41. A train overtakes two persons who are walking in the same directions in which the train is going, at the rate of 2 kmph and 4 kmph respectively and passed them completely in 9 and 10 seconds respectively. The length of the train is
(1) 50 m (2) 60 m
(3) 65 m (4) 70 m
(5) None of these

42. A train travels at the speed of 65 kms/hr and halts at 8 junctions for a certain time. It covers a distance of 1300 kms in 1 day (24 hours). How long does the train stop at each function, if it halts for the same period of time at all the junctions?
(1) 30 minutes (2) 20 minutes
(3) 60 minutes (4) 40 minutes
(5) None of these

43. A train running at the speed of 90 kmph crosses a 250 metres long platform in 22 seconds. What is the length of the train?
(1) 280 metres (2) 260 metres
(3) 250 metres (4) 300 metres
(5) None of these

44. How many seconds will a train 60 m in length, travelling at the rate of 42 km an hour, take to pass another train 84 m long, proceeding in the same direction at the rate of 30 km an hour?
(1) 41.2 seconds (2) 43.2 seconds
(3) 42.3 seconds (4) 42.5 seconds
(5) None of these

45. Train A crosses another train B in 30 seconds. The length of train B is 140% of the length of train A. The speed of train A is 72 kmph. What is the difference between the lengths of the two trains?
(1) 140 metres (2) 80 metres
(3) 70 metres (4) 115 metres
(5) None of these

46. A train crosses a 300 metre long platform in 38 seconds while it crosses a signal pole in 18 seconds. What is the speed of the train in kmph?
(1) Cannot be determined
(2) 72 (3) 48
(4) 54
(5) None of these

47. A 570 metre long train crosses a platform of equal length in 15 seconds. What is the speed of the train in metres/second?
(1) 38 (2) 54
(3) 76
(4) Cannot be determined
(5) None of these

48. A train is running at the rate of 40 kmph. A man is also going in the same direction parallel to the train at the speed of 25 kmph. If the train crossed the man in 48 seconds, the length of the train is
(1) 150 m (2) 175 m
(3) 200 m
(4) Cannot be determined
(5) None of these

49. A 240 metre long train takes 40 seconds longer to cross a platform twice its length than the time it takes to cross a pole at the same speed. What is the speed of the train?
(1) 6 metres/second
(2) 24 metres/second
(3) 48 metres/second
(4) 12 metres/second
(5) None of these

50. A 180 metre long train crosses another 270 metre long train running in the opposite direction in 10.8 seconds. If the speed of the first train is 60 kmph, what is the speed of the second train in kmph?
(1) 80 (2) 90
(3) 150
(4) Cannot be determined
(5) None of these

51. A 275 metre long train crosses a platform of equal length in 33 seconds. What is the speed of the train in kmph?
(1) 66 (2) 60
(3) 64 (4) 72
(5) None of these

52. Two trains of equal length take 10 seconds and 15 seconds respectively to cross a telegraph post. If the length of each train be 120 metres, in what time (in seconds) will they cross each other travelling in opposite direction?
(1) 16 (2) 15
(3) 12 (4) 10
(5) None of these

53. The distance between two stations, Delhi and Amritsar, is 450 km. A train starts at 4 p.m. from Delhi and moves towards Amritsar at an average speed of 60 km/hr. Another train starts from Amritsar at 3.20 p.m. and moves towards Delhi at an average speed of 80 km/hr. At what time will the both trains meet?
(1) 5.30 p.m. (2) 5.50 a.m.
(3) 6.50 p.m (4) 6.30 a.m.
(5) None of these

54. A train travelling 25 km an hour leaves Delhi at 9 a.m and another train travelling 35 km an hour starts at 2 p.m. in the same direction. How many kms from Delhi will they be together?
(1) $437\frac{1}{2}$ km (2) 437 km
(3) $348\frac{1}{2}$ km (4) 348 km
(5) None of these

55. A carriage driving in a fog passed a man who was walking at the rate of 3 kms an hour in the same direction. He could see the carriage for 4 minutes and it was visible to him upto a distance of 100 m. What was the speed of the carriage?
(1) $4\frac{1}{2}$ km/hr. (2) $6\frac{1}{2}$ km/hr.
(3) $4\frac{2}{3}$ km/hr. (4) $6\frac{2}{3}$ km/hr.
(5) None of these

56. A train leaves Patna at 5 a.m and reaches Varanasi at 9 a.m. Another train leaves Varanasi at 6.30 a.m. and reaches Patna at 10 a.m. At what time do the two trains meet?
(1) 7.40 a.m. (2) 7.40 p.m.
(3) 8.30 a.m. (4) 8.30 p.m.
(5) None of these

