Time, Speed and Distance
समय, दूरी और ट्रेन

1. प्लेटफार्म को पार करने में लगा समय

$36 - 20 = 16$ sec

प्लेटफॉर्म की ल0 $= 54 \times \frac{5}{10} \times 16$

$= 15 \times 16 = 240$

2. ट्रेन की आपेक्षिक चाल $= 25 - 7 = 18$ km/h

ट्रेन की ल0 $= 18 \times 5\frac{5}{18} \times 10$

$= 15 \times 16 = 240$m

प्लेटफॉर्म की ल0 $25 \times \frac{5}{18} \times 10$

$= 125 - 50$

$= 75$ m

3. Speed $= \frac{d_d}{d_t} = \frac{\text{दूरी का अन्तर}}{\text{समय का अन्तर}}$

$\frac{88}{8} = 11$ m/sec

Length $= 25 \times 11 - 210$

$= 65$ m

4. लम्बी ट्रेन द्वारा चली दूरी

$= 90 \times 36 \times \frac{5}{18}$

छोटी ट्रेन द्वारा चली दूरी $= 800$ m

Time $= \frac{800 \times 18}{45 \times 5}$

$= \frac{800 \times 2}{25} = 32 \times 2$

$= 64$ seconds

5. ट्रेन व व्यक्ति की Rs. $= \frac{75}{18} \times \frac{18}{5} = 15$ km/h

ट्रेन की यात्रा $= 15 + 6 = 21$ km/h

दूसरे आदमी की गति $= 21 - 18 = 3$ km/h

6. Time $= \frac{600 \times 18}{54 \times 5} = \frac{600}{15}$

$= 40$ seconds

7. Relative speed $= \frac{240}{24} = 10$m / sec

$10 \times \frac{18}{5} = 36$ km/sec

Train speed $= 36 + 10$

$= 46$ km/h

8. 150m cross

$22\text{-}10 = 12$ sec

Speed $= \frac{150}{12} = 12.5$ m/sec

9. Length of train $= 45 \times \frac{5}{8} \times 6 = 75$

Length of platform $= 36 \times \frac{5}{8} \times 12 - 75$

$= 120 - 75 = 45$m

10. Speed of train $= \frac{300}{30} = 10$m

130m long platform crossing time $= \frac{180}{10} = 18$ sec

11. Length of bridge $= 5 \times \frac{5}{18} \times 15 \times 60 = 1250$ m

12. Total time = 10 hr, 30 min

Speed = 40 km/hr

13. $D = \frac{50 \times 40}{50 - 40} \times \frac{6}{60} = 20$ km

Time from 40 km/h $= \frac{20}{40} = \frac{1}{2}$hr

$= 30$ min

Actual time $= 30 - 11$

$= 19$ min

14. Speed of train $= \frac{400}{40} = 10$ m/sec

Length of train $= 10 \times 100 - 800$

$= 1000 - 800 = 200$m

15. Speed of train $= \frac{650}{30} = \frac{6}{3}$m / sec

Crossing time to 370 m long platform

$= \frac{370 + 150}{65} = \frac{520 \times 3}{65}$

16. Speed $= \frac{150}{15} = 10$m / sec

Relative speed for IInd train

$\frac{300}{12} = 25$m / sec

IInd train speed $= 25 - 10 = 15$

$15 \times \frac{18}{5}$km / h $= 54$ km/h

17. Speed of train = 63 km/h

Speed of man in same direction = 3

Relative speed = 63 – 3 = 60 km/h

Time $= \frac{500 \times 18}{60 \times 5} = 10 \times 3 = 30$ seconds

18. Speed of train $= \frac{50}{4}$m / sec

$\frac{50}{4} \times \frac{18}{5} = 45$ km / h

19. माना ट्रेन की चाल x km हैं, तब

$(x - 3) \times 10 = (x - 5) \times 11$

$10x - 30 = 11x - 55$

$x = 25$ km/h

20. Speed of train = 36 km/h

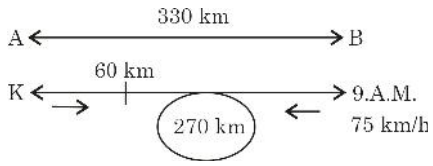
Speed of man in same direction = 9 km/h

Relative speed = 36 – 9 = 27 km/h

$27 \times \frac{5}{18} = \frac{15}{2}$m / sec

Time $= \frac{150}{\frac{15}{2}} = \frac{150 \times 2}{15} = 20$ seconds

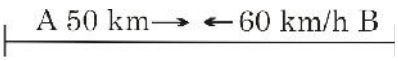
21.



