14 TIME AND DISTANCE

Importance : Normally 1 or 2 questions on Time and distance are always asked in different competitive exams.

Scope of questions : In such questions, average distance, time/average time taken to cover any distance, ratio between speeds or taken times by two persons/ things are asked. Other questions include questions based on – reaching at some place before or after scheduled time, covering a part of distance on foot or on different coveyances.

Way to success : In such questions concentrate on basic concepts – make 'Mind Map' and some time used 'Tricks' as explained.

RULE 1 : Distance = Speed × Time

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}, \text{ Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$1 \text{ m/s} = \frac{18}{5} \text{ km/h}, 1 \text{ km/h} = \frac{5}{18} \text{ m/s}$$

RULE 2 : If a man travels different distances d_1, d_2, d_3, ... and so on in different time t_1, t_2, t_3 respectively then,

Average speed

$$= \frac{\text{total travelled distance}}{\text{total time taken in travelling distance}}$$

$$= \frac{d_1 + d_2 + d_3 + ...}{t_1 + t_2 + t_3 + ...}$$

RULE 3 : If a man travels different distances d_1, d_2, d_3, and so on with different speeds s_1, s_2, s_3, respectively then,

$$\text{Average speed} = \frac{(d_1 + d_2 + d_3 + ...)}{\frac{d_1}{s_1} + \frac{d_2}{s_2} + \frac{d_3}{s_3} + ...}$$

RULE 4 : If a distance is divided into n equal parts each travelled with different speeds, then, Average speed

$$= \frac{n}{\left(\frac{1}{s_1} + \frac{1}{s_2} + \frac{1}{s_3} + \frac{1}{s_4}\right)}$$ where n = number of equal parts

$s_1, s_2, s_3, ..., s_n$ are speeds.

RULE 5 : If a bus travels from A to B with the speed x km/h and returns from B to A with the speed y km/h, then the average speed will be $\left(\frac{2xy}{x+y}\right)$

RULE 6 : If d_1 distance is travelled in t_1 time and d_2 distance is travelled in t_2 time then,

$$\boxed{d_1 t_2 = d_2 t_1} \text{ or } \frac{d_1}{t_1} = \frac{d_2}{t_2}$$

$\Rightarrow$ Distance α time [provided speed is constant]

RULE 7 : If an object increases/decreases its speed from x km/hr to y km/hr. to cover a distance in t_2 hours in place of t_1 hours then [Here $(t_2 - t_1)$ will be given].

$$\text{Distance} = \frac{xy}{(\text{Difference of x and y})} \times (\text{Change in time})$$

or, Distance

$$= \left(\frac{\text{Product of Speeds}}{\text{Difference in Speeds}}\right) \times (\text{Change in time})$$

RULE 8 : If an object travels certain distance with the speed of $\frac{A}{B}$ of its original speed and reaches its destination 't' hours before or after, then the taken time by object travelling at original speed is

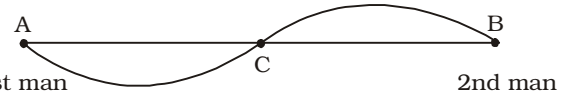
$$\text{Time} = \frac{A}{(\text{Difference of A and B})} \times \text{time (in hour)}$$

RULE 9 : Speed (s) $\propto \frac{1}{\text{time (t)}} \Rightarrow s \propto \frac{1}{t}$

$\therefore$ $\boxed{s_1 t_1 = s_2 t_2}$ (Provided distance is constant)

RULE 10 : If a man travels at the speed of s_1, he reaches his destination t_1 late while he reaches t_2 before when he travels at s_2 speed, then the distance between the two places is $D = \frac{(s_1 \times s_2) \times (t_1 + t_2)}{s_2 - s_1}$

RULE 11 :



Time taken by 1st man to reach B after meeting 2nd man at C is 't_1' and time taken by 2nd man to reach A after meeting 1st man at C is 't_2' then:

$$\frac{\text{Speed of 1st man}(s_1)}{\text{Speed of 2nd man}(s_2)} = \sqrt{\frac{t_2}{t_1}}$$

$\therefore$ Distance from A to B = $s_1 t_1 + s_2 t_2$

RULE 12 : If both objects run in opposite direction then, Relative speed = Sum of speeds.

If both objects run in the same direction then, Relative speed = Difference of Speeds.

$$\text{Time taken in meeting} = \frac{\text{Distance between them}}{\text{Relative Speed}}$$

RULE 13 : Let a man take 't' hours to travel 'x' km. If he travels some distance on foot with the speed u km/h and remaining distance by cycle with the speed v km/h, then time taken to travel on foot.

$$\text{Time} = \frac{(vt - x)}{(v - u)}$$

Distance travelled on foot = Time × u

RULE 14 : Formula to calculate the no. of rounds.

Circular Distance = (circumference) × No of rounds,

$D = 2\pi r \times n$

RULE 15 : If any one overtakes or follows another, then time taken to catch

$$= \frac{\text{distance between them}}{\text{Relative speed}}$$

$$\text{or meet} = \frac{(\text{Speed of 1st traveller}) \times \text{time}}{(\text{Difference of speeds})}$$

Total travelled distance to catch the thief

$$= \frac{(\text{Product of speeds}) \times \text{time}}{(\text{Difference of speeds})}$$

RULE 16 : Formula to calculate the no. of poles,

Distance = (n – 1)x

where n = No. of poles.

x = distance between consecutive two poles.

RULE 17 : If in a certain time, 'd_1' distance is travelled with 's_1' speed and d_2 distance is travelled with 's_2' speed

then, $\frac{d_1}{s_1} = \frac{d_2}{s_2}$

RULE 18 : If a man covers $\frac{1}{x}$ part of Journey at u km/h, $\frac{1}{y}$ part at v km/h and $\frac{1}{z}$ part at w km/hr and so on, then his average speed for the whole journey will be

$$\frac{1}{\frac{1}{xu} + \frac{1}{yv} + \frac{1}{zw} + ...}$$

THEOREMS OF TRAINS

Importance : Question based Theorems of Trains are asked in almost all competitive exams.

Scope of Questions : In how much time. the train will cross a person/platform/other, train or what will be length of train/platform or relative speed of two trains or speed of a train – kind of questions are asked. Some another type of questions like change in speeds, distance in way or other special situations are also asked.

Key to Success: Most of the questions can be solved with the help of basic formulae on time and distance. Regular practice of different type of question will ensure your success.

RULE 1 : If a train crosses an electric pole, a sitting/ standing man, km or mile stone etc. then distance = Length of train. Then,

Length of train = Speed × Time

$$\text{And Time} = \frac{\text{Length of train}}{\text{Speed}} \text{ and}$$

$$\text{Speed} = \frac{\text{Length of train}}{\text{Time}}$$

IMPORTANT POINTS

Time taken in crossing 'b' metre length (i.e. platform, bridge, tunnel, standing train etc) by 'a' metre length train = total time taken in travelling (a + b) metre by the train.

Let a train is travelling with the speed x km/h and in the same direction, another train is travelling on parallel path with the speed y km/h, then, relative speed of the faster train = (x – y) km/h.

Suppose that a train is travelling with the speed 'x' km/h and from the opposite direction another train is coming on parallel path with the speed 'y' km/h, then

Relative speed of the train = (x + y) km/h.

RULE 2 : Let 'a' metre long train is going with the speed 'x' m/s and 'b' metre long train is also going with the speed 'y' m/s in the same direction on parallel path, then total time taken by the faster train to cross the slower train

$$= \frac{a + b}{x - y} \text{ seconds}$$

RULE 3 : Let 'a' metre long train is travelling with the speed 'x' m/s and 'b' metre long train is travelling with the speed 'y' m/s in the opposite direction on parallel path. Then, time taken by the trains to cross each other

$$= \left(\frac{a+b}{x+y}\right) = \text{seconds.}$$

RULE 4 : If a train crosses a standing man/a pole in 't_1' sec time and crosses 'P' meter long platform in 't_2' sec. time, then length of the train = $\frac{P \times t_1}{(t_2 - t_1)}$

RULE 5 : Let 'a' metre long train is running with the speed 'x' m/s. A man is running in same direction and with the speed 'y' m/s, then time taken by the train to cross the man = $\frac{a}{(x-y)}$ seconds. And a = (x – y)t

RULE 6 : Let 'a' metre long train is running with the speed 'x' m/s. A man is running in the opposite direction of train with the speed of 'y' m/s. Then, time taken by the train to cross the man $= \left(\frac{a}{(x+y)}\right)$ seconds.

RULE 7 : A train crosses two men in t_1 seconds and t_2 seconds running in the same direction with the speed s_1 and s_2. then the speed of train is = $\frac{t_1 s_1 - t_2 s_2}{t_1 - t_2}$ and length of train is $l = (s_1 - s_2)\left(\frac{t_1 - t_2}{t_1 - t_2}\right)$

RULE 8 : If two trains of (same lengths) are coming from same direction and cross a man in t_1 and t_2 seconds, then time taken by both the trains to cross each other = $\frac{2 \times \text{Product of time}}{\text{Difference of time}}$

RULE 9 : If two trains of same length are coming from opposite directions and cross a man in t_1 seconds and t_2 seconds then time taken by both trains to cross each other = $\frac{2 \times \text{Product of time}}{\text{Sum of time}}$

RULE 10 : If a train of length x m crosses a platform/ tunnel/bridge of length y m with the speed u m/s in t seconds, then, t = $\frac{x+y}{u}$

RULE 11 : Two trains A and B, run from stations X to Y and from Y to X with the speed 'S_A' and 'S_B' respectively. After meeting with each other. A reached at Y after 't_A' time and B reached at X after 't_B' time. Then Ratio of speeds of trains,

$$\frac{S_A}{S_B} = \sqrt{\frac{t_B}{t_A}}$$

RULE 12 : If a train of length l m passes a bridge/ platform of 'x' m in t_1 sec, then the time taken by the same train to cross another bridge/platform of length 'y' m is, Time taken $= \left(\frac{l+y}{l+x}\right)t_1$

RULE 13 : From stations A and B, two trains start travelling towards each other at speeds a and b, respectively. When they meet each other, it was found that one train covers distance d more than that of another train. The distance between stations A and B is given as

$$\left(\frac{a+b}{a-b}\right) \times d$$

RULE 14 : The distance between two places A and B is x km. A train starts from A towards B at a speed of a km/ hr and after a gap of t hours another train with speed b km/hr starts from B towards A, then both the trains will meet at a certain point after time T. Then, we have. T = $\left(\frac{x \pm tb}{a+b}\right)$

t is taken as positive if second train starts after first train and t is taken as negative if second train starts before the first train.

RULE 15 : Excluding stoppage, the average speed of a train is u and with stoppage its average speed is v. Then, the stoppage time per hour

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

$$= \frac{u-v}{u}$$

With u > v and u, v ≠ 0

RULE 16 : A train covers a distance between stations A and B in time t_1. If the speed is changed by S. then the time taken to cover the same distance is t_2. Then the distance (D) between A and B is given by

$$D = S\left(\frac{t_1 t_2}{t_1 - t_2}\right) \text{ or } \left(\frac{S'}{t'}\right) t_1 t_2$$

Where t' : change in the time taken

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QUESTIONS ASKED IN PREVIOUS SSC EXAMS

TYPE–I

1. A train is travelling at the rate of 45km/hr. How many seconds it will take to cover a distance of $\frac{4}{5}$ km ?

(1) 36 sec. (2) 64 sec.
(3) 90 sec. (4) 120 sec.

(SSC CGL Prelim Exam. 04.07.1999 (Second Sitting)

2. An aeroplane covers a certain distance at a speed of 240 km hour in 5 hours. To cover the same distance in $1\frac{2}{3}$ hours, it must travel at a speed of :

(1) 300 km./hr. (2) 360 km./hr.
(3) 600 km./hr. (4) 720 km./hr.

(SSC CGL Prelim Exam. 04.07.1999 (Second Sitting)

3. A man walking at the rate of 5 km/hr. crosses a bridge in 15 minutes. The length of the bridge (in metres) is :

(1) 600 (2) 750
(3) 1000 (4) 1250

(SSC CGL Prelim Exam. 27.02.2000 (First Sitting)

4. A man crosses a road 250 metres wide in 75 seconds. His speed in km/hr is :

(1) 10 (2) 12
(3) 12.5 (4) 15

(SSC CGL Prelim Exam. 27.02.2000 (Second Sitting)

5. An athlete runs 200 metres race in 24 seconds. His speed (in km/hr) is :

(1) 20 (2) 24
(3) 28.5 (4) 30

(SSC CGL Prelim Exam. 24.02.2002 (First Sitting)

6. A car goes 10 metres in a second. Find its speed in km/hour.

(1) 40 (2) 32
(3) 48 (4) 36

(SSC CGL Prelim Exam. 24.02.2002 (Second Sitting)

7. A car travelling at a speed of 40 km/hour can complete a journey in 9 hours. How long will it take to travel the same distance at 60 km/hour ?

(1) 6 hours (2) 3 hours
(3) 4 hours (4) $4\frac{1}{2}$ hours

(SSC CGL Prelim Exam. 11.05.2003 (Second Sitting)

8. A man travelled a certain distance by train at the rate of 25 kmph. and walked back at the rate of 4 kmph. If the whole journey took 5 hours 48 minutes, the distance was

(1) 25 km (2) 30 km
(3) 20 km (4) 15 km

(SSC CGL Prelim Exam. 08.02.2004 (First Sitting)

9. A boy goes to his school from his house at a speed of 3 km/hr and returns at a speed of 2 km/hr. If he takes 5 hours in going and coming, the distance between his house and school is :

(1) 6 km (2) 5 km
(3) 5.5 km (4) 6.5 km

(SSC CGL Prelim Exam. 08.02.2004 (Second Sitting)

10. A boy runs 20 km in 2.5 hours. How long will he take to run 32 km at double the previous speed ?

(1) 2 hours (2) $2\frac{1}{2}$ hours
(3) $4\frac{1}{2}$ hours (4) 5 hours

(SSC CPO S.I. Exam. 26.05.2005)

11. A train is moving with the speed of 180 km/hr. Its speed (in metres per second) is :

(1) 5 (2) 40
(3) 30 (4) 50

(SSC CGL Prelim Exam. 13.11.2005 (First Sitting)

12. A man riding his bicycle covers 150 metres in 25 seconds. What is his speed in km per hour ?

(1) 25 (2) 21.6
(3) 23 (4) 20

(SSC CGL Prelims Exam. 24.02.2002 (Middle Zone) & (SSC CGL Prelim Exam. 13.11.2005 (IInd Sitting)

13. A and B travel the same distance at speed of 9 km/hr and 10 km/hr respectively. If A takes 36 minutes more than B, the distance travelled by each is

(1) 48 km (2) 54 km
(3) 60 km (4) 66 km

(SSC SAS Exam. 26.06.2010 (Paper-1)

14. A person started his journey in the morning. At 11 a.m. he covered $\frac{3}{8}$ of the journey and on the same day at 4.30 p.m. he covered $\frac{5}{6}$ of the journey. He started his journey at

(1) 6.00 a.m. (2) 3.30 a.m.
(3) 7.00 a.m. (4) 6.30 a.m.

(SSC CGL Prelim Exam. 04.02.2007 (Second Sitting)

15. The speed of a bus is 72 km/hr. The distance covered by the bus in 5 seconds is

(1) 100 m (2) 60 m
(3) 50 m (4) 74.5 m

(SSC CHSL DEO & LDC Exam. 21.10.2012 (Ist Sitting)

16. Two men start together to walk a certain distance, one at 4 km/h and another at 3 km/h. The former arrives half an hour before the latter. Find the distance.

(1) 8 km (2) 7 km
(3) 6 km (4) 9 km

(SSC CHSL DEO & LDC Exam. 21.10.2012 (Ist Sitting)

17. A train starts from a place A at 6 a.m. and arrives at another place B at 4.30 p.m. on the same day. If the speed of the train is 40 km per hour, find the distance travelled by the train ?

(1) 420 km (2) 230 km
(3) 320 km (4) 400 km

(SSC CHSL DEO & LDC Exam. 28.10.2012 (Ist Sitting)

18. Walking at the rate of 4 km an hour, a man covers a certain distance in 3 hours 45 minutes. If he covers the same distance on cycle, cycling at the rate of 16·5 km/hour, the time taken by him is
(1) 55.45 minutes
(2) 54.55 minutes
(3) 55.44 minutes
(4) 45.55 minutes
(SSC Multi-Tasking (Non-Technical) Staff Exam. 22.02.2011)

19. A train covers a distance of 10 km in 12 minutes. If its speed is decreased by 5 km/hr, the time taken by it to cover the same distance will be :
(1) 10 minutes
(2) 13 minutes 20 sec
(3) 13 minutes
(4) 11 minutes 20 sec
(SSC CHSL DEO & LDC Exam. 21.10.2012, IInd Sitting)

20. A man walks 'a' km in 'b' hours. The time taken to walk 200 metres is
(1) $\frac{200b}{a}$ hours (2) $\frac{b}{5a}$ hours
(3) $\frac{b}{a}$ hours (4) $\frac{ab}{200}$ hours
(SSC CHSL DEO & LDC Exam. 04.11.2012, Ist Sitting)

21. The speed $3\frac{1}{3}$ m/sec when expressed in km/hour becomes
(1) 8 (2) 9
(3) 10 (4) 12
(SSC Graduate Level Tier-I Exam. 11.11.2012, Ist Sitting)

22. A bullock cart has to cover a distance of 120 km. in 15 hours. If it covers half of the journey in $\frac{3}{5}$ th time, the speed to cover the remaining distance in the time left has to be
(1) 6.4 km/hr (2) 6.67 km/hr
(3) 10 km/hr (4) 15 km/hr
(SSC Multi-Tasking Staff Exam. 10.03.2013, Ist Sitting : Patna)

23. A train covers a certain distance in 210 minutes at a speed of 60 kmph. The time taken by the train, to cover the same distance at a speed of 80 kmph is :
(1) $3\frac{5}{8}$ hours (2) $2\frac{5}{8}$ hours
(3) $4\frac{5}{8}$ hours (4) 3 hours
(SSC Multi-Tasking Staff Exam. 10.03.2013

24. A man rides at the rate of 18 km/hr, but stops for 6 mins. to change horses at the end of every 7th km. The time that he will take to cover a distance of 90 km is
(1) 6 hrs.
(2) 6 hrs. 12 min.
(3) 6 hrs. 18 min.
(4) 6 hrs. 24 min.
(SSC Graduate Level Tier-I Exam. 21.04.2013)

25. A speed of 30.6 km/.hr is the same as
(1) 8.5 m/sec. (2) l0 m/sec.
(3) 12 m/sec. (4) 15.5 m/sec.
(SSC Constable (GD) Exam. 12.05.2013)

26. A man covers $\frac{2}{15}$ of the total journey by train, $\frac{9}{20}$ by bus and the remaining 10 km on foot. His total journey (in km) is
(1) 15.6 (2) 24
(3) 16.4 (4) 12.8
(SSC Graduate Level Tier-I Exam. 19.05.2013)

27. You arrive at your school 5 minutes late if you walk with a speed of 4 km/h, but you arrive 10 minutes before the scheduled time if you walk with a speed of 5 km/h. The distance of your school from your house (in km) is
(1) 4 (2) 5
(3) 10 (4) 2
(SSC CGL Tier-I Re-Exam. (2013) 27.04.2014)

28. Sarita and Julie start walking from the same place in the opposite directions. If Julie walks at a speed of $2\frac{1}{2}$ km/hr and Sarita at a speed of 2 km/hr, in how much time will they be 18 km apart ?
(1) 4.0 hrs (2) 4.5 hrs
(3) 5.0 hrs (4) 4.8 hrs
(SSC CGL Tier-I Re-Exam. (2013) 20.07.2014 (Ist Sitting)

29. A man travelled a distance of 80 km in 7 hrs partly on foot at the rate of 8 km per hour and partly on bicycle at 16km per hour. The distance travelled on the foot is
(1) 32 km (2) 48 km
(3) 36 km (4) 44 km
(SSC CGL Tier-II Exam. 21.09.2014)

30. A car driver leaves Bangalore at 8.30 A.M. and expects to reach a place 300 km from Bangalore at 12.30 P.M. At 10.30 he finds that he has covered only 40% of the distance. By how much he has to increase the speed of the car in order to keep up his schedule?
(1) 45 km/hr (2) 40 km/hr
(3) 35 km/hr (4) 30 km/hr
(SSC CGL Tier-II Exam. 21.09.2014)

31. A man is walking at a speed of 10 kmph. After every km, he takes a rest for 5 minutes. How much time will he take to cover a distance of 5 km?
(1) 60 minutes (2) 50 minutes
(3) 40 minutes (4) 70 minutes
(SSC CGL Tier-II Exam. 21.09.2014)

32. A train covers a distance of 10 km in 12 minutes. If its speed is decreased by 5 km/hr, the time taken by it to cover the same distance is equal to
(1) 40 minutes (2) $\frac{40}{3}$ minutes
(3) 20 minutes (4) 15 minutes
(SSC CAPFs SI, CISF ASI & Delhi Police SI Exam. 22.06.2014)

33. Motor-cyclist P started his journey at a speed of 30 km/hr. After 30 minutes, motor-cyclist Q started from the same place but with a speed of 40 km/hr. How much time (in hours) will Q take to overtake P ?
(1) 1 (2) $\frac{3}{2}$
(3) $\frac{3}{8}$ (4) 2
(SSC CAPFs SI, CISF ASI & Delhi Police SI Exam. 22.06.2014)

34. A is twice as fast as B and B is thrice as fast as C is. The journey covered by C in $1\frac{1}{2}$ hours will be covered by A in
(1) 15 minutes (2) 20 minutes
(3) 30 minutes (4) 1 hour
(SSC CHSL DEO & LDC Exam. 9.11.2014)

35. A truck travels at 90 km/hr for the first $1\frac{1}{2}$ hours. After that it travels at 70 km/hr. Find the time taken by the truck to travel 310 kilometres.

(1) 2.5 hrs (2) 3 hrs

(3) 3.5 hrs (4) 4 hrs

(SSC CHSL DEO Exam. 02.11.2014 (Ist Sitting)

36. A car travels at a speed of 60 km/hr and covers a particular distance in one hour. How long will it take for another car to cover the same distance at 40 km/hr ?

(1) $\frac{5}{2}$ hours (2) 2 hours

(3) $\frac{3}{2}$ hours (4) 1 hour

(SSC CHSL DEO Exam. 16.11.2014 (Ist Sitting)

37. A student goes to school at the rate of $\frac{5}{2}$ km/hr and reaches 6 minutes late. If he travels at the speed of 3 km/hr, he reaches 10 minutes earlier. The distance of the school is

(1) 45 km (2) 20 km

(3) 10 km (4) 4 km

(SSC CAPFs SI, CISF ASI & Delhi Police SI Exam. 22.06.2014 TF No. 999 KP0)

38. Sriya with her family travelled from Bolpur to Suri by car at a speed of 40 km/hr and returned to Bolpur at a speed of 50 km/hr. The average speed for the whole journey is

(1) $44\frac{4}{9}$ km/hr

(2) 45 km/hr

(3) $45\frac{1}{2}$ km/hr

(4) 44.78 km/hr

(SSC CHSL (10+2) DEO & LDC Exam. 16.11.2014 , Ist Sitting TF No. 333 LO 2)

39. A journey takes 4 hours 30 minutes at a speed of 60 km/hr. If the speed is 15 m/s, then the journey will take

(1) 5 hours

(2) 5 hours 30 minutes

(3) 6 hours

(4) 6 hours 15 minutes

(SSC CHSL (10+2) DEO & LDC Exam. 16.11.2014 , Ist Sitting TF No. 333 LO 2)

40. The distance between 2 places R and S is 42 km. Anita starts from R with a uniform speed of 4 km/h towards S and at the same time Romita starts from S towards R also with some uniform speed. They meet each other after 6 hours. The speed of Romita is

(1) 18 km/hour (2) 6 km/hour

(3) 20 km/hour (4) 8 km/hour

(SSC CGL Tier-II Exam. 12.04.2015 TF No. 567 TL 9)

41. A farmer travelled a distance of 61 km in 9 hours. He travelled partly on foot at the rate 4 kmph and partly on bicycle at the rate 9 kmph. The distance travelled on foot is

(1) 16 km (2) 14 km

(3) 17 km (4) 15 km

(SSC CGL Tier-II Exam. 12.04.2015 TF No. 567 TL 9) & SSC CGL Tier-I Exam. 09.08.2015 Ist Sitting TF No. 1443088)

42. A bus moving at 40 km per hour covers a distance in 6 hours 15 minutes. If it travels the same distance at 50 km per hour how long will it take to cover the distance ?

(1) 2 hrs. (2) 6 hrs.

(3) 4 hrs. (4) 5 hrs.

(SSC CAPFs SI, CISF ASI & Delhi Police SI Exam, 21.06.2015 (Ist Sitting) TF No. 8037731)

43. A student starting from his house walks at a speed of $2\frac{1}{2}$ km/hour and reaches his school 6 minutes late. Next day starting at the same time he increases his speed by 1 km/hour and reaches 6 minutes early. The distance between the school and his house is

(1) 4 km (2) $3\frac{1}{2}$ km

(3) $1\frac{3}{4}$ km (4) 6 km

(SSC Constable (GD) Exam, 04.10.2015, Ist Sitting)

44. A man starts from a place P and reaches the place Q in 7 hours. He travels $\frac{1}{4}$ th of the distance at 10 km/hour and the remaining distance at 12 km/hour. The distance between P and Q is

(1) 72 km (2) 90 km

(3) 80 km (4) 70 km

(SSC CGL Tier-II Exam, 25.10.2015, TF No. 1099685)

45. A student goes to school at the rate of $2\frac{1}{2}$ km/hr and reaches 6 minutes late. If he travels at the speed of 3 km/hr. he is 10 minutes early. What is the distance to the school?

(1) 4 km (2) $3\frac{1}{2}$ km

(3) 1 km (4) $3\frac{1}{4}$ km

(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 01.11.2015, IInd Sitting)

46. A man travels for 5 hours 15 minutes. If he covers the first half of the journey at 60 km/h and rest at 45 km/h. Find the total distance travelled by him.

(1) $1028\frac{6}{7}$ km. (2) 189 km.

(3) 378 km. (4) 270 km.

(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 15.11.2015 (IInd Sitting) TF No. 7203752)

47. A car can finish a certain journey in 10 hours at the speed of 42 kmph. In order to cover the same distance in 7 hours, the speed of the car (km/h) must be increased by :

(1) 12 (2) 15

(3) 18 (4) 24

(SSC CGL Tier-II Online Exam.01.12.2016)

48. A man cycles at the speed of 8km/hr and reaches office at 11 am and when he cycles at the speed of 12 km/hr he reaches office at 9 am. At what speed should he cycle so that he reaches his office at 10 am?

(1) 9.6 kmph.

(2) 10 kmph.

(3) 11.2 kmph.

(4) Cannot be determined

(SSC CPO SI, ASI Online Exam.05.06.2016) (IInd Sitting)

49. A bus travels at the speed of 36 km/hr, then the distance covered by it in one second is
(1) 10 metre (2) 15 metre
(3) 12.5 metre (4) 13.5 metre
(SSC CGL Tier-I (CBE) Exam. 09.09.2016) (Ist Sitting)

50. Two buses travel to a place at 45 km./hr. and 60 km./hr. respectively. If the second bus takes $5\frac{1}{2}$ hours less than the first for the journey, the length of the journey is :
(1) 900 km. (2) 945 km.
(3) 990 km. (4) 1350 km.
(SSC CGL Tier-I (CBE) Exam. 31.08.2016) (IInd Sitting)

51. A train is running at a speed of 116 km/hr. The distance covered by the train in metres in 18 seconds is :
(1) 900 metre (2) 1160 metre
(3) 508 metre (4) 580 metre
(SSC CGL Tier-I (CBE) Exam. 04.09.2016 (IInd Sitting)

52. A man travels $\frac{3}{4}$ th of the distance of his journey by bus, $\frac{1}{6}$ th by rickshaw and 2 km on foot. The total distance travelled by the man is :
(1) 12 km (2) 18 km
(3) 20 km (4) 24 km
(SSC CGL Tier-I (CBE) Exam. 08.09.2016 (IInd Sitting)

53. To cover a certain distance with a speed of 60 km/hr, a train takes 15 hours. If it covers the same distance in 12 hours, what will be its speed?
(1) 65 km/h (2) 70 km/h
(3) 75 km/h (4) 80 km/h
(SSC CGL Tier-I (CBE) Exam. 09.09.2016 (IIIrd Sitting)

54. Sound travels at 330 metre per second. The distance (in kilometre) of a thunder cloud when its sound follows the flash after 10 seconds is :
(1) 0.33 km. (2) 3.3 km.
(3) 33 km. (4) 33.3 km.
(SSC CGL Tier-I (CBE) Exam. 10.09.2016 (IInd Sitting)

56. A man travels some distance at a speed of 12 km/hr and returns at a speed of 9 km/hr. If the total time taken by him is 2 hrs 20 minutes the distance is
(1) 35 km. (2) 21 km.
(3) 9 km. (4) 12 km.
(SSC CGL Tier-II (CBE) Exam. 12.01.2017)

TYPE–II

1. The length of a train and that of a platform are equal. If with a speed of 90 km/hr the train crosses the platform in one minute, then the length of the train (in metres) is :
(1) 500 (2) 600
(3) 750 (4) 900
(SSC CGL Prelim Exam. 27.02.2000 (Second Sitting)

2. A train passes two bridges of lengths 800 m and 400 m in 100 seconds and 60 seconds respectively. The length of the train is :
(1) 80 m (2) 90 m
(3) 200 m (4) 150 m
(SSC CGL Prelim Exam. 24.02.2002 (Ist Sitting) & (SSC CGL Prelim Exam. 13.11.2005 (Ist Sitting)

3. A train 300 metres long is running at a speed of 25 metres per second. It will cross a bridge of 200 metres in
(1) 5 seconds (2) 10 seconds
(3) 20 seconds (4) 25 seconds
(SSC CPO S.I. Exam. 12.01.2003

4. A train 800 metres long is running at the speed of 78 km/hr. If it crosses a tunnel in 1 minute, then the length of the tunnel (in metres) is :
(1) 77200 (2) 500
(3) 1300 (4) 13
(SSC CGL Prelim Exam. 11.05.2003 (First Sitting)

5. A train is moving at a speed of 132 km/hour. If the length of the train is 110 metres, how long will it take to cross a railway platform 165 metres long?
(1) 5 seconds (2) 7.5 seconds
(3) 10 seconds (4) 15 seconds
(SSC Section Officer (Commercial Audit) Exam. 16.11.2003)

6. A train takes 18 seconds to pass through a platform 162 m long and 15 seconds to pass through another platform 120 m long. The length of the train (in m) is :
(1) 70 (2) 80
(3) 90 (4) 105
(SSC CPO S.I. Exam. 26.05.2005)

7. A train, 150 m long, takes 30 seconds to cross a bridge 500 m long. How much time will the train take to cross a platform 370 m long ?
(1) 36 secs (2) 30 secs
(3) 24 secs (4) 18 secs
(SSC CGL Prelim Exam. 24.02.2002 (Middle Zone) & (SSC CGL Prelim Exam. 13.11.2005 (Ist Sitting)

8. A 120 metre long train is running at a speed of 90 km per hour. It will cross a railway platform 230 m long in :
(1) $4\frac{4}{5}$ seconds (2) $9\frac{1}{5}$ seconds
(3) 7 seconds (4) 14 seconds
(SSC CGL Prelim Exam. 13.11.2005 (First Sitting)

9. A train travelling at a speed of 30 m/sec crosses a platform, 600 metres long, in 30 seconds. The length (in metres) of train is
(1) 120 (2) 150
(3) 200 (4) 300
(SSC CGL Prelim Exam. 04.02.2007 (First Sitting)

10. A train with a uniform speed passes a platform, 122 metres long, in 17 seconds and a bridge, 210 metres long, in 25 seconds. The speed of the train is
(1) 46.5 km/hour
(2) 37.5 km/hour
(3) 37.6 km/hour
(4) 39.6 km/hour
(SSC CPO S.I. Exam. 09.11.2008)

11. A train, with a uniform speed, crosses a platform, 162 metres long, in 18 seconds and another platform, 120 metres long, in 15 seconds. The speed of the train is
(1) 14 km/hr (2) 42 km/hr
(3) 50.4 km/hr (4) 67.2 km/hr
(SSC Data Entry Operator Exam. 02.08.2009)

12. A train travelling with uniform speed crosses two bridges of lengths 300 m and 240 m in 21 seconds and 18 seconds respectively. The speed of the train is :
(1) 72 km/hr (2) 68 km/hr
(3) 65 km/hr (4) 60 km/hr
(SSC CHSL DEO & LDC Exam. 27.11.2010)

13. A train, 110m long , is running at a speed of 60km/hr. How many seconds does it take to cross another train, 170 m long, standing on parallel track ?
(1) 15.6 sec (2) 16.8 sec
(3) 17.2 sec (4) 18 sec
(SSC CHSL DEO & LDC Exam. 28.11.2010 (Ist Sitting)

14. A train of length 500 feet crosses a platform of length 700 feet in 10 seconds. The speed of the train is
(1) 70 ft/second
(2) 85 ft/second
(3) 100 ft/second
(4) 120 ft/second
(SSC CISF Constable (GD) Exam. 05.06.2011)

15. A train 200 m long running at 36 kmph takes 55 seconds to cross a bridge. The length of the bridge is
(1) 375 m. (2) 300 m.
(3) 350 m. (4) 325 m.
(SSC Constable (GD) Exam. 12.05.2013)

16. A train 270 metres long is running at a speed of 36 km per hour, then it will cross a bridge of length 180 metres in :
(1) 40 sec (2) 45 sec
(3) 50 sec (4) 35 sec
(SSC CAPFs SI & CISF ASI Exam. 23.06.2013)

17. A train 50 metres long passes a platform of length 100 metres in 10 seconds. The speed of the train in metre/second is
(1) 50 (2) 10
(3) 15 (4) 20
(SSC CGL Tier-I Re-Exam. (2013) 27.04.2014)

18. A train 50 metre long passes a platform 100 metre long in 10 seconds. The speed of the train in km/hr is
(1) 10 (2) 54
(3) 15 (4) 100
(SSC CAPFs SI, CISF ASI & Delhi Police SI Exam. 22.06.2014 TF No. 999 KP0)

19. How many seconds will a train 120 metre long running at the rate of 36 km/hr take to cross a bridge of 360 metres in length ?
(1) 48 sec (2) 40 sec
(3) 46 sec (4) 36 sec
(SSC CAPFs SI, CISF ASI & Delhi Police SI Exam, 21.06.2015 (Ist Sitting) TF No. 8037731)

20. If a man running at 15 kmph crosses a bridge in 5 minutes, the length of the bridge is
(1) 1000 metres
(2) 500 metres
(3) 750 metres
(4) 1250 metres
(SSC CGL Tier-I Re-Exam, 30.08.2015)

21. A 200 metre long train is running at a speed of 72 km/hr. How long will it take to cross 800metre long bridge ?
(1) 50 seconds (2) 40 seconds
(3) 60 seconds (4) 30 seconds
(SSC Constable (GD) Exam, 04.10.2015, IInd Sitting)

22. A train passes two bridges of lengths 500 m and 250 m in 100 seconds and 60 seconds respectively. The length of the train is :
(1) 152 m (2) 125 m
(3) 250 m (4) 120 m
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 15.11.2015 (Ist Sitting) TF No. 6636838)

