

CH 3 DISTANCE SPEED AND TIME

ANSWERS AND EXPLANATIONS

EXERCISE 1

1. (b) Let x be the length of the bridge.

Length of the train = 100 m

Speed of train = 72 km/hr

$$= \frac{72 \times 5}{18} \text{ m/s}$$

Time taken by train = 25 seconds.

$$\therefore 25 = \frac{100 + x}{72 \times \frac{5}{18}}$$

$$\Rightarrow 25 \times 72 \times \frac{5}{18} = 100 + x$$

$$\Rightarrow x = 500 - 100 = 400 \text{ m.}$$

2. (d) Train takes 20 seconds to cover its length and 36 seconds to cross the platform, it mean it has taken 16 second at 54 km/hr to cross the length of platform.

\therefore Length of the platform

= Distance \times Time

$$= 54 \times 16 \text{ km / hr}$$

$$= 54 \times 16 \times \frac{5}{18} \text{ m/sec}$$

$$= 240 \text{ m.}$$

3. (a) Train has 12 bogies. Each bogie is 15 metre long.

\therefore Total length of bogie = 15×12

$$= 180$$

Since, train crosses in 18 second

$$\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{\text{Length}}{\text{Time}} = \frac{180}{18} = 10$$

Due to some problem, 2 bogies were detached

\therefore Remaining bogies = $12 - 2 = 10$

\therefore Total length of bogie = $15 \times 10 = 150$

$$\text{Thus, time} = \frac{\text{distance}}{\text{speed}} = \frac{150}{10} = 15 \text{ sec}$$

4. (d) Relative speed of both trains

$$= 60 + 90 = 150 \text{ km / h}$$

Total distance = $1.10 + 0.9 = 2 \text{ km}$

\therefore Required time

$$= \frac{2 \times 60 \times 60}{150} = 48 \text{ seconds.}$$

5. (d) Let the car take n hr. to cover 385 km. Using the formula for sum of n terms of an A.P., we get

$$\frac{n}{2} [2 \times 40 + (n-1)5] = 385$$

$$\text{or } \frac{n}{2} (80 + 5n - 5) = 385$$

$$\text{or } 80n + 5n^2 - 5n = 770$$

$$\text{or } 5n^2 + 75n - 770 = 0$$

$$\therefore n = 7 \text{ h}$$

6. (c) Relative speed = $90 + 60 = 150 \text{ km/hr}$.

Total distance to be covered = $300 + 200 = 500 \text{ m}$

Time required

$$= \frac{500}{150 \times 1000} \times 3600 = 12 \text{ sec.}$$

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

Distance covered in 15 minutes

$$= \left(\frac{25}{18} \times 15 \times 60\right) \text{ m} = 1250 \text{ m.}$$



$$8. \quad (a) \quad \text{Speed} = \left(\frac{750}{150}\right) \text{ m/sec} = 5 \text{ m/sec}$$

$$\Rightarrow x = \frac{726 \times 60}{8250} = 5.28 \text{ min}$$

$$= \left(5 \times \frac{18}{5}\right) \text{ km/hr} = 18 \text{ km/hr.}$$

$$14. \quad (c) \quad \text{Speed} = \frac{150+45}{20} = \frac{195}{20} \text{ m/s} = \frac{195}{20} \times \frac{18}{5} \text{ km/h}$$

$$= 35.1 \text{ km/h} \approx 35 \text{ km/h}$$

$$9. \quad (a) \quad \text{Time taken by first man} = \frac{54}{8} = \frac{27}{4} \text{ h}$$

\therefore Time taken by second man

$$= \left(\frac{27}{4} - \frac{1}{2} - \frac{15}{60}\right) \text{ h} = 6 \text{ h}$$

$$\therefore \text{ speed of second man} = \frac{54}{6} = 9 \text{ km/h}$$

Hence, ratio of their speeds = 8 : 9

10. (d) Total distance travelled

$$= \left[\left(50 \times \frac{5}{2}\right) + \left(70 \times \frac{3}{2}\right)\right] \text{ miles}$$

$$= (125 + 105) \text{ miles} = 230 \text{ miles.}$$

11. (c) Number of gaps between 21 telephone posts = 20.

$$\text{Distance travelled in 1 minute} = (50 \times 20) \text{ m} \\ = 1000 \text{ m} = 1 \text{ km.}$$

$$\therefore \text{ Speed} = \frac{1}{1/60} \text{ km/h} = 60 \text{ km/h}$$

$$12. \quad (d) \quad \text{Required difference} = \frac{180}{3} - \frac{180}{4} = 15 \text{ km}$$

13. (c) Let the husband and the wife meet after x minutes. 4500 metres are covered by Pradeep in 60 minutes.

$$\text{In } x \text{ minutes, he will cover } \frac{4500}{60}x \text{ metres.}$$

