Day 5

1. Ramesh walks 3 km in 30 m.
   $T = 30\ m = 0.5\ h$ / speed $= \dfrac{3}{0.5} = 6\ km/hr$

2. Car Covers. 60 km in 2 hrs
   Speed $= \dfrac{60}{2} = 30\ km/hr$

3. Train 50 km/hr in 3 hrs
   $1\ hr \to 50\ km$
   $3\ hr \to ?$
   $50 \times 3 = 150\ km$

4. $20\ km \to 1.5$ hours.
   Speed $= \dfrac{20}{1.5} = 13.33\ km/hr$

5. $10\ km \to 1\ hour$
   Speed $= \dfrac{10}{1} = 10\ km/hr$

6. Still water $= 15\ km/hr$
   Steam speed $= 5\ km/hr$
   up stream speed $= 15 - 5 = 10\ km/hr$

7. $4\ km$ up stream $\to 2$ hours
   $\dfrac{dist}{time} = \dfrac{4\ km}{2\ h} = 2\ km/hr$

8. $24\ km$ downstream $\to 2$ hours
   Still water speed $= 10\ km/hr$
   $\dfrac{24\ km}{2} = 12\ km/hr - 10\ km/hr$
   $= 2\ km/hr$

9. 300 km → 5 hours

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

10 60 km → 3 hours

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

11 240 km → 60 km/hr

  $\frac{Dist}{speed}$ = $\frac{240}{00}$ = 4 hours

12 30 km → 3 hours (upstream)

  30 km → 2 hours (down)

  upstream speed = B - S = 30 ÷ 3 = 10 km

  downstream speed = B + S = 30 ÷ 2 = 15 km/hr

  B - S = 10

  B + S = 15

  2B = 25

  B = $\frac{25}{2}$ = 12.5

  12.5 - S = 10

  S = 2.5 Km

13. 20 km/hr

  Stream speed = 5 km/hr

  downstream = 20 + 5 = 25 km/hr

  upstream = 20 - 5 = 15 km/hr

14. 120 m → 9 seconds

  Speed = $\frac{D}{T}$ = $\frac{120}{9}$ = 13.33 m/s

  To km/hr

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

15.

Total dist $= 120 + 140 = 260\,m$

Time $= 10\,sec$

Convert $54\ km/hr \to m/s$

$$\frac{54 \times 1000}{3600} = 15\ m/s$$

$$15 + y = \frac{260}{10} \quad \Rightarrow y = 26 - 15 = 11$$

$$11 \times \frac{18}{5} \Rightarrow 39.6\ km/hr.$$

16. 4 hours — upstream
3 hours — downstream

Upstream speed $= 20 \div 4 = 5\ km/hr$
downstream $= 20 \div 3 = 6.67\ km/hr$

$$B - S = 5$$
$$B + S = 6.67$$
$$\overline{}$$
$$2B = 11.67$$

$$B = \frac{11.67}{2} = 5.835\ km/hr$$
$$S = 6.67 - B = 0.853\ km/hr$$

17. Still water $= 5\ km/hr$
Stream speed $= 2$
Downstream speed $= 5 + 2 = 7$
Time $= \frac{D}{S} = \frac{10}{7} = 1.4\ hours$

18. Dist $= 60 + 60 = 120\ km$
Time $= 1.5 + 1 = 2.5\ hours$
Avg $= \frac{120}{2.5} = 48\ km/hr$

19. 48 Km $\rightarrow$ 3 hours (downstream)
    4 hours (upstream)

downstream $= \dfrac{48}{3} = 16 \text{ km/hr}$

upstream $= \dfrac{48}{4} = 12 \text{ km/hr}$

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

Stream speed $= \dfrac{16-12}{2} = 2 \text{ km/hr}$

20 Total dist $= 100 + 200 = 300 \text{ m}$
    Speed $= \dfrac{60 \times 1000}{3600} = 16.67 \text{ m/s}$

    Time $= \dfrac{300}{16.67} = 18 \text{ sec}$

21 30 km $\rightarrow$ downstream $\} - 5 hr$
    20 km $\rightarrow$ upstream

    Speed $= 2 \text{ km/hr}$
    $D = B+2$
    $U = B-2$
    Time $= \dfrac{30}{B+2} + \dfrac{20}{B-2} = 5$

    $= \dfrac{30(B-2) + 20(B+2)}{(B+2)(B-2)}$

    $B = \sqrt{8}$

22 Total length = $150 + 250 = 400\,m$
Relative speed = $100\,km/hr$
$$= \frac{100 \times 1000}{3600} = 27.78$$

Time = $\frac{400}{27.78}$ = $14.4\,sec$

23 $20\,km \rightarrow x$ downstream
$20\,km \rightarrow x+20$ upstream
Stream speed = $2\,km/hr$
    speed = B
    down = $B+2$
    up = $B-2$
$$\frac{20}{B-2} - \frac{20}{B+2} = 2$$

$B = 6.63$

24. Speed = $\frac{72 \times 1000}{3600}$ = 20

Length of train = $20 \times 12 = 240\,m$
    total length = $20 \times 18 = 360\,m$
    platform = $360 - 240 = 120\,m$

25. Down = $20 + x$
    up = $20 - x$

$$\frac{40}{20-x} - \frac{40}{20+x} = 2 \quad \Rightarrow \quad \underline{2.5\,km/hr}$$