23. A train 150 metre long takes 20 seconds to cross a platform 450 metre long. The speed of the train in, km per hour, is :
(1) 108 (2) 100
(3) 106 (4) 104
(SSC CAPFs (CPO) SI & ASI, Delhi Police Exam. 20.03.2016) (IInd Sitting)

24. A moving train passes a platform 50 metre long in 14 seconds and a lamp post in 10 seconds. The speed of the train (in km/h) is :
(1) 24 (2) 36
(3) 40 (4) 45
(SSC CGL Tier-I (CBE) Exam. 29.08.2016) (IInd Sitting)

25. The lengths of a train and that of a platform are equal. If with a speed of 90 km/hr the train crosses the platform in one minute, then the length of the train (in metres) is
(1) 500 (2) 600
(3) 750 (4) 900
(SSC CGL Tier-I (CBE) Exam. 30.08.2016) (Ist Sitting)

26. A train, 500 metre long, running at a uniform speed, passes a station in 35 seconds. If the length of the platform is 221 metre, the speed of the train in km/hr is
(1) $72\frac{1}{35}$ (2) 74.16
(3) 24.76 (4) 78.54
(SSC CGL Tier-I (CBE) Exam. 04.09.2016) (Ist Sitting)

27. A train, 200 metre long, is running at a speed of 54 km/hr. The time in seconds that will be taken by train to cross a 175 metre long bridge is :
(1) 12.5 (2) 20
(3) 25 (4) 10
(SSC CGL Tier-I (CBE) Exam. 11.09.2016 (IIIrd Sitting)

TYPE–III

1. A train 180 m long moving at the speed of 20 m/sec. over-takes a man moving at a speed of 10m/sec in the same direction. The train passes the man in :
(1) 6 sec (2) 9 sec
(3) 18 sec (4) 27 sec
(SSC CGL Prelim Exam. 04.07.1999 (First Sitting)

2. A train 100m long is running at the speed of 30 km/hr. The time (in second) in which it will pass a man standing near the railway line is :
(1) 10 (2) 11
(3) 12 (4) 15
(SSC CGL Prelim Exam. 04.07.1999 (Second Sitting)

3. How many seconds will a 500 metre long train take to cross a man walking with a speed of 3 km/hr. in the direction of the moving train if the speed of the train is 63 km/hr ?
(1) 25 sec (2) 30 sec
(3) 40 sec (4) 45 sec
(SSC CGL Prelim Exam. 27.02.2000 (First Sitting)

4. A train is 125 m long. If the train takes 30 seconds to cross a tree by the railway line, then the speed of the train is :
(1) 14 km/hr (2) 15 km/hr
(3) 16 km/hr (4) 12 km/hr
(SSC CGL Prelim Exam. 24.02.2002 (First Sitting)

5. A 120 m long train takes 10 seconds to cross a man standing on a platform. What is the speed of the train ?
(1) 12 m/sec. (2) 10 m/sec.
(3) 15 m/sec. (4) 20 m/sec.
(SSC CGL Prelim Exam. 24.02.2002 (IInd Sitting) & (SSC CPO S.I. Exam. 03.09.2006)

6. A 75 metre long train is moving at 20 kmph. It will cross a man standing on the platform in
(1) 12 seconds
(2) 14 seconds
(3) 13.5 seconds
(4) 15.5 seconds
(SSC CGL Prelim Exam. 24.02.2002 (Middle Zone)

7. In what time will a train 100 metres long cross an electric pole, if its speed be 144 km/hour ?
(1) 2.5 seconds
(2) 5 seconds
(3) 12.5 seconds
(4) $3\frac{5}{4}$ seconds
(SSC CGL Prelim Exam. 11.05.2003 (Second Sitting)

8. A man observed that a train 120 m long crossed him in 9 seconds. The speed (in km/hr) of the train was
(1) 42 (2) 45
(3) 48 (4) 55
(SSC CPO S.I. Exam. 07.09.2003)

9. If a train, with a speed of 60 km/hr, crosses a pole in 30 seconds, the length of the train (in metres) is :
(1) 1000 (2) 900
(3) 750 (4) 500
(SSC CGL Prelim Exam. 13.11.2005 (First Sitting)

10. A train passes two persons walking in the same direction at a speed of 3 km/hour and 5km/hour respectively in 10 seconds and 11 seconds respectively. The speed of the train is
(1) 28 km/hour (2) 27 km/hour
(3) 25 km/hour (4) 24 km/hour
(SSC CPO S.I. Exam. 03.09.2006)

11. A passenger train 150m long is travelling with a speed of 36 km/hr. If a man is cycling in the direction of train at 9 km/hr., the time taken by the train to pass the man is
(1) 10 sec (2) 15 sec
(3) 18 sec (4) 20 sec
(SSC CPO S.I. Exam. 06.09.2009)

12. Buses start from a bus terminal with a speed of 20 km/hr at intervals of 10 minutes. What is the speed of a man coming from the opposite direction towards the bus terminal if he meets the buses at intervals of 8 minutes?
(1) 3 km/hr (2) 4 km/hr
(3) 5 km/hr (4) 7 km/hr
(SSC CGL Tier-I Exam. 16.05.2010 (First Sitting)

13. A train, 300m long, passed a man, walking along the line in the same direction at the rate of 3 km/hr in 33 seconds. The speed of the train is
(1) 30 km/h (2) 32 km/h
(3) $32\frac{8}{11}$ km/h (4) $35\frac{8}{11}$ km/h
(SSC CGL Tier-I Exam. 16.05.2010 (First Sitting)

14. A train, 240 m long crosses a man walking along the line in opposite direction at the rate of 3 kmph in 10 seconds. The speed of the train is
(1) 63 kmph (2) 75 kmph
(3) 83.4 kmph (4) 86.4 kmph
(SSC CGL Tier-I Exam. 16.05.2010 (Second Sitting)

15. A train is running at 36 km/hr. If it crosses a pole in 25 seconds, its length is
(1) 248 m (2) 250 m
(3) 255 m (4) 260 m
(SSC (South Zone) Investigator Exam 12.09.2010)

16. A train is running at a speed of 90 km/hr. If it crosses a signal in 10 sec., the length of the train (in metres) is
(1) 150 (2) 324
(3) 900 (4) 250
(SSC CHSL DEO & LDC Exam. 04.11.2012 (IInd Sitting)

17. A train 100 metres long meets a man going in opposite direction at 5 km/hr and passes him in $7\frac{1}{5}$ seconds. What is the speed of the train (in km/hr) ?
(1) 45 km/hr (2) 60 km/hr
(3) 55 km/hr (4) 50 km/hr
(SSC CHSL DEO & LDC Exam. 04.11.2012, Ist Sitting)

18. A train, 120 m long, takes 6 seconds to pass a telegraph post; the speed of train is
(1) 72 km/hr (2) 62 km/hr
(3) 55 km/hr (4) 85 km/hr
(SSC CGL Prelim Exam. 04.02.2007 (IInd Sitting) & (SSC Constable (GD) Exam. 12.05.2013 (Ist Sitting)

19. A train 300 m long is running with a speed of 54 km/hr. In what time will it cross a telephone pole?
(1) 20 seconds (2) 15 seconds
(3) 17 seconds (4) 18 seconds
(SSC CGL Tier-II Exam. 21.09.2014)

20. A train 180 metres long is running at a speed of 90 km/h. How long will it take to pass a post ?
(1) 8.2 secs (2) 7.8 secs
(3) 8 secs (4) 7.2 secs
(SSC CGL Tier-I Exam, 16.08.2015 (Ist Sitting) TF No. 3196279)

21. If a man walks at the rate of 5 km/hour, he misses a train by 7 minutes. However if he walks at the rate of 6 km/hour, he reaches the station 5 minutes before the arrival of the train. The distance covered by him to reach the station is
(1) 6 km (2) 7 km
(3) 6.25 km (4) 4 km
(SSC CGL Tier-II Exam, 25.10.2015, TF No. 1099685)

22. A train passes an electrical pole in 20 seconds and passes a platform 250 m long in 45 seconds. Find the length of the train.
(1) 400m (2) 200m
(3) 300m (4) 250m
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 01.11.2015, IInd Sitting)

23. A train is 250m long. If the train takes 50 seconds to cross a tree by the railway line, then the speed of the train in km/hr is :
(1) 10 (2) 9
(3) 5 (4) 18
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 06.12.2015 (Ist Sitting) TF No. 1375232)

24. A train 150m long passes a km stone in 30 seconds and another train of the same length travelling in opposite direction in 10 seconds. The speed ot the second train is :
(1) 90 km/hr (2) 125 km/hr
(3) 25 km/hr (4) 75 km/hr
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 06.12.2015 (IInd Sitting) TF No. 3441135)

25. The time taken by a train 160 m long, running at 72 km/hr, in crossing an electric pole is
(1) 8 seconds (2) 9 seconds
(3) 6 seconds (4) 4 seconds
(SSC CGL Tier-I (CBE) Exam. 28.08.2016) (IInd Sitting)

26. In what time will a 100 metre long train running with a speed of 50 km/hr cross a pillar ?
(1) 7.0 seconds (2) 72 seconds
(3) 7.2 seconds (4) 70 seconds
(SSC CGL Tier-I (CBE) Exam. 31.08.2016) (Ist Sitting)

27. A train 150m long passes a telegraphic post in 12 seconds. Find the speed of the train.(in km/hr)
(1) 50 (2) 12.5
(3) 25 (4) 45
(SSC CGL Tier-I (CBE) Exam. 02.09.2016) (IInd Sitting)

28. In what time will a train, 60 metre long, running at the rate of 36 km/hr pass a telegraph post ?
(1) 9 seconds (2) 8 seconds
(3) 7 seconds (4) 6 seconds
(SSC CGL Tier-I (CBE) Exam. 06.09.2016) (Ist Sitting)

29. A train 240 metres in length crosses a telegraph post in 16 seconds. The speed of the train is
(1) 50 km/hr (2) 52 km/hr
(3) 54 km/hr (4) 56 km/hr
(SSC CGL Tier-I (CBE) Exam. 01.09.2016 (IIIrd Sitting)

30. How long does a train, 75 metre long, moving at 60 km/hr take to pass a certain telegraph post?
(1) 3.5 seconds (2) 4.5 seconds
(3) 5 seconds (4) 5.4 seconds
(SSC CGL Tier-I (CBE) Exam. 02.09.2016 (IInd Sitting)

31. A train 100 metre long is running at a speed of 120 km/hr. The time taken to pass a person standing near the line is
(1) 1 second (2) 3 seconds
(3) 5 seconds (4) 7 seconds
(SSC CGL Tier-I (CBE) Exam. 07.09.2016 (IInd Sitting)

TYPE–IV

1. The distance between two cities A and B is 330 km. A train starts from A at 8 a.m. and travels towards B at 60 km/hr. Another train starts from B at 9 a.m. and travels towards A at 75 km/hr. At what time do they meet?
(1) 10 a.m. (2) 10 : 30 a.m.
(3) 11 a.m. (4) 11 : 30 a.m.
(SSC CGL Prelim Exam. 04.07.1999 (First Sitting)

2. Two men are standing on opposite ends of a bridge 1200 metres long. If they walk towards each other at the rate of 5m/minute and 10m/minute respectively, in how much time will they meet each other ?
(1) 60 minutes (2) 80 minutes
(3) 85 minutes (4) 90 minutes
(SSC CGL Prelim Exam. 04.07.1999 (Second Sitting)

3. Two trains, one 160 m and the other 140 m long are running in opposite directions on parallel rails, the first at 77 km an hour and the other at 67 km an hour. How long will they take to cross each other?
(1) 7 seconds (2) $7\frac{1}{2}$ seconds
(3) 6 seconds (4) 10 seconds
(SSC CGL Prelim Exam. 11.05.2003 (First Sitting)

4. Two trains are running in opposite direction with the same speed. If the length of each train is 120 metres and they cross each other in 12 seconds, the speed of each train (in km/hour) is
(1) 72 (2) 10
(3) 36 (4) 18
(SSC CGL Prelim Exam. 11.05.2003 (Second Sitting)

5. Two trains 140 m and 160 m long run at the speed of 60 km/hour and 40 km/hour respectively in opposite directions on parallel tracks. The time (in seconds) which they take to cross each other, is :
(1) 10 sec. (2) 10.8 sec.
(3) 9 sec. (4) 9.6 sec.
(SSC CGL Prelim Exam. 08.02.2004 (Second Sitting)

6. Two trains start from stations A and B and travel towards each other at speed of 50 km/hour and 60 km/hour respectively. At the time of their meeting, the second train has travelled 120 km more than the first. The distance between A and B is :
(1) 990 km (2) 1200 km
(3) 1320 km (4) 1440 km
(SSC CPO S.I. Exam. 26.05.2005)

7. Two trains are moving on two parallel tracks but in opposite directions. A person sitting in the train moving at the speed of 80 km/hr passes the second train in 18 seconds. If the length of the second train is 1000 m, its speed is
(1) 100 km/hr (2) 120 km/hr
(3) 140 km/hr (4) 150 km/hr
(SSC Section Officer (Commercial Audit) Exam. 26.11.2006 (Second Sitting)

8. Two trains 105 metres and 90 metres long, runs at the speed of 45 km/hr and 72 km/hr respectively, in opposite directions on parallel tracks. The time which they take to cross each other, is
(1) 8 seconds (2) 6 seconds
(3) 7 seconds (4) 5 seconds
(SSC CGL Prelim Exam. 04.02.2007 (First Sitting)

9. Two trains of equal length, running in opposite directions, pass a pole in 18 and 12 seconds. The trains will cross each other in
(1) 14.4 seconds
(2) 15.5 seconds
(3) 18.8 seconds
(4) 20.2 seconds
(SSC CGL Prelim Exam. 27.07.2008 (First Sitting)

10. A train, 150m 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
(SSC CGL Prelim Exam. 27.07.2008 (IInd Sitting) & (SSC GL Tier-I Exam. 19.05.2013)

11. A train travelling at 48 km/hr crosses another train, having half its length and travelling in opposite direction at 42 km/hr, in 12 seconds. It also passes a railway platform in 45 seconds. The length of the railway platform is

(1) 200 m (2) 300 m

(3) 350 m (4) 400 m

(SSC CGL Prelim Exam. 27.07.2008 (Second Sitting)

12. Two towns A and B are 500 km. apart. A train starts at 8 AM from A towards B at a speed of 70 km/hr. At 10 AM, another train starts from B towards A at a speed of 110 km/hr. When will the two trains meet ?

(1) 1 PM (2) 12 Noon

(3) 12.30 PM (4) 1.30 PM

(SSC CPO S.I. Exam. 06.09.2009)

13. Two trains of length 70 m and 80 m are running at speed of 68 km/hr and 40 km/hr respectively on parallel tracks in opposite directions. In how many seconds will they pass each other ?

(1) 10 sec (2) 8 sec

(3) 5 sec (4) 3 sec

(SSC CISF ASI Exam. 29.08.2010 (Paper-1)

14. 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

(SSC CGL Prelim Exam. 08.02.2004 (First Sitting)

15. Two trains of length 137 metre and 163 metre are running with speed of 42 km/hr and 48 km/hr respectively towards each other on papallel tracks. In how many seconds will they cross each other?

(1) 30 sec (2) 24 sec

(3) 12 sec (4) 10 sec

(SSC CHSL DEO & LDC Exam. 28.11.2010 (IInd Sitting)

16. Two trains 150 m and 120 m long respectively moving from opposite directions cross each other in 10 secs. If the speed of the second train is 43.2 km/hr, then the speed of the first train is

(1) 54 km/hr (2) 50 km/hr

(3) 52 km/hr (4) 51 km/hr

(SSC Multi-Tasking Staff Exam. 10.03.2013, Ist Sitting : Patna)

17. Two trains start from station A and B and travel towards each other at speed of 16 miles/ hour and 21 miles/ hour respectively. At the time of their meeting, the second train has travelled 60 miles more than the first. The distance between A and B (in miles) is :

(1) 444 (2) 496

(3) 333 (4) 540

(SSC Multi-Tasking Staff Exam. 10.03.2013)

18. Two trains 108 m and 112 m in length are running towards each other on the parallel lines at a speed of 45 km/hr and 54 km/hr respectively. To cross each other after they meet, it will take

(1) 12 sec (2) 9 sec

(3) 8 sec (4) 10 sec

(SSC Multi-Tasking Staff Exam. 17.03.2013, IInd Sitting)

19. A man standing on a platform finds that a train takes 3 seconds to pass him and another train of the same length moving in the opposite direction, takes 4 seconds. The time taken by the trains to pass each other will be

(1) $2\frac{3}{7}$ seconds (2) $3\frac{3}{7}$ seconds

(3) $4\frac{3}{7}$ seconds (4) $5\frac{3}{7}$ seconds

(SSC CPO S.I. Exam. 03.09.2006)

20. Two trains, each of length 125 metre, are running in parallel tracks in opposite directions. One train is running at a speed 65 km/hour and they cross each other in 6 seconds. The speed of the other train is

(1) 75 km/hour (2) 85 km/hour

(3) 95 km/hour (4) 105 km/hour

(SSC CHSL DEO & LDC Exam. 27.10.2013 IInd Sitting)

21. A train running at the speed of 84 km/hr passes a man walking in opposite direction at the speed of 6 km/hr in 4 seconds. What is the length of train (in metre) ?

(1) 150 (2) 120

(3) 100 (4) 90

(SSC CGL Tier-I Re-Exam. (2013) 27.04.2014)

22. Two trains X and Y start from Jodhpur to Jaipur and from Jaipur to Jodhpur respectively. After passing each other they take 4 hours 48 minutes and 3 hours 20 minutes to reach Jaipur and Jodhpur respectively. If X is moving at 45 km/hr, the speed of Y is

(1) 60 km/hr (2) 58 km/hr

(3) 54 km/hr (4) 64.8 km/hr

(SSC CHSL (10+2) DEO & LDC Exam. 16.11.2014, IInd Sitting TF No. 545 QP 6)

23. P and Q starting simultaneously from two different places proceed towards each other at a speed of 20 km/hour and 30 km/hour respectively. By the time they meet each other. Q has covered 36 km more than that of P. The distance (in km.) between the two places is

(1) 144 (2) 162

(3) 180 (4) 108

(SSC CGL Tier-II Exam, 2014 12.04.2015 (Kolkata Region) TF No. 789 TH 7)

24. Two places P and Q are 162 km apart. A train leaves P for Q and simultaneously another train leaves Q for P. They meet at the end of 6 hours. If the former train travels 8 km/hour faster than the other, then speed of train from Q is

(1) $12\frac{5}{6}$ km/hour

(2) $10\frac{5}{6}$ km/hour

(3) $9\frac{1}{2}$ km/hour

(4) $8\frac{1}{2}$ km/hour

(SSC CGL Tier-II Exam, 25.10.2015, TF No. 1099685)

25. Two trains start at the same time from A and B and proceed toward each other at the speed of 75 km/hr and 50 km/hr respectively. When both meet at a point in between, one train was found to have travelled 175 km more than the other. Find the distance between A and B.
(1) 875 km. (2) 785 km.
(3) 758 km. (4) 857 km.
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 15.11.2015 (IInd Sitting) TF No. 7203752)

26. Two trains of lengths 150m and 180m respectively are running in opposite directions on parallel tracks. If their speeds be 50 km/hr and 58 km/hr respectively, in what time will they cross each other?
(1) 22 seconds (2) 15 seconds
(3) 30 seconds (4) 11 seconds
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 20.12.2015 (Ist Sitting) TF No. 9692918)

27. Two trains start at the same time from Aligarh and Delhi and proceed towards each other at the rate of 14 km and 21 km per hour respectively. When they meet, it is found that one train has travelled 70 km more than the other. The distance between two stations is
(1) 350 km (2) 210 km
(3) 300 km (4) 140 km
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 20.12.2015 (Ist Sitting) TF No. 9692918)

TYPE–V

1. A train running at $\frac{7}{11}$ of its own speed reached a place in 22 hours. How much time could be saved if the train would run at its own speed?
(1) 14 hours (2) 7 hours
(3) 8 hours (4) 16 hours
(SSC CGL Prelim Exam. 24.02.2002 (Ist Sitting) & (SSC CGL Prelim Exam. 13.11.2005 (Ist Sitting)

2. A man with $\frac{3}{5}$ of his usual speed reaches the destination $2\frac{1}{2}$ hours late. Find his usual time to reach the destination.
(1) 4 hours (2) 3 hours
(3) $3\frac{3}{4}$ hours (4) $4\frac{1}{2}$ hours
(SSC CGL Prelim Exam. 24.02.2002 (Middle Zone)

3. A car travelling with $\frac{5}{7}$ of its usual speed covers 42 km in 1 hour 40 min 48 sec. What is the usual speed of the car?
(1) $17\frac{6}{7}$ km/hr (2) 35 km/hr
(3) 25 km/hr (4) 30 km/hr
(SSC CGL Prelim Exam. 13.11.2005 (Second Sitting)

4. Walking at three-fourth of his usual speed, a man covers a certain distance in 2 hours more than the time he takes to cover the distance at his usual speed. The time taken by him to cover the distance with his usual speed is
(1) 4.5 hours (2) 5.5 hours
(3) 6 hours (4) 5 hours
(SSC CGL Prelim Exam. 13.11.2005 (Second Sitting)

5. By walking at $\frac{3}{4}$ of his usual speed, a man reaches his office 20 minutes later than his usual time. The usual time taken by him to reach his office is
(1) 75 minutes (2) 60 minutes
(3) 40 minutes (4) 30 minutes
(SSC CGL Tier-I Exam. 16.05.2010 (Ist Sitting) & (SSC GL Tier-I Exam. 19.05.2013)

6. Walking at $\frac{3}{4}$ of his usual speed, a man is $1\frac{1}{2}$ hours late. His usual time to cover the same distance, (in hours) is
(1) $4\frac{1}{2}$ (2) 4
(3) $5\frac{1}{2}$ (4) 5
(SSC CGL Tier-1 Exam 19.06.2011 (First Sitting)

7. Walking at $\frac{6}{7}$th of his usual speed a man is 25 minutes late. His usual time to cover this distance is
(1) 2 hours 30 minutes
(2) 2 hours 15 minutes
(3) 2 hours 25 minutes
(4) 2 hours 10 minutes
(SSC CGL Tier-1 Exam 19.06.2011 (Second Sitting)

8. Walking $\frac{6}{7}$th of his usual speed, a man is 12 minutes late. The usual time taken by him to cover that distance is
(1) 1 hour
(2) 1 hour 12 minutes
(3) 1 hour 15 minutes
(4) 1 hour 20 minutes
(SSC CGL Tier-1 Exam. 26.06.2011 (Second Sitting)

9. A car travels from P to Q at a constant speed. If its speed were increased by 10 km/h, it would have been taken one hour lesser to cover the distance. It would have taken further 45 minutes lesser if the speed was further increased by 10 km/h. The distance between the two cities is
(1) 540 km (2) 420 km
(3) 600 km (4) 620 km
(SSC CGL Tier-I Exam. 19.10.2014)

10. A car covers four successive 7 km distances at speeds of 10 km/hour, 20 km/hour, 30 km/hour and 60 km/hour respectively. Its average speed over this distance is
(1) 30 km/hour (2) 20 km/hour
(3) 60 km/hour (4) 40 km/hour
(SSC CGL Tier-II Exam, 25.10.2015, TF No. 1099685)

11. A car goes 20 metres in a second. Find its speed in km/hr.
(1) 18 (2) 72
(3) 36 (4) 20
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 15.11.2015 (Ist Sitting) TF No. 6636838)

12. The speed of a car is 54 km/hr. What is its speed in m/sec?
(1) 15 m/sec (2) 19.44 m/sec
(3) 194.4 m/sec (4) 150 m/sec
(SSC CHSL (10+2) LDC, DEO & PA/SA Exam, 06.12.2015 (IInd Sitting) TF No. 3441135)

13. A car covers a certain distance in 25 hours. If it reduces the speed by $\frac{1}{5}$th, the car covers 200 km. less in that time. The speed of car is

(1) 60 km./hr. (2) 30 km./hr.
(3) 40 km./hr. (4) 50 km./hr.

(SSC CGL Tier-I (CBE) Exam. 03.09.2016) (IInd Sitting)

14. A car moving in the morning fog passes a man walking at 4 km/h. in the same direction. The man can see the car for 3 minutes and visibility is upto a distance of 130 m. The speed of the car is :

(1) $7\frac{3}{5}$ km. per hour

(2) $6\frac{3}{5}$ km. per hour

(3) 7 km. per hour
(4) 5 km. per hour

(SSC CGL Tier-I (CBE) Exam. 08.09.2016 (IIIrd Sitting)

TYPE–VI

1. A boy rides his bicycle 10km at an average speed of 12 km/hr and again travels 12 km at an average speed of 10 km/hr. His average speed for the entire trip is approximately :

(1) 10.4 km/hr (2) 10.8 km/hr
(3) 11.0 km/hr (4) 12.2 km/hr

(SSC CGL Prelim Exam. 04.07.1999 (First Sitting)

2. A person travels 600 km by train at 80km/hr, 800 km by ship at 40 km/hr 500 km by aeroplane at 400 km/hr and 100 km by car at 50km/hr. What is the average speed for the entire distance ?

(1) $65\frac{5}{123}$km./hr.

(2) 60 km./hr.

(3) $60\frac{5}{123}$km./hr.

(4) 62 km./hr.

(SSC CGL Prelim Exam. 04.07.1999 (Second Sitting)

3. A train moves with a speed of 30 kmph for 12 minutes and for next 8 minutes at a speed of 45 kmph. Find the average speed of the train:

(1) 37.5 kmph (2) 36 kmph
(3) 48 kmph (4) 30 kmph

(SSC Section Officer (Commercial Audit) Exam. 25.09.2005)

4. A man covers half of his journey at 6km/hr and the remaining half at 3km/hr. His average speed is

(1) 9 km/hr (2) 4.5 km/hr
(3) 4 km/hr (4) 3 km/hr

(SSC CGL Prelim Exam. 04.02.2007 (First Sitting)

5. A man goes from A to B at a uniform speed of 12 kmph and returns with a uniform speed of 4 kmph His average speed (in kmph) for the whole journey is :

(1) 8 (2) 7.5
(3) 6 (4) 4.5

(SSC CPO S.I. Exam. 16.12.2007)

6. A train covers a distance of 3584 km in 2 days 8 hours. If it covers 1440 km on the first day and 1608 km on the second day, by how much does the average speed of the train for the remaining part of the journey differ from that for the entire journey ?

(1) 3 km/hour more
(2) 3 km/hour less
(3) 4 km/hour more
(4) 5 km/hour less

(SSC CGL Prelim Exam. 27.07.2008 (First Sitting)

7. A man travels a distance of 24 km at 6 kmph. Another distance of 24 km at 8 kmph and a third distance of 24 km at 12 kmph. His average speed for the whole journey (in kmph) is

(1) $8\frac{2}{3}$ (2) 8

(3) $2\frac{10}{13}$ (4) 9

(SSC CPO S.I. Exam. 09.11.2008)

8. A constant distance from Chennai to Bangalore is covered by Express train at 100 km/hr. If it returns to the same distance at 80 km/hr, then the average speed during the whole journey is

(1) 90.20 km/hr
(2) 88.78 km/hr
(3) 88.98 km/hr
(4) 88.89 km/hr

(SSC CPO S.I. Exam. 06.09.2009)

9. A person went from A to B at an average speed of x km/hr and returned from B to A at an average speed of y km/hr. What was his average speed during the total journey ?

(1) $\frac{x+y}{2xy}$ (2) $\frac{2xy}{x+y}$

(3) $\frac{2}{x+y}$ (4) $\frac{1}{x}+\frac{1}{y}$

(SSC SAS Exam. 26.06.2010 (Paper-1)

10. A man goes from Mysore to Bangalore at a uniform speed of 40 km/hr and comes back to Mysore at a uniform speed of 60 km/hr. His average speed for the whole journey is

(1) 48 km/hr (2) 50 km/hr
(3) 54 km/hr (4) 55 km/hr

(SSC CISF ASI Exam. 29.08.2010 (Paper-1) & (SSC CHSL DEO & LDC Exam. 21.10.2012 (IInd Sitting)

11. A man goes from a place A to B at a speed of 12 km/hr and returns from B to A at a speed of 18 km/hr. The average speed for the whole journey is

(1) $14\frac{2}{5}$ km/hr

(2) 15 km/hr

(3) $15\frac{1}{2}$ km/hr

(4) 16 km/hr

(SSC (South Zone) Investigator Exam. 12.09.2010)

12. One third of a certain journey is covered at the rate of 25 km/hour, one-fourth at the rate of 30 km/hour and the rest at 50 km/hour. The average speed for the whole journey is

(1) 35 km/hour

(2) $33\frac{1}{3}$ km/hour

(3) 30 km/hour

(4) $37\frac{1}{12}$ km/hour

FCI Assistant Grade-III Exam. 25.02.2012 (Paper-I) North Zone (Ist Sitting)

13. A man completes 30 km of a journey at the speed of 6 km/hr and the remaining 40 km of the journey in 5 hours. His average speed for the whole journey is

(1) 7 km/hr (2) $6\frac{4}{11}$ km/hr

(3) 8 km/hr (4) 7.5 km/hr

(SSC CGL Prelim Exam. 04.02.2007 (First Sitting)

14. A man covers the journey from a station A to station B at a uniform speed of 36 km/hr and returns to A with a uniform speed of 45 km/hr. His average speed for the whole journey is :

(1) 40 km/hr (2) 40.5 km/hr

(3) 41 km/hr (4) 42 km/hr

(SSC CHSL DEO & LDC Exam. 28.11.2010 (Ist Sitting)

15. The speed of a train going from Nagpur to Allahabad is 100 kmph while its speed is 150 kmph when coming back from Allahabad to Nagpur. Then the average speed during the whole journey is :

(1) 120 kmph (2) 125 kmph

(3) 140 kmph (4) 135 kmph

(SSC CHSL DEO & LDC Exam. 21.10.2012 (IInd Sitting)

16. P travels for 6 hours at the rate of 5 km/ hour and for 3 hours at the rate of 6 km/ hour. The average speed of the journey in km/ hour is

(1) $3\frac{1}{5}$ (2) $5\frac{1}{3}$

(3) $1\frac{2}{9}$ (4) $2\frac{2}{5}$

(SSC CHSL DEO & LDC Exam. 28.10.2012 (Ist Sitting)

17. With an average speed of 40 km/ hr, a train reaches its destination in time. If it goes with an average speed of 35 km/hr, it is late by 15 minutes. The total journey is

(1) 30 km (2) 40 km

(3) 70 km (4) 80 km

(SSC Multi-Tasking Staff Exam. 17.03.2013, Kolkata Region)

18. A bus covers four successive 3 km stretches at speed of 10 km/ hr, 20 km/hr, 30 km/hr and 60 km/hr respectively. Its average speed over this distance is

(1) 30 km/hr (2) 25 km/hr

(3) 20 km/hr (4) 10 km/hr

(SSC Multi-Tasking Staff Exam. 17.03.2013, Kolkata Region)

19. A train travelled at a speed of 35 km/hr for the first 10 minutes and at a speed of 20 km/hr for the next 5 minutes. The average speed of the train for the total 15 minutes is

(1) 30 km/hr (2) 23 km/hr

(3) 31 km/hr (4) 29 km/hr

(SSC Constable (GD) Exam. 12.05.2013 Ist Sitting)

20. On a journey across Kolkata, a taxi averages 50 km per hour for 50% of the distance, 40 km per hour for 40% of it and 20 km per hour for the remaining. The average speed (in km/hour) for the whole journey is :

(1) 42 (2) 40

(3) 35 (4) 45

(SSC CAPFs SI & CISF ASI Exam. 23.06.2013)

21. A train goes from Ballygunge to Sealdah at an average speed of 20 km/hour and comes back at an average speed of 30 km/hour. The average speed of the train for the whole journey is

(1) 27 km/hr (2) 26 km/hr

(3) 25 km/hr (4) 24 km/hr

(SSC Graduate Level Tier-II Exam. 29.09.2013

22. A and B are 20 km apart. A can walk at an average speed of 4 km/ hour and B at 6 km/hr. If they start walking towards each other at 7 a.m., when they will meet ?

(1) 8.00 a.m. (2) 8.30 a.m.

(3) 9.00 a.m. (4) 10.00 a.m.

(SSC CGL Tier-I Exam. 19.10.2014 (Ist Sitting)

23. A train runs from Howrah to Bandel at an average speed of 20 km/ hr and returns at an average speed of 30 km/hr. The average speed (in km/hr) of the train in the whole journey is

(1) 20 (2) 22.5

(3) 24 (4) 25

(SSC CHSL DEO Exam. 02.11.2014 (Ist Sitting)

24. A motorist travels to a place 150 km away at an average speed of 50 km/hr and returns at 30 km/ hr. His average speed for the whole journey in km/hr is

(1) 37.5 (2) 37

(3) 35 (4) 40

(SSC CHSL (10+2) DEO & LDC Exam. 16.11.2014, IInd Sitting TF No. 545 QP 6)

25. A man walks from his house at an average speed of 5 km per hour and reaches his office 6 minutes late. If he walks at an average speed of 6 km/h he reaches 2 minutes early. The distance of the office from his house is

(1) 6 km (2) 9 km

(3) 12 km (4) 4 km

(SSC CGL Tier-II Exam, 2014 12.04.2015 (Kolkata Region) TF No. 789 TH 7)

26. A train runs at an average speed of 75 km/hr. If the distance to be covered is 1050 kms, how long will the train take to cover it ?