57. A train was late by 6 minutes. The driver increased its speed by 4 km/hr. At the next station, 36 km away, the train reached on time. Find the original speed of the train.
(1) 32 km/hr (2) 33 km/hr
(3) 34 km/hr (4) 36 km/hr
(5) None of these

58. A train 150 metre long, passes a pole in 15 seconds and another train of the same length travelling in the opposite direction in 12 seconds. The speed of the second train is
(1) 45 km/hr (2) 48 km/hr
(3) 52 km/hr (4) 54 km/hr
(5) None of these

59. Two trains start at the same time from two stations and proceed towards each other at the rates of 20 km/hr. and 25 km/hr respectively. When they meet, it is found that one train has travelled 80 km more than the other. Find the distance between the two stations.
(1) 720 km (2) 740 km
(3) 760 km (4) 780 km
(5) None of these

60. Supposing that telegraph poles on a railway track are 50 metres apart, how many poles will be passed by a train in 4 hours if the speed of the train is 45 km an hour?
(1) 3201 poles (2) 3401 poles
(3) 3601 poles
(4) Can't be determined
(5) None of these

Answers with explanations

1.4; S = 180 km /hr. = $180\times \frac{5}{18}$ m/sec.

= 50m/sec.

2.3; Let the length of train be l m.

Speed = $\frac{D}{T}$

speed of train =

$\frac{L_{train} + L_{Bridge}}{time} = \frac{l+800}{100} = \frac{l+400}{60}$

(as speed was same both the time i.e. while passing two bridges)

$\Rightarrow$ 60 $(l + 800)$ = 100 $(l + 400)$

$\Rightarrow$ 3 $(l + 800)$ = 5 $(l + 400)$

$\Rightarrow$ $2l$ = 2400 - 2000

= 400

$\Rightarrow$ l = 200m.

Paramount Concept:-

Diff. in dist.= 400m. — 800 m ⟶ 100 sec. / 400 m ⟶ 60 sec. — diff in time = 40 sec.

400 m. was covered in 40 sec.

$\therefore$ Speed = $\frac{400}{40}$ = 10 m /sec.

D = S × T

Distance in 100 sec. = 10 × 100

= 1000 m. (as 800 m. was covered in 100 sec.)

$D = L_{train} + L_{bridge}$

Length of train = 1000 - 800

= 200m.

3.3; Normal speed = $11x$ km./hr.

Present speed = $7x$ km./hr.

$t_1 = \frac{D}{S_1}$, $22 = \frac{D}{7x}$

$D = 22 \times 7x$ _____(i)

$t_2 = \frac{D}{S_2} = \frac{22\times 7x}{11x}$ = 14 hrs.

$t_1 - t_2$ = 22 − 14 = 8 hrs.

3.3; **Paramount Concept:-**

Let the normal speed= 11 km./hr.

$\therefore$ New speed = 7 km /hr.

Now, speed $\propto \frac{1}{time}$

	Normal	:	New
Speed	11	:	7
time	7	:	11

diff. = 4

×2 ×2 ×2

14hr. (time taken normally) — 8hr. (saved) — 22hr. (given) (time taken when train was de layed)

Paramount Concept:-2

	Time	Speed
(given) 22 hrs. ←	11	7
14 hrs. ←	7	11

(If S = $\frac{7}{11}$ then, T = $\frac{11}{7}$ as S $\propto \frac{I}{T}$)

Time that could be saved = 22 - 14

= 8 hrs.

Other new concept :-

Time taken by original speed

$= \left(\frac{7}{11}\right)\times 22 = 14 \Rightarrow$ only $\Rightarrow \frac{7}{11}\times 22 = 14$

then, 22 - 14 = 8

4.3; Speed of train = $\frac{150+500}{30} = \frac{650}{30}$ m./s.

When it crosses 370 m. long bridge then

D = 370 + 150 = 520 m

Time = $\frac{520}{650}\times 30$ = 24 second

5.4; Speed = 60 km/hr.

S = $60 \times \frac{5}{18}$ m./sec. = $\frac{50}{3}$ m./sec.

T = 30 sec.

$$\text{Length} = S \times T = \left(\frac{50}{3} \times 30\right)\text{m}.$$

$l = 500$ m.