Similarly,

$$\text{In } x \text{ minutes, his wife will cover } \frac{3750}{60}x \text{ m.}$$

$$\text{Now, } \frac{4500}{60}x + \frac{3750}{60}x = 726$$

$$15. \quad (a) \quad \text{Speed of train} = \frac{150+250}{30} = \frac{400}{30} = \frac{40}{3} \text{ m/s}$$

$$\therefore \text{ Required time} = \frac{150+130}{40/3} = \frac{280 \times 3}{40} = 21 \text{ sec}$$

16. (e) Distance covered by the car = $80 \times 10 = 800$ km

$$\therefore \text{ Speed} = \frac{800}{8} = 100 \text{ km/hr}$$

$$\therefore \text{ Speed gain} = 100 - 80 = 20 \text{ km/hr}$$

$$17. \quad (c) \quad \text{Speed of the car } A = \frac{5}{6} \times 90 = 75 \text{ km/hr}$$

$$\therefore \text{ Reqd time} = \frac{88}{90+75} \times 60 = 32 \text{ minutes}$$

18. (b) Relative speed of the trains

$$= (72 - 54) \text{ km/h} = 18 \text{ km/h}$$

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

Time taken by the trains to cross each other

$$= \text{Time taken to cover } (100 + 120) \text{ m at } 5 \text{ m/sec}$$

$$= \left(\frac{220}{5}\right) \text{ sec} = 44 \text{ sec.}$$

19. (a) Let speed of train be S km/h.

Speed of train relative to man

$$= [S - (-6)] \text{ km/h}$$

$$= (S + 6) \times \frac{5}{18} \text{ m/s}$$

$$\text{Now } (S+6) \times \frac{5}{18} = \frac{100}{18/5}$$

$$\Rightarrow S = 94 \text{ m/s}$$



20. (b) Speed of the train relative to man

$$= (68 - 8) \text{ kmph} = \left(60 \times \frac{5}{18}\right) \text{ m/sec}$$

$$= \left(\frac{50}{3}\right) \text{ m/sec.}$$

Time taken by the train to cross the man

$$= \left(150 \times \frac{3}{50}\right) \text{ sec} = 9 \text{ sec.}$$

21. (b) Distance covered by train A before the train B leaves Mumbai Central = $60 \times 3 = 180 \text{ km}$

∴ Time taken to cross each other

$$= \frac{180}{12} = 15 \text{ hour}$$

∴ Reqd time = 2 pm + 15 = 5 am on the next day

22. (e) Speed of the car = $\frac{\text{Distance Covered}}{\text{Time Taken}}$

$$= \frac{816}{12} = 68 \text{ kmph.}$$

23. (c) Speed of bus = $\frac{\text{Distance covered}}{\text{Time taken}}$

$$= \frac{2924}{43} = 68 \text{ kmph.}$$

24. (e) Speed of train = $\frac{1560}{26}$

$$= 60 \text{ kmph.}$$

25. (a) Distance covered = Speed \times Time

$$= 49 \times 7 = 343 \text{ km}$$

26. (e) Time taken to cover a distance of 45 kms

$$= \frac{45}{15} = 3 \text{ hour}$$

Time taken to cover a distance of 50 kms

$$= \frac{50}{25} = 2 \text{ hour}$$

Time taken to cover distance of 25 kms

$$= \frac{25}{10} = 2.5 \text{ hour}$$

Total distance = $(45 + 50 + 25) \text{ kms} = 120 \text{ kms}$

Total time = $(3 + 2 + 2.5) \text{ hour} = 7.5 \text{ hour}$

$$\therefore \text{Required average speed} = \frac{120}{7.5} = 16 \text{ kmph}$$

27. (e) Let the distance between the village and the school be $x \text{ km}$.

According to the question,

$$\frac{x}{4} + \frac{x}{2} = 6$$

$$\text{or, } \frac{x + 2x}{4} = 6$$

$$\text{or, } 3x = 6 \times 4$$

$$\therefore x = \frac{6 \times 4}{3} = 8 \text{ km}$$

28. (a) Speed of train

$$= \frac{(200 + 400)}{36} \times \frac{18}{5}$$

$$= 60 \text{ km/hr.}$$

29. (c) Distance covered in 18 seconds

$$= 90 \times \frac{5}{18} \times 18 = 450 \text{ m}$$

∴ length of platform

$$= 450 - 160 = 290 \text{ m}$$

30. (b) Stoppage minute per hour

$$= \frac{(64 - 48) \times 60}{64} = 15 \text{ minutes.}$$

31. (c) Speed of car

$$= \frac{540}{9}$$

$$= 60 \text{ kms/hr.}$$

Speed of bike

$$= 60 \times 2 \times \frac{2}{3}$$