Time = $\frac{270}{75+60} = \frac{270}{135} = 24$ hr

Time to meet = 9 + 2 = 11 A.M.

22.



Time ti Run $= \frac{120}{10} = 12$ hrs

Total distance = 110 × 12 = 1320

23. Relative speed = 48 + 42 = 90 km

Total length = $90 \times \frac{5}{18} \times 12$

= 300 m

Length of long train = 200m

Small train = 100m

Length of platform = $48 \times \frac{5}{18} \times 45 - 2$

= 600 – 200

= 400m

24. Speed 11 7

Time 7 11

11 value हैं → 22 की

Staring time → 4

$4 = \frac{22}{11} \times 4$ = 8 hrs

25. Speed $= \frac{50}{4} \times \frac{18}{5}$

= 45 km/h

26. Speed $= \frac{264}{12} = 22$ / sec

$22 \times \frac{18}{5}$ km / h

27. Length of train = 8 × 22 = 176m

28. Speed $= \frac{300}{13} = 20$ m/sec

Length of train = 10 × 20 = 200 m

Time of cross platform = 200m

$= \frac{400}{200} = 20$ seconds

PRACTICE SET

1. Let the speed =x km/hr

Then time =y hr.

According to the question

x×y=(x+3) (y-1)

xy=xy+3y-x-3

x-3y= – 3 ....(i)

x×y=xy-2y+x-2

x-2y=2 ....(ii)

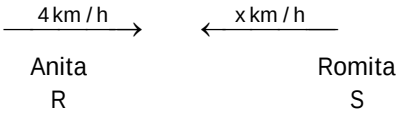
Solve equation (i) and (ii)

x=12, y=5,

Distance = speed×time =12×5=60.

2. (c) Let speed of Romita be x

ATQ



d=42 km

t=6 h

$(4+x) = \frac{42}{6} \quad \left(S = \frac{d}{t}\right)$

4+x=7

x=3 km/h.

3. (c) Circumference of wheel $2\pi r$

$\Rightarrow 22 \times \frac{22}{7} \times \frac{70}{2} = 220$ cm

Speed of hour = $\frac{220 \times 400 \times 60}{1000 \times 100}$ =52.8 km/h

4. (d) Let speed of train traveling from P to Q =a

Speed of train traveling from Q to P =b

(a+b) speed =162/6 =27 km/h

Difference in their speed (a-b)= 8 km/h

a+b=27

a-b=8

from both equation $b = 9\frac{1}{2}$ km/h

5. (d) Let distance be 60 km

LCM of 10, 20, 30 and 60

Average speed = Total distance/ Total time

Total time

$= \frac{60\,\text{km}}{10\,\text{km/h}} + \frac{60\text{km}}{20\text{km/h}} + \frac{60\text{km}}{30\text{km/h}} + \frac{60\text{km}}{60\text{km/h}}$

Average speed

$= \frac{60+60+60+60}{12} = \frac{240}{12} = 20\,\text{km/hrs.}$

6. (c) Difference of time is =6-5 hours = 1hour

Actual difference of time = 7 min – (-5 min)

$\Rightarrow$ (7+5) min $\Rightarrow$ 12 min

$1\text{ hour} \xrightarrow{1/5} 12\text{ min}$

$30\text{ hour} \xrightarrow{1/5} 6\,\text{km}$

7. (b) According to first situation total distance covered by man

= speed × time

=4 km/hr× (2hr +45 min)

$=4\text{ km/hr} \times \left(2 + \frac{45}{60}\right)$

$= 4 \times \left(2 + \frac{3}{4}\right) = 4 \times \frac{11}{4}$

Total distance = 11 km

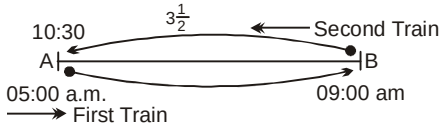
Time will taken by man with speed of 16.5 km/hr o cover a distance of 11 km

Time =distance/speed

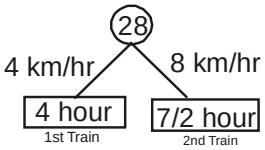
Time = 11/16.5 km/h

$= \frac{11}{33} \times 2 = \frac{2}{3}\text{hours} = \frac{2}{3} \times 60\,\text{min} = 40\,\text{min.}$

8. (b)



Let total distance



Distance covered by first train in (7 am-5am)=2 hours before starting the second train