6.4; Speed = 90km /hr.

$$= 90 \times \frac{5}{18} \text{ m./sec.} = 25\text{m./sec.}$$

D = 230 + 120 = 350m

$$T = \frac{350\text{m}}{25\text{m/s}} = 14 \text{ Seconds}$$

7.3; Relative speed = (50 – 30)
= 20 km./hr.

$$= \left(20 \times \frac{5}{18}\right) \text{m/sec} = \frac{50}{9} \text{ m/sec.}$$

Length of train = Speed× Time

$$= \frac{50}{9} \times 18 = 100\text{m}.$$

8.1; Speed of the train relative to man = 25 + 5 = 30 km/hr. (Relative speed is added when distance is opp.)

$$= 30 \times \frac{5}{18} = \frac{25}{3} \text{ m/sec.}$$

Distance travelled in 12 seconds at this speed $= \frac{25}{3} \times 12 = 100$ m.

∴ Length of train = 100 m.

Speed of train = 25 km./hr.

$$= 25 \times \frac{5}{18} = \frac{125}{18} \text{ m/sec}$$

Distance travelled in 18 secs at this speed

Where $D = L._{\text{train}} + L._{\text{platform}}$

$$= \frac{125}{18} \times 18 = 125 \text{ m}$$

∴ length of train + length of platform = 125 m.

Paramount Concept:-

$$\text{Speed in m/sec.} = 25 \times \frac{5}{18}$$

$$= \frac{125}{18} \text{m/sec.}$$

$$S = \frac{D}{T} \Rightarrow \frac{125}{18} = \frac{L_T + L_P}{18}$$

Sum of length of train & Platform

$$= \frac{125}{18} \times 18 = 125 \text{ m.}$$

9.3; Faster train moves 95 – 80 = 15 km more in 1 hr.

∴ faster train moves 180 km more in

$$= \frac{1}{15} \times 180 = 12 \text{ hrs.}$$

Since, they are moving in opposite directions,

they cover a distance of 80 + 95 = 175 kms. in 1 hr.

∴ in 12 hrs they cover a distance = 175 × 12 = 2100 km

∴ distance = 2100 km.

Paramount Concept:-

Extra distance covered by faster train per
hrs. =15 km

Time to cover 180 km. = 12 hrs.

Total distance covered in 12 hrs.

$= T \times (S_1 + S_2) = 12 \times (80 + 95)$

= 2100 km.

10.2; **Direct Formula:-**

Required distance = (9.00 – 8.30) ×

$$\left(\frac{60 \times 75}{75 - 60}\right) = \frac{1}{2}\left(\frac{60 \times 75}{15}\right) = 150 \text{ km.}$$

Paramount Concept:-

Distance covered by 1st train in 30 min.

= 30 kms. (as speed per hrs.60)

Time taken by 2nd train to cover 30 kms.

= 2 hrs. (as it travels 15 km. per hr. more
than A. Hence takes 2 hrs. to cover 30 km. that A has already covered)

Dist. covered = (60 × 2.5 hr.) or (75 × 2 hrs.) = 150 km.

11.2; Time of rest per hour

$$= \frac{\text{Difference in average speed}}{\text{Speed without stoppage}}$$

$$= \frac{75-60}{75} = \frac{1}{5} \text{ hr.} = 12 \text{ minutes.}$$

Paramount Concept:-

Speed = 75km. in 1 hr

Distance = 60 kms.

$$\text{Time} = \frac{D}{S} = \frac{60}{75} \text{ hrs.} = \frac{60}{75} \times 60 \text{ min.}$$

$$= 48 \text{ min.}$$

$\therefore$ 60 - 48

= 12 min. is the stoppage time

12.1; Let the length of train be x m.

Then speed of the train

$$= \frac{x}{7} \text{ m. per sec.}$$

$$= \left(S = \frac{D}{T}\right)$$

And also the speed of the train

$$= \frac{x+330}{28} \text{ m per sec}$$

Both the speeds should be equal,i.e.,

$$\frac{x}{7} = \frac{x+330}{28}$$

or, $28x - 7x = 7 \times 330$

$$\therefore x = \frac{7 \times 330}{21} = 110 \text{ m}$$

Short cut Method:-

$$\text{Speed of train} = \frac{330}{28-7} = \frac{110}{7} \text{ m/sec.}$$

$$\text{Length ot train} = S \times T = \frac{110}{7} \times 7$$

= 110 metre

13.3; Let the first train meet the second x hrs after it starts, then

$40x + (x-2) \times 50 = 110$ (the 2nd train takes x - 2 hrs. as the train starts two hours later than the 1st)

or, $90x = 110 + 100 = 210$

$$\therefore x = \frac{210}{90} \text{ hrs.} = \frac{7}{3} \text{ hrs.} = 2\frac{1}{3} \text{ hrs.}$$

= 2 hrs. 20 min. = 10.20 a.m

Paramount Concept:-

Distance travelled by train A in 2 hrs.(i.e. from 8 am. to 10am.) = 80 km. (Since speed is 40km. per hr.)