(1) 13 hrs (2) 12 hrs

(3) 15 hrs (4) 14 hrs

(SSC CGL Tier-I Exam, 16.08.2015 (Ist Sitting) TF No. 3196279)

27. A train travels 500 m in first minute. In the next 4 minutes, it travels in each minute 125 m more than that in the previous minute. The average speed per hour of the train during those 5 minutes will be

(1) 30 km/hr (2) 45 km/hr

(3) 50 km/hr (4) 55 km/hr

(SSC CGL Tier-I Re-Exam, 30.08.2015)

28. A man covers a total distance of 100 km on bicycle. For the first 2 hours, the speed was 20 km/ hr and for the rest of the journey, it came down to 10 km/hr. The average speed will be

(1) $12\frac{1}{2}$ km/hr

(2) 13 km/hr

(3) $15\frac{1}{8}$ km/hr

(4) 20 km/hr

(SSC CGL Tier-I (CBE) Exam.10.09.2016)

29. When Alisha goes by car at 50 kmph, she reaches her office 5 minutes late. But when she takes her motorbike, she reaches 3 minutes early. If her office is 25 kms away, what is the approximate average speed at which she rides her motorbike ?
(1) 68 kmph (2) 62 kmph
(3) 58 kmph (4) 52 kmph
(SSC CPO Exam. 06.06.2016) (Ist Sitting)

30. A man goes to a place on bicycle at speed of 16 km/hr and comes back at lower speed. If the average speed is 6.4 km/hr in total journey, then the return speed (in km/hr) is :
(1) 10 (2) 8
(3) 6 (4) 4
(SSC CHSL (10+2) Tier-I (CBE) Exam. 08.09.2016) (Ist Sitting)

31. A car completed a journey of 400 km in $12\frac{1}{2}$ hrs. The first $\frac{3}{4}$ th of the journey was done at 30 km/hr. Calculate the speed for the rest of the journey.
(1) 45 km/hr (2) 25 km/hr
(3) 40 km/hr (4) 30 km/hr
(SSC CAPFs (CPO) SI & ASI, Delhi Police Exam. 20.03.2016) (IInd Sitting)

32. Durga walks 5 km from her home to school in 60 minutes, then bicycles back to home along the same route at 15 km per hour. Her sister Smriti makes the same round trip, but does so at half of Durga's average speed. How much time does Smriti spend on her round trip ?
(1) 120 minutes (2) 40 minutes
(3) 160 minutes (4) 80 minutes
(SSC CPO SI & ASI, Online Exam. 06.06.2016) (IInd Sitting)

33. Gautam travels 160 kms at 32 kmph and returns at 40 kmph. Then his average speed is
(1) 72 kmph (2) 71.11 kmph
(3) 36 kmph (4) 35.55 kmph
(SSC CGL Tier-I (CBE) Exam. 01.09.2016) (Ist Sitting)

34. A car travels from A to B at the rate of 40 km/h and returns from B to A at the rate of 60 km/h. Its average speed during the whole journey is
(1) 48 km/h (2) 50 km/h
(3) 45 km/h (4) 60 km/h
(SSC CGL Tier-II (CBE) Exam. 30.11.2016)

35. A bus travels 150 km in 3 hours and then travels next 2 hours at 60 km/hr. Then the average speed of the bus will be
(1) 55 km/hr. (2) 54 km/hr.
(3) 50 km/hr. (4) 60 km/hr.
(SSC CGL Tier-II (CBE) Exam. 30.11.2016)

36. Gautam goes to office at a speed of 12 kmph and returns home at 10 kmph. His average speed is :
(1) 11 kmph (2) 22 kmph
(3) 10.9 kmph (4) 12.5 kmph
(SSC CGL Tier-I (CBE) Exam. 30.08.2016 (IIIrd Sitting)

37. A man travels 50 km at speed 25 km/h and next 40 km at 20 km/h and there after travels 90 km at 15 km/h. His average speed is :
(1) 18 kmph. (2) 25 kmph.
(3) 20 kmph. (4) 15 kmph.
(SSC CGL Tier-I (CBE) Exam. 31.08.2016 (IIIrd Sitting)

38. At an average of 80 km/hr Shatabdi Express reaches Ranchi from Kolkata in 7 hrs. The distance between Kolkata and Ranchi is
(1) 560 km. (2) 506 km.
(3) 560 m. (4) 650 m.
(SSC CGL Tier-I (CBE) Exam. 09.09.2016 (IInd Sitting)

39. To cover a distance of 216 km in 3.2 hours, what should be the average speed of the car in metre/second?
(1) 67.5 metre/second
(2) 33.75 metre/second
(3) 37.5 metre/second
(4) 18.75 metre/second
(SSC CHSL (10+2) Tier-I (CBE) Exam. 15.01.2017) (IInd Sitting)

TYPE–VII

1. In covering a certain distance, the speed of A and B are in the ratio of 3 : 4. A takes 30 minutes more than B to reach the destination. The time taken by A to reach the destination is :
(1) 1 hour (2) $1\frac{1}{2}$ hours
(3) 2 hours (4) $2\frac{1}{2}$ hours
(SSC CGL Prelim Exam. 04.07.1999 (First Sitting)

2. The speed of A and B are in the ratio 3 : 4. A takes 20 minutes more than B to reach a destination. In what time does A reach the destination ?
(1) $1\frac{1}{3}$ hours (2) 2 hours
(3) $2\frac{2}{3}$ hours (4) $1\frac{2}{3}$ hours
(SSC CGL Prelim Exam. 04.02.2007 (First Sitting)

3. The ratio of length of two trains is 5 : 3 and the ratio of their speed is 6 : 5. The ratio of time taken by them to cross a pole is
(1) 5 : 6 (2) 11 : 8
(3) 25 : 18 (4) 27 : 16
(SSC CGL Prelim Exam. 04.02.2007 (Second Sitting)

4. A train starts from *A* at 7 a.m. towards *B* with speed 50 km/h. Another train starts from *B* at 8 a.m. with speed 60 km/h towards *A*. Both of them meet at 10 a.m. at *C*. The ratio of the distance *AC* to *BC* is
(1) 5 : 6 (2) 5 : 4
(3) 6 : 5 (4) 4 : 5
(SSC CGL Prelim Exam. 04.02.2007 (Second Sitting)

5. Two trains started at the same time, one from A to B and the other from B to A. If they arrived at B and A respectively 4 hours and 9 hours after they passed each other, the ratio of the speed of the two trains was
(1) 2 : 1 (2) 3 : 2
(3) 4 : 3 (4) 5 : 4
(SSC CGL Prelim Exam. 08.02.2004 (Ist Sitting) & (SSC CGL Prelim Exam. 27.07.2008 (First Sitting)

6. The speed of two trains are in the ratio 6 : 7. If the second train runs 364 km in 4 hours, then the speed of first train is
(1) 60 km/hr (2) 72 km/hr
(3) 78 km/hr (4) 84 km/hr
(SSC CPO S.I. Exam 12.12.2010 (Paper-I)

7. A truck covers a distance of 550 metres in 1 minute whereas a bus covers a distance of 33 kms in 45 minutes. The ratio of their speed is :
(1) 4 : 3 (2) 3 : 5
(3) 3 : 4 (4) 50 : 3
(SSC CGL Prelim Exam. 08.02.2004 (First Sitting)

8. Three cars travelled distance in the ratio 1 : 2 : 3. If the ratio of the time of travel is 3 : 2 : 1, then the ratio of their speed is
(1) 3 : 9 : 1 (2) 1 : 3 : 9
(3) 1 : 2 : 4 (4) 4 : 3 : 2
(SSC CPO S.I. Exam. 06.09.2009)

9. *A* and *B* run a 5 km race on a round course of 400 m. If their speed are in the ratio 5 : 4, the number of times, the winner passes the other, is
(1) 1 (2) 2
(3) 3 (4) 5
(SSC CGL Prelim Exam. 04.02.2007 (Second Sitting)

10. A cyclist, after cycling a distance of 70 km on the second day, finds that the ratio of distance covered by him on the first two days is 4 : 5. If he travels a distance of 42 km. on the third day, then the ratio of distance travelled on the third day and the first day is :
(1) 4 : 3 (2) 3 : 2
(3) 3 : 4 (4) 2 : 3
(SSC Multi-Tasking Staff Exam. 10.03.2013)

11. A certain distance is covered by a cyclist at a certain speed. If a jogger covers half the distance in double the time, the ratio of the speed of the jogger to that of the cyclist is
(1) 1 : 4 (2) 4 : 1
(3) 1 : 2 (4) 2 : 1
(SSC GL Tier-I Exam. 19.05.2013 (Ist Sitting) & (SSC Graduate Level Tier-II Exam. 29.09.2013)

12. It takes 8 hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the car is
(1) 2 : 3 (2) 3 : 2
(3) 3 : 4 (4) 4 : 3
(SSC CGL Tier-I Exam. 19.10.2014 TF No. 022 MH 3)

13. It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the car is :
(1) 3 : 5 (2) 3 : 4
(3) 4 : 3 (4) 4 : 5
(SSC CGL Tier-I (CBE) Exam. 02.09.2016) (Ist Sitting)

14. A truck covers a distance of 550 metre in one minute where as a bus covers a distance of 33 km in $\frac{3}{4}$ hour. Then the ratio of their speeds is :
(1) 1 : 3 (2) 2 : 3
(3) 3 : 4 (4) 1 : 4
(SSC CGL Tier-I (CBE) Exam. 03.09.2016 (IIIrd Sitting)

15. A car travels 80 km. in 2 hours and a train travels 180 km. in 3 hours. The ratio of the speed of the car to that of the train is :
(1) 2 : 3 (2) 3 : 2
(3) 3 : 4 (4) 4 : 3
(SSC CGL Tier-I (CBE) Exam. 04.09.2016 (IIIrd Sitting)

16. The speeds of three cars are in the ratio of 1 : 3 : 5. The ratio among the time taken by these cars to travel the same distance is
(1) 3 : 5 : 15 (2) 15 : 3 : 5
(3) 15 : 5 : 3 (4) 5 : 3 : 1
(SSC Multi-Tasking Staff Exam. 30.04.2017)

TYPE–VIII

1. A thief is noticed by a policeman from a distance of 200m. The thief starts running and the policeman chases him. The thief and the policeman run at the rate of 10 km./hr and 11 km./hr respectively. What is the distance between them after 6 minutes ?
(1) 100 m (2) 190 m
(3) 200 m (4) 150 m
(SSC CGL Prelim Exam. 27.02.2000 (First Sitting)

2. A moving train, 66 metres long, overtakes another train of 88 metres long, moving in the same direction in 0.168 minutes. If the second train is moving at 30 km/hr, at what speed is the first train moving ?
(1) 85 km/hr. (2) 50 km/hr.
(3) 55 km/hr. (4) 25 km/hr.
(SSC CPO S.I. Exam. 07.09.2003)

3. A constable is 114 metres behind a thief. The constable runs 21 metres and the thief runs 15 metres in a minute. In what time will the constable catch the thief ?
(1) 19 minutes (2) 18 minutes
(3) 17 minutes (4) 16 minutes
(SSC CPO S.I. Exam. 07.09.2003)

4. How much time does a train, 50 m long, moving at 68 km/hour take to pass another train, 75 m long, moving at 50 km/hour in the same direction ?
(1) 5 seconds (2) 10 seconds
(3) 20 seconds (4) 25 seconds
(SSC CPO S.I. Exam. 05.09.2004)

5. A constable follows a thief who is 200 m ahead of the constable. If the constable and the thief run at speed of 8 km/hour and 7 km/hour respectively, the constable would catch the thief in
(1) 10 minutes (2) 12 minutes
(3) 15 minutes (4) 20 minutes
(SSC CPO S.I. Exam. 05.09.2004)

6. Two trains are running with speed 30 km/hr and 58 km/hr in the same direction. A man in the slower train passes the faster train in 18 seconds. The length (in metres) of the faster train is :
(1) 70 (2) 100
(3) 128 (4) 140
(SSC CPO S.I. Exam. 26.05.2005)

7. Two trains travel in the same direction at the speed of 56 km/h and 29 km/h respectively. The faster train passes a man in the slower train in 10 seconds. The length of the faster train (in metres) is
(1) 100 (2) 80
(3) 75 (4) 120
(SSC CGL Prelim Exam. 04.02.2007 (Second Sitting)

8. A bus moving at a speed of 45 km/hr overtakes a truck 150 metres ahead going in the same direction in 30 seconds. The speed of the truck is
(1) 27 km/hr (2) 24 km/hr
(3) 25 km/hr (4) 28 km/hr
(SSC Data Entry Operator Exam. 31.08.2008)

9. Two trains of equal length are running on parallel lines in the same direction at 46 km/h and 36 km/h. The faster train passes, the slower train in 36 seconds. The length of each train is :
(1) 82 m (2) 50 m
(3) 80 m (4) 72 m
(SSC CHSL DEO & LDC Exam. 21.10.2012 (IInd Sitting)

10. Two trains start from a certain place on two parallel tracks in the same direction. The speed of the trains are 45 km/hr and 40 km/hr respectively. The distance between the two trains after 45 minutes will be
(1) 2 km 500 m (2) 2 km 750 m
(3) 3 km 750 m (4) 3 km 250 m
(SSC Assistant Grade-III Exam. 11.11.2012 (IInd Sitting)

11. A boy started from his house by bicycle at 10 a.m. at a speed of 12 km per hour. His elder brother started after 1 hr 15 mins by scooter along the same path and caught him at 1.30 p.m. The speed of the scooter will be (in km/hr)

(1) 4.5 (2) 36

(3) $18\frac{2}{3}$ (4) 9

(SSC FCI Assistant Grade-III Main Exam. 07.04.2013)

12. A policeman goes after a thief who has 100 metres start, if the policeman runs a kilometre in 8 min, and the thief a km in 10 min, the distance covered by thief before he is over-powered is

(1) 350 m (2) 400 m

(3) 320 m (4) 420 m

(SSC Graduate Level Tier-I Exam. 21.04.2013 IInd Sitting)

13. Two trains are running 40 km/hr and 20 km/hr respectively in the same direction. The fast train completely passes a man sitting in the slow train in 5 seconds. The length of the fast train is

(1) $23\frac{2}{9}$ m (2) 27 m

(3) $27\frac{7}{9}$ m (3) 23 m

(SSC Graduate Level Tier-II Exam. 29.09.2013

14. A train is moving at a speed of 80 km/h and covers a certain distance in 4.5 hours. The speed of the train to cover the same distance in 4 hours is

(1) 100 km/h (2) 70 km/h

(3) 85 km/h (4) 90 km/h

(SSC CHSL DEO & LDC Exam. 20.10.2013)

15. Two trains 180 metres and 120 metres in length are running towards each other on parallel tracks, one at the rate 65 km/hour and another at 55 km/hour. In how many seconds will they be clear of each other from the moment they meet ?

(1) 6 (2) 9

(3) 12 (4) 15

(SSC CHSL DEO & LDC Exam. 10.11.2013, Ist Sitting)

16. Two trains, of same length, are running on parallel tracks in the same direction with speed 60 km/hour and 90 km/hour respectively. The latter completely crosses the former in 30 seconds. The length of each train (in metres) is

(1) 125 (2) 150

(3) 100 (4) 115

(SSC CHSL DEO & LDC Exam. 10.11.2013, IInd Sitting)

17. Two trains, 80 metres and 120 metres long, are running at the speed of 25 km/hr and 35 km/hr respectively in the same direction on parallel tracks. How many seconds will they take to pass each other ?

(1) 48 (2) 64

(3) 70 (4) 72

(SSC CPO S.I. Exam 12.12.2010 (Paper-I)

18. A goods train starts running from a place at 1 P.M. at the rate of 18 km/hour. Another goods train starts from the same place at 3 P.M. in the same direction and overtakes the first train at 9 P.M. The speed of the second train in km/hr is

(1) 24 (2) 30

(3) 15 (4) 18

(SSC Multi-Tasking Staff Exam. 17.03.2013, Ist Sitting)

19. Two trains 125 metres and 115 metres in length, are running towards each other on parallel lines, one at the rate of 33 km/hr and the other at 39 km/hr. How much time (in seconds) will they take to pass each other from the moment they meet ?

(1) 8 (2) 10

(3) 12 (4) 15

(SSC CGL Tier-I Re-Exam. (2013) 20.07.2014 (Ist Sitting)

20. A thief steals a car at 1.30 p.m. and drives it off at 40 km/hr. The theft is discovered at 2 p.m. and the owner sets off in another car at 50 km/hr. He will overtake the thief at

(1) 5 p.m. (2) 4 p.m.

(3) 4.30 p.m. (4) 6 p.m.

(SSC CGL Tier-I Re-Exam. (2013) 20.07.2014 (IInd Sitting)

21. Two trains of equal length are running on parallel lines in the same direction at the rate of 46 km/hr and 36 km/hr. The faster train passes the slower train in 36 seconds. The length of each train is

(1) 50 m (2) 72 m

(3) 80 m (4) 82 m

(SSC CGL Tier-II Exam. 21.09.2014)

22. Two trains start from stations A and B and travel towards each other at speeds of 50 kmph and 60 kmph respectively. At the time of their meeting, the second train has travelled 120 km more than the first. The distance between A and B is

(1) 1200 km (2) 1440 km

(3) 1320 km (4) 990 km

(SSC CHSL DEO & LDC Exam. 16.11.2014)

23. The distance between two places A and B is 60 km. Two cars start at the same time from A and B, travelling at the speeds of 35 km/h and 25 km/h, respectively. If the cars run in the same direction, then they will meet after (in hours)

(1) 6.5 (2) 6.2

(3) 6 (4) 6.52

(SSC CGL Tier-I (CBE) Exam.11.09.2016) (Ist Sitting)

24. A train 'B' speeding with 100 kmph crosses another train C, running in the same direction, in 2 minutes. If the length of the train B and C be 150 metre and 250 metre respectively, what is the speed of the train C (in kmph)?

(1) 75 (2) 88

(3) 95 (4) 110

(SSC CGL Tier-II Online Exam.01.12.2016)

25. A passenger train running at the speed of 80 kms./hr leaves the railway station 6 hours after a goods train leaves and overtakes it in 4 hours. What is the speed of the goods train?

(1) 32 kmph (2) 50 kmph

(3) 45 kmph (4) 64 kmph

(SSC CGL Tier-I (CBE) Exam. 01.09.2016) (IInd Sitting)

26. Two trains start from a certain place on two parallel tracks in the same direction. The speed of the trains are 45 km/hr. and 40 km/hr respectively. The distance between the two trains after 45 minutes will be
(1) 2.5 km. (2) 2.75 km.
(3) 3.7 km. (4) 3.75 km.
(SSC CGL Tier-I (CBE) Exam. 02.09.2016) (IInd Sitting)

27. A thief is stopped by a policeman from a distance of 400 metres. When the policeman starts the chase, the thief also starts running. Assuming the speed of the thief as 5 km/h and that of policeman as 9 km/h, how far the thief would have run, before he is over taken by the policeman ?
(1) 400 metre (2) 600 metre
(3) 500 metre (4) 300 metre
(SSC CHSL (10+2) Tier-I (CBE) Exam. 16.01.2017) (IInd Sitting)

28. Two trains of equal length are running on parallel lines in the same direction at 46 km/hour and 36 km/hour. The faster train passes the slower train in 36 seconds. The length of each train is
(1) 72 m (2) 80 m
(3) 82 m (4) 50 m
(SSC Multi-Tasking Staff Exam. 30.04.2017)

TYPE–IX

1. If a man walks 20 km at 5 km/hr, he will be late by 40 minutes. If he walks at 8 km/hr, how early from the fixed time will he reach?
(1) 15 minutes (2) 25 minutes
(3) 50 minutes (4) $1\frac{1}{2}$ hours
(SSC CGL Prelim Exam. 04.07.1999 (First Sitting)

2. If a man reduces his speed to 2/3, he takes 1 hour more in walking a certain distance. The time (in hours) to cover the distance with his normal speed is :
(1) 2 (2) 1
(3) 3 (4) 1.5
(SSC CGL Prelim Exam. 27.02.2000 (First Sitting)

3. A student rides on bicycle at 8 km/hour and reaches his school 2.5 minutes late. The next day he increases his speed to 10 km/hour and reaches school 5 minutes early. How far is the school from his house ?
(1) $\frac{5}{8}$ km (2) 8 km
(3) 5 km (4) 10 km
(SSC CPO S.I. Exam. 12.01.2003

4. A man covered a certain distance at some speed. Had he moved 3 km per hour faster, he would have taken 40 minutes less. If he had moved 2 km per hour slower, he would have taken 40 minutes more. The distance (in km) is :
(1) 20 (2) 35
(3) $36\frac{2}{3}$ (4) 40
(SSC CGL Prelim Exam. 11.05.2003 (First Sitting)

5. If a train runs at 40 km/hour, it reaches its destination late by 11 minutes. But if it runs at 50 km/hour, it is late by 5 minutes only. The correct time (in minutes) for the train to complete the journey is
(1) 13 (2) 15
(3) 19 (4) 21
FCI Assistant Grade-III Exam. 25.02.2012 (Paper-I) North Zone (Ist Sitting)

6. A student walks from his house at a speed of $2\frac{1}{2}$ km per hour and reaches his school 6 minutes late. The next day he increases his speed by 1 km per hour and reaches 6 minutes before school time. How far is the school from his house ?
(1) $\frac{5}{4}$ km (2) $\frac{7}{4}$ km
(3) $\frac{9}{4}$ km (4) $\frac{11}{4}$ km
(SSC CGL Prelim Exam. 08.02.2004) (Ist Sitting) & (SSC CGL Prelim Exam. 04.02.2007 (First Sitting)

7. A boy is late by 9 minutes if he walks to school at a speed of 4 km/hour. If he walks at the rate of 5 km/hour, he arrives 9 minutes early. The distance to his school is
(1) 9 km (2) 5 km
(3) 4 km (4) 6 km
(SSC CPO S.I. Exam. 06.09.2009)

8. A car can cover a certain distance in $4\frac{1}{2}$ hours. If the speed is increased by 5 km/hour, it would take $\frac{1}{2}$ hour less to cover the same distance. Find the slower speed of the car.
(1) 50 km/hour (2) 40 km/hour
(3) 45 km/hour (4) 60 km/hour
(SSC CPO S.I. Exam. 06.09.2009)

9. Shri X goes to his office by scooter at a speed of 30km/h and reaches 6 minutes earlier. If he goes at a speed of 24 km/h, he reaches 5 minutes late. The distance of his office is
(1) 20 km (2) 21 km
(3) 22 km (4) 24 km
(SSC CGL Tier-1 Exam 19.06.2011 (First Sitting)

10. Walking at 5 km/hr a student reaches his school from his house 15 minutes early and walking at 3 km/hr he is late by 9 minutes. What is the distance between his school and his house ?
(1) 5 km (2) 8 km
(3) 3 km (4) 2 km
(SSC CGL Tier-1 Exam 19.06.2011 (Second Sitting)

11. A student goes to school at the rate of $2\frac{1}{2}$ km/h and reaches 6 minutes late. If he travels at the speed of 3 km/h. he is 10 minutes early. The distance (in km) between the school and his house is
(1) 5 (2) 4
(3) 3 (4) 1
(SSC CGL Tier-1 Exam. 26.06.2011 (First Sitting)

12. When a person cycled at 10 km per hour he arrived at his office 6 minutes late. He arrived 6 minutes early, when he increased his speed by 2 km per hour. The distance of his office from the starting place is
(1) 6 km (2) 7 km
(3) 12 km (4) 16 km
(SSC Multi-Tasking (Non-Technical) Staff Exam. 27.02.2011)

13. A train covers a distance between station A and station B in 45 minutes. If the speed of the train is reduced by 5 km/hr, then the same distance is covered in 48 minutes. The distance between station A and B is
(1) 60 km (2) 64 km
(3) 80 km (4) 55 km
(SSC Graduate Level Tier-II Exam.16.09.2012)

14. A train covers a distance of 10 km in 12 minutes. If its speed is decreased by 5 km/hr, the time taken by it to cover the same distance will be :
(1) 10 minutes
(2) 13 minutes 20 sec
(3) 13 minutes
(4) 11 minutes 20 sec
(SSC CHSL DEO & LDC Exam. 21.10.2012 (IInd Sitting)

15. Walking at a speed of 5 km/hr, a man reaches his office 6 minutes late. Walking at 6 km/hr, he reaches there 2 minutes early. The distance of his office is
(1) 3 km (2) 4 km
(3) 3.5 km (4) 2 km
(SSC Multi-Tasking Staff Exam. 17.03.2013, IInd Sitting)

16. If a boy walks from his house to school at the rate of 4 km per hour, he reaches the school 10 minutes earlier than the scheduled time. However, if he walks at the rate of 3 km per hour, he reaches 10 minutes late. Find the distance of his school from his house.
(1) 5 km (2) 4 km
(3) 6 km (4) 4.5 km
(SSC Graduate Level Tier-II Exam. 29.09.2013

17. A train travelling at a speed of 55 km/hr travels from place X to place Y in 4 hours. If its speed is increased by 5 km/hr., then the time of journey is reduced by
(1) 25 minutes (2) 35 minutes
(3) 20 minutes (4) 30 minutes
(SSC CGL Tier-I Exam. 26.10.2014)

18. If a train runs at 70 km/hour, it reaches its destination late by 12 minutes. But if it runs at 80 km/hour, it is late by 3 minutes. The correct time to cover the journey is
(1) 58 minutes (2) 2 hours
(3) 1 hour (4) 59 minutes
(SSC CGL Tier-I Exam. 19.10.2014 TF No. 022 MH 3)

TYPE–X

1. A train passes a 50 metres long platform in 14 seconds and a man standing on the platform in 10 seconds.The speed of the train is :
(1) 24 km/hr (2) 36km/hr
(3) 40 km/hr (4) 45 km/hr
(SSC CGL Prelim Exam. 27.02.2000 (Second Sitting)

2. A train passes a man standing on a platform in 8 seconds and also crosses the platform which is 264 metres long in 20 seconds. The length of the train (in metres) is :
(1) 188 (2) 176
(3) 175 (4) 96
(SSC CGL Prelim Exam. 24.02.2002 (IInd Sitting) & (SSC CGL Prelim Exam. 13.11.2005)

3. A train moves past a telegraph post and a bridge 264 m long in 8 seconds and 20 seconds respectively. What is the speed of the train ?
(1) 69.5 km/hr (2) 70 km/hr
(3) 79 km/hr (4) 79.2 km/hr
(SSC CGL Prelim Exam. 08.02.2004 (Second Sitting)

4. A person standing on a railway platform noticed that a train took 21 seconds to completely pass through the platform which was 84 m long and it took 9 seconds in passing him. The speed of the train was
(1) 25.2 km/hour
(2) 32.4 km/hour
(3) 50.4 km/hour
(4) 75.6 km/hour
(SSC CPO S.I. Exam. 05.09.2004)

5. A moving train passes a platform 50 metres long in 14 seconds and a lamp-post in 10 seconds. The speed of the train is
(1) 24 km/hr. (2) 36 km/hr.
(3) 40 km/hr. (4)45 km/hr.
(SSC CPO S.I. Exam. 07.09.2003)

6. A train passes a platform 90 metre long in 30 seconds and a man standing on the platform in 15 seconds. The speed of the train is :
(1) 12.4 kmph (2) 14.6 kmph
(3) 18.4 kmph (4) 21.6 kmph
(SSC CPO S.I. Exam. 16.12.2007)

7. A moving train crosses a man standing on a platform and a bridge 300 metres long in 10 seconds and 25 seconds respectively. What will be the time taken by the train to cross a platform 200 metres long ?
(1) $16\frac{2}{3}$ seconds (2) 18 seconds
(3) 20 seconds (4) 22 seconds
(SSC CGL Prelim Exam. 27.07.2008 (First Sitting)

8. A train passes a platform 110 m long in 40 seconds and a boy standing on the platform in 30 seconds . The length of the train is
(1) 100 m (2) 110 m
(3) 220 m (4) 330 m
(SSC CPO S.I. Exam. 09.11.2008)

9. A train crosses a pole in 15 seconds and a platform 100 metres long in 25 seconds. Its length (in metres) is
(1) 50 (2) 100
(3) 150 (4) 200
(SSC (South Zone) Investigator Exam 12.09.2010)

10. Points 'A' and 'B' are 70 km apart on a highway. A car starts from 'A' and another from 'B' at the same time. If they travel in the same direction, they meet in 7 hours, but if they travel towards each-other, they meet in one hour. Find the speed of the two cars (in km/hr).
(1) 20, 30 (2) 40, 30
(3) 30, 50 (4) 20, 40
(SSC Delhi Police S.I. (Sl) Exam. 19.08.2012)

11. Two trains 100 metres and 95 metres long respectively pass each other in 27 seconds when they run in the same direction and in 9 seconds when they run in opposite directions. Speed of the two trains are
(1) 44 km/hr, 22 km/hr
(2) 52 km/hr, 26 km/hr
(3) 36 km/hr. 18 km/hr
(4) 40 km/hr, 20 km/hr
(SSC Multi-Tasking Staff Exam. 17.03.2013, Ist Sitting)

12. A train passes by a lamp post on a platform in 7 sec. and passes by the platform completely in 28 sec. If the length of the platform is 390 m, then length of the train (in metres) is

(1) 120 (2) 130

(3) 140 (4) 150

(SSC Multi-Tasking Staff Exam. 24.03.2013, Ist Sitting)

13. A train moving at a rate of 36 km/hr. crosses a standing man in 10 seconds. It will cross a platform 55 metres long, in :

(1) 6 seconds

(2) 7 seconds

(3) $15\frac{1}{2}$ seconds

(4) $5\frac{1}{2}$ seconds

(SSC Graduate Level Tier-I Exam. 21.04.2013, Ist Sitting)

14. A train crosses a platform in 30 seconds travelling with a speed of 60 km/h. If the length of the train be 200 metres, then the length (in metres) of the platform is

(1) 400 (2) 300

(3) 200 (4) 500

(SSC CGL Tier-I Re-Exam. (2013) 27.04.2014)

15. A train leaves a station A at 7 am and reaches another station B at 11 am. Another train leaves B at 8 am and reaches A at 11.30 am. The two trains cross one another at

(1) 8:36 am (2) 8:56 am

(3) 9:00 am (4) 9:24 am

(SSC CGL Tier-I Exam. 19.10.2014)

16. The time for a train of length 110 metre running at the speed of 72 km/hr to cross a bridge of length 132 metre is

(1) 9.8 seconds

(2) 12.1 seconds

(3) 12.42 seconds

(4) 14.3 seconds

(SSC CGL Tier-I (CBE) Exam. 03.09.2016 (IIIrd Sitting)

17. A train 110 metre long is running with a speed of 60 kmph. In what time will it pass a man who is running at 6 kmph in the direction opposite to that in which the train is going ?

(1) 5 seconds (2) 6 seconds

(3) 7 seconds (4) 10 seconds

(SSC CGL Tier-I (CBE) Exam. 06.09.2016 (IInd Sitting)

TYPE–XI

1. In a one-kilometre race A, B and C are the three participants. A can give B a start of 50 m. and C a start of 69 m. The start, which B can allow C is

(1) 17 m. (2) 20 m.

(3) 19 m. (4) 18 m.

(SSC Section Officer (Commercial Audit) Exam. 26.11.2006 (Second Sitting)

2. A runs twice as fast as B and B runs thrice as fast as C. The distance covered by C in 72 minutes, will be covered by A in :

(1) 18 minutes (2) 24 minutes

(3) 16 minutes (4) 12 minutes

(SSC CPO S.I. Exam. 16.12.2007)

3. In a race of one kilometre, A gives B a start of 100 metres and still wins by 20 seconds. But if A gives B a start of 25 seconds, B wins by 50 metres. The time taken by A to run one kilometre is

(1) 17 seconds

(2) $\frac{500}{29}$ seconds

(3) $\frac{1200}{29}$ seconds

(4) $\frac{700}{29}$ seconds

(SSC CPO S.I. Exam. 09.11.2008)

4. In a 100m race, Kamal defeats Bimal by 5 seconds. If the speed of Kamal is 18 Kmph, then the speed of Bimal is

(1) 15.4 kmph (2) 14.5 kmph

(3) 14.4 kmph (4) 14 kmph

(SSC CGL Tier-I Exam. 16.05.2010 (Second Sitting)

5. In a race of 1000 m, A can beat B by 100m. In a race of 400 m, B beats C by 40m. In a race of 500m. A will beat C by

(1) 95 m (2) 50 m

(3) 45 m (4) 60 m

(SSC Section Officer (Commercial Audit) Exam. 30.09.2007 (Second Sitting)

6. In a race of 800 metres, A can beat B by 40 metres. In a race of 500 metres, B can beat C by 5 metres. In a race of 200 metres, A will beat C by

(1) 11.9 metre (2) 1.19 metre

(3) 12.7 metre (4) 1.27 metre

(SSC CPO S.I. Exam. 16.12.2007)

7. In a race of 200 metres, B can give a start of 10 metres to A, and C can give a start of 20 metres to B. The start that C can give to A, in the same race, is

(1) 30 metres (2) 25 metres

(3) 29 metres (4) 27 metres

(SSC CPO S.I. Exam. 16.12.2007)

8. A can give 40 metres start to B and 70 metres to C in a race of one kilometre How many metres start can B give to C in a race of one kilometre ?

(1) 30 metre (2) $31\frac{1}{4}$ metre

(3) $31\frac{3}{4}$ metre (4) 32 metre

(SSC CPO S.I. Exam. 09.11.2008)

9. A jeep is chasing a car which is 5km ahead. Their respective speed are 90 km/hr and 75 km/hr. After how many minutes will the jeep catch the car ?

(1) 18 min. (2) 20 min.

(3) 24 min. (4) 25 min.

(SSC Data Entry Operator Exam. 02.08.2009)

10. A is twice as fast as B, and B is thrice as fast as C is. The journey covered by C in $1\frac{1}{2}$ hours will be covered by A in

(1) 15 minutes (2) 30 minutes

(3) 1 hour (4) 10 minutes

(SSC CGL Tier-II Exam, 2014 12.04.2015 (Kolkata Region) TF No. 789 TH 7)

11. Walking at the rate of 4 kmph a man covers certain distance in 2 hrs 45 min. Running at a speed of 16.5 kmph the man will cover the same distance in how many minutes ?

(1) 50 min. (2) 35 min.

(3) 40 min. (4) 45 min.

(SSC CGL Tier-I Exam, 09.08.2015 (Ist Sitting) TF No. 1443088)

12. Sarthak completed a marathon in 4 hours and 35 minutes. The marathon consisted of a 10 km run followed by 20 km cycle ride and the remaining distance again a run. He ran the first stage at 6 km/hr and then cycled at 16 km/hr. How much distance did Sarthak cover in total, if his speed in the last run was just half that of his first run?

(1) 5 km. (2) 35 km.

(3) 40 km. (4) 45 km.

