SOLUTIONS

1. Speed $= \left(80 \times \frac{5}{18}\right)$ m/sec $= \frac{200}{9}$ m/sec $= 22\frac{2}{9}$ m/sec.

2. Speed $= \frac{200}{24}$ m/sec $= \frac{25}{3}$ m/sec $= \left(\frac{25}{3} \times \frac{18}{5}\right)$ km/hr $= 30$ km/hr.

3. 25 m/sec $= \left(25 \times \frac{18}{5}\right)$ km/hr $= 90$ km/hr.

   And, 25 m/sec $= (25 \times 60)$ m/min $= 1500$ m/min.

   So, all the three speeds are equal.

4. Speed $= \left(\frac{600}{5 \times 60}\right)$ m/sec $= 2$ m/sec $= \left(2 \times \frac{18}{5}\right)$ km/hr $= 7.2$ km/hr.

5. Speed $= \left(5 \times \frac{5}{18}\right)$ m/sec $= \frac{25}{18}$ m/sec.

Distance covered in 15 minutes $= \left(\frac{25}{18} \times 15 \times 60\right)$ m $= 1250$ m.

6. Speed $= 9$ km/hr $= \left(9 \times \frac{5}{18}\right)$ m/sec $= \frac{5}{2}$ m/sec.

Distance $= (35 \times 4)$ m $= 140$ m.

$\therefore$ Time taken $= \left(140 \times \frac{2}{5}\right)$ sec $= 56$ sec.

7. Speed $= 108$ kmph $= \left(108 \times \frac{5}{18}\right)$ m/sec $= 30$ m/sec.

$\therefore$ Distance covered in 15 sec. $= (30 \times 15)$ m $= 450$ m.

8. Ratio of speeds $= \left(300 \times \frac{2}{15}\right) : \left(\frac{450}{9}\right) = 40 : 50 = 4 : 5.$

9. Ratio of speeds $= \left(\frac{550}{60} \times \frac{18}{5}\right) : \left(\frac{33}{45} \times 60\right) = 33 : 44 = 3 : 4.$

10. Let the speeds of two trains be $7x$ and $8x$ km/hr.

Then, $8x = \frac{400}{4} = 100 \Rightarrow x = \left(\frac{100}{8}\right) = 12.5.$

$\therefore$ Speed of first train $= (7 \times 12.5)$ km/hr $= 87.5$ km/hr.

11. Total distance travelled $= \left[\left(50 \times 2\frac{1}{2}\right) + \left(70 \times 1\frac{1}{2}\right)\right]$ miles $= (125 + 105)$ miles $= 230$ m

12. Number of gaps between 21 telephone posts $= 20$.
Distance travelled in 1 minute $= (50 \times 20)$ m $= 1000$ m $= 1$ km.
$\therefore$ Speed $= 60$ km/hr.

13. Distance $= \left(1100 \times \frac{11}{5}\right)$ feet $= 2420$ feet.

14. Time taken to cover 600 km $= \left(\frac{600}{100}\right)$ hrs $= 6$ hrs.

Number of stoppages $= \frac{600}{75} - 1 = 7.$

Total time of stoppage $= (3 \times 7)$ min $= 21$ min.
Hence, total time taken $= 6$ hrs 21 min.

15. Let the distance covered by the cyclist be x and the time taken be y. Then,

Required ratio $= \frac{\frac{1}{2}x}{2y} : \frac{x}{y} = \frac{1}{4} : 1 = 1 : 4.$

16. Distance covered in first 2 hours $= (70 \times 2)$ km $= 140$ km.
Distance covered in next 2 hours $= (80 \times 2)$ km $= 160$ km.
Remaining distance $= 345 - (140 + 160) = 45$ km.
Speed in the fifth hour $= 90$ km/hr.

Time taken to cover 45 km $= \left(\frac{45}{90}\right)$ hr $= \frac{1}{2}$ hr.

$\therefore$ Total time taken $= \left(2 + 2 + \frac{1}{2}\right) = 4\frac{1}{2}$ hrs.

17. Total distance travelled in 12 hours = (35 + 37 + 39 + ... upto 12 terms).
This is an A.P. with first term, $a = 35$, number of terms, $n = 12$, common difference, $d = 2$.

$\therefore$ Required distance $= \frac{12}{2}[2 \times 35 + (12-1) \times 2] = 6(70 + 22) = 552$ km.

18. Speed $= \left(10 \times \frac{60}{12}\right)$ km/hr $= 50$ km/hr.

New speed $= (50 - 5)$ km/hr $= 45$ km/hr.