=2 ×7 =14 km

Remaining distance =28-14 =14 km

After 07:00 a.m. their relative speed in opposite direction = 7+8 =15 km /hr

Time taken by both to cover 14 km 14/15 km

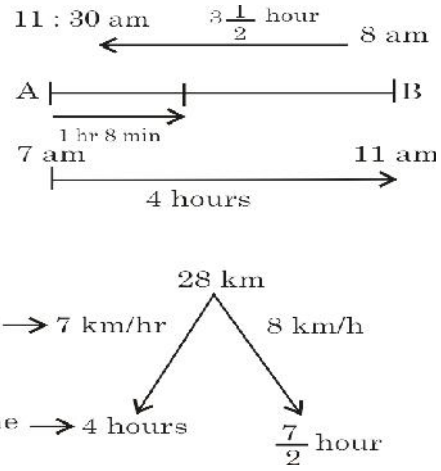
$$\frac{14}{15}\times 60\text{ km} = 56\text{ minutes}$$

The time at which the two trains cross each other

07:00 a.m. + 56 minutes

= 07:56 a.m.

9.



Distance covered by train started from point A before 8 am with 7 km/hr

⇒ Distance = 7 × 1

= 7 km

⇒ Remaining distance = 28 – 7

⇒ After 8 am = 21 km

Their relative speed in oppo. Direction

= (7 + 8) km/hr

= 15 kmph

⇒ Time will be taken to cover 21 km

$$= \frac{21}{15} \Rightarrow \frac{7}{5} \Rightarrow 1\frac{2}{5}$$

$$= 1\text{ hour} + \frac{2}{5}\times 60\text{ min}$$

= 1 hour + 24 min

⇒ Therefore they will cross each other

= 8 am + 1 hour + 24 min

= 9 : 24 am

10. Let the lengths of trains

l metre (equal)

⇒ Relative speed in the same direction

= 46 – 36

= 10 kmph

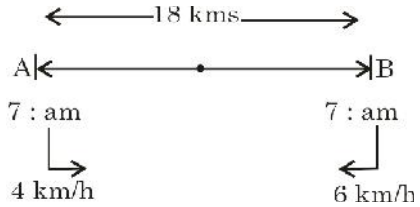
$$\left\{\text{time} = \frac{\text{distance}}{\text{speed}}\right\}$$

$$\Rightarrow 36\text{ sec} = \frac{(l+l)\text{ metre}}{10\times\frac{5}{18}\text{ m/s}}$$

$$\Rightarrow \text{length} = \frac{2l\times 18}{50}$$

⇒ length = 50 metres

11.



Their relative speed in opp. direction.

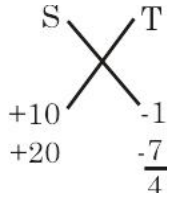
= 4 + 6 = 10 km/hr

⇒ Time will be taken to cover 20 km with relative speed 10 km/hr

$$\Rightarrow \text{Time} = \frac{20\text{ km}}{10\text{ km/h}} = 2\text{ hours}$$

⇒ Meeting time = 7 am + 2 hr. = 9 am

12. In such type of question follow the below given method.



- s + 10t = 10 ....(i)

$\frac{-7}{4}$ s + 20t = 35 ...(ii)

On solving equation (i) and (ii) we get

S = 60 km/hr and T = 7 hours

Total distance = 60 × 7 = 420 km

13. Total distance = 60 km/hr × 1 hour

= 60 km

⇒ Therefore,

⇒ Time will be taken by another car to travel the same distance with 40 km/hr.

$$= \frac{60}{40} \Rightarrow \frac{3}{2}\text{hr}$$

14. Their Relative speed in same direction

= 40 – 30 = 10 km/hr

⇒ Distance covered by P in 30 min

= p30 km/hr × 30 min ⇒ 15 km.

⇒ Time will be taken by Q to overtake P $= \frac{15}{10} \Rightarrow \frac{3}{2}\text{hours}$

