

Day 5

1. $3 \text{ km} \rightarrow 30 \text{ min}$

$3 \text{ km Time} = 30 \text{ min} = 0.5 \text{ hours}$

$$\text{Speed} = \frac{3}{0.5} = 6 \text{ km/hr}$$

2. $60 \text{ km} \rightarrow \text{in } 2 \text{ hours}$

$$\text{Speed} = \frac{60}{2} = 30 \text{ km/hr}$$

3. 50 km/hr

in 3 hr

$1 \text{ hr} \rightarrow 50 \text{ km}$

$3 \text{ hr} \rightarrow 1$

$$S = 50 \times 3 = 150 \text{ km}$$

4. $20 \text{ km} \rightarrow 1.5 \text{ hour}$

$$\text{speed} = \frac{20}{1.5} = 13.33 \text{ km/hr}$$

5. $10 \text{ km} \rightarrow 1 \text{ hour}$

$$\text{speed} = \frac{10}{1} = 10 \text{ km/hr}$$

6. Still water $= 15 \text{ km/hr}$

stream speed $= 5 \text{ km/hr}$

$$\text{upstream speed} = 15 - 5$$

$$= 10 \text{ km/hr}$$

7. 4 km upstream \rightarrow 2 hours.

$$\frac{\text{dist}}{\text{time}} = \frac{4 \text{ km}}{2 \text{ h}} = 2 \text{ km/hr}$$

8. 24 km downstream \rightarrow 2 hours
still water speed = 10 km/hr

$$\frac{24 \text{ km}}{2} = 12 \text{ km/hr} - 10 \text{ km/hr} \\ = 2 \text{ km/hr}$$

9. 300 km \rightarrow 5 hours

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

10. 60 km \rightarrow 3 hours

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

11. 120 km \rightarrow 60 km/hr

$$\frac{\text{Dist}}{\text{Speed}} = \frac{120}{60} = 2 \text{ hours}$$

12. 30 km \rightarrow 3 hours (upstream)
30 km \rightarrow 2 hours (down)

$$\begin{aligned} \text{upstream speed} &= B - S = 30 \div 3 = 10 \text{ km/hr} \\ \text{downstream speed} &= B + S = 30 \div 2 = 15 \text{ km/hr} \end{aligned}$$

$$B - S = 10$$

$$(1) B + S = 15$$

$$+ 2B = 25$$

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

$$2) 12.5 - S = 10$$

$$S = 2.5 \text{ km/hr}$$

13. 20 km/hr
stream speed = 5 km/hr

$$\text{downstream} = 20 + 5 = 25 \text{ km/hr}$$

$$\text{upstream} = 20 - 5 = 15 \text{ km/hr}$$

14. $120 \text{ m} \rightarrow 9 \text{ seconds}$

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

$$\text{To km/hr}$$

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

15. Total dist. = $120 + 140 = 260 \text{ m}$

$$\text{Time} = 10 \text{ sec}$$

convert $54 \text{ km/hr} \rightarrow \text{m/s}$

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

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

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

16. 4 hours - upstream
3 hours - downstream.

$$\begin{aligned}\text{Upstream speed} &= 20 \div 4 = 5 \text{ km/hr} \\ \text{Downstream speed} &= 20 \div 3 = 6.67 \text{ km/hr}\end{aligned}$$

$$B - S = 5$$

$$B + S = 6.67$$

$$2B = 11.67$$

$$B = \frac{11.67}{2} = 5.835 \text{ km/hr}$$

$$S = 6.67 - B = 0.835 \text{ km/hr}$$

17. Still water = 5 km/hr
Stream speed = 2

$$\text{Downstream speed} = 5 + 2 = 7$$

$$\text{Time} = \frac{D}{S} = \frac{10 \text{ km}}{7 \text{ km/hr}} = 1.4 \text{ hours.}$$

$$\approx 1 \text{ hour } 24 \text{ min.}$$

18. Dist = 60 + 60 = 120 km

$$\text{Time} = 1.5 + 1 = 2.5 \text{ hour.}$$

$$\text{Avg} = \frac{120}{2.5} = 48 \text{ km/hr}$$

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

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

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

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

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

20. Total dist = 100 + 200 = 300m

$$\text{Speed} = \frac{60 \times 1000}{3600} = 16.67 \text{ m/s}$$

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

21. 30km \rightarrow downstream } 5 hr
20km \rightarrow upstream }

$$\text{Speed} = 2 \text{ km/hr}$$

$$D = B + 2$$

$$U = B - 2$$

$$\text{Time} = \frac{30}{B+2} + \frac{20}{B-2} = 5$$

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

$$30(B-2) + 20(B+2) = 5(B+2)(B+2)$$

$$30B - 60 + 20B + 40 = 5(B^2 - 4)$$

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

$$5B^2 - 50B = 0$$

$$5B(B-10) = 0$$

$$(5B-0)(B-10) = 0$$

$$\frac{(B+2)}{20} + \frac{B-1}{20} = \frac{1}{5}$$

$$\frac{(B+2)(B-1)}{60} = \frac{1}{5}$$

$$\frac{B^2 - 4}{60} = \frac{1}{5}$$

$$5B^2 - 20 = 60$$

$$5B^2 = 80$$

$$B^2 = 16$$

$$B = 4$$

22. Total length = $100 + 200 = 400\text{m}$

relative speed = 100 km/hr

$$= \frac{100 \times 1000}{3600} = 27.78$$

$$\text{Time} = \frac{400}{27.78} = 14.4\text{ sec.}$$

23. $20\text{ km} \rightarrow x$ downstream

$20\text{ km} \rightarrow x+20$ upstream

Stream speed = 2 km/hr

$$\text{Speed} = B$$

$$\text{down} = B + 2$$

$$\text{up} = B - 2$$

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

$$\frac{20(B+2) - 20(B-2)}{(B-2)(B+2)} = 2 \Rightarrow$$

$$\frac{80}{B^2 - 4} = 2$$

$$\Rightarrow \cancel{2} \Rightarrow B^2 - 4 = 40$$

$$\Rightarrow B^2 = 44$$

$$B = 6.63$$

24. $\text{Speed} = \frac{275 \times 1000}{3600} \approx 20$

$$\text{length of train} = 20 \times 12 = 240 \text{m}$$

$$\text{total length} = 20 \times 18 = 360 \text{m}$$

$$\text{platform} = 360 - 240 = 120 \text{m}$$

25. $\text{Down} = 20 + x$
 $\text{up} = 20 - x$

$$\frac{40}{20-x} - \frac{40}{20+x} = 1 \Rightarrow 2.5 \text{ km/hr}$$