(SSC CPO SI, ASI Online Exam.05.06.2016) (IInd Sitting)

13. Walking at $\frac{3}{4}$ of his usual speed, a man reaches his office 20 minutes late. Then his usual time for walking to his office is :
(1) 1 hour (2) 30 minutes
(3) 45 minutes (4) 40 minutes
(SSC CPO SI & ASI, Online Exam. 06.06.2016) (IInd Sitting)

14. A is faster than B. A and B each walk 24 km. The sum of their speeds is 7 km/hr and the sum of times taken by them is 14 hours. Then A's speed is equal to:
(1) 3 km/hr. (2) 4 km/hr.
(3) 5 km/hr. (4) 7 km/hr.
(SSC CGL Tier-I (CBE) Exam. 27.08.2016) (IInd Sitting)

15. Two persons ride towards each other from two places 55 km apart, one riding at 12km/hr and the other at 10 km/hr. In what time will they be 11 km apart?
(1) 2 hours and 30 minutes
(2) 1 hour and 30 minutes
(3) 2 hours
(4) 2 hours and 45 minutes
(SSC CGL Tier-I (CBE) Exam. 02.09.2016) (IInd Sitting)

16. A and B start running at the same time and from the same point around a circle. If A can complete one round in 40 seconds and B in 50 seconds, how many seconds will they take to reach the starting point simultaneously ?
(1) 10 (2) 200
(3) 90 (4) 2000
(SSC CGL Tier-I (CBE) Exam. 28.08.2016 (IST Sitting)

17. Rubi goes to a multiplex at the speed of 3 km/hr to see a movie and reaches 5 minutes late. If she travels at the speed of 4 km/hr she reaches 5 minutes early. Then the distance of the multiplex from her starting point is
(1) 2 km. (2) 5 km.
(3) 2 metre (4) 5 metre
(SSC CGL Tier-II (CBE) Exam. 12.01.2017)

TYPE–XII

1. I walk a certain distance and ride back taking a total time of 37 minutes. I could walk both ways in 55 minutes. How long would it take me to ride both ways?
(1) 9.5 minutes (2) 19 minutes
(3) 18 minutes (4) 20 minutes
(SSC CGL Prelim Exam. 27.02.2000 (First Sitting)

2. A and B start at the same time with speed of 40 km/hr and 50 km/hr respectively. If in covering the journey A takes 15 minutes longer than B, the total distance of the journey is :
(1) 46 km (2) 48 km
(3) 50 km (4) 52 km
(SSC CGL Prelim Exam. 27.02.2000 (Second Sitting)

3. A man can reach a certain place in 30 hours. If he reduces his speed by $\frac{1}{15}$th, he goes 10 km less in that time. Find his speed per hour.
(1) 6 km/hr (2) $5\frac{1}{2}$ km/hr
(3) 4 km/hr (4) 5 km/hr
(SSC CGL Prelim Exam. 24.02.2002 (Second Sitting)

4. A, B and C start at the same time in the same direction to run around a circular stadium. A completes a round in 252 seconds, B in 308 seconds and C in 198 seconds, all starting at the same point. After what time will they next meet at the starting point again ?
(1) 46 minutes 12 seconds
(2) 45 minutes
(3) 42 minutes 36 seconds
(4) 26 minutes 18 seconds
(SSC CGL Prelim Exam. 11.05.2003 (First Sitting)

5. A man walks a certain distance and rides back in 4 hours 30 minutes. He could ride both ways in 3 hours. The time required by the man to walk both ways is
(1) 4 hours 30 minutes
(2) 4 hours 45 minutes
(3) 5 hours
(4) 6 hours
(SSC CPO S.I. Exam. 07.09.2003)

6. A person, who can walk down a hill at the rate of $4\frac{1}{2}$ km/hour and up the hill at the rate of 3 km/hour, ascends and comes down to his starting point in 5 hours. How far did he ascend ?
(1) 13.5 km (2) 3 km
(3) 15 km (4) 9 km
(SSC CPO S.I. Exam. 05.09.2004)

7. A walks at a uniform rate of 4 km an hour; and 4 hours after his start, B bicycles after him at the uniform rate of 10 km an hour. How far from the starting point will B catch A ?
(1) 16.7 km (2) 18.6 km
(3) 21.5 km (4) 26.7 km
(SSC CPO S.I. Exam. 26.05.2005)

8. A car completes a journey in 10 hours. If it covers half of the journey at 40 kmph and the remaining half at 60 kmph, the distance covered by car is
(1) 400 km (2) 480 km
(3) 380 km (4) 300 km
(SSC Section Officer (Commercial Audit) Exam. 25.09.2005)

9. *A* and *B* run a kilometre and *A* wins by 25 sec. *A* and *C* run a kilometre and *A* wins by 275 m. When *B* and *C* run the same distance, *B* wins by 30 sec. The time taken by *A* to run a kilometre is
(1) 2 min 25 sec
(2) 2 min 50 sec
(3) 3 min 20 sec
(4) 3 min 30 sec
(SSC CGL Prelim Exam. 13.11.2005 (Second Sitting)

10. Two cars start at the same time from one point and move along two roads at right angles to each other. Their speeds are 36 km/hour and 48 km/hour respectively. After 15 seconds the distance between them will be
(1) 400 m (2) 150 m
(3) 300 m (4) 250 m
(SSC CPO S.I. Exam. 03.09.2006)

11. In a kilometre race, A beats B by 30 seconds and B beats C by 15 seconds. If A beats C by 180 metres, the time taken by A to run 1 kilometre is
(1) 250 seconds (2) 205 seconds
(3) 200 seconds (4) 210 seconds
(SSC CPO S.I. Exam. 03.09.2006)

12. Two guns are fired from the same place at an interval of 6 minutes. A person approaching the place observes that 5 minutes 52 seconds have elapsed between the hearing of the sound of the two guns. If the velocity of the sound is 330 m/sec, the man was approaching that place at what speed (in km/hr) ?
(1) 24 (2) 27
(3) 30 (4) 36
(SSC CGL Prelim Exam. 04.02.2007 (First Sitting)

13. Ram arrives at a Bank 15 minutes earlier than scheduled time if he drives his car at 42 km/hr. If he drives car at 35 km/hr he arrives 5 minutes late. The distance of the Bank from his starting point is

(1) 70 km (2) 210 km

(3) 72 km (4) 60 km

(SSC CGL Prelim Exam. 04.02.2007 (Second Sitting)

14. A and B started at the same time from the same place for a certain destination. B walking at $\frac{5}{6}$ of A's speed reached the destination 1 hour 15 minutes after A. B reached the destination in

(1) 6 hours 45 minutes

(2) 7 hours 15 minutes

(3) 7 hours 30 minutes

(4) 8 hours 15 minutes

(SSC CGL Prelim Exam. 27.07.2008 (First Sitting)

15. In covering a distance of 30 km, Abhay takes 2 hours more than Sameer. If Abhay doubles his speed, then he would take 1 hour less than Sameer. Abhay's speed (in km/hr) is

(1) 5 (2) 6

(3) 6.25 (4) 7.5

(SSC Constable (GD) & Rifleman (GD) Exam. 22.04.2012 (IInd Sitting)

16. A man takes 6 hours 15 minutes in walking a distance and riding back to the starting place. He could walk both ways in 7 hours 45 minutes. The time taken by him to ride both ways, is

(1) 4 hours

(2) 4 hours 30 minutes

(3) 4 hours 45 minutes

(4) 5 hours

(SSC CGL Prelim Exam. 27.07.2008 (First Sitting)

17. A man completed a certain journey by a car. If he covered 30% of the distance at the speed of 20km/hr, 60% of the distance at 40km/hr and the remaining distance at 10km/hr; his average speed for the whole journey was

(1) 25 km/hr (2) 28 km/hr

(3) 30 km/hr (4) 33 km/hr

(SSC CGL Prelim Exam. 27.07.2008 (Second Sitting)

18. From two places, 60 km apart, A and B start towards each other at the same time and meet each other after 6 hours. Had A travelled with $\frac{2}{3}$ of his speed and B travelled with double of his speed, they would have met after 5 hours. The speed of A is

(1) 4 km/hr. (2) 6 km/hr.

(3) 10 km/hr. (4) 12 km/hr.

(SSC CGL Prelim Exam. 27.07.2008 (Second Sitting)

19. P and Q are 27 km away. Two trains with speed of 24 km/hr and 18 km/hr respectively start simultaneously from P and Q and travel in the same direction. They meet at a point R beyond Q. Distance QR is

(1) 126 km (2) 81 km

(3) 48 km (4) 36 km

(SSC Graduate Level Tier-II Exam.16.09.2012)

20. Ravi and Ajay start simultaneously from a place A towards B, 60 km apart. Ravi's speed is 4km/hr less than that of Ajay. Ajay, after reaching B, turns back and meets Ravi at a place 12 km away from B. Ravi's speed is

(1) 12 km/hr (2) 10 km/hr

(3) 8 km/hr (4) 6 km/hr

(SSC CGL Prelim Exam. 27.07.2008 (Second Sitting)

21. A man travelled a distance of 61 km in 9 hours, partly on foot at the rate of 4 km/hr and partly on bicycle at the rate of 9 km/hr. The distance travelled on foot was

(1) 12 km (2) 16 km

(3) 20 km (4) 24 km

(SSC (South Zone) Investigator Exam 12.09.2010)

22. If I walk at 5 km/hour, I miss a train by 7 minutes. If, however, I walk at 6 km/hour, I reach the station 5 minutes before the departure of the train. The distance (in km) between my house and the station is

(1) 6 (2) 5

(3) 4 (4) 3

(SSC CGL Tier-1 Exam. 26.06.2011 (Second Sitting)

23. A man has to be at a certain place at a certain time. He finds that he shall be 20 minutes late if he walks at 3 km/hour speed and 10 minutes earlier if he walks at a speed of 4 km/hour. The distance he has to walk is

(1) 24 km (2) 12·5 km

(3) 10 km (4) 6 km

(SSC CPO (SI, ASI & Intelligence Officer) Exam 28.08.2011 (Paper-I)

24. Ravi travels 300 km partly by train and partly by car. He takes 4 hours to reach, if he travels 60 km by train and rest by car. He will take 10 minutes more if he were to travel 100 km by train and rest by car. The speed of the train is :

(1) 50 km/hr (2) 60 km/hr

(3) 100 km/hr (4) 120 km/hr

FCI Assistant Grade-III Exam. 05.02.2012 (Paper-I) East Zone (IInd Sitting)

25. A is twice as fast runner as B, and B is thrice as fast runner as C. If C travelled a distance in 1 hour 54 minutes, the time taken by B to cover the same distance is

(1) 19 minutes (2) 38 minutes

(3) 51 minutes (4) 57 minutes

(SSC SAS Exam. 26.06.2010 (Paper-1)

26. Two trains, A and B, start from stations X and Y towards Y and X respectively. After passing each other, they take 4 hours 48 minutes and 3 hours 20 minutes to reach Y and X respectively. If train A is moving at 45 km/hr., then the speed of the train B is

(1) 60 km/hr (2) 64.8 km/hr

(3) 54 km/hr (4) 37.5 km/hr

(SSC Graduate Level Tier-II Exam.16.09.2012)

27. Ram travelled 1200 km by air which formed $\frac{2}{5}$ of his trip. He travelled one-third of the trip by car and the rest by train. The distance (in km) travelled by train was

(1) 480 (2) 800

(3) 1600 (4) 1800

(SSC Graduate Level Tier-I Exam. 21.04.2013 IInd Sitting)

28. A, B, C walk 1 km in 5 minutes, 8 minutes and 10 minutes respectively. C starts walking from a point, at a certain time, B starts from the same point 1 minutes later and A starts from the same point 2 minutes later than C. Then A meets B and C after

(1) $\frac{5}{3}$ min, 2 min

(2) 1 min, 2 min

(3) 2 min, 3 min

(4) $\frac{4}{3}$ min, 3 min

(SSC Graduate Level Tier-I Exam. 21.04.2013)

29. Two cars are moving with speed v_1, v_2 towards a crossing along two roads. If their distance from the crossing be 40 metres and 50 metres at an instant of time then they do not collide if their speed are such that

(1) $v_1 : v_2 = 16 : 25$

(2) $v_1 : v_2 \neq 4 : 5$

(3) $v_1 : v_2 \neq 5 : 4$

(4) $v_1 : v_2 = 25 : 16$

(SSC Graduate Level Tier-I Exam. 19.05.2013 Ist Sitting)

30. The distance between place A and B is 999 km. An express train leaves place A at 6 am and runs at a speed of 55.5 km/hr. The train stops on the way for 1 hour 20 minutes. It reaches B at

(1) 1.20 am (2) 12 pm

(3) 6 pm (4) 11 pm

(SSC Graduate Level Tier-II Exam. 29.09.2013)

31. A speed of 45 km per hour is the same as

(1) 12.5 metre/seccond

(2) 13 metre/seccond

(3) 15 metre/seccond

(4) 12 metre/seccond

(SSC CGL Tier-I Exam. 26.10.2014)

32. If a distance of 50 m is covered in 1 minute, that 90 m in 2 minutes and 130 m in 3 minutes find the distance covered in 15 minutes.

(1) 610 m (2) 750 m

(3) 1000 m (4) 650 m

(SSC CGL Tier-II Exam. 21.09.2014)

33. A train leaves station A at 5 AM and reaches station B at 9 AM on the same day. Another train leaves station B at 7 AM and reaches station A at 10:30 AM on the same day. The time at which the two trains cross each other is :

(1) 8 : 26 AM (2) 7: 36 AM

(3) 7: 56 AM (4) 8 AM

(SSC CGL Tier-I Exam, 16.08.2015 (IInd Sitting) TF No. 2176783)

34. A plane can cover 6000 km in 8 hours. If the speed is increased by 250 kmph, then the time taken by the plane to cover 9000 km is

(1) 8 hours (2) 6 hours

(3) 5 hours (4) 9 hours

(SSC Constable (GD) Exam, 04.10.2015, Ist Sitting)

35. A man travels 450 km to his home partly by train and partly by car. He takes 8 hours 40 minutes if he travels 240 km by train and rest by car. He takes 20 minutes more if he travels 180 km by train and the rest by car. The speed of the car in km/hr is

(1) 45 (2) 50

(3) 60 (4) 48

(SSC CGL Tier-II Online Exam.01.12.2016)

36. Two rifles are fired from the same place at a difference of 11 min. 45 seconds. But a man who is coming towards the same place in a train hears the second sound after 11 minutes. Find the speed of the train (Assuming speed of sound = 330 m/s).

(1) 72 km/h (2) 36 km/h

(3) 81 km/h (4) 108 km/h

(SSC CGL Tier-I (CBE) Exam. 27.08.2016) (IInd Sitting)

37. A man can cover a certain distance in 3 hours 36 minutes if he walks at the rate of 5 km/hr. If he covers the same distance on cycle at the rate of 24 km/hr, then the time taken by him in minutes is

(1) 40 (2) 45

(3) 50 (4) 55

(SSC CGL Tier-II (CBE) Exam. 30.11.2016)

38. Due to inclement weather, an air plane reduced its speed by 300 km/hr, and reached the destination of 1200 km late by 2hrs. Then the schedule duration of the flight was

(1) 1 hour (2) 1.5 hours

(3) 2 hours (4) 2.5 hours

(SSC CGL Tier-II (CBE) Exam. 30.11.2016)

39. A motor cycle gives an average of 45 km per litre. If the cost of petrol is Rs. 20 per litre, the amount required to complete a journey of 540 km is, (in Rupees)

(1) 120 (2) 360

(3) 200 (4) 240

(SSC CGL Tier-I (CBE) Exam. 06.09.2016 (IIIrd Sitting)

40. Ravi has a roadmap with a scale of 1.5 cm for 18 km. He drives on that road for 72 km. What would be his distance covered in that map?

(1) 4 cm (2) 6 cm

(3) 8 cm (4) 7 cm

(SSC CGL Tier-I (CBE) Exam. 02.09.2016 (IInd Sitting)

41. A farmer travelled a distance of 61 km in 9 hours. He travelled partly on foot at a speed of 4 km/hour and partly on bicycle at a speed of 9 km/hour. The distance travelled on foot is :

(1) 14 km. (2) 16 km.

(3) 20 km. (4) 18 km.

(SSC CGL Tier-I (CBE) Exam. 03.09.2016 (IInd Sitting)

42. A man travelled a distance of 61 km. in 9 hours, partly by walking at the speed of 4 km./hr. and partly on bicycle at the speed of 9 km./hr. The distance covered by walking is

(1) 16 km. (2) 12 km.

(3) 15 km. (4) 17 km.

(SSC CGL Tier-I (CBE) Exam. 11.09.2016 (IInd Sitting)

43. Sound travels 330 metre in a second.When the sound follows the flash of lightning after 10 seconds the thunder cloud will be at a distance of :

(1) 1300 metre (2) 2000 metre

(3) 3650 metre (4) 3300 metre

(SSC CGL Tier-I (CBE) Exam. 27.10.2016 (Ist Sitting)

44. A man travels for 14 hours 40 minutes. He covers half of the journey by train at the rate of 60 km/hr and rest half by road at the rate of 50 km/hr. The distance travelled by him is :

(1) 720 km (2) 800 km

(3) 960 km (4) 1000 km

(SSC CGL Tier-I (CBE) Exam. 27.10.2016 (Ist Sitting)

45. Two donkeys are standing 400 metres apart. First donkey can run at a speed of 3 m/sec and the second can run at 2 m/sec. If two donkeys run towards each other after how much time (in seconds) will they bump into each other?

(1) 60 (2) 80

(3) 400 (4) 40

(SSC CGL Tier-II (CBE) Exam. 12.01.2017)

46. A and B are 15 kms apart and when travelling towards each other meet after half an hour whereas they meet two and a half hours later if they travel in the same direction. The faster of the two travels at the speed of
(1) 15 km./hr. (2) 18 km./hr.
(3) 10 km./hr. (4) 8 km./hr.
(SSC CGL Tier-II (CBE) Exam. 12.01.2017)

47. A man walking at 3 km/hour crosses a square field diagonally in 2 minutes. The area of the field (in square metre) is
(1) 3000 (2) 5000
(3) 6000 (4) 2500
(SSC Multi-Tasking Staff Exam. 30.04.2017)

SHORT ANSWERS

TYPE-I

1. (2)	**2.** (4)	**3.** (4)	**4.** (2)
5. (4)	**6.** (4)	**7.** (1)	**8.** (3)
9. (1)	**10.** (1)	**11.** (4)	**12.** (2)
13. (2)	**14.** (4)	**15.** (1)	**16.** (3)
17. (1)	**18.** (2)	**19.** (2)	**20.** (2)
21. (4)	**22.** (3)	**23.** (2)	**24.** (2)
25. (1)	**26.** (2)	**27.** (2)	**28.** (1)
29. (1)	**30.** (4)	**31.** (2)	**32.** (2)
33. (2)	**34.** (1)	**35.** (4)	**36.** (3)
37. (4)	**38.** (1)	**39.** (1)	**40.** (*)
41. (1)	**42.** (4)	**43.** (3)	**44.** (3)
45. (1)	**46.** (4)	**47.** (3)	**48.** (1)
49. (1)	**50.** (3)	**51.** (4)	**52.** (4)
53. (3)	**54.** (2)	**55.** (4)	

TYPE-II

1. (3)	**2.** (3)	**3.** (3)	**4.** (2)
5. (2)	**6.** (3)	**7.** (3)	**8.** (4)
9. (4)	**10.** (4)	**11.** (3)	**12.** (1)
13. (2)	**14.** (4)	**15.** (3)	**16.** (2)
17. (3)	**18.** (2)	**19.** (1)	**20.** (4)
21. (1)	**22.** (2)	**23.** (1)	**24.** (4)
25. (3)	**26.** (2)	**27.** (3)	

TYPE-III

1. (3)	**2.** (3)	**3.** (2)	**4.** (2)
5. (1)	**6.** (3)	**7.** (1)	**8.** (3)
9. (4)	**10.** (3)	**11.** (4)	**12.** (3)
13. (4)	**14.** (3)	**15.** (2)	**16.** (4)
17. (1)	**18.** (1)	**19.** (1)	**20.** (4)
21. (1)	**22.** (2)	**23.** (4)	**24.** (1)
25. (1)	**26.** (3)	**27.** (4)	**28.** (4)
29. (3)	**30.** (2)	**31.** (2)	

TYPE-IV

1. (3)	**2.** (2)	**3.** (2)	**4.** (3)
5. (2)	**6.** (3)	**7.** (2)	**8.** (2)
9. (1)	**10.** (4)	**11.** (4)	**12.** (2)
13. (3)	**14.** (3)	**15.** (3)	**16.** (1)
17. (1)	**18.** (3)	**19.** (2)	**20.** (2)
21. (3)	**22.** (3)	**23.** (3)	**24.** (3)
25. (1)	**26.** (4)	**27.** (1)	

TYPE-V

1. (3)	**2.** (3)	**3.** (2)	**4.** (3)
5. (2)	**6.** (1)	**7.** (1)	**8.** (2)
9. (2)	**10.** (2)	**11.** (2)	**12.** (1)
13. (3)	**14.** (2)		

TYPE-VI

1. (2)	**2.** (1)	**3.** (2)	**4.** (3)
5. (3)	**6.** (1)	**7.** (2)	**8.** (4)
9. (2)	**10.** (1)	**11**. (1)	**12.** (2)
13. (1)	**14.** (1)	**15.** (1)	**16.** (2)
17. (3)	**18.** (3)	**19.** (1)	**20.** (2)
21. (4)	**22.** (3)	**23.** (3)	**24.** (1)
25. (4)	**26.** (4)	**27.** (2)	**28.** (1)
29. (1)	**30.** (4)	**31.** (3)	**32.** (3)
33. (4)	**34.** (1)	**35.** (2)	**36.** (3)
37. (1)	**38.** (1)	**39.** (4)	

TYPE-VII

1. (3)	**2.** (1)	**3.** (3)	**4.** (2)
5. (2)	**6.** (3)	**7.** (3)	**8.** (2)
9. (3)	**10.** (3)	**11.** (1)	**12.** (3)
13. (2)	**14.** (3)	**15.** (1)	**16.** (1)

TYPE-VIII

1. (1)	**2.** (1)	**3.** (1)	**4.** (4)
5. (2)	**6.** (4)	**7.** (3)	**8.** (1)
9. (2)	**10.** (3)	**11.** (3)	**12.** (2)
13. (3)	**14.** (4)	**15.** (2)	**16.** (1)
17. (4)	**18.** (1)	**19.** (3)	**20.** (2)
21. (1)	**22.** (3)	**23.** (3)	**24.** (2)
25. (1)	**26.** (4)	**27.** (3)	**28.** (4)

TYPE-IX

1. (3)	**2.** (1)	**3.** (3)	**4.** (4)
5. (3)	**6.** (2)	**7.** (4)	**8.** (2)
9. (3)	**10.** (3)	**11.** (2)	**12.** (3)
13. (1)	**14.** (2)	**15.** (2)	**16.** (2)
17. (3)	**18.** (3)		

TYPE-X

1. (4)	**2.** (2)	**3.** (4)	**4.** (1)
5. (4)	**6.** (4)	**7.** (3)	**8.** (4)
9. (3)	**10.** (2)	**11.** (2)	**12.** (2)
13. (3)	**14.** (2)	**15.** (4)	**16.** (2)
17. (2)			

TYPE-XI

1. (2)	**2.** (4)	**3.** (2)	**4.** (3)
5. (1)	**6.** (1)	**7.** (3)	**8.** (2)
9. (2)	**10.** (1)	**11.** (3)	**12.** (2)
13. (1)	**14.** (2)	**15.** (3)	**16.** (2)
17. (1)			

TYPE-XII

1. (2)	**2.** (3)	**3.** (4)	**4.** (1)
5. (4)	**6.** (4)	**7.** (4)	**8.** (2)
9. (1)	**10.** (4)	**11.** (2)	**12.** (2)
13. (1)	**14.** (3)	**15.** (1)	**16.** (3)
17. (1)	**18.** (2)	**19.** (2)	**20.** (3)
21. (2)	**22.** (1)	**23.** (4)	**24.** (2)
25. (2)	**26.** (3)	**27.** (2)	**28.** (1)
29. (2)	**30.** (1)	**31.** (1)	**32.** (1)
33. (3)	**34.** (4)	**35.** (1)	**36.** (3)
37. (2)	**38.** (3)	**39.** (4)	**40.** (2)
41. (2)	**42.** (1)	**43.** (4)	**44.** (2)
45. (2)	**46.** (2)	**47.** (2)	

EXPLANATIONS

TYPE-I

1. (2) Using Rule 1,

$$\text{Time taken} = \frac{\text{Distance}}{\text{time}}$$

$$= \frac{\frac{4}{5}}{45} \text{ hour} = \frac{4 \times 60 \times 60}{5 \times 45} \text{ sec.}$$

= 64 seconds

2. (4) Using Rule 1,
Let the required speed is x km/hr

Then, $240 \times 5 = \frac{5}{3} \times x$

$\therefore$ x = 720 km/hr.

3. (4) Using Rule 1,
Speed of the man = 5km/hr

$$= 5 \times \frac{1000}{60} \text{m / min} = \frac{250}{3} \text{m / min}$$

Time taken to cross the bridge = 15 minutes
Length of the bridge
= speed × time

$$= \frac{250}{3} \times 15\text{m} = 1250\text{m}$$

4. (2) Using Rule 1,

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{250}{75}$$

$$= \frac{10}{3} \text{m/sec} = \frac{10}{3} \times \frac{18}{5} \text{km/hr.}$$

$$\left[\because 1 \text{ m/s} = \frac{18}{5} \text{km/hr}\right]$$

= 2 × 6 km/hr. = 12 km/hr.

5. (4) Using Rule 1,

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$= \frac{200}{24} \text{m/s}$$

$$\frac{200}{24} \text{m/s} = \frac{200}{24} \times \frac{18}{5}$$

= 30 km/h

$$[\because x \text{ m/s} = \frac{18}{5} x \text{ km/h}]$$

6. (4) Using Rule 1,
Speed of car = 10 m/sec.
Required speed in kmph

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

7. (1) Total distance covered
= Speed × Time
= 40 × 9 = 360 km.
The required time at 60 kmph

$$= \frac{360}{60} = 6 \text{ hours.}$$

Aliter : Using Rule 9,
Here, $S_1 = 40$, $t_1 = 9$
$S_2 = 60$, $t_2 = ?$
$S_1t_1 = S_2t_2$
$40 \times 9 = 60 \times t_2$

$$t_2 = \frac{4 \times 9}{6} = 6 \text{ hours}$$

8. (3) Let the distance be *x* km.
Total time = 5 hours 48 minutes

$$= 5 + \frac{48}{60} = \left(5 + \frac{4}{5}\right) \text{ hours}$$

$$= \frac{29}{5} \text{ hours}$$

$$\therefore \frac{x}{25} + \frac{x}{4} = \frac{29}{5}$$

$$\Rightarrow \frac{4x + 25x}{100} = \frac{29}{5}$$

$\Rightarrow 5 \times 29x = 29 \times 100$

$$\Rightarrow x = \frac{29 \times 100}{5 \times 29} = 20 \text{ km.}$$

Aliter : Using Rule 5,
Here, x = 25, y = 4

$$\text{Average speed} = \frac{2xy}{x + y}$$

$$= \frac{2 \times 25 \times 4}{25 + 4} = \frac{200}{29}$$

$$\text{Total Distance} = \frac{200}{29} \times 5\frac{4}{5}$$

$$= \frac{200}{29} \times \frac{29}{5} = 40 \text{ km}$$

$\Rightarrow$ Required distance = 20 km

9. (1) Let the required distance be *x* km.
Then,

$$\frac{x}{3} + \frac{x}{2} = 5$$

$$\Rightarrow \frac{2x + 3x}{6} = 5$$

$\Rightarrow 5x = 6 \times 5$

$$\therefore x = \frac{6 \times 5}{5} = 6 \text{ km}$$

Aliter : Using Rule 5,
Here, x = 3, y = 2

$$\text{Average Speed} = \frac{2 \times x \times y}{x + y}$$

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

$$= \frac{12}{5} \text{ km/hr}$$

$$\text{Total distance} = \frac{12}{5} \times 5 = 12\text{km}$$

$\therefore$ Required distance

$$= \frac{12}{2} = 6 \text{ km}$$

10. (1) Using Rule 1,
The boy covers 20 km in 2.5 hours.

$$\Rightarrow \text{Speed} = \frac{20}{2.5} = 8 \text{ km/hr.}$$

New speed = 16 km/hr

$$\therefore \text{Time} = \frac{32}{16} = 2 \text{ hours.}$$

11. (4) Using Rule 1,
Speed = 180 kmph

$$= \frac{180 \times 5}{18} \text{m/sec} = 50 \text{ m/sec}$$

$$\left[\because 1 \text{ km/hr} = \frac{5}{18} \text{m/s}\right]$$

12. (2) Using Rule 1,

$$\text{Speed} = \frac{150}{25} = 6 \text{ m/sec}$$

$$= 6 \times \frac{18}{5} = \frac{108}{5} = 21.6 \text{ kmph}$$

13. (2) Let the distance between A and B be *x* km, then

$$\frac{x}{9} - \frac{x}{10} = \frac{36}{60} = \frac{3}{5}$$

$$\Rightarrow \frac{x}{90} = \frac{3}{5}$$

$$\Rightarrow x = \frac{3}{5} \times 90 = 54 \text{ km.}$$

Aliter :
Using Rule 9,
Here, $S_1 = 9$, $t_1 = x$

$$S_2 = 10, \; t_2 = x - \frac{36}{60}$$

$S_1t_1 = S_2t_2$

$$9 \times x = 10\left(x - \frac{36}{60}\right)$$

9x = 10x – 6x = 6
Distance travelled
= 9 × 6 = 54 km

14. (4) Difference of time
= 4.30 p.m – 11.a.m.

$= 5\frac{1}{2}$ hours $= \frac{11}{2}$ hours

Distance covered in $\frac{11}{2}$ hrs

$= \frac{5}{6} - \frac{3}{8} = \frac{20-9}{24} = \frac{11}{24}$ part

$\because \frac{11}{24}$ part of the journey is covered in $\frac{11}{2}$ hours

$\Rightarrow$ $\frac{3}{8}$ part of the journey is covered in

$= \frac{11}{2} \times \frac{24}{11} \times \frac{3}{8} = \frac{9}{2}$ hours

$= 4\frac{1}{2}$ hours.

Clearly the person started at 6.30 a.m.

15. (1) Using Rule 1,
Speed of bus = 72 kmph

$= \left(\frac{72 \times 5}{18}\right)$ metre/second

= 20 metre/second
$\therefore$ Required distance
= 20 × 5 = 100 metre

16. (3) If the required distance be x km, then

$\frac{x}{3} - \frac{x}{4} = \frac{1}{2}$

$\Rightarrow \frac{4x-3x}{12} = \frac{1}{2}$

$\Rightarrow \frac{x}{12} = \frac{1}{2} \Rightarrow x = 6$ km

Aliter : Using Rule 9,
Here $S_1 = 4$, $t_1 = x$

$S_2 = 3$, $t_2 = x + \frac{1}{2}$

$S_1t_1 = S_2t_2$

$4 \times x = 3\left(x + \frac{1}{2}\right)$

$4x - 3x = \frac{3}{2}$ $x = \frac{3}{2}$

Distance= $4 \times \frac{3}{2}$ = 6 kms

17. (1) Using Rule 1,

Time = $10\frac{1}{2}$ hours

$= \frac{21}{2}$ hours

Speed = 40 kmph
Distance = Speed × Time

$= 40 \times \frac{21}{2}$ = 420 km

18. (2) Using Rule 1,
Distance covered on foot

$= 4 \times 3\frac{3}{4}$ km. = 15 km.

$\therefore$ Time taken on cycle

$= \frac{\text{Distance}}{\text{Speed}} = \frac{15}{16.5}$ hour

$= \frac{15 \times 60}{16.5}$ minutes

= 54.55 minutes

19. (2) Using Rule 1,

Speed of train = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{10}{\frac{12}{60}}$ kmph

$= \frac{10 \times 60}{12} = 50$ kmph

New speed = 45 kmph

$\therefore$ Required time = $\frac{10}{45}$ hour

$= \frac{2}{9} \times 60$ minutes

$= \frac{40}{3}$ minutes

= 13 minutes 20 seconds

20. (2) Using Rule 1,

Man's speed = $\frac{\text{Distance}}{\text{Time}}$

$= \frac{a}{b}$ kmph

$= \frac{1000a}{b}$ m/hour

$\therefore$ Time taken in walking 200 metre

$= \frac{200}{\frac{1000a}{b}} = \frac{b}{5a}$ hours

21. (4) $\because$ 1 m/sec = $\frac{18}{5}$ kmph

$\therefore \frac{10}{3}$ m/sec

$= \frac{18}{5} \times \frac{10}{3} = 12$ kmph

22. (3) Using Rule 1,
Remaining time

$= \frac{2}{5} \times 15 = 6$ hours

$\therefore$ Required speed

$= \frac{60}{6} = 10$ kmph

23. (2) Speed of train = 60 kmph
Time = 210 minutes

$= \frac{210}{60}$ hours

or $\frac{7}{2}$ hours

Distance covered

$= 60 \times \frac{7}{2} = 210$ km

Time taken at 80 kmph

$= \frac{210}{80} = \frac{21}{8}$ hours

$= 2\frac{5}{8}$ hours

Aliter : Using Rule 9,

Here, $S_1 = 60$, $t_1 = \frac{210}{60}$ hrs

$S_2 = 80$, $t_2 = ?$
$S_1t_1 = S_2t_2$

$60 \times \frac{210}{60} = 80 \times t_2$

$t_2 = \frac{21}{8}$ hrs

$t_2 = 2\frac{5}{8}$ hrs

24. (2) 90 km = 12 × 7km + 6 km. To cover 7 km total time taken = $\frac{7}{18}$ hours + 6 min. = $\frac{88}{3}$ min. So, (12 × 7 km) would be covered in $\left(12 \times \frac{88}{3}\right)$ min. and remaining 6

km is $\frac{6}{18}$ hrs or 20 min.

$\therefore$ Total time $= \frac{1056}{3} + 20$

$= \frac{1116}{3 \times 60}$ hours $= 6\frac{1}{5}$ hours

= 6 hours 12 minutes.

25. (1) 30.6 kmph

$= \left(30.6 \times \frac{5}{18}\right)$ m/sec.

= 8.5 m/sec

26. (2) Let the total journey be of x km, then

$$\frac{2x}{15} + \frac{9x}{20} + 10 = x$$

$$\Rightarrow x - \frac{2x}{15} - \frac{9x}{20} = 10$$

$$\Rightarrow \frac{60x - 8x - 27x}{60} = 10$$

$$\Rightarrow \frac{25x}{60} = 10$$

$$\Rightarrow x = \frac{60 \times 10}{25} = 24 \text{ km}$$

27. (2) If the required distance be = x km, then

$$\frac{x}{4} - \frac{x}{5} = \frac{10+5}{60}$$

$$\Rightarrow \frac{5x - 4x}{20} = \frac{1}{4}$$

$$\Rightarrow \frac{x}{20} = \frac{1}{4}$$

$$\Rightarrow x = \frac{1}{4} \times 20 = 5 \text{ km.}$$

Aliter : Using Rule 10,

Here, $S_1 = 4$, $t_1 = 5$

$S_2 = 5$, $t_2 = 10$

$$\text{Distance} = \frac{(S_1 \times S_2)(t_1 + t_2)}{S_2 - S_1}$$

$$= \frac{(4 \times 5)(5+10)}{5-4}$$

$$= 20 \times \frac{15}{60} = 5 \text{ kms}$$

28. (1) Using Rule 12,

Relative speed

$= \left(\frac{5}{2} + 2\right)$kmph $= \frac{9}{2}$ kmph

$$\text{Time} = \frac{\text{Distance}}{\text{Relative speed}} = \frac{18}{\frac{9}{2}}$$

$$= \frac{18 \times 2}{9} = 4 \text{ hours}$$

29. (1) Journey on foot = x km

Journey on cycle = $(80 - x)$ km

$$\therefore \frac{x}{8} + \frac{80 - x}{16} = 7$$

$$\Rightarrow \frac{2x + 80 - x}{16} = 7$$

$\Rightarrow x + 80 = 16 \times 7 = 112$

$\Rightarrow x = 112 - 80 = 32$ km.

Aliter : Using Rule 13,

Here, x = 80, t = 7

u = 8, v = 16

$$\text{Time} = \left(\frac{vt - x}{v - u}\right)$$

$$= \left(\frac{16 \times 7 - 80}{16 - 8}\right)$$

$$= \left(\frac{112 - 80}{8}\right)$$

$$= \frac{32}{8} = 4 \text{ hrs}$$

Distance travelled

= 4 × 8 = 32 kms

30. (4) Distance covered by car in 2 hours

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

Remaining distance

= 300 – 120 = 180 km

Remaining time = 4 – 2

= 2 hours

$$\therefore \text{Required speed} = \frac{180}{2}$$

= 90 kmph

$$\text{Original speed of car} = \frac{120}{2}$$

= 60 kmph

$\therefore$ Required increase in speed

= 90 – 60 = 30 kmph

31. (2) Time taken in covering 5 Km

$= \frac{5}{10} = \frac{1}{2}$ hour

= 30 minutes

That person will take rest for four times.

$\therefore$ Required time

= (30 + 4 × 5) minutes

= 50 minutes

32. (2) Time = 12 minutes

$= \frac{12}{60}$ hour $= \frac{1}{5}$ hour

$$\text{Speed of train} = \frac{10}{\frac{1}{5}}$$

= 50 kmph

New speed = 50 – 5 = 45 kmph

$$\therefore \text{Required time} = \frac{\text{Distance}}{\text{Speed}}$$

$= \frac{10}{45} = \frac{2}{9}$ hour

$= \left(\frac{2}{9} \times 60\right)$ minutes

$= \frac{40}{3}$ minutes

Aliter : Using Rule 9,

Here, $S_1 = \frac{10}{12}$km / min

$= \frac{10}{12} \times 60$km / hr

= 50 km/hr, $t_1 = \frac{12}{60} = \frac{1}{5}$hr

S_2 = 45 km/hr, t_2 = ?