Time taken to cover rest 30 km.

$$\frac{D}{S} = \frac{30}{(50+40)} \text{ hrs.} = \frac{30}{90} \times 60 \text{ min.}$$

= 20 min.

$\therefore$ trains will meet at 10 : 20 am.

14.1; Let the speeds of trains be x m/s and y m/s.

When they are moving in the same direction, the relative speed = $(x-y)$ m./s.

$$\therefore x - y = \frac{100+80}{18} = 10 \quad \text{\_\_\_\_\_(i)}$$

When running in opposite direction, relative speed = $(x+y)$m./s.

Similarly, $x + y = \frac{100+80}{9} = 20$

_____(ii)

Solving the two equation

$x - y = 10$ _____(i)

$x + y = 20$ _____(ii)

$2x = 30$

x = 15 m./sec. and y = 5 m./sec.

15.2; Let the speed of the train be x m/s.

Then, as in previous example

Length of the train = $(x + 5)\ 6 = (x + 10)\ 5$

or, $6x - 5x = 50 - 30$

$x = 20$

($x + 5$ and $x + 10$ are the relative speed of the train and the two men respectively)

$\therefore$ x = 20 m/s

and length of the train = $(20 + 5) \times 6$

= 150 m.

Paramount Concept:-

Speed of train =

Speed of 1st man	time taken by 1st man	Speed of 2nd man	time taken by 2nd man
5	× 6	10	× 5
30		50	

diff. = 20m/sec.

S_{train} = 20m./sec.

Relative speed = 20m./sec. + 5 m./sec

= 25 m./sec.

L = S × T = 25 × 6 = 150 m.

16.3; **Paramount Concept:-**

(Both travelling in same direction)

Relative Speed = $S_1 - S_2$

$$S_1 - S_2 = \frac{D_1}{60}$$

$$S_1 - S_2 = \frac{D_2}{40}$$

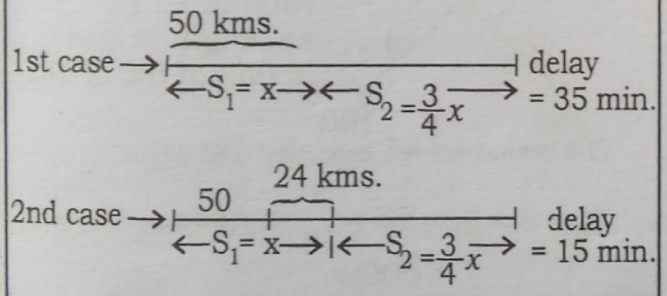
$$\frac{D_1}{60} = \frac{D_2}{40}$$

$$\frac{D_1}{3} = \frac{D_2}{2}$$

$$\frac{D_1}{D_2} = \frac{3}{2}$$

Ratio of length = 3 : 2

17.4; **Paramount Concept:-**



Speed change in the 24 km. stretch causes 20 min. change i.e. from 35 min. late to 15m.

or $\frac{20}{60}$ i.e. $\frac{1}{3}$ hr. change

$$\frac{D}{S_2} - \frac{D}{S_1} = T$$

$$\frac{24}{3x} - \frac{24}{4x} = \frac{1}{3} \Rightarrow \frac{96-72}{12x} = \frac{1}{3}$$

$$\frac{24}{12x} = \frac{1}{3} \Rightarrow x = 6$$

Normal speed = $4x = 4 \times 6$

= 24km/hr

18. 1; **Direct Formula:**

$$\text{Speed of the train} = \frac{48}{48-45} \times 5$$

= 80 km/hr

And distance (S × T)

$$= \left[\frac{45 \times 48}{48-45}\right] \times 5 \times \frac{1}{60} = 60 \text{ km.}$$

2nd Method:-

$$t = \frac{45}{60} \text{hrs.} = \frac{3}{4} \text{hrs.}$$

A——————————B

$S_1 - S_2 = 5$ km/hr. **or** $S_1 = S_2 + 5$

$$t_2 = \frac{48}{60} = \frac{4}{5} \text{hrs.}$$

D = S × T

Distance remaining the same

$S_1 T_1 = S_2 T_2$

$$S_1 \times \frac{3}{4} = (S_1 + 5) \times \frac{4}{5}$$

$$\frac{3S_1}{4} = \frac{4S_1 + 20}{5}$$

$15 S_1 = 16S_1 + 80$

$S_1 = 80$ km/hr.

$$D = S_1 T_1 = 80 \times \frac{3}{4} = 60 \text{ km}$$

Paramount Concept:-

Diff. in time = 3 min ⟶ 5 km diff. in speed

↓ × 16 ↓ × 16

48 min.(given) 80 km / hr.

