text{ hrs}}$

18) car travels 60km at 40km/hr & next 60km at 60 km/hr

Average speed $= \frac{2 \times 40 \times 60}{40+60} = \frac{4800}{100} = \boxed{48 \text{ km/hr}}$

19) Boat goes 48km downstream 3hr & return 4hrs.

Downstream $= \frac{48}{3} = 16$ km/hr.

upstream $= \frac{48}{4} = 12$ km/hr.

Boat speed $= \frac{16+12}{2} = \frac{28}{2} = \boxed{14 \text{ km/hr}}$

Stream speed $= \frac{16-12}{2} = \frac{4}{2} = \boxed{2 \text{ km/hr}}$

20) train 100m long running 60km/hr crosses platform 200m long.

Total length $= 100+200 = 300$m.

speed $= \frac{60 \times 1000}{3600} = \frac{6000}{36} = 16.67$ m/s.

Time $= \frac{300}{16.67} = 18$ sec

21) Boat covers 30 km ↓ & 20 km ↑ in 5 hrs.
Steam speed = 2 km/h.
↓ stream = $x+2$ = 30 ⇒ $T = \frac{30}{x+2}$ $\quad \frac{30}{x+2} + \frac{20}{x-2} = 5$
↑ speed = $x-2$ = 20 km = $T = \frac{20}{x-2}$
(Trial) $x = 10$.
↓ = 10+2 = 12 $\quad \downarrow = \frac{30}{12} = 2.5$ hrs. $\quad \uparrow = \frac{20}{8} = 2.5$ hrs
↑ = 10−2 = 8.
Total time = 2.5 + 2.5 = 5 hrs

22) 2 trains length 150 m, 250 m. Speeds = 60 km/h, 40 km/h opp direc.
Total length = 150 + 250 = 400 m
Relative speed = 60 + 40 = 100 km/h = $\frac{100 \times 1000}{3600} = \frac{1000}{36} =$
$= 27.78$ m/s
Time = $\frac{400}{27.78}$ = 14.4 sec.

23) Swimmer takes 2 hrs more to swim upstream than downstream for 20 km. stream speed = 2 km/h.
swimmer speed = x.
↓ speed = $x+2$, time = $\frac{20}{x+2}$
↑ speed = $x-2$, time = $\frac{20}{x-2}$
$\frac{20}{x-2} - \frac{20}{x+2} = 2$
$20\left(\frac{1}{x-2} - \frac{1}{x+2}\right) = 2 \Rightarrow \frac{1}{x-2} - \frac{1}{x+2} = \frac{1}{10}$
LCM:
$\frac{(x+2)-(x-2)}{(x-2)(x+2)} = \frac{1}{10} = \frac{4}{x^2-4} = \frac{1}{10}$
$x^2 - 4 = 40$
$x^2 = 44$ $\quad x = 6.63$ km/h

24) Train moving 72 km/h crosses platform 18 sec, man standing platform 12 sec.
Speed = $\frac{72 \times 1000}{3600} = 20$ m/s
Length of train = 20 × 12 = 240 m

Length of train + platform = 20 × 18 = 360m

Platform length = 360 − 240 = 120m

25) Boat speed still water = 20km/h. takes 1hrs more to go upstream than downstream for 40km.

upstream = 20 − x stream speed = x

Downstream = 20 + x

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

LCM

$\frac{(20+x) - (20-x)}{(20x)(20+x)} = \frac{1}{40} = \frac{2x}{400-x^2} = \frac{1}{40}$

$= 400 - x^2 = 80x$

$= x^2 + 80x - 400 = 0$

Quadratic formula. $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$

$a = 1 \quad b = 80 \quad c = -400$

$x = \frac{-80 \pm \sqrt{80^2 - 4(1)(-400)}}{2(1)} = \frac{-80 \pm \sqrt{6400 + 1600}}{2}$

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

$= \sqrt{8000} = 89.44$

$x = \frac{9.44}{2} = 4.72$