$S_1 t_1 = S_2 t_2$

$$50 \times \frac{1}{5} = 45 \times t_2$$

$$t_2 = \frac{10}{45} \times 60 \text{ min}$$

$$= \frac{40}{3} \text{ min}$$

33. (2) Using Rule 12,

Distance covered by motor cyclist P in 30 minutes

$= 30 \times \frac{1}{2} = 15$ km

Relative speed

= 40 – 30 = 10 kmph

$\therefore$ Required speed = Time taken to cover is km at 10 kmph

$= \frac{15}{10} = \frac{3}{2}$ hours

34. (1) Speed of B = x kmph (let)
Speed of A = $2x$ kmph

Speed of C = $\frac{x}{3}$ kmph

$\therefore \frac{\text{Speed of A}}{\text{Speed of C}} = \frac{2x}{\frac{x}{3}} = 6$

$\therefore$ Required time = $\frac{1}{6}$ of $\frac{3}{2}$ hours

= $\frac{1}{4}$ hour = 15 minutes

35. (4) Using Rule 12,

Distance covered by truck in $\frac{3}{2}$ hours
= Speed × Time

= 90 × $\frac{3}{2}$ = 135 km

Remaining distance
= 310 – 135 = 175 km
$\therefore$ Time taken at 70 kmph

= $\frac{175}{70}$ = 2.5 hours
$\therefore$ Total time = 1.5 + 2.5
= 4 hours

36. (3) Distance = Speed × Time
= 60 km.
Time taken at 40 kmph

= $\frac{60}{40} = \frac{3}{2}$ hours

Aliter : Using Rule 9,
Here, S_1 = 60, t_1 = 1
S_2 = 40, t_2 = ?
$S_1t_1 = S_2t_2$
$60 \times 1 = 40 \times t_2$

$t_2 = \frac{3}{2}$ hours.

37. (4) Distance of school = x km
Difference of time

= 16 minutes = $\frac{16}{60}$ hour

$\therefore \frac{x}{\frac{5}{2}} - \frac{x}{3} = \frac{16}{60}$

$\Rightarrow \frac{2x}{5} - \frac{x}{3} = \frac{4}{15}$

$\Rightarrow \frac{6x - 5x}{15} = \frac{4}{15}$

$\Rightarrow \frac{x}{15} = \frac{4}{15}$

$\Rightarrow x = \frac{4}{15} \times 15 = 4$ km

Aliter : Using Rule 10,

Here, $S_1 = \frac{5}{2}$, $t_1 = 6$

$S_2 = 3$, $t_2 = 10$

Distance = $\frac{(S_1 \times S_2)(t_1 + t_2)}{S_2 - S_1}$

= $\frac{\frac{5}{2} \times 3(6+10)}{3 - \frac{5}{2}}$

= $15 \times \frac{16}{60}$ km = 4 km.

38. (1) Using Rule 5,
Average speed of journey

= $\left(\frac{2xy}{x+y}\right)$ kmph

= $\frac{2 \times 40 \times 50}{40+50} = \frac{2 \times 40 \times 50}{90}$

= $\frac{400}{9} = 44\frac{4}{9}$ kmph

39. (1) 60 kmph = $\left(\frac{60 \times 5}{18}\right)$ m/sec

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

$\therefore$ Speed $\propto \frac{1}{\text{Time}}$

$\Rightarrow S_1 \times T_1 = S_2 \times T_2$

$\Rightarrow \frac{50}{3} \times \frac{9}{2} = 15 \times T_2$

$\Rightarrow 75 = 15 \times T_2$

$\Rightarrow T_2 = \frac{75}{15} = 5$ hours

Aliter : Using Rule 9,

Here, S_1 = 60, $t_1 = 4\frac{1}{2} = \frac{9}{2}$

$S_2 = 15 \times \frac{18}{5} = 54$

$S_1t_1 = S_2t_2$

$60 \times \frac{9}{2} = 54 \times t_2$

$t_2 = \frac{270}{54} = 5$ hours

40. (*) Speed of Romita = x kmph (let)
Distance = Speed × Time
According to the question,
$4 \times 6 + x \times 6 = 42$
$\Rightarrow 6x = 42 - 24 = 18$
$\Rightarrow x = 18 \div 6 = 3$ kmph
Aliter : Using Rule 11,
Distance from R to S
$= S_1t_1 + S_2t_2$
$42 = 4 \times 6 + x \times 6$
$6x = 18$ $x = 3$ km/hr.

41. (1) Distance travelled by farmer on foot = x km (let)
$\therefore$ Distance covered by cycling = $(61-x)$ km.

Time = $\frac{\text{Distance}}{\text{Speed}}$

According to the question,

$\frac{x}{4} + \frac{61-x}{9} = 9$

$\Rightarrow \frac{9x + 61 \times 4 - 4x}{9 \times 4} = 9$

$\Rightarrow 5x + 244 = 9 \times 9 \times 4 = 324$
$\Rightarrow 5x = 324 - 244 = 80$

$\Rightarrow x = \frac{80}{5} = 16$ km.

Aliter : Using Rule 13,
Here, t = 9, x= 61
u = 4, v = 9

Time taken = $\left(\frac{vt - x}{v - u}\right)$

= $\frac{9 \times 9 - 61}{9 - 4}$

= $\frac{20}{5} = 4$ hrs.

Distance travelled
= 4 × 4 = 16 km

42. (4) Distance = Speed × TIme

= $\left(40 \times 6\frac{1}{4}\right)$ km

= $\left(\frac{40 \times 25}{4}\right)$km = 250 km

New speed = 50 kmph
$\therefore$ Required time

= $\frac{\text{Distance}}{\text{Speed}} = \frac{250}{50} = 5$ hours

Aliter : Using Rule 9,

Here, $S_1 = 40$, $t_1 = 6\frac{15}{60} = \frac{25}{4}$

$S_2 = 50$, $t_2 = ?$

$S_1t_1 = S_2t_2$

$40 \times \frac{25}{4} = 50 \times t_2$

$t_2 = 5$ hrs.

43. (3) Distance between school and house = x km (let)

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

According to the question,

$$\frac{x}{\frac{5}{2}} - \frac{x}{\frac{7}{2}} = \frac{6+6}{60} = \frac{1}{5}$$

(Difference of time = 6 + 6 =12 minutes)

$$\Rightarrow \frac{2x}{5} - \frac{2x}{7} = \frac{1}{5}$$

$$\Rightarrow \frac{14x - 10x}{35} = \frac{1}{5} \Rightarrow \frac{4x}{35} = \frac{1}{5}$$

$$\Rightarrow 4x = \frac{35}{5} = 7$$

$$\Rightarrow x = \frac{7}{4} = 1\frac{3}{4} \text{ km.}$$

Aliter : Using Rule 10,

Here, $S_1 = 2\frac{1}{2}$, $t_1 = 6$

$S_2 = 3\frac{1}{2}$, $t_2 = 6$

$$\text{Distance} = \frac{(S_1 \times S_2)(t_1 + t_2)}{S_2 - S_1}$$

$$= \frac{\left(\frac{5}{2} \times \frac{7}{2}\right)(6+6)}{\frac{7}{2} - \frac{5}{2}}$$

$$= \frac{35}{4} \times \frac{12}{60}$$

$$= \frac{7}{4} \text{ km} = 1\frac{3}{4} \text{ km}$$

44. (3) Using Rule 1,

Let the total distance be $4x$ km.

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

According to the question,

$$\frac{x}{10} + \frac{3x}{12} = 7$$

$$\Rightarrow \frac{x}{10} + \frac{x}{4} = 7$$

$$\Rightarrow \frac{2x + 5x}{20} = 7$$

$$\Rightarrow 7x = 7 \times 20$$

$$\therefore x = \frac{7 \times 20}{7} = 20 \text{ km.}$$

$\therefore$ PQ = $4x = 4 \times 20 = 80$ km.

45. (1) Let the distance of school be x km.

Difference of time = 6 + 10

$$= 16 \text{ minutes} = \frac{16}{60} \text{ hour}$$

$$= \frac{4}{15} \text{ hour}$$

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\therefore \frac{x}{\frac{5}{2}} - \frac{x}{3} = \frac{4}{15}$$

$$\Rightarrow \frac{2x}{5} - \frac{x}{3} = \frac{4}{15}$$

$$\Rightarrow \frac{6x - 5x}{15} = \frac{4}{15}$$

$\Rightarrow x = 4$ km.

Aliter : Using Rule 10,

Here, $S_1 = 2\frac{1}{2}$, $t_1 = 6$

$S_2 = 3$, $t_2 = 10$

$$\text{Distance} = \frac{(S_1 \times S_2)(t_1 + t_2)}{S_2 - S_1}$$

$$= \frac{\frac{5}{2} \times 3(6 + 10)}{3 - \frac{5}{2}}$$

$$= 15 \times \frac{16}{60}$$

$$= \frac{16}{4} = 4 \text{ km}$$

46. (4) Using Rule 1,

Let the distance covered be $2x$ km.

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

According to the question,

$$\frac{x}{60} + \frac{x}{45} = 5\frac{15}{60} = 5\frac{1}{4}$$

$$\Rightarrow \frac{3x + 4x}{180} = \frac{21}{4}$$

$$\Rightarrow 7x = \frac{21}{4} \times 180$$

$$\Rightarrow x = \frac{21 \times 180}{4 \times 7} = 135 \text{ km.}$$

$\therefore$ Length of total journey

$= 2 \times 135 = 270$ km.

47. (3) Distance covered by car

$= 42 \times 10 = 420$ km.

New time = 7 hours

$$\therefore \text{ Required speed} = \frac{420}{7}$$

= 60 kmph.

$\therefore$ Required increase

= (60 – 42) kmph

= 18 kmph

48. (1) Distance of the office

= x km.

Difference of time = 2 hours

$$\therefore \frac{x}{8} - \frac{x}{12} = 2$$

$$\Rightarrow \frac{3x - 2x}{24} = 2$$

$$\Rightarrow \frac{x}{24} = 2 \Rightarrow x = 48 \text{ km.}$$

$\therefore$ Time taken at the speed of 8 kmph = $\frac{48}{8}$ = 6 hours

$\therefore$ Required time to reach the office at 10 a.m. i.e., in 5 hours

$$= \left(\frac{48}{5}\right) \text{ kmph}$$

= 9.6 kmph

49. (1) Speed of bus = 36 kmph.

$$= \left(36 \times \frac{5}{18}\right) \text{ m/sec.}$$

= 10 m/sec.

$\therefore$ Distance covered in 1 second = 10 metre

50. (3) Time taken by bus moving at 60 kmph = t hours

Distance = Speed × Time

$$\therefore 60 \times t = 45 \times \left(t + \frac{11}{2}\right)$$

$$\Rightarrow 60t - 45t = \frac{45 \times 11}{2}$$

$\Rightarrow 15t = \frac{45 \times 11}{2}$

$\Rightarrow t = \frac{45 \times 11}{15 \times 2} = \frac{33}{2}$ hours

$\therefore$ Required distance

$= \frac{60 \times 33}{2} = 990$ km.

51. (4) Speed of train = 116 kmph

$= \left(116 \times \frac{5}{18}\right)$ m./sec.

$= \left(\frac{580}{18}\right)$ m./sec.

$\therefore$ Required distance

= Speed × Time

$= \left(\frac{580}{18} \times 18\right)$ metre

= 580 metre

52. (4) Part of journey covered by bus and rickshaw

$= \frac{3}{4} + \frac{1}{6} = \frac{9+2}{12} = \frac{11}{12}$

Distance covered on foot

$= 1 - \frac{11}{12} = \frac{1}{12}$ part

$\therefore$ Total journey

= 12 × 2 = 24 km.

53. (3) Distance covered by train in 15 hours = Speed × Time

= (60 × 15) km. = 900 km.

Required speed to cover 900 km.

in 12 hours = $\frac{900}{12}$

= 75 kmph

54. (2) Distance = Speed × Time

= 330 × 10 = 3300 metre

$= \left(\frac{3300}{1000}\right)$ km. = 3.3 km.

55. (4) Let the required distance be x km.

Time = 2 hours 20 minutes

$= 2\frac{1}{3}$ hours

According to the question,

$\frac{x}{12} + \frac{x}{9} = \frac{7}{3}$

$\Rightarrow \frac{3x + 4x}{36} = \frac{7}{3}$

$\Rightarrow \frac{7x}{36} = \frac{7}{3}$

$\Rightarrow x = \frac{7}{3} \times \frac{36}{7} = 12$ km.

TYPE-II

1. (3) Using Rule 1,

Let the length of train be x metre

Speed = 90 km/hr

$= \frac{90 \times 5}{18}$ metre / sec.

= 25 metre/sec.

$\therefore$ Distance covered in 60 sec.

= 25 × 60 = 1500 metres

Now, according to question,

2x = 1500

$\therefore$ x = 750 metre

2. (3) Using Rule 1,

When a train crosses a bridge it covers the distance equal to length of Bridge & its own length

Let the length of the train be = x

$\therefore$ Speed of the train

$= \frac{x + 800}{100}$ m/s

Since train passes the 800 m bridge in 100 seconds.

Again, train passes the 400 m bridge in 60 seconds.

$\therefore \frac{400 + x}{\frac{x + 800}{100}} = 60$

$\Rightarrow \frac{(400 + x) \times 100}{x + 800} = 60$

$\Rightarrow 40000 + 100x$

$= 60x + 48000$

$\Rightarrow 100x - 60x = 48000 - 40000$

$\Rightarrow 40x = 8000$

$\therefore x = \frac{8000}{40} = 200$m

3. (3) In crossing the bridge, the train travels its own length plus the length of the bridge.

Total distance (length)

= 300 + 200 = 500 m.

Speed = 25m/sec.

$\therefore$ The required time

= 500 ÷ 25 = 20 seconds

Aliter : Using Rule 10,

Here, x = 300m, y= 200 m, t = ?

u= 25 m/sec

$t = \frac{x + y}{u}$

$= \frac{300 + 200}{25}$

$= \frac{500}{25}$ t = 20 seconds

4. (2) When a train crosses a tunnel, it covers a distance equal to the sum of its own length and tunnel.

Let the length of tunnel be x

Speed = 78 kmph

$= \frac{78 \times 1000}{60 \times 60}$ m/sec. $= \frac{65}{3}$ m/sec.

$\therefore$ Speed $= \frac{\text{Distance}}{\text{Time}}$

$\Rightarrow \frac{65}{3} = \frac{800 + x}{60}$

$\Rightarrow (800 + x) \times 3 = 65 \times 60$

$\Rightarrow 800 + x = 65 \times 20$ m

$\Rightarrow x = 1300 - 800 = 500$

$\therefore$ Length of tunnel = 500 metres.

Aliter : Using Rule 10,

Here, x = 800 m,

u = 78 km/hr

$= 78\frac{5}{18} = \frac{65}{3}$ m/sec

t = 1 min = 60 sec, y = ?

using $t = \frac{x + y}{u}$

$60 = \frac{800 + y}{\frac{65}{3}}$

$60 \times \frac{65}{3} = 800 + y$

1300 – 800 = y

y = 500 metres

5. (2) When a train crosses a railway platform, it travels a distance equal to sum of length of platform and its own length.

Speed = 132 kmph

$= 132 \times \frac{5}{18} = \frac{110}{3}$ m/sec.

$\therefore$ Required time

$= \frac{110 + 165}{\frac{110}{3}}$ seconds

$= \frac{275 \times 3}{110} = 7.5$ seconds

Aliter : Using Rule 10,

Here, x = 110m,

u = 132 km/hr.

$= 132 \times \frac{5}{18} = \frac{110}{3}$ m/sec

y = 165m, t = ?

using $t = \frac{x + y}{u}$

$t = \frac{110 + 165}{\frac{110}{3}}$

$$t = \frac{275 \times 3}{110}$$

$$= \frac{25 \times 3}{10} = \frac{15}{2} = 7.5 \text{ sec}$$

6. (3) Using Rule 10,
Let the length of the train be x metres.
When a train corsses a platform it covers a distance equal to the sum of lengths of train and platform. Also, the speed of train is same.

$$\therefore \frac{x+162}{18} = \frac{x+120}{15}$$

$\Rightarrow 6x + 720 = 5x + 810$
$\Rightarrow 6x - 5x = 810 - 720$
$\Rightarrow x = 90$
$\therefore$ The length of the train = 90m.

7. (3) Using Rule 10,
When a train croses a bridge, distance covered = length of (bridge + train).
$\therefore$ Speed of train

$$= \frac{150+500}{30}$$

$$= \frac{650}{30} = \frac{65}{3} \text{ m/sec.}$$

$\therefore$ Time taken to cross the 370m long platform

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

$$= \frac{520 \times 3}{65} = 24 \text{ seconds}$$

8. (4) Using Rule 10,
Speed of train = 90 kmph

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

Distance covered
= 230 + 120 = 350 m

$$\therefore \text{Time taken} = \frac{350}{25}$$

= 14 seconds

9. (4) Using Rule 10,
Let the length of train be x
According to the question,

$$\frac{x+600}{30} = 30$$

$\Rightarrow x + 600 = 900$
$\Rightarrow x = 900 - 600 = 300$ m

10. (4) Using Rule 10,
Let the length of the train be x
According to the question,

$$\frac{x+122}{17} = \frac{x+210}{25}$$

$\Rightarrow 25x + 3050 = 17x + 3570$
$\Rightarrow 25x - 17x = 3570 - 3050$
$\Rightarrow 8x = 520$

$$\Rightarrow x = \frac{520}{8} = 65 \text{ metres}$$

$\therefore$ Speed of the train

$$= \frac{65+122}{17}$$

$$= \frac{187}{17} \text{ metre/second}$$

= 11 metre/second

$$= \frac{11 \times 18}{5} \text{ kmph}$$

= 39.6 kmph

11. (3) Using Rule 10,
Let the Length of the train be x

$$\text{Then, } \frac{x+162}{18} = \frac{x+120}{15}$$

(Speed of the train)

$$\Rightarrow \frac{x+162}{6} = \frac{x+120}{5}$$

$\Rightarrow 6x + 720 = 5x + 810$
$\Rightarrow x = 810 - 720 = 90$
$\therefore$ Speed of the train

$$= \frac{90+162}{18} \text{ m/sec.}$$

$$= \frac{252}{18} \times \frac{18}{5} \text{ kmph}$$

= 50.4 kmph

12. (1) Using Rule 10,
Let the length of the train be x
$\therefore$ Speed of train

$$\frac{x+300}{21} = \frac{x+240}{18}$$

$$\Rightarrow \frac{x+300}{7} = \frac{x+240}{6}$$

$\Rightarrow 7x + 1680 = 6x + 1800$
$\Rightarrow x = 120$
$\therefore$ Speed of train

$$= \frac{x+300}{21} = \frac{420}{21} = 20 \text{ m/sec}$$

$$= \left(\frac{20 \times 18}{5}\right) \text{kmph} = 72 \text{ kmph}$$

13. (2) Speed of train

$$= \frac{\text{Sum of length of both trains}}{\text{Time taken}}$$

$$\Rightarrow \frac{60 \times 5}{18} = \frac{110+170}{t} = \frac{280}{t}$$

$$\Rightarrow t = \frac{280 \times 18}{60 \times 5} = 16.8 \text{ seconds.}$$

14. (4) Speed of train

$$= \frac{\text{Length of (train + platform)}}{\text{Time taken to cross}}$$

$$= \left(\frac{500+700}{10}\right) \text{ feet/second}$$

= 120 feet/second
Aliter : Using Rule 10,
Here, x = 500 feet, y = 700 feet
t = 10 seconds, u = ?

$$\text{using } t = \frac{x+y}{u}$$

$$u = \frac{500+700}{10}$$

= 120ft/second

15. (3) Speed of train = 36kmph

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

If the length of bridge be x metre, then

$$10 = \frac{200+x}{55}$$

$\Rightarrow 200 + x = 550$
$\Rightarrow x = 550 - 200 = 350$ metre.
Aliter : Using Rule 10,
Here, x = 200 m

$$u = 36 \text{ km/hr}, \frac{36 \times 5}{18} \text{ m/second}$$

= 10 m/sec
y = ?, t = 55 sec

$$\text{using } t = \frac{x+y}{u}$$

$$55 = \frac{200+y}{10}$$

$y = 550 - 200$
$y = 350$ m

16. (2) Using Rule 10,

$$36 \text{ kmph} = \left(36 \times \frac{5}{18}\right) \text{m/sec.}$$

= 10 m/sec.

$$\text{Required time} = \frac{270+180}{10}$$

= 45 seconds

17. (3) Using Rule 10,
Speed of train

$$= \frac{\text{Length of (train + platform)}}{\text{Time taken in crossing}}$$

$$= \frac{(50+100)}{10}$$

$$= \frac{150}{10} = 15 \text{ m/sec}$$

18. (2) Using Rule 10,
Speed of train

$$= \frac{\text{Length of platform and train}}{\text{Time taken in crossing}}$$

$$= \left(\frac{100+50}{10}\right) \text{ metre/second}$$

$$= 15 \text{ metre/second}$$

$$= \left(15 \times \frac{18}{5}\right) \text{kmph}$$

$$= 54 \text{ kmph}$$

19. (1) Using Rule 10,
Speed of train = 36 kmph

$$= \left(\frac{36 \times 5}{18}\right) \text{ m/sec.}$$

$$= 10 \text{ m/sec}$$

Required time

$$= \frac{\text{Length of train and bridge}}{\text{Speed of train}}$$

$$= \frac{120+360}{10} = \frac{480}{10}$$

$$= 48 \text{ seconds}$$

20. (4) Using Rule 10,
Time = 5 minutes

$$= \frac{1}{12} \text{ hour}$$

$\therefore$ Length of bridge = Speed $\times$ Time

$$= 15 \times \frac{1}{12} = \frac{5}{4} \text{ km.}$$

$$= \left(\frac{5}{4} \times 1000\right) \text{ metre}$$

$$= 1250 \text{ metre}$$

21. (1) Using Rule 10,
Speed of train = 72 kmph

$$= \left(\frac{72 \times 5}{18}\right) \text{m/sec.}$$

$$= 20 \text{ m/sec.}$$

Required time

$$= \frac{\text{Length of train and bridge}}{\text{Speed of train}}$$

$$= \frac{(200+800)}{20}$$

$$= \frac{1000}{20} = 50 \text{ seconds}$$

22. (2) Using Rule 10,
Length of train = x metre (let)
Speed of train

$$= \frac{\text{(Length of train and bridge)}}{\text{Time taken in crossing}}$$

$$\Rightarrow \frac{x+500}{100} = \frac{x+250}{60}$$

$$\Rightarrow \frac{x+500}{5} = \frac{x+250}{3}$$

$$\Rightarrow 5x + 1250 = 3x + 1500$$

$$\Rightarrow 5x - 3x = 1500 - 1250$$

$$\Rightarrow 2x = 250$$

$$\Rightarrow x = \frac{250}{2} = 125 \text{ metre}$$

23. (1) Speed of train

$$= \frac{\text{length of platform and train}}{\text{Time taken in crossing}}$$

$$= \left(\frac{450+150}{20}\right) \text{ m/sec.}$$

$$= \left(\frac{600}{20}\right) \text{ m/sec.}$$

$$= \left(30 \times \frac{18}{5}\right) \text{ kmph}$$

$$= 108 \text{ kmph.}$$

24. (4) Let the length of train be x metre.

When a train crosses a platform, distance covered by it = length of train and platform.

$\therefore$ Speed of train

$$= \frac{x+50}{14} = \frac{x}{10}$$

$$\Rightarrow \frac{x+50}{7} = \frac{x}{5}$$

$$\Rightarrow 7x = 5x + 250$$

$$\Rightarrow 7x - 5x = 250$$

$$\Rightarrow 2x = 250 \Rightarrow x = \frac{250}{2}$$

$$= 125 \text{ metre}$$

$\therefore$ Speed of train $= \frac{x}{10}$

$$= \left(\frac{125}{10}\right) \text{ m./sec.}$$

$$= \left(\frac{125}{10} \times \frac{18}{5}\right) \text{ kmph}$$

$$= 45 \text{ kmph.}$$

25. (3) Let, length of train = length of platform = x metre
Speed of train = 90 kmph

$$= \left(\frac{90 \times 5}{18}\right) \text{ m/sec.}$$

$$= 25 \text{ m/sec.}$$

$\therefore$ Speed of train

$$= \frac{\text{Length of train and platform}}{\text{Time taken in crossing}}$$

$$\Rightarrow 25 = \frac{2x}{60} \Rightarrow 2x = 25 \times 60$$

$$\Rightarrow x = \frac{25 \times 60}{2} = 750 \text{ metre}$$

26. (2) Speed of train

$$= \frac{\text{Length of train and platform}}{\text{Time taken in crossing}}$$

$$= \left(\frac{221+500}{35}\right) \text{ metre/second}$$

$$= \left(\frac{721}{35}\right) \text{ metre/second}$$

$$= \left(\frac{721 \times 18}{35 \times 5}\right) \text{ kmph}$$

$$= 74.16 \text{ kmph}$$

27. (3) Speed of train
= 54 kmph

$$= \left(\frac{54 \times 5}{18}\right) \text{ m/sec.}$$

$$= 15 \text{ m/sec.}$$

$\therefore$ Required time

$$= \frac{\text{Length of train and bridge}}{\text{Speed of train}}$$

$$= \left(\frac{200+175}{15}\right) \text{seconds}$$

$$= \left(\frac{375}{15}\right) \text{ seconds}$$

$$= 25 \text{ seconds}$$

TYPE-III

1. (3) Using Rule 5,
Relative speed of man and train
= 20 – 10 = 10m/sec.

$\therefore$ Required time $= \frac{180}{10}$

= 18 seconds

2. (3) Using Rule 1,
In this situation, the train covers it length.
Required time

$= \frac{100}{30 \times 1000}$hr.

$= \frac{100 \times 60 \times 60}{30 \times 1000}$ = 12 seconds

3. (2) Using Rule 5,
Relative speed of train
= 63–3 = 60 kmph

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

$\therefore$ Time = $\frac{\text{Length of train}}{\text{Relative Speed}}$

$= \frac{500 \times 18}{60 \times 5}$ = 30 sec.

4. (2) Using Rule 1,

Speed $= \frac{\text{Distance}}{\text{Time}}$

$= \frac{125}{30} = 4.16$m/s

4.16 m/s $= 4.16 \times \frac{18}{5}$

= 15 km/hr

5. (1) Using Rule 1,
In crossing a man standing on platform, train crosses its own length.
$\therefore$ Speed of train

$= \frac{120}{10} = 12$ m/s

6. (3) Using Rule 1,
Speed of train (in m/s)

= 20 × $\frac{5}{18} = \frac{50}{9}$ m/sec

Required time = $\frac{75}{50} \times 9$

= 13.5 seconds

7. (1) Using Rule 1,
Speed of the train

= 144 kmph $= 144 \times \frac{5}{18}$

= 40 m/s
When a train crosses a pole, it covers a distance equal to its own length.

The required time = $\frac{100}{40}$

$= \frac{5}{2} = 2.5$ seconds.

8. (3) Using Rule 1,
Speed of train

$= \frac{120}{9} \times \frac{18}{5}$ = 48 kmph

9. (4) Using Rule 1,
Speed of train = 60 kmph

= 60 × $\frac{5}{18} = \frac{50}{3}$ m/sec

$\therefore$ Length of train
= Speed × Time

$= \frac{50}{3} \times 30$ = 500 m

10. (3) Let the speed of train be x kmph and its length be y km.
When the train crosses a man, it covers its own length
According to he question,

$\frac{y}{(x-3) \times \frac{5}{18}} = 10$

$\Rightarrow 18y = 10 \times 5(x-3)$
$\Rightarrow 18y = 50x - 150$ ..... (i)

and, $\frac{y}{(x-5) \times \frac{5}{18}} = 11$

$\Rightarrow 18y = 55(x-5)$
$\Rightarrow 18y = 55x - 275$ .... (ii)
From equations (i) and (ii),
$55x - 275 = 50x - 150$
$\Rightarrow 55x - 50x = 275 - 150$
$\Rightarrow 5x = 125$

$\Rightarrow x = \frac{125}{5} = 25$

$\therefore$ Speed of the train = 25 kmph
Aliter : Using Rule 7,
Here, $S_1 = 3$, $S_2 = 5$

$t_1 = \frac{10}{3600}$, $t_2 = \frac{11}{3600}$

Speed of train = $\frac{t_1 S_1 - t_2 S_2}{t_1 - t_2}$

$= \frac{\frac{3 \times 10}{3600} - \frac{5 \times 11}{3600}}{\frac{10}{3600} - \frac{11}{3600}}$

$= \frac{-25}{3600} \times \frac{3600}{-1}$

= 25 m/sec

11. (4) Using Rule 5,
Relative speed of train
= (36 – 9) kmph = 27 kmph

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

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

$\therefore$ Required time

= $\frac{\text{Length of the train}}{\text{Relative speed}}$

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

12. (3) Distance covered in 10 minutes at 20kmph = distance covered in 8 minutes at (20 + x) kmph

$\Rightarrow 20 \times \frac{10}{60} = \frac{8}{60}(20 + x)$
$\Rightarrow 200 = 160 + 8x$
$\Rightarrow 8x = 40$

$\Rightarrow x = \frac{40}{8} = 5$ kmph

13. (4) Using Rule 5,
If the speed of the train be x kmph, then relative speed
= (x – 3) kmph.

or (x – 3) × $\frac{5}{18}$ m/sec

$\therefore \frac{300}{(x-3) \times \frac{5}{18}} = 33$

$\Rightarrow 5400 = 33 \times 5\ (x - 3)$
$\Rightarrow 360 = 11\ (x - 3)$
$\Rightarrow 11x - 33 = 360$

$\Rightarrow x = \frac{393}{11} = 35\frac{8}{11}$ kmph

14. (3) Using Rule 6,
If the speed of train be x kmph then,
Its relative speed = (x + 3) kmph

$\therefore$ Time = $\frac{\text{Length of the train}}{\text{Relative speed}}$

$\Rightarrow \frac{10}{3600} = \frac{\frac{240}{1000}}{(x+3)} = \frac{240}{1000(x+3)}$

$\Rightarrow x + 3 = 86.4$
$\Rightarrow x = 83.4$ kmph

15. (2) Using Rule 1,
Speed of train = 36 kmph

$= \left(\frac{36 \times 5}{18}\right)$ m/sec = 10 m/sec.

$\therefore$ Length of train
= Speed × time
= 10 × 25 = 250 metre

16. (4) Using Rule 1,
Speed of train = 90 kmph

$= \left(\frac{90 \times 5}{18}\right)$ metre/second

= 25 metre/second
If the length of the train be x then,
Speed of train

$= \frac{\text{Length of train}}{\text{Time taken in crossing the signal}}$

$\Rightarrow 25 = \frac{x}{10}$

$\Rightarrow x$ = 250 metre

17. (1) Using Rule 6,
Let speed of train be x kmph
Relative speed = $(x + 5)$ kmph

Length of train = $\frac{100}{1000}$ km

$= \frac{1}{10}$ km

$\therefore \frac{\frac{1}{10}}{x+5} = \frac{36}{5 \times 60 \times 60}$

$\Rightarrow \frac{1}{10(x+5)} = \frac{1}{500}$

$\Rightarrow x + 5 = 50$
$\Rightarrow x = 45$ kmph

18. (1) Using Rule 1,
Speed of train

$= \frac{\text{Length of train}}{\text{Time taken in crossing the pole}}$

$= \frac{120}{6} = 20$ m/sec

$= 20 \times \frac{18}{5} = 72$ kmph

19. (1) Using Rule 1,
Speed of train = 54 kmph

$= \left(\frac{54 \times 5}{18}\right)$ m/sec = 15 m/sec

Required time

$= \frac{\text{Length of trains}}{\text{Speed of train}}$

$= \frac{300}{15}$ = 20 seconds

20. (4) Using Rule 1,
Speed of train = 90 kmph

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

= 25 m/sec.

When a train crosses a post, it covers a distance equal to its own length.

$\therefore$ Required time = $\frac{\text{Distance}}{\text{Speed}}$

$= \frac{180}{25}$ = 7.2 seconds

21. (1) Let the required distance be x km.
Difference of time = 7 + 5 = 12 minutes = $\frac{1}{5}$ hour

Time = $\frac{\text{Distance}}{\text{Speed}}$

According to the question,

$\frac{x}{5} - \frac{x}{6} = \frac{1}{5}$

$\Rightarrow \frac{6x - 5x}{30} = \frac{1}{5}$

$\Rightarrow \frac{x}{30} = \frac{1}{5}$

$\Rightarrow x = \frac{30}{5}$ = 6 km.

22. (2) Using Rule 1,
If the length of train be x metre, then speed of train

$= \frac{x}{20} = \frac{x + 250}{45}$

$\Rightarrow \frac{x}{4} = \frac{x + 250}{9}$
$\Rightarrow 9x = 4x + 1000$
$\Rightarrow 9x - 4x = 1000$
$\Rightarrow 5x = 1000$
$\Rightarrow x = \frac{1000}{5}$
= 200 metre

23. (4) Using Rule 1,
Speed of train

$= \frac{\text{Length of train}}{\text{Time taken in crossing}}$

$= \frac{250}{50}$ = 5 m/sec.

$= \left(5 \times \frac{18}{5}\right)$ kmph

= 18 kmph

24. (1) $\therefore$ Speed of train A

$= \frac{150}{30}$ = 5 m/sec.

Speed of train B = x m/sec.
Relative speed = $(5+x)$ m/sec.
$\therefore$ Length of both trains = Relative speed × Time
$\Rightarrow 300 = (5 + x) \times 10$

$\Rightarrow 5 + x = \frac{300}{10} = 30$

$\Rightarrow x = 30 - 5 = 25$ m/sec.

$= \left(\frac{25 \times 18}{5}\right)$ kmph.

= 90 kmph.

25. (1) Distance covered in crossing a pole = Length of train
Speed of train = 72 kmph

$= \left(\frac{72 \times 5}{18}\right)$ m./sec.

= 20 m./sec.

$\therefore$ Required time = $\frac{160}{20}$

= 8 seconds

26. (3) Speed of train = 50 kmph

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

$= \frac{125}{9}$ m./sec.

$\therefore$ Required time

$= \left(\frac{100}{\frac{125}{9}}\right)$ seconds

$= \left(\frac{100 \times 9}{125}\right)$ seconds

= 7.2 seconds

27. (4) Distance covered by train in crossing a telegraphic post = length of train

$\therefore$ Speed of train = $\frac{\text{Distance}}{\text{Time}}$

$= \left(\frac{150}{12}\right)$ m./sec.

$= \left(\frac{150}{12} \times \frac{18}{5}\right)$ kmph

= 45 kmph

28. (4) Speed of train = 36 kmph

$= \left(\frac{36 \times 5}{18}\right)$ m./sec.

= 10 m./sec.

∴ Required time

$= \frac{\text{Length of train}}{\text{Speed of train}}$

$= \frac{60}{10}$ = 6 seconds

29. (3) When a train crosses a pole it travels a distance equal to its length.

∴ Speed of train

$= \frac{240}{16}$ = 15 m./sec.

$= \left(15 \times \frac{18}{5}\right)$ kmph

= 54 kmph.

30. (2) Distance covered by train = Length of train

Speed of train = 60 kmph

$= \left(\frac{60 \times 5}{18}\right)$ m./sec.