= Speed

Distance = T × S = $\frac{45}{60} \times 80 = 60$ kms

19.1; **1st Method** :-

Relative

Speed = $S_1 + S_2 = S_1 + (S_1 + 8)$

$= 2S_1 + 8$ km/hr.

T = 6 hrs. D= 162 kms.

$T = \frac{D}{3} \Rightarrow 6 = \frac{162}{2S_1 + 8}$

S_1 = 9.5km/hr.

S_2 = 17.5 km/hr.

2nd Method:-

Suppose the speeds of the two trains are p km/hr and q km/hr respectively. Thus

$p + q = \frac{162}{6} = 27$ .... (i)

and $p - q = 8$ ..... (ii)

(i) + (ii) implies that

$2p = 35 \therefore p = 17.5$ km./hr.

and (i) – (ii) implies that

$2q = 19 \therefore q = 9.5$ km./hr.

Paramount Concept:-

Take speed = $\frac{162}{6}$ = 27 km/hr.

$(x) + (x + 8) = 27$ (as diff. in speed = 8 kms./hr. (given)

$\therefore$ 9.5 & 17.5

20.2; Speed of both trains = 3 : 4

× 3 ↓ : ↓ × 3 → time

Length = 9 m. : 12 m. taken

$\text{Time} = \frac{D}{S} = \frac{L_1 + L_2}{S_1 + S_2} = \frac{9 + 12}{4 + 3} = \frac{21}{4 + 3}$

= 3 sec.

21.3; Length of 1st train = xm

Length of 2nd train = y b

Time =

$$\frac{\text{Total dist.}}{\text{Sum of time (as direction is opp.)}}$$

$= \frac{xa + yb}{x + y}$

22.4; **Paramount Concept:-**

Length of both trains = (7 × 4) + (9 × 6)

= 28 + 54 = 82 m.

$\text{Time} = \frac{D}{\text{Speed}} \Rightarrow \frac{82}{7 + 9} = \frac{82}{16}$

$= \frac{41}{8} \Rightarrow 5\frac{1}{8}$ sec.

23.4; Speed of 1st train = $\frac{D}{T} = \frac{150}{15}$

$\Rightarrow$ 10m/sec.

Total length = 150 + 150 = 300

$\text{Total speed} = \frac{\text{Total distance}}{\text{Time}} = \frac{300}{12}$

= 25m/sec.

Speed of 2nd train = (25 - 10)

=15 m./sec.

$= 15 \times \frac{18}{5}$ km./hr.

= 54km/hr.

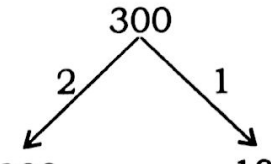
24.4; Total speed = (48 + 42) km./hr.

$= (48 + 42) \times \frac{5}{18} = 25$ m/sec.

Total length of both train = S × T

= 25 × 12

= 300m.



ratio is 2 : 1 as length of 2nd is half of the of 1st

200 100

Distance in 45 sec. by 1st train

$D = S \times T = 48 \times \frac{5}{18}$ m / sec. × 45 sec.

= 600m.

$D = L_T + L_P$

Length of platform = 600 - 200

= 400m.

3; Speed difference = 56 - 29
= 27km/hr.

$= 27 \times \frac{5}{18}$

$= \frac{15}{2}$ m/sec.

Length of faster train = S × T

$= \frac{15}{2} \times 10$

= 75m.

. 2; T_1 7am. → S_1=50km/hr.

A ←— 3 hrs. —→ C ←— 2 hrs. —→ B

S_2= 60 km/hr. ← 8 am. (T_2)

Dist. between A & C = 50 × 3 = 150 km. (as A has been travelling for 3 hrs.)

Dist. between B & C = 60 × 2 = 120 km. (as B has been travelling for 2 hrs.)

Ratio between the two 150 : 120
= 5 : 4

27.2; Speed in m/sec. $= 45 \times \frac{5}{18}$

$= \frac{25}{2}$ m/sec.