15. Time taken by man if he did not stop

$$= \frac{5\text{ km}}{10\text{ kmph}}$$

$$= \frac{1}{2}\text{h} = 30\text{ min}$$

⇒ ∴ man takes rest for 5 minutes on each km

$\Rightarrow$ total rest time = 5 × 4 = 20 min

$\Rightarrow$ total travelling time = 30 min + 20 min

16. Distance travelled by driver in 2 hours

$$= 300 \times \frac{40}{100} = 120 \text{ km}$$

Distance to be covered in 2 hours

= 300 – 120 = 180 km

$$\text{Required speed } = \frac{1800}{2} = 90 \text{ km}$$

$$\text{Required difference } = 90 - \frac{120}{2} = 30 \text{ km/hr}$$

17. The distance between of school and home

$$= \frac{S_1 \times S_2}{S_1 - S_2} \times \frac{\text{Diff. of time}}{60}$$

$$= \frac{5 \times 4}{(5-4)} \times \frac{(5 \text{ min late} + 10 \text{ min before})}{60}$$

$$\Rightarrow 20 \times \frac{15}{60}$$

$\Rightarrow$ Distance = 5 km

18. The two cars will collide if their speed are in the ratio of the distance to be covered by them

Ratio of distance = 40 : 50 = 4 : 5

$\Rightarrow$ for the cars not be collide

$$V_1 : V_2 \neq 4 : 5$$

19. Speed of A, B, and C $= \frac{1000}{5}$

$\frac{1000}{8} \frac{1000}{10}$ = 200 m/min., 125 m/min., 100 m/min

Distance travelled by B and C before A starts

= 125, 200 metres

$$= \frac{125}{200-125}, \frac{200}{200-100} = \frac{5}{3} \text{min., 2 min}$$

20. $\therefore \frac{2}{5}$th of journey = 1200 km

$$\therefore \text{ total journey } = \frac{1200}{2} \times 5 = 3000 \text{ kms.}$$

$$\text{Distance travelled by car } = 3000 \times \frac{1}{3} = 1000$$

$\Rightarrow$ Therefore,

Remaining distance covered by train

= 3000 – (1200 + 1000) = 800

21. According to the explanation of question (198)

$\Rightarrow$ Length of the train = Speed × time

= 36 km/hr × 10 sec

$$= 36 \times \frac{5}{18} \text{m/s} \times 10 \text{ sec}$$

= 100 metres

Therefore,

Time taken by train to cross a plateform of 55 metre long in time

$$= \frac{(100+55)}{5} \Rightarrow \frac{155}{10}$$

Time = $15\frac{1}{2}$ sec.

22. Let the speed of first train is S_1 km/hr and speed of second train is s_2 km/hr

$\Rightarrow$ From method

$$\text{Time} = \frac{\text{total distance}}{(\text{relative speed in same/opp. direction})}$$

$\Rightarrow$ In the same direction.

$$\Rightarrow 27 \text{ sec} = \frac{(100+95)}{(s_1 - s_2) \times \frac{5}{18}}$$

$$\Rightarrow 27 = \frac{195 \times 18}{(s_1 - s_2) \times 5}$$

$$\Rightarrow s_1 - s_2 = 26 \quad \text{.....(i)}$$

$\Rightarrow$ In the opp. direction.

$$\Rightarrow 9 = \frac{(100+95)}{(s_1 + s_2) \times \frac{5}{18}}$$

$$\Rightarrow 9 = \frac{195 \times 18}{(s_1 + s_2) \times 5}$$

$$\Rightarrow s_1 + s_2 = 39 \times 2$$

$$\Rightarrow s_1 + s_2 = 78 \quad \text{.....(ii)}$$

From equation (i) and (ii)

$$\Rightarrow s_1 - s_2 = 26$$

$$\Rightarrow s_1 + s_2 = 78$$

$$\Rightarrow s_1 = \frac{26+78}{2}$$

$$\Rightarrow s_1 = \frac{104}{2}$$

$$\Rightarrow s_1 = 52 \text{ km/hr and } s_2 = 26 \text{ km/hr}$$

23. Time taken by trains to cross each other in opp. direction.

$$= \frac{\text{total distance}}{\text{Relative speed in oppo. direction}}$$

$$= \frac{(125+115)}{(33+39) \times \frac{5}{18} \text{m/s}}$$

$$= \frac{240 \times 18}{72 \times 5}$$

Time = 12 second

24. Let their lengths are = l metre (equal)

$\Rightarrow$ Relative speed in same direction

= (90 – 60)

= 30 km/hr

$$\Rightarrow \text{Time} = \frac{\text{distance}}{\text{Relative speed in same direction}}$$

$$\Rightarrow 30 \text{ sec} = \frac{(l+l)\text{metre}}{30 \times \frac{5}{18} \text{m/s}}$$

$$\Rightarrow 30 = \frac{2l \times 18}{30 \times 5}$$

$\Rightarrow$ lengths of each train = 125 metres

25. Their relative speed in same direction

= 1 km/8 min – 1 km/10 min

$$= \frac{1000 \text{ metre}}{8 \text{ min}} - \frac{1000 \text{ metre}}{10 \text{ min}}$$

$$\Rightarrow 1000 \times \left[\frac{10-8}{10\times 8}\right]$$

$$\Rightarrow \frac{1000 \times 2 \text{ metre}}{8 \text{ min}}$$

$\Rightarrow$ 4 min

$\Rightarrow$ Distance covered by theif before overtake.

$$\frac{1000 \text{ metre}}{10 \text{ min}} \times 4 \text{ min} = 400 \text{ metre}$$

26.