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

∴ Required time = $\frac{\text{Distance}}{\text{Speed}}$

$= \left(\frac{75}{\frac{50}{3}}\right)$ seconds

$= \frac{75 \times 3}{50}$ seconds

= 4.5 seconds

31. (2) Speed of train = 120 kmph.

$= \left(\frac{120 \times 5}{18}\right)$ m./sec.

$= \frac{100}{3}$ m./sec.

∴ Required time = $\frac{\text{Length of train}}{\text{Speed of train}}$

$= \left(\frac{100}{\frac{100}{3}}\right)$ seconds

$= \left(\frac{100}{100} \times 3\right)$ seconds

= 3 seconds

TYPE-IV

1. (3) Distance travelled by first train in one hour

= 60 × 1 = 60km

A ⟵ 330km ⟶ B

Therefore, distance between two train at 9 a.m.

= 330 – 60 = 270 km

Now, Relative speed of two trains

= 60 + 75 = 135 km/hr

∴ Time of meeting of two trains

$= \frac{270}{135}$ = 2 hrs.

Therefore, both the trains will meet at 9 + 2 = 11 A.M.

2. (2) Using Rule 6,

Men are walking in opposite directions. Hence, they will cover the length of bridge at their relative speed.

Required time

$= \frac{1200}{(5+10)}$ = 80 minutes

3. (2) Using Rule 3,

If two trains be moving in opposite directions at rate u and v kmph respectively, then their relative speed

= $(u + v)$ kmph.

Further, if their length be x and y km. then time taken to cross each other $= \frac{x+y}{u+v}$ hours.

Here,

Total length = 160 + 140

= 300m.

Relative speed = (77 + 67) kmph

= 144 kmph $= 144 \times \frac{5}{18}$ m/s

or 40 m/sec.

∴ Time $= \frac{300}{40} = 7\frac{1}{2}$ Seconds

4. (3) Using Rule 3,

Let the speed of each train be x kmph.

Their relative speed

= $x + x = 2x$ kmph.

Time taken

$= \frac{\text{Total length of trains}}{\text{Relative Speed}}$

$= \frac{12}{60 \times 60} = \frac{240 \times \frac{1}{1000}}{2x}$

$= \frac{1}{300} = \frac{120}{1000x}$

$x = \frac{300 \times 120}{1000} = 36$

The required speed = 36 kmph.

5. (2) Using Rule 3,

Total length of trains

= 140 + 160 = 300 m.

Relative speed = 60 + 40

= 100 kmph

$= 100 \times \frac{5}{18}$ m/sec.

or $\frac{250}{9}$ m/sec.

∴ Time taken to cross each other

$= \frac{300}{\frac{250}{9}} = \frac{300 \times 9}{250} = 10.8$ sec.

6. (3) Let train A start from station A and B from station B.

Let the trains A and B meet after t hours.

∴ Distance covered by train A in t hours = $50t$

Distance covered by train B in t hours = $60t$ km

According to the question,

$60t - 50t = 120$

$\Rightarrow t = \frac{120}{10}$ = 12 hours.

∴ Distance AB = 50 × 12 + 60 × 12 = 600 + 720 = 1320 km

Aliter : Using Rule 12,

Here, a = 60, b = 50, d = 120

Distance between A and B

$= \left(\frac{a+b}{a-b}\right) \times d$

$= \left(\frac{60+50}{60-50}\right) \times 120$

$= \frac{110}{10} \times 120$ = 1320 km

7. (2) Let the speed of second train be x m/s.

80 km/h = $\frac{80 \times 5}{18}$ m / s

According to the question

$\frac{1000}{x + \frac{80 \times 5}{18}} = 18$

$\Rightarrow 1000 = 18x + 400$

$\therefore x = \frac{600}{18}$ m/s

$= \frac{600}{18} \times \frac{18}{5}$ km/h $= 120$ km/h

8. (2) Using Rule 3,
Length of both trains
= 105 + 90 = 195 m.
Relative speed = (45 + 72)
= 117 kmph

$= 117 \times \frac{5}{18}$ or $\frac{65}{2}$ m/sec.

$\therefore$ Time taken $= \frac{195}{\frac{65}{2}} = \frac{195 \times 2}{65}$

= 6 seconds

9. (1) Using Rule 3,
Let the length of each train be x metre.

Speed of first train = $\frac{x}{18}$ m/sec

Speed of second train = $\frac{x}{12}$ m/sec

When both trains cross each other, time taken

$= \frac{2x}{\frac{x}{18} + \frac{x}{12}}$

$= \frac{2x}{\frac{2x + 3x}{36}} = \frac{2x \times 36}{5x}$

$= \frac{72}{5}$ = 14.4 seconds

10. (4) Using Rule 3,
Let the speed of the second train be x m/s
Speed of first train

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

Relative speed of trains
= $(x + 10)$ m/s
Total distance covered
= 150 + 150 = 300 metre

$\therefore$ Time taken = $\frac{300}{x + 10}$

$\Rightarrow \frac{300}{x + 10} = 12$

$\Rightarrow 12x + 120 = 300$

$\Rightarrow 12x = 300 - 120 = 180$

$\Rightarrow x = \frac{180}{12} = 15$ m/s

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

11. (4) Let the length of the train travelling at 48 kmph be x metres.
Let the length of the platform be y metres.
Relative speed of train
= (48 + 42) kmph

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

= 25 m./sec.
and 48 kmph

$= \frac{48 \times 5}{18} = \frac{40}{3}$ m./sec.

According to the question,

$\frac{x + \frac{x}{2}}{25} = 12$

$\Rightarrow \frac{3x}{2 \times 25} = 12$

$\Rightarrow 3x = 2 \times 12 \times 25 = 600$

$\Rightarrow x = 200$ m.

Also, $\frac{200 + y}{40 / 3} = 45$

$\Rightarrow 600 + 3y = 40 \times 45$

$\Rightarrow 3y = 1800 - 600 = 1200$

$\Rightarrow y = \frac{1200}{3} = 400$ m.

12. (2) Let two trains meet after t hours when the train from town A leaves at 8 AM.
$\therefore$ Distance covered in t hours at 70 kmph + Distance covered in $(t - 2)$ hours at 110 kmph = 500km
$\therefore$ $70t + 110 (t - 2) = 500$
$\Rightarrow 70t + 110t - 220 = 500$
$\Rightarrow 180\ t = 500 + 220 = 720$

$\Rightarrow t = \frac{720}{180} = 4$ hours

Hence, the trains will meet at 12 noon.

13. (3) Using Rule 3,
Relative speed
= (68 + 40) kmph = 108 kmph

$= \left(\frac{108 \times 5}{18}\right)$ m/s or 30 m/s

$\therefore$ Required time

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

$= \left(\frac{70 + 80}{30}\right)$ second = 5 seconds

14. (3) Using Rule 3,
When a train crosses a telegraph post, it covers its own length.

$\therefore$ Speed of first train $= \frac{120}{10}$

= 12 m/sec.

Speed of second train $= \frac{120}{15}$

= 8 m/sec.
Relative speed = 12 + 8
= 20 m/sec.
Required time

$= \frac{\text{Total length of trains}}{\text{Relative speed}}$

$= \frac{2 \times 120}{20}$ = 12 seconds.

15. (3) Using Rule 3,
Relative speed = 42 + 48
= 90 kmph

$= \left(\frac{90 \times 5}{18}\right)$ m/s = 25 m/s

Sum of the length of both trains
= 137 + 163 = 300 metres
$\therefore$ Required time

$= \frac{300}{25} = 12$ seconds

16. (1) Using Rule 3,
Speed of second train
= 43.2 kmph

$= \frac{43.2 \times 5}{18}$ m/sec.

or 12 m/sec.
Let the speed of first train be x m per second, then

$\frac{150 + 120}{x + 12} = 10$

$\Rightarrow 27 = x + 12$
$\Rightarrow x = 15$ m/s

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

17. (1) Let the trains meet after t hours

Then, $21t - 16t = 60$

$\Rightarrow 5t = 60 \Rightarrow t = 12$ hours

$\therefore$ Distance between A and B

$= (16 + 21) \times 12$

$= 37 \times 12 = 444$ miles

Aliter : Using Rule 13,

Here, a = 21, b = 16, d = 60

Distance between A and B

$= \left(\frac{a+b}{a-b}\right) \times d$

$= \left(\frac{21+16}{21-16}\right) \times 60$

$= \frac{37}{5} \times 60$

$= 37 \times 12 = 444$ miles

18. (3) Using Rule 3,

Relative speed = 45 + 54

= 99 kmph

$= \left(99 \times \frac{5}{18}\right)$ m/sec.

or $\frac{55}{2}$ m/sec.

$\therefore$ Required time $= \frac{108+112}{\frac{55}{2}}$

$= \frac{220 \times 2}{55} = 8$ seconds

19. (2) Let the length of each train be x metres

Then, Speed of first train $= \frac{x}{3}$ m/sec

Speed of second train $= \frac{x}{4}$ m/sec

They are moving in opposite directions

$\therefore$ Relaive speed $= \frac{x}{3} + \frac{x}{4}$

$= \frac{4x+3x}{12} = \frac{7x}{12}$ m/sec.

Total length = $x + x = 2x$ m.

$\therefore$ Time taken $= \frac{2x}{\frac{7x}{12}} = \frac{24}{7}$

$= 3\frac{3}{7}$ sec.

20. (2) Using Rule 3,

Total length of both trains = 250 metres

Let speed of second train = x kmph

Relative speed = $(65 + x)$ kmph

$= (65 + x) \times \frac{5}{18}$ m/sec

$\therefore$ Time

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

$\Rightarrow 6 = \frac{250}{(65 + x) \times \frac{5}{18}}$

$\Rightarrow 6 \times \frac{5}{18} \times (65 + x) = 250$

$\Rightarrow 65 + x = \frac{250 \times 3}{5}$

$\Rightarrow 65 + x = 150$

$\Rightarrow x = 150 - 65 = 85$ kmph

21. (3) Using Rule 6,

Relative speed = (84 + 6)

= 90 kmph

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

= 25 m/sec.

$\therefore$ Length of train

= Relative speed × Time

= 25 × 4 = 100 metre

22. (3) Using Rule 11,

$\frac{\text{Speed of X}}{\text{Speed of Y}}$

$= \sqrt{\frac{\text{Time taken by Y}}{\text{Time taken by X}}}$

$\Rightarrow \frac{45}{y} = \sqrt{\frac{3 \text{ hours } 20 \text{ min.}}{4 \text{ hours } 48 \text{ min.}}}$

$\Rightarrow \frac{45}{y} = \sqrt{\frac{200 \text{ minutes}}{288 \text{ minutes}}}$

$= \frac{10}{12}$

$\Rightarrow 10y = 12 \times 45$

$\Rightarrow y = \frac{12 \times 45}{10} = 54$ kmph

23. (3) Let P and Q meet after t hours.

Distance = speed × time

According to the question,

$30t - 20t = 36$

$\Rightarrow 10t = 36$

$\Rightarrow t = \frac{36}{10} = 3.6$ hours

$\therefore$ Distance between P and Q

$= 30t + 20t$

$= 50t = (50 \times 3.6)$ km.

$= 180$ km.

Aliter : Using Rule 13,

Here, a = 30, b = 20, d = 36

Required distance

$= \left(\frac{a+b}{a-b}\right) \times d$

$= \left(\frac{30+20}{30-20}\right) \times 36$

$= \frac{50}{10} \times 36 = 180$ km

24. (3)

Speed of train starting from Q = x kmph

$\therefore$ Speed of train starting from P = $(x + 8)$ kmph

According to the question,

PR + RQ = PQ

$\Rightarrow (x + 8) \times 6 + x \times 6 = 162$

[Distance = Speed × Time]

$\Rightarrow 6x + 48 + 6x = 162$

$\Rightarrow 12x = 162 - 48 = 114$

$\Rightarrow x = \frac{114}{12} = \frac{19}{2}$

$= 9\frac{1}{2}$ kmph

25. (1) Let the trains meet after t hours.

Distance = Speed × Time

According to the question,

$75t - 50t = 175$

$\Rightarrow 25t = 175$

$\Rightarrow t = \frac{175}{25} = 7$ hours

$\therefore$ Distance between A and B

$= 75t + 50t = 125t$

$= 125 \times 7 = 875$ km.

Aliter : Using Rule 13,

Here, a = 75, b = 50, d = 175

Required distance

$= \left(\frac{a+b}{a-b}\right) \times d$

$= \left(\frac{75+50}{75-50}\right) \times 175$

$= \frac{125}{25} \times 175$

$= 125 \times 7 = 875$ km

26. (4) Using Rule 3,
Relative speed
= (50 + 58) kmph

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

= 30 m/sec

$\therefore$ Required time

$= \frac{\text{Total length of trains}}{\text{Relative speed}}$

$= \left(\frac{150+180}{30}\right)$ seconds

$= \left(\frac{330}{30}\right)$ seconds

= 11 seconds

27. (1) Let the trains meet each other after t hours.
Distance = Speed × Time
According to the question,
$21t - 14t = 70$

$\Rightarrow 7t = 70 \Rightarrow t = \frac{70}{7}$

= 10 hours

$\therefore$ Required distance
$= 21t + 14t = 35t$
$= 35 \times 10 = 350$ km.
Aliter : Using Rule 13,
Here, a = 21, b = 14, d = 70
Required distance

$= \left(\frac{a+b}{a-b}\right) \times d$

$= \left(\frac{21+14}{21-14}\right) \times 70$

$= \frac{35}{7} \times 70 = 350$ km.

TYPE-V

1. (3) Since the train runs at $\frac{7}{11}$ of its own speed, the time it takes is $\frac{11}{7}$ of its usual speed.

Let the usual time taken be t hours.

Then we can write, $\frac{11}{7}t = 22$

$\therefore t = \frac{22 \times 7}{11} = 14$ hours

Hence, time saved
= 22 – 14 = 8 hours

2. (3) $\frac{3}{5}$ of usual speed will take $\frac{5}{3}$ of usual time.

[$\because$ time & speed are inversely proportional]

$\therefore \frac{5}{3}$ of usual time

= usual time + $\frac{5}{2}$

$\Rightarrow \frac{2}{3}$ of usual time = $\frac{5}{2}$

$\Rightarrow$ usual time

$= \frac{5}{2} \times \frac{3}{2} = \frac{15}{4} = 3\frac{3}{4}$ hours.

Aliter : Using Rule 8,

Here, A = 3, B = 5, $t = 2\frac{1}{2}$

Usual time

$= \frac{A}{\text{Diff. of A and B}} \times \text{time}$

$= \frac{3}{5-3} \times 2\frac{1}{2}$

$= \frac{3}{2} \times \frac{5}{2}$

$= \frac{15}{4} = 3\frac{3}{4}$ hours

3. (2) 1 hr 40 min 48 sec

$= 1 \text{ hr } \left(40 + \frac{48}{60}\right)$ min

$= 1 \text{ hr } \left(40 + \frac{4}{5}\right)$ min

$= 1 \text{ hr } \frac{204}{5}$ min

$= \left(1 + \frac{204}{300}\right)$ hr $= \frac{504}{300}$ hr

$\therefore$ Speed $= \frac{42}{\frac{504}{300}} = 25$ kmph

Now, $\frac{5}{7} \times$ usual speed = 25

$\therefore$ Usual speed $= \frac{25 \times 7}{5}$

= 35 kmph

4. (3) $\frac{4}{3} \times$ usual time – usual time = 2

$\Rightarrow \frac{1}{3}$ usual time = 2

$\therefore$ Usual time = 2 × 3 = 6 hours
Aliter : Using Rule 8,

Here, $\frac{A}{B} = \frac{3}{4}$, time= 2 hrs.

Usual Speed

$= \frac{A}{\text{Diff. of A \& B}} \times \text{time}$

$= \frac{3}{(4-3)} \times 2 = 6$ hours

5. (2) $\frac{4}{3}$ of usual time

= Usual time + 20 minutes

$\therefore \frac{1}{3}$ of usual time = 20 minutes

$\Rightarrow$ Usual time = 20 × 3
= 60 minutes
Aliter : Using Rule 8,
Here, A = 3, B= 4, t = 20 minutes
Usual time taken

$= \frac{A}{\text{Diff. of A \& B}} \times \text{time}$

$= \frac{3}{(4-3)} \times 20 = 60$ minutes

6. (1) Time and speed are inversely proportional.

$\therefore \frac{4}{3}$ of usual time – usual time

$= \frac{3}{2}$

$\Rightarrow \frac{1}{3} \times$ usual time $= \frac{3}{2}$

$\therefore$ Usual time $= \frac{3 \times 3}{2} = \frac{9}{2}$

$= 4\frac{1}{2}$ hours

Aliter : Using Rule 8,

Here, A = 3, B = 4, t= $\frac{3}{2}$

Usual time

$= \frac{A}{\text{Diff. of A \& B}} \times \text{time}$

$= \frac{3}{(4-3)} \times \frac{3}{2}$

$= 4\frac{1}{2}$ hrs.

7. (1) Time and speed are inversely proportional.

$\therefore \frac{7}{6} \times$ Usual time – Usual time

= 25 minutes

$\Rightarrow$ Usual time $\left(\frac{7}{6}-1\right)$

= 25 minutes

$\Rightarrow$ Usual time $\times \frac{1}{6}$

= 25 minutes

$\therefore$ Usual time = 25 × 6

= 150 minutes

= 2 hours 30 minutes

Aliter : Using Rule 8,

Here, A = 6, B = 7,

$t = \frac{25}{60} = \frac{5}{12}$ hrs.

Usual time

$= \frac{A}{\text{Diff. of A \& B}} \times \text{time}$

$= \frac{6}{(7-6)} \times \frac{5}{12} = \frac{5}{2}$ hrs.

= 2 hours 30 minutes

8. (2) Time and speed are inversely proportional.

$\therefore$ Usual time $\times \frac{7}{6}$ – usual time

= 12 minutes

$\Rightarrow$ Usual time $\times \frac{1}{6} = 12$ minutes

$\therefore$ Usual time = 72 minutes

= 1 hour 12 minutes

Aliter : Using Rule 8,

Here, A = 6, B = 7,

$t = \frac{12}{60} = \frac{1}{5}$ hrs.

Usual time

$= \frac{A}{\text{Diff. of A \& B}} \times \text{time}$

$= \frac{6}{(7-6)} \times \frac{1}{5} = 1\frac{1}{5}$ hrs.

= 1 hrs. 12 minutes

9. (2) Fixed distance = x km and certain speed = y kmph (let).

Case I,

$\frac{x}{y+10} = \frac{x}{y} - 1$

$\Rightarrow \frac{x}{y+10} + 1 = \frac{x}{y}$ --- (i)

Case II,

$\frac{x}{y+20} = \frac{x}{y} - 1 - \frac{3}{4}$

$= \frac{x}{y} - \frac{4+3}{4}$

$\Rightarrow \frac{x}{y+20} + \frac{7}{4} = \frac{x}{y}$ --- (ii)

From equations (i) and (ii),

$\frac{x}{y+10} + 1 = \frac{x}{y+20} + \frac{7}{4}$

$\Rightarrow \frac{x}{y+10} - \frac{x}{y+20} = \frac{7}{4} - 1$

$\Rightarrow x\left(\frac{y+20-y-10}{(y+10)(y+20)}\right)$

$= \frac{7-4}{4} = \frac{3}{4}$

$\Rightarrow \frac{x \times 10}{(y+10)(y+20)} = \frac{3}{4}$

$\Rightarrow 3\ (y + 10)\ (y + 20) = 40\ x$

$\Rightarrow \frac{3(y+10)(y+20)}{40} = x$ --(iii)

From equation (i),

$\frac{3(y+10)(y+20)}{40(y+10)} + 1$

$= \frac{3\ (y+10)\ (y+20)}{40y}$

$\Rightarrow 3\ (y + 20) + 40$

$= \frac{3(y+10)(y+20)}{y}$

$\Rightarrow 3y^2 + 60y + 40\ y = 3(y^2 + 30y + 200)$

$\Rightarrow 3y^2 + 100y = 3y^2 + 90y + 600$

$\Rightarrow 10y = 600 \Rightarrow y = 60$

Again from equation (i),

$\frac{x}{y+10} + 1 = \frac{x}{y}$

$\Rightarrow \frac{x}{60+10} + 1 = \frac{x}{60}$

$\Rightarrow \frac{x}{70} + 1 = \frac{x}{60}$

$\Rightarrow \frac{x+70}{70} = \frac{x}{60}$

$\Rightarrow 6x + 420 = 7x$

$\Rightarrow 7x - 6x = 420$

$\Rightarrow x = 420$ km.

10. (2) Total distance

= 7 × 4 = 28 km.

Total time

$= \left(\frac{7}{10} + \frac{7}{20} + \frac{7}{30} + \frac{7}{60}\right)$ hours

$= \left(\frac{42+21+14+7}{60}\right)$ hours

$= \frac{84}{60}$ hours $= \frac{7}{5}$ hours

$\therefore$ Average speed

$= \frac{\text{Total distance}}{\text{Total time}} = \left(\frac{28}{\frac{7}{5}}\right)$ kmph

$= \frac{28 \times 5}{7} = 20$ kmph

11. (2) 1 m/sec = $\frac{18}{5}$ kmph

$\therefore$ 20 m/sec = $\frac{20 \times 18}{5}$

= 72 kmph

12. (1) 1 kmph = $\frac{5}{18}$ m/sec

$\therefore$ 54 kmph = $\frac{5}{18} \times 54$

= 15 m/sec.

13. (3) Speed of car = x kmph.

$\therefore$ Distance = Speed × Time

= 25x km.

Case II,

Speed of car = $\frac{4x}{5}$ kmph.

Distance covered = $\frac{4x}{5} \times 25$

= $20x$ km.

According to the question,

$25x - 20x = 200$

$\Rightarrow 5x = 200$

$\Rightarrow x = \frac{200}{5} = 40$ kmph.

14. (2) Speed of car = x kmph.

Relative speed = $(x - 4)$ kmph.

Time = 3 minutes = $\frac{3}{60}$ hour = $\frac{1}{20}$ hour

Distance = 130 metre

$= \frac{130}{1000}$ km. $= \frac{13}{100}$ km.

$\therefore$ Relative speed = $\frac{\text{Distance}}{\text{Time}}$

$\Rightarrow x - 4 = \frac{13}{100} \times 20$

$\Rightarrow 5x - 20 = 13$

$\Rightarrow 5x = 20 + 13 = 33$

$\Rightarrow x = \frac{33}{5} = 6\frac{3}{5}$ kmph.

TYPE-VI

1. (2) Total distance = 10 + 12 = 22 km

Total time $= \frac{10}{12} + \frac{12}{10} = \frac{244}{120}$ hours

$\therefore$ Required average speed

$= \frac{\text{Total distance}}{\text{Total time}} = \frac{22}{\frac{244}{120}} = \frac{22}{244} \times 120$

= 10.8 km/hr.

Aliter : Using Rule 3,

Here, $d_1 = 10$, $S_1 = 12$

$d_2 = 12$, $S_2 = 10$

Average Speed = $\frac{d_1 + d_2}{\frac{d_1}{S_1} + \frac{d_2}{S_2}}$

$= \frac{10+12}{\frac{10}{12} + \frac{12}{10}} = \frac{22 \times 120}{244}$

= 10.8 km/hrs.

2. (1) Using Rule 3,

Total time

$= \frac{600}{80} + \frac{800}{40} + \frac{500}{400} + \frac{100}{50}$

$= \frac{246}{8}$ hours.

Average speed

$= \frac{600 + 800 + 500 + 100}{\frac{246}{8}}$

$= \frac{2000 \times 8}{246} = 65\frac{5}{123}$ km/hr.

3. (2) Using Rule 3,

Average speed

$= \frac{\text{Total distance}}{\text{time taken}}$

$= \frac{30 \times \frac{12}{60} + 45 \times \frac{8}{60}}{\frac{12}{60} + \frac{8}{60}}$

= 12 × 3 = 36 kmph

4. (3) Using Rule 5,

If the same distance are covered at different speed of x kmph and y kmph, the average speed of the whole journey is given by $= \frac{2xy}{x+y}$ kmph.

$\therefore$ Required average speed

$= \frac{2 \times 6 \times 3}{6+3} = \frac{36}{9} = 4$ kmph

5. (3) Using Rule 5,

If two equal distances are covered at two unequal speed of x kmph and y kmph, then average speed = $\left(\frac{2xy}{x+y}\right)$ kmph

$= \frac{2 \times 12 \times 4}{12 + 4} = \frac{96}{16} = 6$ kmph

6. (1) Using Rule 2,

Remaining distance

= (3584 – 1440 – 1608) km

= 536 km.

This distance is covered at the rate of $\frac{536}{8} = 67$ kmph.

Average speed of whole journey

$= \frac{3584}{56} = 64$ kmph

$\therefore$ Required difference in speed = (67 – 64) kmph i.e. = 3 kmph more

7. (2) Using Rule 2,

Total distance

= 24 + 24 + 24 = 72 km.

Total time

$= \left(\frac{24}{6} + \frac{24}{8} + \frac{24}{12}\right)$ hours

= (4 + 3 + 2) hours = 9 hours

$\therefore$ Required average speed

$= \frac{\text{Total distance}}{\text{Total time}} = \frac{72}{9} = 8$ kmph.

8. (4) Using Rule 5,

If same distance are covered at two different speed of x and y kmph, the average speed of journey = $\frac{2xy}{x+y}$

$= \left(\frac{2 \times 100 \times 80}{100 + 80}\right)$ kmph

= 88.89 kmph

9. (2) Using Rule 5,

Required average speed

$= \left(\frac{2xy}{x+y}\right)$kmph

[Since, can be given as corollary

If the distance between A and B be z units, then

Average speed = $\frac{\text{Total distance}}{\text{Time taken}}$

$= \frac{z+z}{\frac{z}{x} + \frac{z}{y}}$

$= \frac{2}{\frac{1}{x} + \frac{1}{y}} = \frac{2}{\frac{x+y}{xy}} = \frac{2xy}{x+y}$]

10. (1) Using Rule 5,

Average speed

$= \left(\frac{2xy}{x+y}\right)$kmph

$= \left(\frac{2 \times 40 \times 60}{40 + 60}\right)$kmph

= 48 kmph

11. (1) Using Rule 5,

Average speed

$= \left(\frac{2\ xy}{x+y}\right)$ kmph

$= \left(\frac{2 \times 12 \times 18}{12 + 18}\right)$ kmph

$= \left(\frac{2 \times 12 \times 18}{30}\right)$ kmph

$= 14\frac{2}{5}$ kmph

12. (2) Let the total distance be x km.

$$\text{Total time} = \frac{\frac{x}{3}}{25} + \frac{\frac{x}{4}}{30} + \frac{\frac{5x}{12}}{50}$$

$$= \frac{x}{75} + \frac{x}{120} + \frac{x}{120}$$

$$= \frac{x}{75} + \frac{x}{60} = \frac{4x + 5x}{300} = \frac{3x}{100} \text{ hours}$$

$\therefore$ Average speed

$$= \frac{\text{Total distance}}{\text{Time taken}}$$

$$= \frac{x}{\frac{3x}{100}} = \frac{100}{3} = 33\frac{1}{3} \text{ kmph}$$

Aliter : Using Rule 18,

Here, x = 3, u = 25

y = 4, v = 30

z = $\frac{12}{5}$, w = 50

$$\text{Average Speed} = \frac{1}{\frac{1}{xu} + \frac{1}{yv} + \frac{1}{zw}}$$

$$= \frac{1}{\frac{1}{3 \times 25} + \frac{1}{4 \times 30} + \frac{1}{\frac{12}{5} \times 50}}$$

$$= \frac{1}{\frac{1}{75} + \frac{1}{120} + \frac{1}{120}}$$

$$= \frac{1}{\frac{1}{75} + \frac{1}{60}} = \frac{1}{\frac{4+5}{300}}$$

$$= \frac{300}{9} = \frac{100}{3}$$

$$= 33\frac{1}{3} \text{ km/hr.}$$

13. (1) Time taken to cover 30km at 6 kmph = $\frac{30}{6}$ = 5 hours

Time taken to cover 40 km = 5 hours

$\therefore$ Average speed

$$= \frac{\text{Total distance}}{\text{Total time}} = \frac{30 + 40}{10}$$

$$= \frac{70}{10} = 7 \text{ kmph}$$

14. (1) Using Rule 5,

Here same distances are covered at different speeds.

$\therefore$ Average speed

$$= \left(\frac{2xy}{x + y}\right) \text{kmph}$$

$$= \left[\frac{2 \times 36 \times 45}{(36 + 45)}\right] \text{ kmph}$$

$$= \frac{2 \times 36 \times 45}{81} = 40 \text{ kmph}$$

15. (1) Using Rule 5,

Here, the distances are equal.

$\therefore$ Average speed

$$= \left(\frac{2 \times 100 \times 150}{100 + 150}\right) \text{ kmph}$$

$$= \frac{2 \times 100 \times 150}{250}$$

= 120 kmph

16. (2) Using Rule 2,

Total distance

= 5 × 6 + 3 × 6

= 30 + 18 = 48 km

Total time = 9 hours

$\therefore$ Average speed

$$= \frac{48}{9} = \frac{16}{3} = 5\frac{1}{3} \text{ kmph}$$

17. (3) Let the length of journey be x km, then

$$\frac{x}{35} - \frac{x}{40} = \frac{15}{60} = \frac{1}{4}$$

$$\Rightarrow \frac{8x - 7x}{280} = \frac{1}{4}$$

$$\Rightarrow x = \frac{280}{4} = 70 \text{ km}$$

18. (3) Using Rule 3,

Average speed

$$= \frac{\text{Total distance}}{\text{Time taken}}$$

$$= \frac{12}{\frac{3}{10} + \frac{3}{20} + \frac{3}{30} + \frac{3}{60}}$$

$$= \frac{12}{3\left(\frac{6 + 3 + 2 + 1}{60}\right)}$$

$$= \frac{12 \times 60}{3 \times 12} = 20 \text{ kmph}$$

19. (1) Using Rule 2,

Distance covered

$$= \left(35 \times \frac{10}{60} + 20 \times \frac{5}{60}\right) \text{ km}$$

$$= \left(\frac{35}{6} + \frac{10}{6}\right) = \frac{45}{6} \text{ km}$$

Total time = 15 minutes

$$= \frac{1}{4} \text{ hour}$$

$\therefore$ Required average speed

$$= \frac{\text{Distance covered}}{\text{Time taken}}$$

$$= \frac{45}{6} \times 4$$

= 30 kmph

20. (2) Using Rule 2,

Total distance = 100 km.

Total time

$$= \frac{50}{50} + \frac{40}{40} + \frac{10}{20}$$

$$= 1 + 1 + \frac{1}{2} = \frac{5}{2} \text{hours}$$

$$\therefore \text{ Average speed} = \frac{100 \times 2}{5}$$

= 40 kmph

21. (4) Using Rule 5,

Required average speed

$$= \frac{2 \times 30 \times 20}{30 + 20}$$

[$\because$ Distance covered is same]

$$= \frac{2 \times 30 \times 20}{50} = 24 \text{ kmph}$$

22. (3) Using Rule 11,

If A and B meet after t hours, then

4 t + 6 t = 20

$\Rightarrow$ 10 t = 20

$$\Rightarrow t = \frac{20}{10} = 2 \text{ hours.}$$

Hence, both will meet at 9 a.m.

23. (3) Using Rule 5,

$$\text{Average speed} = \frac{2xy}{x + y} \text{ kmph}$$

$$= \frac{2 \times 20 \times 30}{20 + 30} = \frac{2 \times 20 \times 30}{50}$$

= 24 kmph

24. (1) Using Rule 5,
Average speed of whole journey

$= \left(\frac{2xy}{x+y}\right)$ kmph

$= \frac{2\times50\times30}{50+30} = \frac{2\times50\times30}{80}$

= 37.5 kmph

25. (4) Required distance of office from house = x km. (let)

$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$

$\therefore$ According to the question,

$\frac{x}{5} - \frac{x}{6} = \frac{6+2}{60} = \frac{2}{15}$

$\Rightarrow \frac{6x-5x}{30} = \frac{2}{15}$

$\Rightarrow \frac{x}{30} = \frac{2}{15}$

$\Rightarrow x = \frac{2}{15} \times 30 = 4$ km.

Aliter : Using Rule 10,
Here, $S_1 = 5$, $t_1 = 6$
$S_2 = 6$, $t_2 = 2$

$\text{Distance} = \frac{(S_1\times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{(5\times6)(6+2)}{6-5}$

$= 30\times\frac{8}{60} = 4$ km.

26. (4) Using Rule 1,

$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{1050}{75}$

= 14 hours

27. (2) Using Rule 2,
Total distance covered by train in 5 minutes
= (500 + 625 + 750 + 875 + 1000) metre = 3750 metre
= 3.75 km.

Time = 5 minutes = $\frac{5}{60}$ hour

$= \frac{1}{12}$ hour

$\text{Speed of train} = \frac{\text{Distance}}{\text{Time}}$

$= \left(\frac{3.75}{\frac{1}{12}}\right)$ kmph

= (3.75 × 12) kmph
= 45 kmph

28. (1) Distance covered in first 2 hours
= 2 × 20 = 40 km.
Remaining distance
= 100 – 40 = 60 km.
Time taken in covering 60 km at 10 kmph

$= \frac{60}{10} = 6$ hours

$\therefore$ Required average speed

$= \frac{\text{Total distance}}{\text{Total Time}}$

$= \left(\frac{100}{2+6}\right)$ kmph

$= \left(\frac{100}{8}\right)$ kmph

$= \frac{25}{2}$ kmph $= 12\frac{1}{2}$ kmph

29. (1) Difference of time = 5 + 3 = 8 minutes

$= \frac{8}{60}$ hour $= \frac{2}{15}$ hour

If the speed of motorbike be x kmph, then

$\frac{25}{50} - \frac{25}{x} = \frac{2}{15}$

$\Rightarrow \frac{25}{x} = \frac{1}{2} - \frac{2}{15}$

$\Rightarrow \frac{25}{x} = \frac{15-4}{30} = \frac{11}{30}$

$\Rightarrow 11x = 25 \times 30$

$\Rightarrow x = \frac{25\times30}{11} = \frac{750}{11}$

= 68.18 kmph
$\approx$ 68 kmph

30. (4) Let the speed of cyclist while returning be x kmph.
$\therefore$ Average speed

$= \frac{2\times16\times x}{16+x}$

$\Rightarrow 6.4 = \frac{32x}{16+x}$

$\Rightarrow 6.4 \times 16 + 6.4x = 32x$
$\Rightarrow 32x - 6.4x = 6.4 \times 16$
$\Rightarrow 25.6x = 6.4 \times 16$

$\Rightarrow x = \frac{6.4\times16}{25.6} = 4$ kmph.

31. (3) Total distance covered = 400 km.

Total time = $\frac{25}{2}$ hours

$\therefore \frac{3}{4}$ th of total journey

$= \frac{3}{4} \times 400 = 300$ km.

$\text{Time taken} = \frac{\text{Distance}}{\text{Speed}}$

$= \frac{300}{30} = 10$ hours

Remaining time $= \frac{25}{2} - 10$

$= \frac{25-20}{2} = \frac{5}{2}$ hours

Remaining distance
= 100 km.
$\therefore$ Required speed of car

$= \frac{100}{\frac{5}{2}} = \frac{100\times2}{5} = 40$ kmph.

32. (3) Durga's average speed

$= \left(\frac{2xy}{x+y}\right)$ kmph.

$= \left(\frac{2\times5\times15}{5+15}\right)$ kmph.