$\text{Time} = \frac{D}{T} = \frac{800 \text{ m.}}{\frac{25}{2}} = \frac{800}{25} \times 2$

= 64 sec.

$\left(\because \frac{4}{5} \text{kms.} = 800\text{m}\right)$

28.3; Speed in m/sec. $= 30 \times \frac{5}{18}$

$= \frac{25}{3}$ m/sec.

$\text{Time} = \frac{100}{25} \times 3$ = 12 sec.

29.1; Let length of the train = x
Distance = Length of the platform + Length of the train = $260 + x$

Speed = 72 km/hr = $72 \times \frac{5}{18}$
= 20 m/s

Time = 23 seconds.

$T = \frac{D}{S} \Rightarrow 23 = \frac{260 + x}{20}$ or, $260 + x$
$= 23 \times 20 = 460$

$\therefore x = 460 - 260 = 200$ metres

Paramount Concept:-

Speed in m/sec. $= 72 \times \frac{5}{18}$
= 20m/sec.

D = 20 × 23 = 460m

Distance covered in 23 sec = 460m.
i.e. (L_T + L_P)
Length of train = 460 - 260 = 200m.

30.2; Total Distance = 2 × 275 = 550 m and Time = 33 sec

Speed of the train $= \frac{550}{33}$ m/sec.

$= \frac{550}{33} \times \frac{18}{5}$ km/hr.

= 60 km/hr.

31.3; Let the length of the platform be x m
Now, according to the question,

$S = \frac{D}{T} = \frac{x+160}{18} \Rightarrow 90 \times \frac{5}{18} = \frac{x+160}{18}$

or, $x + 160 = 90 \times 5 = 450$

$\therefore x = 450 - 160 = 290$

$\therefore$ Length of the platform = 290 m.

Paramount Concept:-

Speed of train $= 90 \times \frac{5}{18}$ = 25m/sec.

Distance in 18 sec = 25 × 18
= 450 m.

Length of platform = 450 - 160
= 290 m.

32.5; Speed of the train

$$= \left(\frac{240+300}{27}\right) \text{ m/sec.}$$

$$= \left(\frac{540}{27}\right) = 20 \text{ m/sec}$$

$$= \left(20 \times \frac{18}{5}\right) = 72 \text{ km/hr.}$$

33.1; Let the length of the train be x m

$\therefore$ length of the platform = $2x$ m

Total distance covered by the train

= $(2x + x =)\ 3x$ m

Now, according to the question,

$$S = \frac{D}{T} = \frac{3x}{32.4} = 60 \times \frac{5}{18} \text{ km/hr.}$$

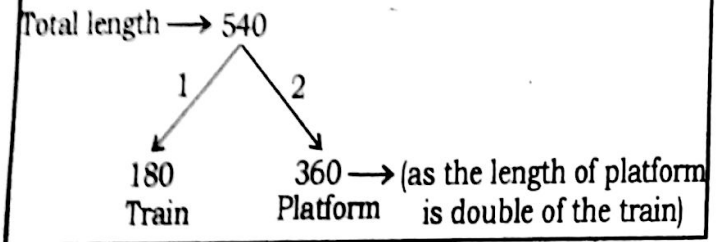
or, $x = 60 \times \frac{5}{18} \times \frac{324}{10 \times 3} = 180$ m

Paramount Concept:-

Speed in m/sec. $= 60 \times \frac{5}{18}$

$$= \frac{50}{3} \text{ m/sec.}$$

Distance covered $= \frac{50}{3} \times 32.4 = 540$



34.1; **Paramount Concept:-**

Length = $66 \times \frac{5}{18} \times 18 = 330$ m. (66 kmph. multiplied by 5/18 to convert it into m./sec.)

35.2; Relative speed of train and first person $S = \frac{D}{T} = \frac{75}{7\frac{1}{2}}$

$$= \frac{75}{\frac{15}{2}} = 10 \text{ m/s} = 10 \times \frac{18}{5} = 36 \text{ km/hr.}$$

$\therefore$ Relative speed = 36 + 6 = 42 km/hr. (speed of train + speed of man)

Now, relative speed of train and 2nd person

$$\frac{\frac{75}{27}}{4} = \frac{75}{27} \times 4 \text{ m/s} = \frac{300}{27} \times \frac{18}{5}$$

= 40 km./hr.

$\therefore$ Speed of 2nd person = 42 – 40

= 2 km/hr.