	Cyclist	:	Jogger
Ratio of distance $\rightarrow$	2	:	1
Ratio of time $\rightarrow$	1	:	2

Ratio of their speed (Jogger : Cyclist)

$$= \frac{1}{2} : \frac{2}{1}$$

$$\Rightarrow 1 : 4$$

27.

	usual	:	late	
Their Ratio of speed =	40	:	35	
	8	:	7	$\left[\text{time} \propto \frac{1}{\text{Speed}}\right]$
Their ratio of time =	7	:	8	

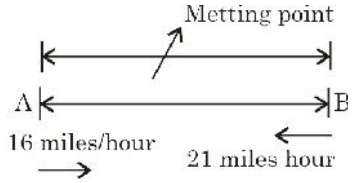
1 hour late

1 unit $\rightarrow \frac{15}{60}$ hours = $\frac{1}{4}$ hours

8 units $= 8 \times \frac{1}{4} = 2$ hr.

Total distance = 35 × 2 = 70 km.

28.



$\Rightarrow$ In the question, it is given that at the time of their meeting the second train has travelled 60 miles more than the first train.

$\Rightarrow$ It would have happened only because of the exceed speed of second train.

= 21 – 16 = 5 mile/h

$\Rightarrow$ i.e., second train covers 60 miles with exceed speed 5 mile/hour

$\Rightarrow$ i.e., second train runs $= \frac{60 \text{ mile}}{5 \text{ mile/hr}} = 12$ hours

According to the question,

Running time of first train

= Running time of second train.

Distance covered by first train

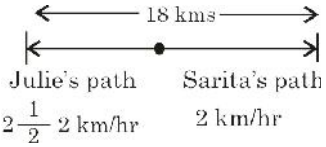
= 16 × 12 = 192 mile

Distance covered by second train

= 21 × 12 = 252 mile

$\Rightarrow$ total distance = 252 + 192 = 444 miles

29.



Their relative speed in opposite direction.

$$= 2\frac{1}{2} \text{km / h} + 2 \text{ km/hr}$$

$$= 4\frac{1}{2} \text{km / hrs}$$

$\Rightarrow$ Time taken by them to cover a distance of 18 kms is

$$= \frac{18}{\frac{9}{2}}$$

$$\left\{\text{time} = \frac{\text{dis tan ce}}{\text{speed}}\right\}$$

Required time = 4 hours

30. Total speed = 54 km/hr

$\Rightarrow$ Total time = 15 hours

$\Rightarrow$ He covers half of the jpurney $\frac{3}{5}$th the time

$$= 15 \times \frac{3}{5} = 9 \text{ hours}$$

$\Rightarrow$ Remaining distance = 120 – 60 = 60 km

$\Rightarrow$ Remaining time = 15 – 9 $\Rightarrow$ 6 hours

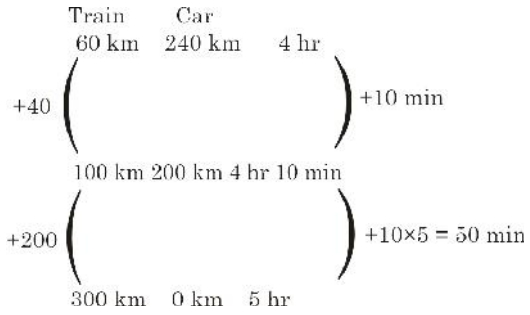
$\Rightarrow$ Average speed to cover a distance of 60 km

will be $= \frac{60 \text{ km}}{6 \text{ hours}}$

$$\left\{\text{speed} = \frac{\text{dis tan ce}}{\text{time}}\right\}$$

$\Rightarrow$ Avg. speed $\Rightarrow$ 10 km/hr

31.



Speed of train $= \frac{300}{5} = 60$ km/hr

32. Speed of the train $= \frac{20}{24} \times 60 = 50$ km/hr

New speed = 50 – 5 = 45 km/hr

Required time = $\frac{20}{45} = \frac{4}{9}$hr = 26 min 40 sec