$\therefore$ Time taken $= \left(\frac{10}{45}\right)$ hr $= \left(\frac{2}{9} \times 60\right)$ min $= 13\frac{1}{3}$ min $= 13$ min 20 sec.

19. Distance covered in 2 hrs 15 min *i.e.*, $2\frac{1}{4}$ hrs $= \left(80 \times \frac{9}{4}\right)$ hrs $= 180$ hrs.

Time taken to cover remaining distance $= \left(\frac{350 - 180}{60}\right)$ hrs $= \frac{17}{6}$ hrs

$= 2\frac{5}{6}$ hrs $= 2$ hrs 50 min.

Total time taken = (2 hrs 15 min + 2 hrs 50 min) = 5 hrs 5 min.
So, Anna reached city A at 10.25 a.m.

20. Distance = (240×5) km = 1200 km.

$\therefore$ Required speed $= \left(1200 \times \frac{3}{5}\right)$ km/hr = 720 km/hr.

21. Time required = (2 hrs 30 min − 50 min) = 1 hr 40 min $= 1\frac{2}{3}$ hrs

$\therefore$ Required speed $= \left(50 \times \frac{3}{5}\right)$ km/hr = 30 km/hr.

Original speed $= \left(50 \times \frac{2}{5}\right)$ km/hr = 20 km/hr.

$\therefore$ Difference in speed = (30 − 20) km/hr = 10 km/hr.

22. Remaining distance = 3 km and Remaining time $= \left(\frac{1}{3} \times 45\right)$ min = 15 min $= \frac{1}{4}$ hour.

$\therefore$ Required speed = (3×4) km/hr = 12 km/hr.

23. Let the total journey be x km.

Then, $\frac{3x}{5} + \frac{7x}{20} + 6.5 = x \Leftrightarrow 12x + 7x + 20 \times 6.5 = 20x \Leftrightarrow x = 130$ km.

24. Let the total distance be x km. Then,

$$\frac{\frac{1}{2}x}{21} + \frac{\frac{1}{2}x}{24} = 10 \Rightarrow \frac{x}{21} + \frac{x}{24} = 20$$

$$\Rightarrow 15x = 168 \times 20 \Rightarrow x = \left(\frac{168 \times 20}{15}\right) = 224 \text{ km}.$$

25. Let the total distance be $3x$ km.

Then, $\frac{x}{3} + \frac{x}{4} + \frac{x}{5} = \frac{47}{60} \Leftrightarrow \frac{47x}{60} = \frac{47}{60} \Leftrightarrow x = 1$.

$\therefore$ Total distance = (3×1) km = 3 km.

26. Let the distance travelled on foot be x km.
Then, distance travelled on bicycle = $(61 - x)$ km.

So, $\frac{x}{4} + \frac{(61-x)}{9} = 9 \Leftrightarrow 9x + 4(61 - x) = 9 \times 36 \Leftrightarrow 5x = 80 \Leftrightarrow x = 16$ km.

27. Let A's speed = x km / hr. Then, B's speed = $(7 - x)$ km / hr.

So, $\frac{24}{x} + \frac{24}{(7-x)} = 14 \Leftrightarrow 24(7 - x) + 24x = 14x(7 - x)$

$\Leftrightarrow 14x^2 - 98x + 168 = 0 \Leftrightarrow x^2 - 7x + 12 = 0$

$\Leftrightarrow (x - 3)(x - 4) = 0 \Leftrightarrow x = 3$ or $x = 4$.

Since, A is faster than B, so A's speed = 4 km / hr and B's speed = 3 km / hr.

28. Speed on return trip = 150% of 40 = 60 kmph.

$\therefore$ Average speed $= \left(\frac{2 \times 40 \times 60}{40 + 60}\right)$ km / hr $= \left(\frac{4800}{100}\right)$ km / hr = 48 km / hr.

29. Average speed $= \left(\frac{2 \times 40 \times 20}{40 + 60}\right)$ km / hr $= \left(\frac{80}{3}\right)$ km / hr = 26.67 km / hr.

30. Speed from A to B $= \left(250 \times \frac{2}{11}\right)$ mph $= \left(\frac{500}{11}\right)$ mph.

Speed from B to A $= \left(250 \times \frac{2}{9}\right)$ mph $= \left(\frac{500}{9}\right)$ mph.

$\therefore$ Average speed $= \left(\frac{2 \times \frac{500}{11} \times \frac{500}{9}}{\frac{500}{11} + \frac{500}{9}}\right)$ mph $= \left(\frac{500000}{4500 + 5500}\right)$ mph = 50 mph.

$\left(\frac{2 \times 3 \times 2}{3 + 2}\right) = \frac{12}{\ldots}$