36.4; Speed of both trains together

$$= \frac{100+80}{9} = \frac{180}{9} = 20 \text{ m/sec.}$$

Extra speed of faster train $= \frac{180}{18}$

= 10m./sec.

This means slower train is 5m./sec. & faster one is 10m./sec. extra i.e. 15m./sec.

Faster train	**Slower train**
15m/sec.	5m/ sec.
$\downarrow \times \frac{18}{5}$	$\downarrow \times \frac{18}{5}$
54 km/hrs.	18km/hrs.

37.2; Speed of train $= \frac{120}{5} = 24 \text{ m/s}$

$\therefore$ Time taken by the train to pass the platform

$$= \frac{120+180}{24} = 12.5 \text{ seconds}$$

38.3; Length of the second train = Relative speed × Time taken to cross each other – Length of first train

$$= \left\{(40-22)\frac{5}{18}\right\} \times 60 - 125 = 175 \text{ m.}$$

Paramount Concept:-

Relative speed = $(40 - 22) \times \frac{5}{18}$

= 5 m/sec.

Distance covered in 60 sec. i.e.1 min.

= 300 m. (Which is 5 × 60)

Length of second train = 300 - 125

= 175m.

39.1; **Paramount Concept:-**

Total distance = 100 + 120 = 220m

Time = 2sec.

Relative speed = $\frac{220}{6}$ m / sec.

$= \frac{220}{6} \times \frac{18}{5}$ km/hr.

= 132 km/hr.

Speed of second train = 132 - 50

= 82 km/hr.

40. 1; Till 8 a.m, the train from A covers a distance of 20 km.

Now, the remaining distance

110 – 20 = 90 km is covered by the trains with relative speed

= 20 + 25 = 45 km/hr

$\therefore$ they meet after = $\frac{90}{45}$ = 2 hrs.

That is, at 8 + 2 = 10 a.m.

Paramount Concept:-

A cover 20 km till 8 am.

Total speed = 45 km/hr. (this means 45 km. in 1 hr.)

Distance = 90 km.

This means they will meet after 2 hrs.

$\therefore$ They will meet at 8 + 2 = 10 : 00 am.

41. 1; **Short cut Method:-**

Speed of train = $\frac{2 \times 9}{18}$ $\frac{10 \times 4}{40}$

22km/hr.

Relative speed with first man

= 22km./hr.

Speed of train = 20 - 2 = 20 km/hr.

Length = $20 \times \frac{5}{18} \times 9$ = 50 m.

42.1; Speed = 65 kmph

Distance = 1300 kms

Time taken = $\frac{1300}{65}$ = 20 hours

Clearly, 4 hours are spent at 8 junctions in stoppages as one full day was taken for the journey to be completed.

$\therefore$ Required time = 4 × 60 = 240 min. and at each junction the halt is of

= $\frac{240}{8}$ =30 min.

Paramount Concept:-

Time to cover 1300 km = $\frac{D}{S} = \frac{1300}{65}$

= 20hrs.

Break = 24 hrs. – 20 hrs. = 4 hrs.

Break at each junction = $\frac{4}{8} = \frac{1}{2}$ hr.

= 30 min.

43. 4; Speed of train = 90 km/hr = $\frac{90 \times 5}{18}$

= 25 m./s.

If length of train x metre, then total length = $(x + 250)$

$(x + 250) = 25 \times 22 = 550$

$\therefore x = 550 - 250 = 300$ metre

Paramount Concept:-

Speed of the train = $90 \times \frac{5}{18}$

= 25m/sec.

Distance covered in 22 sec. = 25 × 22

= 550 m.

Length of train = 550 - 250 = 300 m.

44.2; Relative speed = 42 – 30
= 12 km./hr.

$= 12 \times \frac{5}{18} = \frac{10}{3}$ m/s

Time

$= \frac{\text{Total length of both the train}}{\text{Relative speed}} = \frac{84+60}{\frac{10}{3}}$

$= \frac{144 \times 3}{10} = 43.2$ seconds

45.5; Suppose the length of train A = x metres

Therefore, the length of train

$B = \frac{140}{100} \times x = 1.4x$ metres

Total length of the two trains
$= x + 1.4x = 2.4x$ metres

Speed of train A in metre per second
= 72km./hr.