$= \left(\frac{2\times5\times15}{20}\right)$ kmph

$= \frac{15}{2}$ kmph

Distance of School = 5 km.

Smriti's speed $= \frac{15}{4}$ kmph

$\therefore$ Required time $= 2\left(\frac{5}{\frac{15}{4}}\right)$ hours

$= \left(\frac{2\times5\times4}{15}\right) = \frac{8}{3}$ hours

$= \left(\frac{8}{3}\times60\right)$ minutes

= 160 minutes

33. (4) Here, distances are equal.
∴ Average speed

$= \left(\frac{2xy}{x+y}\right)$ kmph.

$= \left(\frac{2 \times 32 \times 40}{32+40}\right)$ kmph.

$= \left(\frac{2 \times 32 \times 40}{72}\right)$ kmph.

$= \left(\frac{320}{9}\right)$ kmph. = 35.55 kmph.

34. (1) Here, distance is same.

∴ Average speed $= \frac{2xy}{x+y}$

$= \left(\frac{2 \times 40 \times 60}{40+60}\right)$ kmph.

$= \left(\frac{2 \times 40 \times 60}{100}\right)$ kmph.

= 48 kmph.

35. (2) Total distance covered by the bus = 150 km. + 2 × 60 km.
= (150 + 120) km.
= 270 km.
∴ Average speed

$= \frac{\text{Total distance}}{\text{Time taken}}$

$= \frac{270}{5}$ = 54 kmph.

36. (3) Here distances are same.

∴ Average speed $= \left(\frac{2xy}{x+y}\right)$ kmph

$= \left(\frac{2 \times 12 \times 10}{12+10}\right)$ kmph

$= \left(\frac{240}{22}\right)$ kmph

= 10.9 kmph

37. (1) Total distance covered
= (50 + 40 + 90) km
= 180 km

$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$

∴ Total time taken

$= \left(\frac{50}{25} + \frac{40}{20} + \frac{90}{15}\right)$ hours

= (2 + 2 + 6) hours
= 10 hours

∴ Average speed

$= \frac{\text{Total distance}}{\text{Total time taken}}$

$= \frac{180}{10}$ = 18 kmph

38. (1) Distance = Speed × Time
= (80 × 7) km.
= 560 km.

39. (4) Required speed of car

$= \frac{\text{Distance}}{\text{Time}}$

$= \left(\frac{216}{3.2}\right)$ kmph.

$= \left(\frac{216}{3.2} \times \frac{5}{18}\right)$ m./sec.

= 18.75 m./sec.

TYPE-VII

1. (3) Let the distance of destination be D km
Let the speed of A = 3x km/hr
then speed of B = 4x km/hr
∴ According to question,

$\frac{D}{3x} - \frac{D}{4x}$ = 30 minutes

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

$\therefore \frac{D}{12x} = \frac{1}{2}$

$\Rightarrow \frac{D}{3x} = \frac{4}{2}$ = 2 hours

Hence, time taken by A to reach destination = 2hrs.
Aliter : Using Rule 9,
Here, S_1 = 3x, S_2 = 4x

t_2 = y, $t_1 = y + \frac{30}{60} = y + \frac{1}{2}$

$S_1t_1 = S_2t_2$

$3x \times \left(y + \frac{1}{2}\right) = 4 \times x \times y$

$3y + \frac{3}{2} = 4y$

$y = \frac{3}{2}$

∴ Time taken by A

$= \frac{3}{2} + \frac{1}{2}$ = 2 hrs.

2. (1) Ratio of speed = 3 : 4
Ratio of time taken = 4 : 3
Let the time taken by A and B be $4x$ hours and 3 x hours respectively.

Then, $4x - 3x = \frac{20}{60} \Rightarrow x = \frac{1}{3}$

∴ Time taken by A = $4x$ hours

$= \left(4 \times \frac{1}{3}\right)$ hours = $1\frac{1}{3}$ hours

Aliter : Using Rule 9,
Here, S_1 = 3x, S_2 = 4x

t_2 = y, $t_1 = y + \frac{20}{60} = y + \frac{1}{3}$

$S_1t_1 = S_2t_2$

$3x\left(y + \frac{1}{3}\right) = 4xy$

3y + 1 = 4y, y = 1
∴ Time taken by A

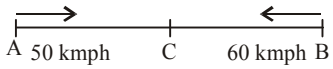
$= 1 + \frac{1}{3} = 1\frac{1}{3}$ hours

3. (3) Required ratio

$= \frac{5}{6} : \frac{3}{5} = \frac{30 \times 5}{6} : \frac{30 \times 3}{5}$

= 25 : 18

4. (2)



AC = Distance covered by train starting from A in 3 hours
= 50 × 3 = 150 km
BC = Distance covered by train starting from B in 2 hours
= 60 ×2 = 120 km
∴ AC : BC = 150 : 120 = 5 : 4

5. (2) Using Rule 11,
Required ratio of the speed of two trains = $\frac{\sqrt{9}}{\sqrt{4}} = \frac{3}{2}$ or 3 : 2

6. (3) Using Rule 1,
Speed of second train

$= \frac{364}{4}$ = 91 kmph

∴ $7x \equiv 91$

$\Rightarrow 6x \equiv \frac{91}{7x} \times 6x \equiv$ 78 kmph

7. (3) Using Rule 1,
Speed of truck
= 550m/minute

Speed of bus $= \frac{33000}{45}$ m/minute

or $\frac{2200}{3}$ m/minute

$\therefore$ Required ratio $= 550 : \frac{2200}{3}$

$= 1 : \frac{4}{3} = 3 : 4$

8. (2) Required ratio $= \frac{1}{3} : \frac{2}{2} : \frac{3}{1}$

$= \frac{1}{3} : 1 : 3$

$\frac{1}{3} \times 3 : 1 \times 3 : 3 \times 3$

$\left[\because \text{Speed} = \frac{\text{Distance}}{\text{Time}}\right]$

$= 1 : 3 : 9$

9. (3) The winner will pass the other, one time in covering 1600m. Hence, the winner will pass the other 3 times in completing 5km race.

10. (3) Using Rule 1,

Distance covered on the first day

$= \frac{4}{5} \times 70 = 56$ km

$\therefore$ Required ratio $= 42 : 56$

$= 3 : 4$

11. (1) Using Rule 1,

Let speed of cyclist $= x$ kmph & Time $= t$ hours

Distance $= \frac{xt}{2}$ while time $= 2t$

$\therefore$ Required ratio $= \frac{xt}{2 \times 2t} : x$

$= 1 : 4$

12. (3) Using Rule 1,

Speed of train $= x$ kmph

Speed of car $= y$ kmph

Case I,

$\frac{120}{x} + \frac{600 - 120}{y} = 8$

$\Rightarrow \frac{120}{x} + \frac{480}{y} = 8$

$\Rightarrow \frac{15}{x} + \frac{60}{y} = 1$ ...(i)

Case II,

$\frac{200}{x} + \frac{400}{y}$ = 8 hours 20 minutes

$\Rightarrow \frac{200}{x} + \frac{400}{y} = 8\frac{1}{3}$ hours

$= \frac{25}{3}$

$\Rightarrow \frac{8}{x} + \frac{16}{y} = \frac{1}{3}$

$\Rightarrow \frac{24}{x} + \frac{48}{y} = 1$ .....(ii)

$\therefore \frac{15}{x} + \frac{60}{y} = \frac{24}{x} + \frac{48}{y}$

$\Rightarrow \frac{24}{x} - \frac{15}{x} = \frac{60}{y} - \frac{48}{y}$

$\Rightarrow \frac{9}{x} = \frac{12}{y} \Rightarrow \frac{x}{y} = \frac{9}{12} = \frac{3}{4} = 3 : 4$

13. (2) Let the speed of train be x kmph. and the speed of car be y kmph.

Time $= \frac{\text{Distance}}{\text{Speed}}$

According to the question,

$\frac{120}{x} + \frac{480}{y} = 8$

$\Rightarrow \frac{15}{x} + \frac{60}{y} = 1$ ..... (i)

and, $\frac{200}{x} + \frac{400}{y} = \frac{25}{3}$

$\Rightarrow \frac{8}{x} + \frac{16}{y} = \frac{1}{3}$

$\Rightarrow \frac{24}{x} + \frac{48}{y} = 1$ ..... (ii)

From equations (i) and (ii),

$\Rightarrow \frac{24}{x} + \frac{48}{y} = \frac{15}{x} + \frac{60}{y}$

$\Rightarrow \frac{24}{x} - \frac{15}{x} = \frac{60}{y} - \frac{48}{y}$

$\Rightarrow \frac{9}{x} = \frac{12}{y}$

$\Rightarrow \frac{x}{y} = \frac{9}{12} = \frac{3}{4} = 3 : 4$

14. (3) Speed of truck $= \frac{550 \text{ metre}}{60 \text{ second}}$

$= \left(\frac{55}{6}\right)$ m./sec.

Speed of bus $= \frac{33 \times 1000 \text{ metre}}{\frac{3}{4} \times 60 \times 60 \text{ second}}$

$= \frac{440}{36}$ m./sec.

$\therefore$ Required ratio $= \frac{55}{6} : \frac{440}{36}$

$= 55 \times 6 : 440$

$= 3 : 4$

15. (1) Speed $= \frac{\text{Distance}}{\text{Time}}$

$\therefore$ Speed of car : Speed of train

$= \frac{80}{2} : \frac{180}{3} = 40 : 60 = 2 : 3$

16. (3) Speed $\propto \frac{1}{\text{Time}}$

$\therefore$ Required ratio of time

$= 1 : \frac{1}{3} : \frac{1}{5}$

$= 15 : \frac{1}{3} \times 15 : \frac{1}{5} \times 15$

$= 15 : 5 : 3$

TYPE-VIII

1. (1) Using Rule 12,

Relative speed of police $= 11 - 10 = 1$ kmph

$= \frac{5}{18} m/\sec$

$\therefore$ Distance decreased in 6 minutes $= \frac{5}{18} \times 6 \times 60 = 100$ m

$\therefore$ Distance remained between them $= 200 - 100 = 100$ m

2. (1) Suppose the speed of first train be x kmph

Speed of second train $= 30$ kmph

$= \frac{30 \times 1000}{60} = 500$ m per min.

$\therefore$ According to question

$\frac{\text{Total Distance}}{\text{Relative speed}}$

$= \frac{(66 + 88)}{x - 500} = 0.168$

$\Rightarrow \frac{154}{x - 500} = 0.168$

$\Rightarrow 0.168x - 84 = 154$

$\Rightarrow 0.168x = 238$

$\Rightarrow x = \frac{238}{0.168}$

$= \left(\frac{238 \times 1000}{168}\right)$ m per minute

$= \frac{238 \times 1000}{168} \times \frac{3}{50}$ kmph

$= 85$ kmph

3. (1) Using Rule 1,
The gap of 114 metre will be filled at relative speed. Required time

$= \left(\frac{114}{21-15}\right)$ minutes

$= \frac{114}{6} = 19$ minutes

4. (4) Both trains are moving in the same direction.
$\therefore$ Their relative speed
= (68 – 50) kmph = 18 kmph

$= 18 \times \frac{5}{8} = 5$ m/sec

Total length = 50 + 75 = 125 m
$\therefore$ Required time

$= \frac{\text{Total length}}{\text{Relative speed}}$

$= \frac{125}{5} = 25$ seconds.

5. (2) The constable and thief are running in the same direction
$\therefore$ Their relative speed
= 8 – 7 = 1km.

$= 1 \times \frac{5}{18}$ m/sec.

$\therefore$ Required time $= \frac{200}{\frac{5}{18}}$

$= \frac{200 \times 18}{5} = 720$ sec

$= \frac{720}{60}$ minutes = 12 minutes

6. (4) Relative speed
= (58 – 30) km/hr

$= \left(28 \times \frac{5}{18}\right)$ m/sec. $= \frac{70}{9}$ m/sec.

$\therefore$ Length of train $= \frac{70}{9} \times 18$

= 140 metres

7. (3) Relative speed
= 56 – 29 = 27 kmph

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

$\therefore$ Distance covered in 10 seconds

$= \frac{15}{2} \times 10 = 75$ m

Hence, length of train = 75 m.

8. (1) Let the speed of the truck be x kmph
Relative speed of the bus

$= (45 - x)$ kmph

$\therefore$ Time $= \frac{\text{Distance}}{\text{Relative speed}}$

$\Rightarrow \frac{30}{60 \times 60} = \frac{\frac{150}{1000}}{(45-x)}$

$\Rightarrow \frac{1}{120} = \frac{15}{100(45-x)}$

$\Rightarrow \frac{1}{6} = \frac{3}{(45-x)} \Rightarrow (45 - x) = 18$

$\Rightarrow x = 45 - 18 = 27$ kmph

9. (2) Let the length of each train be x metre.
Relative speed
= 46 – 36 = 10 kmph

$= \frac{10 \times 5}{18}$ metre/second

$= \frac{25}{9}$ metre/second

$\therefore \frac{2x}{\frac{25}{9}} = 36$

$\Rightarrow 2x = \frac{36 \times 25}{9} = 100$

$\Rightarrow x = 50$ metre

10. (3) Relative speed
= 45– 40 = 5 kmph
$\therefore$ Required distance

$= \left(5 \times \frac{45}{60}\right)$ km

$= \frac{15}{4}$ km = 3 km 750

11. (3) Let the speed of Scooter be x
Distance covered by cycling in $3\frac{1}{2}$ hours = Distance covered by scooter in $2\frac{1}{4}$ hours

$\Rightarrow 12 \times \frac{7}{2} = x \times \frac{9}{4}$

$\Rightarrow x = \frac{12 \times 7 \times 2}{9}$

$= \frac{56}{3} = 18\frac{2}{3}$ kmph

12. (2) Relative speed

$= \frac{1000}{8} - \frac{1000}{10}$

$= \frac{5000 - 4000}{40} = \frac{1000}{40}$ m/minute

$\therefore$ Required time

$= \frac{100}{\frac{1000}{40}} = \frac{4000}{1000} = 4$ m/minute

$\therefore$ Distance covered by the thief

$= \frac{1000}{10} \times 4 = 400$ metres

13. (3) Relative speed = 40 – 20
= 20 km/hour

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

$\therefore$ Length of the faster train

$= \frac{20 \times 5}{18} \times 5$ metres

$= \frac{250}{9} = 27\frac{7}{9}$ metres

14. (4) Distance = Speed × Time
= 80 × 4.5 = 360 km

$\therefore$ Required speed $= \frac{360}{4}$

= 90 kmph.

15. (2) Required time

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

Relative speed = 65 + 55
= 120 kmph

$= \frac{120 \times 5}{18}$ m/sec

Required time $= \frac{180 + 120}{\frac{120 \times 5}{18}}$

$= \frac{300 \times 18}{120 \times 5} = 9$ seconds

16. (1) When two trains cross each other, they cover distance equal to the sum of their length with relative speed.
Let length of each train = x metre
Relative speed = 90 – 60
= 30 kmph

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

$= \left(\frac{25}{3}\right)$ m/sec.

$\therefore \dfrac{2x}{\frac{25}{3}} = 30$

$\Rightarrow 2x = \dfrac{30 \times 25}{3}$

$\Rightarrow 2x = 250$

$\Rightarrow x = 125$ metres

17. (4) Relative speed = 35 – 25
= 10 kmph

$= \dfrac{10 \times 5}{18}$ m/sec.

Total length = 80 + 120
= 200 metres

∴ Required time

$= \dfrac{\text{Sum of the length of trains}}{\text{Relative speed}}$

$= \dfrac{200}{\frac{10 \times 5}{18}} = \dfrac{200 \times 18}{10 \times 5}$

= 72 seconds

18. (1) Distance covered by the first goods train in 8 hours = Distance covered by the second goods train in 6 hours.

$\Rightarrow 18 \times 8 = 6 \times x$

$\Rightarrow x = \dfrac{18 \times 8}{6} = 24$ kmph

19. (3) Relative speed
= (33 + 39) kmph
= 72 kmph

$= \left(\dfrac{72 \times 5}{18}\right)$ m/sec.

= 20 m/sec.

∴ Time taken in crossing

$= \dfrac{\text{Length of both trains}}{\text{Relative speed}}$

$= \dfrac{125 + 115}{20} = \dfrac{240}{20}$

= 12 seconds

20. (2) Distance covered by the thief in half an hour $= \dfrac{1}{2} \times 40 = 20$ km

Relative speed of car owner
= 50 – 40 = 10 km

∴ Required time

$= \dfrac{\text{Difference of distance}}{\text{Relative speed}}$

$= \dfrac{20}{10} = 2$ hours

i.e. at 4 p.m.

21. (1) Length of each train
= x metre

Relative speed = 46 – 36
= 10 kmph

$= \left(10 \times \dfrac{5}{18}\right)$ m/sec

$= \dfrac{25}{9}$ m/sec

∴ Time taken in crossing

$= \dfrac{\text{Length of both trains}}{\text{Relative speed}}$

$\Rightarrow 36 = \dfrac{2x}{\frac{25}{9}}$

$\Rightarrow 2x = 36 \times \dfrac{25}{9} = 100$

$\Rightarrow x = \dfrac{100}{2} = 50$ metre

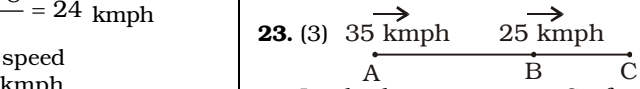
22. (3) Let both trains meet after t hours.

∴ Distance = speed × time

∴ $60t - 50t = 120$

$\Rightarrow 10t = 120 \Rightarrow t = 12$ hours

∴ Required distance
= 60t + 50t
= 110t = 110 × 12
= 1320 km

23. (3) 

Let both cars meet at C after t hours.

∴ Distance covered by car A
= AC = 35t km

Distance covered by car B
= BC = 25t km

∴ AC – BC = AB = 60 km.

$\Rightarrow 35t - 25t = 60$

$\Rightarrow 10t = 60$

$\Rightarrow t = \dfrac{60}{10} = 6$ hours

24. (2) Let the speed of train C be x kmph.

∴ Relative speed of B
= (100 – x) kmph.

∴ Time taken in crossing

$= \dfrac{\text{Length of both trains}}{\text{Relative speed}}$

$\Rightarrow \dfrac{2}{60} = \dfrac{\left(\frac{150 + 250}{1000}\right)}{100 - x}$

$\Rightarrow \dfrac{1}{30} = \dfrac{2}{5(100 - x)}$

$\Rightarrow \dfrac{1}{6} = \dfrac{2}{100 - x}$

$\Rightarrow 100 - x = 12$

$\Rightarrow x = 100 - 12 = 88$ kmph.

25. (1) Let the speed of goods train be x kmph.

∴ Distance covered by goods train in 10 hour = distance covered by passenger train in 4 hours

$\Rightarrow 10x = 80 \times 4$

$\Rightarrow x = \dfrac{80 \times 4}{10} = 32$ kmph.

26. (4) Relative speed = 45 – 40
= 5 kmph.

∴ Gap between trains after 45 minutes $= \left(5 \times \dfrac{45}{60}\right)$ km.

= 3.75 km.

27. (3) Distance between thief and policeman = 400 metre

Relative speed of policeman with respect to thief
= (9 – 5) kmph
= 4 kmph

$= \left(\dfrac{4 \times 5}{18}\right)$ m./sec.

$= \dfrac{10}{9}$ m./sec.

Time taken in overtaking the thief

$= \left(\dfrac{\frac{400}{10}}{\frac{10}{9}}\right)$ second

$= \left(\dfrac{400 \times 9}{10}\right)$ second

= 360 second

∴ Distance covered by thief
= Speed × Time

$= \left(5 \times \dfrac{5}{18} \times 360\right)$ metre

= 500 metre

28. (4) Let the length of each train be x metre.

Relative speed = (46 – 36) kmph
= 10 kmph

$= \left(\dfrac{10 \times 5}{18}\right)$ m./sec.

$= \dfrac{25}{9}$ m./sec.

$\therefore \dfrac{2x}{\frac{25}{9}} = 36$

$\therefore 2x = 36 \times \dfrac{25}{9} = 100$

$\Rightarrow x = \dfrac{100}{2} = 50$ metre

TYPE-IX

1. (3) Time taken to cover 20 km at the speed of 5km/hr
= 4 hours.
∴ Fixed time = 4 hours – 40 minutes
= 3 hour 20 minutes
Time taken to cover 20 km at the speed of 8 km/hr $= \frac{20}{8}$ = 2 hours 30 minutes
∴ Required time = 3 hours 20 minutes – 2 hours 30 minutes = 50 minutes

2. (1) Since man walks at $\frac{2}{3}$ of usual speed, time taken wil be $\frac{3}{2}$ of usual time.

∴ $\frac{3}{2}$ of usual time
= usual time + 1 hour.

$\Rightarrow \left(\frac{3}{2}-1\right)$ of usual time = 1

$\Rightarrow$ usual time = 2 hours.

3. (3) Let x km. be the required distance.
Difference in time
= 2.5 + 5 = 7.5 minutes

$= \frac{7.5}{60}$ hrs. $= \frac{1}{8}$ hrs.

Now, $\frac{x}{8}-\frac{x}{10}=\frac{1}{8}$

$\Rightarrow \frac{5x-4x}{40}=\frac{1}{8}$

$\Rightarrow x = \frac{40}{8}$ = 5 km.

Aliter : Using Rule 10,
Here, S_1 = 8, t_1 = 2.5
S_2 = 10, t_2 = 5

Distance = $\frac{(S_1 \times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{(8\times 10)(2.5+5)}{10-8}$

$= 40\times\frac{7.5}{60}$ = 5 km

4. (4) Let the distance be x km and initial speed be y kmph.
According to question,

$\frac{x}{y}-\frac{x}{y+3}=\frac{40}{60}$ ...(i)

and,

$\frac{x}{y-2}-\frac{x}{y}=\frac{40}{60}$ ...(ii)

From equations (i) and (ii),

$\frac{x}{y}-\frac{x}{y+3}=\frac{x}{y-2}-\frac{x}{y}$

$\Rightarrow \frac{1}{y}-\frac{1}{y+3}=\frac{1}{y-2}-\frac{1}{y}$

$\Rightarrow \frac{y+3-y}{y(y+3)}=\frac{y-y+2}{y(y-2)}$

$\Rightarrow 3(y-2) = 2(y+3)$
$\Rightarrow 3y - 6 = 2y + 6$
$\Rightarrow y = 12$
From equation (i),

$\frac{x}{12}-\frac{x}{15}=\frac{40}{60} \Rightarrow \frac{5x-4x}{60}=\frac{2}{3}$

$\Rightarrow x = \frac{2}{3}\times 60 = 40$

∴ Distance = 40 km.

5. (3) If the distance be x km, then

$\frac{x}{40}-\frac{x}{50}=\frac{6}{60}$

$\Rightarrow \frac{x}{4}-\frac{x}{5}=1$

$\Rightarrow x$ = 20 km.

∴ Required time

$= \left(\frac{20}{40}\right)$ hour – 11 minutes

$= \left(\frac{1}{2}\times 60 - 11\right)$ minutes

= 19 minutes

6. (2) Let the required distance be x km.
Difference of time

= 6 + 6 = 12 minutes $= \frac{1}{5}$ hr.

According to the question,

$\frac{x}{\frac{5}{2}}-\frac{x}{\frac{7}{2}}=\frac{1}{5} \Rightarrow \frac{2x}{5}-\frac{2x}{7}=\frac{1}{5}$

$\Rightarrow \frac{14x-10x}{35}=\frac{1}{5}$

$\Rightarrow \frac{4x}{35}=\frac{1}{5} \Rightarrow x = \frac{35}{20}=\frac{7}{4}$ km.

Aliter : Using Rule 10,

Here, $S_1 = 2\frac{1}{2}$, t_1 = 6

$S_2 = 3\frac{1}{2}$, t_2 = 6

Distance = $\frac{(S_1 \times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{\frac{5}{2}\times\frac{7}{2}\times(6+6)}{\frac{7}{2}-\frac{5}{2}}$

$= \frac{35}{4}\times\frac{12}{60} = \frac{7}{4}$ km

7. (4) Let the required distance be x km.
According to the question,

$\frac{x}{4}-\frac{x}{5}=\frac{18}{60}$

$\Rightarrow \frac{5x-4x}{20}=\frac{3}{10}$

$\Rightarrow x = \frac{3}{10}\times 20$ = 6 km

Aliter : Using Rule 10,
Here, S_1 = 4, t_1 = 9
S_2 = 5, t_2 = 9

Distance = $\frac{(S_1 \times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{(4\times 5)(9+9)}{5-4}$

$= 20\times\frac{18}{60}$ = 6 km

8. (2) Let the initial speed of the car be x kmph and the distance be y km.

Then, $y = \frac{9}{2}x$ ...(i)

and, $y = 4(x+5)$ ...(ii)

∴ $\frac{9x}{2} = 4(x+5)$

$\Rightarrow 9x = 8x + 40$
$\Rightarrow x$ = 40 kmph

9. (3) Let the distance of office be x km.

∴ $\frac{x}{24}-\frac{x}{30}=\frac{11}{60}$

$\Rightarrow \frac{5x-4x}{120}=\frac{11}{60}$

$\Rightarrow \frac{x}{120}=\frac{11}{60}$

$\Rightarrow x=\frac{11}{60}\times 120 = 22$ km.

Aliter : Using Rule 10,
Here, $S_1 = 24$, $t_1 = 5$
$S_2 = 30$, $t_2 = 6$

$\text{Distance} = \frac{(S_1\times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{24\times 30(5+6)}{30-24}$

$= \frac{720\times 11}{6\times 60} = 22$ km

10. (3) Let the required distance be x km.

Then, $\frac{x}{3}-\frac{x}{5}=\frac{24}{60}$

$\Rightarrow \frac{5x-3x}{15}=\frac{2}{5} \Rightarrow \frac{2x}{3}=2$
$\Rightarrow 2x = 2\times 3 \Rightarrow x = 3$ km
Aliter : Using Rule 10,
Here, $S_1 = 3$, $t_1 = 9$
$S_2 = 5$, $t_2 = 15$

$\text{Distance} = \frac{(S_1\times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{(3\times 5)(9+15)}{5-3}$

$= \frac{15}{2}\times\frac{24}{60} = 3$ km

11. (2) Let the required distance be x km.

$\frac{\frac{x}{5}}{2}-\frac{x}{3}=\frac{16}{60}$

$\Rightarrow \frac{2x}{5}-\frac{x}{3}=\frac{4}{15}$

$\Rightarrow \frac{6x-5x}{15}=\frac{4}{15} \Rightarrow x = 4$ km.

Aliter : Using Rule 10,

Here, $S_1 = 2\frac{1}{2}$, $t_1 = 6$

$S_2 = 3$, $t_2 = 10$

$\text{Distance} = \frac{(S_1\times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{\frac{5}{2}\times 3(6+10)}{3-\frac{5}{2}}$

$= 15\times\frac{16}{60}$ km $= 4$ km

12. (3) Let the distance be x km.

$\therefore \frac{x}{10}-\frac{x}{12}=\frac{12}{60}$

$\Rightarrow \frac{6x-5x}{60}=\frac{1}{5}$

$\Rightarrow x=\frac{1}{5}\times 60 = 12$ km.

Aliter : Using Rule 10,
Here, $S_1 = 10$, $t_1 = 6$
$S_2 = 12$, $t_2 = 6$

$\text{Distance} = \frac{(S_1\times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{(10\times 12)(6+6)}{12-10}$

$= \frac{120\times 12}{2}$

$= 60\times\frac{12}{60}$ km $= 12$km

13. (1) Using Rule 1,
Let the distance between stations be x km, then speed of train

$= \frac{x}{\frac{45}{60}} = \frac{4x}{3}$ kmph

$\therefore \frac{x}{\frac{4x}{3}-5}=\frac{48}{60}$

$\Rightarrow \frac{3x}{4x-15}=\frac{4}{5}$
$\Rightarrow 16x - 60 = 15x$
$\Rightarrow x = 60$ km

14. (2) Using Rule 1,

$\text{Speed of train} = \frac{\text{Distance}}{\text{Time}}$

$= \frac{10}{\frac{12}{60}}$ kmph

$= \frac{10\times 60}{12} = 50$ kmph

New speed = 45 kmph

$\therefore$ Required time $= \frac{10}{45}$ hour

$= \frac{2}{9}\times 60$ minutes

$= \frac{40}{3}$ minutes

or 13 minutes 20 seconds

15. (2) Let the distance of the office be x km, then

$\frac{x}{5}-\frac{x}{6}=\frac{8}{60}$

$\Rightarrow \frac{6x-5x}{30}=\frac{2}{15}$

$\Rightarrow x = 2\times 2 = 4$ km
Aliter : Using Rule 10,
Here, $S_1 = 5$, $t_1 = 6$
$S_2 = 6$, $t_2 = 2$

$\text{Distance} = \frac{(S_1\times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{(6\times 5)\times(6+2)}{6-5}$

$= 30\times\frac{8}{60} = 4$ km

16. (2) Let the distance of school be x km, then

$\frac{x}{3}-\frac{x}{4}=\frac{20}{60}$

$\Rightarrow \frac{x}{12}=\frac{1}{3} \Rightarrow x=\frac{12}{3}=4$ km
Aliter : Using Rule 10,
Here, $S_1 = 3$, $t_1 = 10$
$S_2 = 4$, $t_2 = 10$

$\text{Distance} = \frac{(S_1\times S_2)(t_1+t_2)}{S_2-S_1}$

$= \frac{(3\times 4)(10+10)}{4-3}$

$= 12\times\frac{20}{60} = 4$ km

17. (3) Using Rule 1
Distance between stations X and Y = Speed × Time
$= 55 \times 4 = 220$ km.
New speed $= 55 + 5 = 60$ kmph

$\therefore$ Required time $= \frac{220}{60}$

$= \frac{11}{3}$ hours

$= 3$ hours 40 minutes.

$\therefore$ Required answer
= 4 hours – 3 hours 40 minutes
= 20 minutes

18. (3) Distance of journey = x km

Difference of time = 12 – 3

= 9 minutes

$= \frac{9}{60}$ hour $= \frac{3}{20}$ hour

$\therefore \frac{x}{70} - \frac{x}{80} = \frac{3}{20}$

$\Rightarrow \frac{x}{7} - \frac{x}{8} = \frac{3}{2}$

$\Rightarrow \frac{8x - 7x}{56} = \frac{3}{2}$

$\Rightarrow \frac{x}{56} = \frac{3}{2}$

$\Rightarrow x = \frac{3}{2} \times 56$ = 84 km

$\therefore$ Required correct time

$= \frac{84}{70}$ hours – 12 minutes

$= \left(\frac{84}{70} \times 60 - 12\right)$ minutes

= 72 – 12 = 60 minutes

= 1 hour

TYPE-X

1. (4) Rule 10 and Rule 1,

Let the length of train be x metres

$\therefore$ According to question

Speed of the train $= \frac{x}{10}$ m / sec.

Also, the speed of the train

$= \left(\frac{x + 50}{14}\right)$ m / sec.

[$\because$ It passes the platform in 14 seconds]

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

$\frac{x}{10} = \frac{x + 50}{14}$

or 14x = 10x + 500

or 14x – 10x = 500

or 4x = 500

$\therefore$ x = 125 metres

Hence, Speed $= \frac{125}{10} = 12.5$ m / sec.

$= \frac{12.5 \times 18}{5}$ km / hr.

= 45 km/hr.

2. (2) Rule 10 and Rule 1,

Let length of train be x m

$\therefore$ Speed of train $= \frac{x + 264}{20}$

Also, speed of train $= \frac{x}{8}$

Obviously, $\frac{x}{8} = \frac{x + 264}{20}$

$\Rightarrow \frac{x}{2} = \frac{x + 264}{5}$

$\Rightarrow$ 5x = 2x + 528

$\Rightarrow$ 5x – 2x = 528

$\Rightarrow$ x = 528 ÷ 3 = 176 m

3. (4) Rule 10 and Rule 1,

Let the length of train be x metres.

Then, speed of train when it passes a telegraph post $= \frac{x}{8}$ m/sec.

and speed of train, when it passes the bridge = $\frac{x + 264}{20}$

Clearly,

$\frac{x}{8} = \frac{x + 264}{20}$

$\Rightarrow \frac{x}{2} = \frac{x + 264}{5}$

$\Rightarrow 5x = 2x + 528$

$\Rightarrow 3x = 528$

$\Rightarrow x = \frac{528}{3}$ = 176m

$\therefore$ Speed of train

$= \frac{176}{8}$ = 22 m/sec.

$= 22 \times \frac{18}{5}$ Kmph

= 79.2 kmph

4. (1) Rule 10 and Rule 1,

Let the length of train be x metres.