$= 72 \times \frac{5}{18} = 20$ metres per second

According to question

$D = S \times T$

$\therefore 2.4x = 20 \times 30$

$\therefore x = \frac{30 \times 20}{2.4} = 250$ metres

$\therefore$ Length of train B = 250 × 1.4
= 350 metres

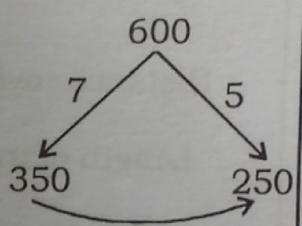
Difference between the lengths of two trains = (350 - 250) metres
= 100 metres

Short cut Method:-

Distance travelled by train A = S × T

$= 72 \times \frac{5}{18} \times 30 = 600$ m.

$140\% = \frac{7}{5}$



46.4; When a train crosses a platform, it covers a distance equal to the sum of lengths of platform and the train itself. If the length of train be x metres, then

Speed of train $= \frac{D}{T}$

$= \frac{L_T + L_P}{T} = \frac{x+300}{38}$ m/sec_____(i)

When the train crosses a signal post it covers its own length.

$\therefore$ Speed of train $= \frac{x}{18}$ m/sec_____(ii)

From equations (i) and (ii)

$\frac{x+300}{38} = \frac{x}{18}$

$\Rightarrow 38x - 18x = 300 \times 18$

$\Rightarrow 20x = 300 \times 18$

$\Rightarrow x = \frac{300 \times 18}{20} = 270$ metres

$\therefore$ Speed of train $= \frac{270}{18} = 15$ m/sec.

$= 15 \times \frac{18}{5} = 54$ kmph.

Short cut Method:-

Speed of train $= \frac{300}{20} \times \frac{18}{5} = 54$ km/hr.

(Where 20 is the diff. in time 38 and 18 sec.)

47.3; Length of trains = 570 metres
Length of platform = 570 metres
When a train crosses a platform it covers a distance equal to the length of platform + Length of itself.

$\therefore$ Speed $= \frac{570+570}{15} = \frac{1140}{15} = 76$ m/sec.

Short cut Method:-

$S = \frac{D}{T} = \frac{\text{Length of train} \times 2}{40 \text{ sec}} = \frac{570 \times 2}{15}$

$= 76$ m/sec.

48.3; Relative speed = 40 - 25
= 15 km./hr.

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

Time = 48 sec.

Distance = Speed × Time

$= 15 \times \frac{5}{18} \times 48 = 200$m.

49.4; Let the time taken by train in crossing a pole be t seconds.

$\therefore$ Time taken in crossing the platform $= (x + 40)$ seconds

According to the question,

Speed of train (when it crosses the pole)

$= \frac{240}{t}$ _____(i)

Speed of train (when it crosses the platform)

$= \frac{\text{total length}}{\text{time}} = \frac{240+2\times240}{t+40}$ _____ (ii)

From equations (i) and (ii),

$\frac{240}{t} = \frac{240+2\times240}{t+40}$

$\Rightarrow \frac{1}{t} = \frac{1+2}{t+40}$

$\Rightarrow 3t = t + 40$

$\Rightarrow 2t = 40$

$\Rightarrow t = 20$ seconds

$\therefore$ Speed of train $= \frac{240}{20} = 12$ m/sec.

Short cut Method:-

$S = \frac{D}{T}$

$= \frac{2\times\text{Length of train}}{40} \quad \frac{240\times2}{40}$

= 12 m./sec

50.2; Time taken by trains in crossing each other

$= \frac{\text{Sum of lengths of trains}}{\text{Relative speed}}$

60 kmph $= \frac{60\times5}{18} = \frac{50}{3}$ m/sec. If the speed of other train be x m/sec. then

$= 180 + 270$

$10.8 = \frac{50}{3} + x$

$\Rightarrow 180 + 10.8x = 450$

$\Rightarrow 10.8x = 450 - 180 = 270$

$\Rightarrow x = \frac{270}{10.8} = 25$ metre/sec.

$\Rightarrow 25 \times \frac{18}{5}$ kmph = 90 kmph

Short cut Method:-

Total speed $= \frac{D}{T}$

$= \frac{270+180}{10.8} = \frac{450\times10}{108} \times \frac{18}{5}$

= 150km/hr.

Speed of second train = 150 - 60

= 90 km/hr

51.2; Distance = 2 × 275 = 550m and Time = 33sec

Speed of the train $= \frac{550}{33} \times \frac{18}{5}$

= 60km/hr.

52.3; The speed of the first train

$= \frac{120}{10} = 12$ m/sec.

And the speed of the second train

$= \frac{120}{15} = 8$ m./sec.

$\therefore$ time taken by them to cross each other $= \frac{120+120}{12+8} = \frac{240}{20}$

= 12 seconds