When the train crosses the standing man, its speed = $\frac{x}{9}$

When the train crosses the platform of length 84 m, its speed

$= \frac{x + 84}{21}$

Obviously, $\frac{x}{9} = \frac{x + 84}{21}$

$\Rightarrow 21x - 9x = 9 \times 84$

$\Rightarrow 12x = 9 \times 84$

$\Rightarrow x = \frac{9 \times 84}{12} = 63\ m$

$\therefore$ Required speed = $\frac{63}{9}$ m/sec

$= \frac{63}{9} \times \frac{18}{5}$ kmph = 25.2 kmph

5. (4) Rule 10 and Rule 1,

Suppose length of train be x

According to question

$\frac{x + 50}{14} = \frac{x}{10}$

$\Rightarrow 14x = 10x + 500$

$\Rightarrow 4x = 500$

$\Rightarrow x = \frac{500}{4} = 125$ m

Therefore, speed

$= \frac{125}{10} \times \frac{18}{5} = 45$ kmph

6. (4) Rule 10 and Rule 1,

Let the length of the train be x

According to the question,

Speed of the train

$= \frac{x + 90}{30} = \frac{x}{15}$

$\Rightarrow x + 90 = 2x$

$\Rightarrow x = 90$ m

$\therefore$ Speed of train = $\frac{90}{15}$

$= 6$ m/s $= 6 \times \frac{18}{5}$ kmph

= 21.6 kmph

7. (3) Rule 10 and Rule 1,

Let the length of the train be x metre

Speed of train when it crosses man = $\frac{x}{10}$

Speed of train when it crosses platform = $\frac{x + 300}{25}$

According to the question,

Speed of train = $\frac{x}{10} = \frac{x + 300}{25}$

$\Rightarrow 25x = 10x + 3000$

$\Rightarrow 15x = 3000$

$\Rightarrow x = \frac{3000}{15}$ = 200 metres

$\therefore$ Length of train = 200 metre

Speed of train = $\frac{x}{10} = \frac{200}{10}$

= 20 m/sce

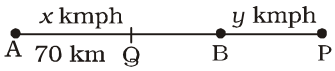
$\therefore$ Time taken in crossing a 200 m long platform = $\frac{200 + 200}{20}$

= 20 seconds

8. (4) Rule 10 and Rule 1,
Let the length of the train be x metres.
Speed of train in crossing boy = $\frac{x}{30}$
Speed of train in crossing platform = $\frac{x+110}{40}$
According to the question,
$\frac{x+110}{40} = \frac{x}{30}$
$\Rightarrow \frac{x+110}{4} = \frac{x}{3}$
$\Rightarrow 4x = 3x + 330$
$\Rightarrow x = 330$ metres

9. (3) Rule 10 and Rule 1,
Let the length of train be x metre.
$\therefore \frac{x}{15} = \frac{x+100}{25}$
$\Rightarrow \frac{x}{3} = \frac{x+100}{5}$
$\Rightarrow 5x = 3x + 300$
$\Rightarrow 2x = 300$
$\Rightarrow x = \frac{300}{2} = 150$ metres

10. (2)



Let speed of car starting from A be x kmph
and speed of car starting from B be y kmph
Case I
When cars meet at P,
$7x$ = AP = AB + BP = 70 + $7y$
$\Rightarrow 7x - 7y = 70$
$\Rightarrow x - y = 10$ ...(i)
Case II
When cars meet at Q,
$x + y = 70$ ...(ii)
On adding these equations,
$x = 40$ kmph
Putting the value of x in equation (i),
$y = 40 - 10 = 30$ kmph

11. (2) Let the speed of trains be x and y metre/sec respectively,
$\frac{100+95}{x-y} = 27$
$\Rightarrow x - y = \frac{195}{27} = \frac{65}{9}$ .....(i)
Again,
$\frac{195}{x+y} = 9$
$\Rightarrow x + y = \frac{195}{9}$ .....(ii)
By equation (i) + (ii)
$2x = \frac{65}{9} + \frac{195}{9} = \frac{260}{9}$
$\Rightarrow x = \frac{260}{2 \times 9} = \frac{130}{9}$ m/sec.
$= \left(\frac{130}{9} \times \frac{18}{5}\right)$ kmph = 52 kmph
From equation (ii),
$y = \frac{195}{9} - \frac{130}{9} = \frac{65}{9}$ m/sec.
$= \frac{65}{9} \times \frac{18}{5} = 26$ kmph

12. (2) Rule 10 and Rule 1,
Let the length of train be x metre, then
$\therefore$ Speed of train
$= \frac{x}{7} = \frac{x+390}{28}$
$\Rightarrow x = \frac{x+390}{4}$
$\Rightarrow 4x - x = 390$
$\Rightarrow x = \frac{390}{3} = 130$ metres

13. (3) Rule 10 and Rule 1,
Speed of train = 36 kmph
$= 36 \times \frac{5}{18} = 10$ m/sec
Length of train = 10 × 10
= 100 metres
$\therefore$ Required time = $\frac{100+55}{10}$
$= 15\frac{5}{10} = 15\frac{1}{2}$ second
= 15.5 seconds

14. (2) Rule 10 and Rule 1,
Speed of train = 60 kmph
$= \left(60 \times \frac{5}{18}\right)$ m/sec.
$= \frac{50}{3}$ m/sec.
If the length of platform be
= x metre, then
Speed of train
$= \frac{\text{Length of (train + platform)}}{\text{Time taken in crossing}}$
$\Rightarrow \frac{50}{3} = \frac{200+x}{30}$
$\Rightarrow 50 \times 10 = 200 + x$
$\Rightarrow x = 500 - 200 = 300$ metre

15. (4) Let both trains meet after t hours since 7 a.m.
Distance between stations A and B = x Km.
$\therefore \frac{x}{4} \times t + \frac{x}{\frac{7}{2}} \times (t - 1) = x$
$\left[\text{Speed} = \frac{\text{Distance}}{\text{Time}}\right]$
$\Rightarrow \frac{t}{4} + \frac{2(t-1)}{7} = 1$
$\Rightarrow \frac{7t + 8t - 8}{28} = 1$
$\Rightarrow 15t - 8 = 28$
$\Rightarrow 15t = 28 + 8 = 36$
$\Rightarrow t = \frac{36}{15} = \frac{12}{5}$ hours
= 2 hours 24 minutes
$\therefore$ Required time = 9 :24 a.m.

16. (2) Speed of train = 72 kmph.
$= \left(\frac{72 \times 5}{18}\right)$ m./sec.
= 20 m./sec.
Required time
$= \frac{\text{Length of train and bridge}}{\text{Speed of train}}$
$= \left(\frac{110+132}{20}\right)$ seconds
$= \left(\frac{242}{20}\right)$ seconds
= 12.1 seconds

17. (2) Relative speed of train
= (60 + 6) kmph.
$= \left(\frac{66 \times 5}{18}\right)$ m/sec.
$= \frac{55}{3}$ m/sec.
Length of train = 110 metre
$\therefore$ Required time = $\left(\frac{110}{\frac{55}{3}}\right)$ seconds
$= \left(\frac{110 \times 3}{55}\right)$ seconds
= 6 seconds

TYPE-XI

1. (2) Let the time taken to complete the race by A,B, and C be x minutes.

$\therefore$ Speed of A $= \frac{1000}{x}$,

B $= \frac{1000-50}{x} = \frac{950}{x}$

C $= \frac{1000-69}{x} = \frac{931}{x}$

Now, time taken to complete the race by

B $= \frac{1000}{\frac{950}{x}} = \frac{1000 \times x}{950}$

and distance travelled by C in

$\frac{1000x}{950}$ min

$= \frac{1000x}{950} \times \frac{931}{x} = 980$ km.

$\therefore$ B can allow C

= 1000 – 980 = 20 m

2. (4) Ratio of the speed of A, B and C = 6 : 3 : 1

$\Rightarrow$ Ratio of the time taken

$= \frac{1}{6} : \frac{1}{3} : 1 = 1 : 2 : 6$

$\therefore$ Time taken by A

$= \frac{72}{6} = 12$ minutes

3. (2) Let A take x seconds in covering 1000m and b takes y seconds

According to the question,

$x + 20 = \frac{900}{1000}y$

$\Rightarrow x + 20 = \frac{9y}{10}$ ...(i)

and, $\frac{950}{1000}x + 25 = y$ ...(ii)

From equation (i),

$\frac{10x}{9} + \frac{200}{9} = y$

$\Rightarrow \frac{10x}{9} + \frac{200}{9} = \frac{950x}{1000} + 25$

$\Rightarrow \frac{10x}{9} + \frac{200}{9} = \frac{19x}{20} + 25$

$\Rightarrow \frac{10x}{9} - \frac{19x}{20} = 25 - \frac{200}{9}$

$\Rightarrow \frac{200x - 171x}{180} = \frac{225 - 200}{9}$

$\Rightarrow \frac{29x}{180} = \frac{25}{9}$

$\Rightarrow x = \frac{25}{9} \times \frac{180}{29} = \frac{500}{29}$

seconds.

4. (3) Time taken by Kamal

$= \frac{100}{18 \times \frac{5}{18}} = 20$ seconds

$\therefore$ Time taken by Bimal

= 20 + 5 = 25 seconds

$\therefore$ Bimal's speed $= \frac{100}{25} = 4$ m/sec

$= \frac{4 \times 18}{5}$ kmph = 14.4 kmph.

5. (1) When A runs 1000m, B runs 900m.

$\therefore$ When A runs 500m, B runs 450 m.

Again, when B runs 400m, C runs 360 m.

$\therefore$ When B runs 450m, C runs

$= \frac{360}{400} \times 450 = 405$ metres

Required distance = 500 – 405

= 95 metres

6. (1) According to the question,

$\therefore$ When A runs 800 metres, B runs 760 metres

$\therefore$ When A runs 200 metres, B runs $= \frac{760}{800} \times 200 = 190$ metres

Again, when B runs 500 metres, C runs 495 metres.

$\therefore$ When B runs 190 metres, C runs $= \frac{495}{500} \times 190 = 188.1$ metres

$\therefore$ Hence, A will beat C by

200 – 188.1 = 11.9 metres in a race of 200 metres.

7. (3) According to the question,

$\because$ When B runs 200 m metres, A runs 190 metres

$\therefore$ When B runs 180 metres, A runs $= \frac{190}{200} \times 180 = 171$ metres

When C runs 200m, B runs 180 metres.

Hence, C will give a start to A by

= 200 – 171 = 29 metres

8. (2) According to the question,

When A covers 1000m, B covers

= 1000 – 40 = 960 m

and C covers =1000 – 70 = 930 m

When B covers 960m, C covers 930 m.

$\therefore$ When B covers 1000m, C covers $= \frac{930}{960} \times 1000$

= 968.75 metre

Hence, B gives C a start of

= 1000 – 968.75 = 31.25 metre

9. (2) Relative speed

= 95 – 75 = 15 kmph

Required time $= \frac{\text{Distance}}{\text{Relative speed}}$

$= \frac{5}{15}$ hours $= \frac{5}{15} \times 60$ minutes

= 20 minutes

10. (1) Time taken by C = t hours

$\therefore$ Time taken by B $= \frac{t}{3}$ hours

and time taken by A $= \frac{t}{6}$ hours

Here, $t = \frac{3}{2}$ hours

$\therefore$ Required time taken by A

$= \frac{3}{\frac{2}{6}}$ hour

$= \frac{1}{4}$ hour

$= \left(\frac{1}{4} \times 60\right)$ minutes

= 15 minutes

11. (3) 2 hours 45 minutes

$= \left(2 + \frac{45}{60}\right)$ hours

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

$\therefore$ Distance = Speed × Time

$= 4 \times \frac{11}{4} = 11$ km.

$\therefore$ Time taken in covering 11 km at 16.5 kmph

$= \frac{11}{16.5}$ hour

$= \left(\frac{11 \times 10 \times 60}{165}\right)$ minutes

= 40 minutes

12. (2) Let the total distance be x km.

Time $= \frac{\text{Distance}}{\text{Speed}}$

According to the question,

$\frac{10}{6} + \frac{20}{16} + \frac{x-30}{3} = 4\frac{35}{60}$

$= 4\frac{7}{12}$

$\Rightarrow \frac{5}{3} + \frac{5}{4} + \frac{x}{3} - 10 = \frac{55}{12}$

$\Rightarrow \frac{x}{3} + \frac{5}{3} + \frac{5}{4} - 10 = \frac{55}{12}$

$\Rightarrow \frac{x}{3} + \left(\frac{20+15-120}{12}\right) = \frac{55}{12}$

$\Rightarrow \frac{x}{3} - \frac{85}{12} = \frac{55}{12}$

$\Rightarrow \frac{x}{3} = \frac{85}{12} + \frac{55}{12} = \frac{140}{12}$

$\Rightarrow x = \frac{140}{12} \times 3 = 35$ km.

13. (1) Usual time = x minutes

New time = $\frac{4x}{3}$ minutes

$\left(\because \text{Speed} \propto \frac{1}{\text{Time}}\right)$

According to the question,

$\frac{4x}{3} - x = 20$

$\Rightarrow \frac{x}{3} = 20$

$\Rightarrow x = 60$ minutes i.e. 1 hour.

14. (2) Let, A's speed = x kmph.

$\therefore$ B's speed = $(7 - x)$ kmph

$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$

According to the question,

$\frac{24}{x} + \frac{24}{7-x} = 14$

$\Rightarrow 24\left(\frac{7-x+x}{x(7-x)}\right) = 14$

$\Rightarrow \frac{24 \times 7}{x(7-x)} = 14$

$\Rightarrow x(7 - x) = 12 = 4 \times 3$ or 3×4

$\Rightarrow x(7 - x) = 4(7 - 4)$ or $3(7 - 3)$

$\Rightarrow x = 4$ or 3

$\therefore$ A's speed = 4 kmph.

15. (3) Relative speed
= 12 + 10 = 22 kmph
Distance covered
= 55 – 11 = 44 km
$\therefore$ Required time

$= \left(\frac{44}{22}\right)$ hours

= 2 hours

16. (2) Required time = LCM of 40 and 50 seconds
= 200 seconds

17. (1) Distance between starting point and multiplex = x metre

$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$

According to the question,

$\frac{x}{3} - \frac{x}{4} = \frac{5+5}{60} \Rightarrow \frac{4x-3x}{12} = \frac{1}{6}$

$\Rightarrow \frac{x}{12} = \frac{1}{6} \Rightarrow x = \frac{12}{6} = 2$ km.

TYPE-XII

1. (2) Two ways walking time = 55 min ...(i)
One way walking + One way riding time = 37 min. ....(ii)
By 2 × (ii) – (i),
2 ways riding time
= 2×37–55 = 19 minutes.

2. (3) Let the distance be x km

Time taken by $A = \frac{x}{40}$ hrs.

Time taken by $B = \frac{x}{50}$ hrs.

Now, $\frac{x}{40} - \frac{x}{50} = \frac{15}{60}$

$\frac{5x-4x}{200} = \frac{15}{60}$

$\therefore x = \frac{15}{60} \times 200 = 50$km

Method 2 :
Distance

$= \frac{\text{Product of speed}}{\text{Diff. of speed}} \times \text{Diff. in time}$

$= \frac{40 \times 50}{50-40} \times \frac{15}{60} = 50$ km

3. (4) Let the speed of man be x kmph.

$\therefore 30x - 30\left(x - \frac{x}{15}\right) = 10$

$\Rightarrow 30\left(x - x + \frac{x}{15}\right) = 10$

$\Rightarrow \frac{x}{15} = \frac{10}{30}$

$\Rightarrow x = \frac{150}{30} = 5$ kmph

4. (1) Required time = LCM of 252, 308 and 198 seconds.
Now, 252 = 2 × 2 × 3 × 3 × 7
308 = 2 × 2 × 7 × 11
198 = 2 × 3 × 3 × 11
$\therefore$ LCM = 2 × 2 × 3 × 3 × 7 × 11
= 36 × 77 seconds

$= \frac{36 \times 77}{60}$ minutes

$= \frac{231}{5} = 46$ minutes 12 seconds

5. (4) Suppose, time taken while walking be x hours
And, time taken on riding be y hours
$\therefore$ According to question

$x + y = 4\frac{1}{2}$ hours ...(i)

Then, $2y = 3$ hours

$y = 1\frac{1}{2}$ hours

From equation (i)

$x = 4\frac{1}{2} - 1\frac{1}{2} = 3$ hours

Time required to walk both ways = 6 hours

6. (4) Let the required distance be x km.

$\therefore \frac{x}{\frac{9}{2}} + \frac{x}{3} = 5$

$\Rightarrow x\left(\frac{2}{9} + \frac{1}{3}\right) = 5 \Rightarrow x\left(\frac{2+3}{9}\right) = 5$

$\Rightarrow x = \frac{5 \times 9}{5} = 9$ km.

7. (4) Distance covered by A in 4 hours = 4 × 4 = 16 km
Relative speed of B with respect to A = 10 – 4 = 6 km/hr
$\therefore$ Time taken to catch A

$= \frac{16}{6} = \frac{8}{3}$ hours

$\therefore$ Required distance

$= \frac{8}{3} \times 10 = \frac{80}{3}$

= 26.67 km. ≈ 26.7 km

8. (2) Suppose distance be x km

$\frac{x}{2 \times 40} + \frac{x}{2 \times 60} = 10$

$\Rightarrow \frac{x}{80} + \frac{x}{120} = 10$

$\Rightarrow \frac{3x+2x}{240} = 10$

$\Rightarrow \frac{5x}{240} = 10$

$x = 480$ km

9. (1) If A covers the distance of 1 km in x seconds, B covers the distance of 1 km in $(x + 25)$ seconds. If A covers the distance of 1 km, then in the same time C covers only 725 metres.
If B covers 1 km in $(x + 25)$ seconds, then C covers 1 km in $(x + 55)$ seconds.

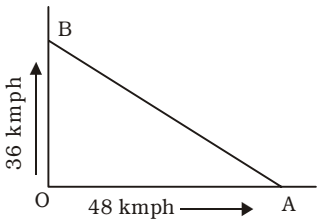
Thus in x seconds, C covers the distance of 725 m.

$\therefore \frac{x}{725} \times 1000 = x + 55$

$\Rightarrow x = 145$

$\therefore$ A covers the distance of 1 km in 2 minutes 25 seconds.

10. (4)



Let O be the starting point. The car running at 36 kmph is moving along OB and that at 48 kmph moving along OA. Also let they reach at B and A respectively after 15 seconds.

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

and OB = $36 \times \frac{5}{18} \times 15 = 150$ m

$\therefore$ Required distance = AB

$= \sqrt{(200)^2 + (150)^2}$

W (By Pythagoras theorem)

$= \sqrt{40000 + 22500}$

$= \sqrt{62500} = 250$ m

11. (2) A beats B by 30 seconds and B beats C by 15 seconds.
Clearly, A beats C by 45 seconds.
Also, A beats C by 180 metres.
Hence, C covers 180 metres in 45 seconds.

$\therefore$ Speed of C = $\frac{180}{45} = 4$ m/sec

$\therefore$ Time taken by C to cover 1000 m

$= \frac{1000}{4} = 250$ sec.

$\therefore$ Time taken by A to cover 1000 m
= 250–45 = 205 sec.

12. (2) Difference of time
= 6 min. – 5 min. 52 sec.
= 8 seconds
Distance covered by man in 5 min. 52 seconds
= Distance covered by sound in 8 seconds
= 330 × 8 = 2640 m.
$\therefore$ Speed of man

$= \frac{2640\,\text{m}}{5\,\text{min.}\,52\,\text{sec.}}$

$= \frac{2640}{352}$ m/sec

$= \frac{2640}{352} \times \frac{18}{5}$ kmph

= 27 kmph

13. (1) Let the required distance be x km.
Difference of time
= 15 + 5 = 20 minutes

$= \frac{1}{3}$ hour

According to the question,

$\frac{x}{35} - \frac{x}{42} = \frac{1}{3} \Rightarrow \frac{6x - 5x}{210} = \frac{1}{3}$

$\Rightarrow \frac{x}{210} = \frac{1}{3}$

$\Rightarrow x = \frac{210}{3} = 70$ km.

14. (3) $\left(1 - \frac{5}{6}\right)$ of time taken by B

=1 hour 15 minutes
$\therefore$ Time taken by B
= 1 hour 15 minutes × 6
=7 hours 30 minutes

15. (1) Abhay's speed = x kmph
Sameer's speed = y kmph

$\therefore \frac{30}{x} - \frac{30}{y} = 2$ ...(i)

and, $\frac{30}{y} - \frac{30}{2x} = 1$ ...(ii)

On adding,

$\frac{30}{x} - \frac{30}{2x} = 3$

$\Rightarrow \frac{60 - 30}{2x} = 3$

$\Rightarrow \frac{30}{2x} = 3 \Rightarrow 6x = 30$

$\Rightarrow x = 5$ kmph

16. (3) Time taken in walking both ways = 7 hours 45 minutes ....(i)
Time taken in walking one way and riding back = 6 hours 15 minutes ....(ii)
By equation (ii) × 2 – (i), we have
Time taken by the man to ride both ways
= 12 hours 30 minutes – 7 hours 45 minutes
= 4 hours 45 minutes

17. (1) Let the total distance be 100 km.
Average speed

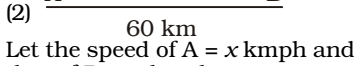
$= \frac{\text{Total distance covered}}{\text{Time taken}}$

$= \frac{100}{\frac{30}{20} + \frac{60}{40} + \frac{10}{10}}$

$= \frac{100}{\frac{3}{2} + \frac{3}{2} + 1} = \frac{100}{\frac{3+3+2}{2}}$

$= \frac{100 \times 2}{8} = 25$ kmph

18. (2)

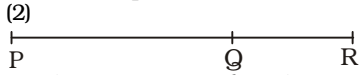


Let the speed of A = x kmph and that of B = y kmph
According to the question,
$x \times 6 + y \times 6 = 60$
$\Rightarrow x + y = 10$ ....(i)

and, $\frac{2}{3}x \times 5 + 2y \times 5 = 60$

$\Rightarrow 10x + 30y = 180$
$\Rightarrow x + 3y = 18$ ...(ii)
From equations (i) × (3) – (ii)
$3x + 3y - x - 3y = 30 - 18$
$\Rightarrow 12x = 12$
$\Rightarrow x = 6$ kmph.

19. (2)



Let the trains meet after t hours, then
$24t - 18t = 27$
$\Rightarrow 6t = 27$

$\Rightarrow t = \frac{27}{6} = \frac{9}{2}$ hours

$\therefore$ QR = $18t = 18 \times \frac{9}{2} = 81$ km

20. (3) Let the speed of Ravi be x kmph then, Ajay's speed = $(x + 4)$ kmph
Distance covered by Ajay
= 60 + 12 = 72 km
Distance covered by Ravi
= 60 – 12 = 48 km.
According to the question,

$\frac{72}{x+4} = \frac{48}{x}$

$\Rightarrow \frac{3}{x+4} = \frac{2}{x}$
$\Rightarrow 3x = 2x + 8$
$\Rightarrow x = 8$ kmph

21. (2) Let man walked for t hours.
then, $t \times 4 + (9 - t) \times 9 = 61$
$\Rightarrow 4t + 81 - 9t = 61$
$\Rightarrow 81 - 5t = 61$
$\Rightarrow 5t = 20$
$\Rightarrow t = 4$
$\therefore$ Distance travelled on foot
= 4 × 4 = 16 km.

22. (1) Let the required distance be x km, then

$\frac{x}{5} - \frac{x}{6} = \frac{12}{60} = \frac{1}{5}$

$\Rightarrow \frac{6x - 5x}{30} = \frac{1}{5} \Rightarrow \frac{x}{30} = \frac{1}{5}$

$\Rightarrow x = 6$ km.

23. (4) Let the required distance be x km.

$\therefore \frac{x}{3} - \frac{x}{4} = \frac{30}{60}$

$\Rightarrow \frac{x}{12} = \frac{1}{2} \Rightarrow x = \frac{1}{2} \times 12 = 6$ km

24. (2) Let the speed of train be x kmph and that of car be y kmph, then

$$\frac{60}{x}+\frac{240}{y}=4 \quad \text{...(i)}$$

and, $\frac{100}{x}+\frac{200}{y}=\frac{25}{6}$

$$\Rightarrow \frac{4}{x}+\frac{8}{y}=\frac{1}{6} \quad \text{...(ii)}$$

By equation (i) – equation (ii) × 30

$$\frac{60}{x}+\frac{240}{y}-\frac{120}{x}-\frac{240}{y}=4-5$$

$$\Rightarrow -\frac{60}{x}=-1$$

$\Rightarrow x = 60$ kmph

25. (2) Ratio of the speed of A and B
= A : B = 2 : 1 = 6 : 3
B : C = 3 : 1
$\therefore$ A : B : C = 6 : 3 : 1
$\therefore$ Ratio of their time taken

$$=\frac{1}{6}:\frac{1}{3}:1 = 1:2:6$$

$\therefore$ Time taken by B

$$=\left(\frac{2}{6}\times 114\right) \text{ minutes}$$

= 38 minutes

26. (3) Let speed of train A = x kmph and speed of train B = y kmph

$$\therefore \frac{x}{y}=\sqrt{\frac{t_2}{t_1}}$$

$$\Rightarrow \frac{45}{y}=\sqrt{\frac{3+\frac{1}{3}}{4+\frac{48}{60}}}=\sqrt{\frac{\frac{10}{3}}{4+\frac{4}{5}}}$$

$$=\sqrt{\frac{10}{3}\times\frac{5}{24}}=\sqrt{\frac{25}{36}}=\frac{5}{6}$$

$$\Rightarrow 5y = 45\times 6 \Rightarrow y=\frac{45\times 6}{5}$$

= 54 kmph

27. (2) Total distance of trip

$$=\frac{1200\times 5}{2}=3000 \text{ km}$$

Part of journey covered by train

$$=1-\frac{2}{5}-\frac{1}{3}=\frac{15-6-5}{15}=\frac{4}{15}$$

$\therefore$ Distance covered by train

$$=3000\times\frac{4}{15}=800 \text{ km}$$

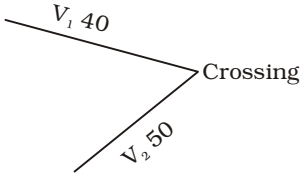
28. (1) A's speed = $\frac{1000}{5}$
= 200 m/minute
B's speed = $\frac{1000}{8}$
= 125 m/minute
C's speed = $\frac{1000}{10}$
= 100 m/minute
Distance covered by C in 2 minutes = 200 metre
Distance covered by B in 1 minute = 125 metre
Relative speed of A with respect to C = 100 metre

$$\therefore \text{Time} = \frac{200}{100}=2 \text{ minutes}$$

Relative speed of A with respect ot B = 75 metre

$$\therefore \text{Time} = \frac{125}{75}=\frac{5}{3} \text{ minutes}$$

29. (2)



Let time taken be equal
i.e., $\frac{40}{V_1}=\frac{50}{V_2}$, then they will collide i.e. cars will reach at the same time.

$$\therefore \frac{V_1}{V_2}\neq\frac{40}{50}=\frac{4}{5}$$

30. (1) Time taken in covering 999km

$$=\frac{999}{55.5}=18 \text{ hours}$$

$\therefore$ Required time = 18 hours + 1 hour 20 minutes
= 19 hours 20 minutes
i.e. 1 : 20 am

31. (1) Speed = 45 kmph

$$=\left(\frac{45\times 1000}{60\times 60}\right) \text{ metre/second}$$

$$=\left(\frac{45\times 5}{18}\right) \text{ metre/second}$$

= 12.5 metre/second

32. (1) Distance covered in 2nd minute = 90 – 50 = 40 metre
Distance covered in 3rd minute
= 130 – 90 = 40 metre
$\therefore$ Required distance
= 50 + 40 × 14
= 50 + 560 = 610 metre

33. (3) Here distance is constant.

$$\therefore \text{Speed} \propto \frac{1}{\text{Time}}$$

$\therefore$ Ratio of the speeds of A and B

$$=\frac{\frac{7}{2}}{4}=7:8$$

$\therefore$ A's speed = $7x$ kmph (let)
B's speed = $8x$ kmph
$\therefore$ AB = $7x\times 4 = 28x$ km.
Let both trains cross each other after t hours from 7 a.m.
According to the question,
$7x(t+2)+8x\times t = 28x$
$\Rightarrow 7t+14+8t=28$
$\Rightarrow 15t = 28-14=14$

$$\Rightarrow t=\frac{14}{15} \text{ hours}$$

$$=\left(\frac{14}{15}\times 60\right) \text{ minutes}$$

= 56 minutes
$\therefore$ Required time = 7 : 56 A.M.

34. (4) Speed of plane = $\frac{\text{Distance}}{\text{Time}}$

$$=\frac{6000}{8}=750 \text{ kmph}$$

New speed = (750 + 250) kmph
= 1000 kmph

$$\therefore \text{Required time} = \frac{9000}{1000}$$

= 9 hours

35. (1) Let speed of train be x kmph.
Speed of car = y kmph.
Case I,

$$\because \text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\therefore \frac{240}{x}+\frac{210}{y}=8\frac{40}{60}=8\frac{2}{3}$$

$$\Rightarrow \frac{240}{x}+\frac{210}{y}=\frac{26}{3} \quad \text{... (i)}$$

Case II,

$$\frac{180}{x}+\frac{270}{y}=9 \quad \text{..... (ii)}$$

By equation (i) × 3 – (ii) × 4,

$$\frac{720}{x}+\frac{630}{y}-\frac{720}{x}-\frac{1080}{y}$$

= 26 – 36

$$\Rightarrow \frac{-450}{y}=-10$$

$\Rightarrow y$ = 45 kmph.

36. (3) Difference of time = 11 minutes 45 seconds – 11 minutes = 45 seconds

Distance covered by sound in 45 seconds = Distance covered by train in 11 minutes

$\Rightarrow 330 \times 45 = 11 \times 60 \times$ Speed of train

$\Rightarrow$ Speed of train

$= \left(\frac{330 \times 45}{11 \times 60}\right)$ m/sec.

$= \left(\frac{45}{2} \times \frac{18}{5}\right)$ kmph.

= 81 kmph.

37. (2) Distance covered in 3 hours 36 minutes i.e. $3\frac{36}{60}$ hours

i.e. $3\frac{3}{5}$ hours

$= 5 \times \frac{18}{5} = 18$ km.

$\therefore$ Time taken at 24 kmph.

$= \frac{18}{24}$ hour

$= \left(\frac{18}{24} \times 60\right)$ minutes

= 45 minutes

38. (3) Let the original speed of aeroplane be x kmph.

According to the question,

$$\frac{1200}{x-300} - \frac{1200}{x} = 2$$

$$\Rightarrow 1200\left(\frac{x - x + 300}{x(x-300)}\right) = 2$$

$$\Rightarrow x(x-300) = \frac{1200 \times 300}{2}$$

$\Rightarrow x(x-300) = 600 \times 300$

$\Rightarrow x(x-300) = 600(600-300)$

$\Rightarrow x = 600$ kmph.

$\therefore$ Scheduled duration of flight = $\frac{1200}{600} = 2$ hours

39. (4) Consumption of petrol in covering 540 km

$= \frac{540}{45} = 12$ litres

$\therefore$ Required expenses

= Rs. (12 × 20)

= Rs. 240

40. (2) $\because$ 18 km ≡ 1.5 cm

$\therefore$ 1 km $\equiv \frac{1.5}{18}$ cm

$\therefore 72 \equiv \left(\frac{1.5 \times 72}{18}\right)$ cm = 6 cm

41. (2) Length of journey on foot = x km. (let).

$\therefore$ Length of journey on cycle = $(61 - x)$ km.

According to the question,

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\therefore \frac{x}{4} + \frac{61-x}{9} = 9$$

$$\Rightarrow \frac{9x + 244 - 4x}{36} = 9$$

$\Rightarrow 5x + 244 = 36 \times 9 = 324$

$\Rightarrow 5x = 324 - 244 = 80$

$\Rightarrow x = \frac{80}{5} = 16$ km.

42. (1) Let the distance covered on foot be x km.

$\therefore$ Distance covered on cycle = $(61 - x)$ km.

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

$$\therefore \frac{x}{4} + \frac{61-x}{9} = 9$$

$$\Rightarrow \frac{x}{4} - \frac{x}{9} = 9 - \frac{61}{9}$$

$$\Rightarrow \frac{9x - 4x}{36} = \frac{81 - 61}{9}$$

$$\Rightarrow \frac{5x}{36} = \frac{20}{9}$$

$$\Rightarrow x = \frac{20}{9} \times \frac{36}{5} = 16 \text{ km.}$$

43. (4) Distance = Speed × Time

= 330 × 10 = 3300 metre

44. (2) Let total distance covered be $2x$ km.

Total time = 14 hours 40 minutes

$= 14\frac{40}{60}$ hours $= 14\frac{2}{3}$ hours

$= \frac{44}{3}$ hours

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}}$$

According to the question,

$$\frac{x}{60} + \frac{x}{50} = \frac{44}{3}$$

$$\therefore \frac{5x + 6x}{300} = \frac{44}{3}$$

$$\Rightarrow \frac{11x}{300} = \frac{44}{3}$$

$$\Rightarrow x = \frac{44}{3} \times \frac{300}{11} = 400$$

$\therefore$ Total distance

$= 2x = 2 \times 400 = 800$ km

45. (2) Distance between both donkeys = 400 metre.

Relative speed = (3 + 2) m./sec. = 5 m./sec.

$\therefore$ Required time

$$= \frac{\text{Distance}}{\text{Relative speed}}$$

$= \frac{400}{5} = 80$ seconds

46. (2)

A's speed = x kmph.

B's speed = y kmph.

When A and B move in opposite directions they meet at C and when they move in the same direction, they meet at D.

Case I,

AC + CB = AB

$$\frac{x}{2} + \frac{y}{2} = 15$$

$\Rightarrow x + y = 30$ ..... (i)

Case II,

AD – BD = AB

$$\Rightarrow x \times \frac{5}{2} - y \times \frac{5}{2} = 15$$

$$\frac{5}{2}(x - y) = 15$$

$$\Rightarrow x - y = \frac{15 \times 2}{5} = 6 \quad \text{.....(ii)}$$

$\therefore$ On adding equations (i) and (ii),

$x + y + x - y = 30 + 6$

$\Rightarrow 2x = 36$

$\Rightarrow x = \frac{36}{2} = 18$ kmph.

47. (2) Speed of person = 3 kmph

$= \left(\frac{3000}{60}\right)$ m./min.

= 50 m./min.

$\therefore$ Length of the diagonal of square field

= 50 × 2 = 100 metre

$\therefore$ Required area $= \frac{1}{2} \times (100)^2$

= 5000 sq. metre

❑❑❑

TEST YOURSELF

1. Express speed of 36 km per hr. in metres per second.
(1) 10 m/sec. (2) 8 m/sec.
(3) 12 m/sec. (4) 18m/sec.

2. Express speed of 60 metres per sec. in km per hour.
(1) 232 kmph (2) 216 kmph
(3) 116 kmph (4) 118 kmph

3. A man covers 20 kms in 2 hours. Find the distance covered by him in $5\frac{1}{2}$ hours.
(1) 50 km (2) 65 km
(3) 55 km (4) 45 km

4. A car runs at 60 km per hr. A man runs at one-third the speed of the car and reaches office from his house in 15 minutes. How far is his office from his house?
(1) 7 km (2) 5.5 km
(3) 6 km (4) 5 km

5. Walking at a speed of 6 km per hour, a man takes 5 hours to complete his journey. How much time will he need to complete the same journey at the rate of 8 km per hr.?
(1) $3\frac{3}{4}$ hours (2) 3 hours
(3) $2\frac{3}{4}$ hours (4) 3.5 hours

6. A person covers 10 kms at 4 km per hr. and then further 21 kms at 6 km per hr. Find his average speed for whole journey.
(1) $5\frac{1}{3}$ kmph (2) $5\frac{1}{6}$ kmph
(3) $5\frac{1}{2}$ kmph (4) $4\frac{1}{2}$ kmph

7. *P* and *Q* are two cities. A boy travels on cycle from *P* to *Q* at a speed of 20 km per hr. and returns at the rate of 10 km per hr. Find his average speed for the whole journey.
(1) $13\frac{2}{3}$ kmph (2) $12\frac{1}{3}$ kmph
(3) $13\frac{1}{3}$ kmph (4) $12\frac{2}{3}$ kmph

8. A man walked a certain distance. One-third he walked at 5 km per hr. Another one-third he walked at 10 km per hr. and the rest at 15 km per hr. Find his average speed.
(1) $8\frac{1}{11}$ kmph (2) $7\frac{1}{11}$ kmph
(3) $7\frac{2}{11}$ kmph (4) $8\frac{2}{11}$ kmph

9. An aeroplane travels a distance in the form of a square with the speed of 400 km per hr, 600 km per hr, 800 km per hr. and 1200 km per hr respectively. Find the average speed for the whole distance along the four sides of the square.
(1) 640 kmph (2) 620 kmph
(3) 630 kmph (4) 650 kmph

10. A man covers one-third of his journey at 30 km per hr. and the remaining two-third at 45 km per hr. If the total journey is of 150 kms, what is his average speed for the whole journey?
(1) 38 kmph (2) $38\frac{4}{7}$ kmph
(3) 64 kmph (4) $39\frac{4}{7}$ kmph

11. When a person covers the distance between his house and office at 50 km per hr. he is late by 20 minutes. But when he travels at 60 km per hr. he reaches 10 minutes early. What is the distance between his office and his house?
(1) 140 km. (2) 160 km.
(3) 150 km. (4) 120 km.

12. A boy walks from his house at 4 km per hr. and reaches his school 9 minutes late. If his speed had been 5 km per hr. he would have reached his school 6 minutes earlier. How far his school from house?
(1) 6.5 km. (2) 5.5 km.
(3) 6 km. (4) 5 km.

13. A car travels a distance of 300 kms at uniform speed. If the speed of the car is 5 km per hr more it takes two hours less to cover the same distance. Find the original speed of the car.
(1) 25 kmph (2) 20 kmph
(3) 24 kmph (4) 28 kmph

14. A car can finish a certain journey in 10 hours at a speed of 48 km per hr. In order to cover the same distance in 8 hours, how much the speed be increased by ?
(1) 10 kmph (2) 12 kmph
(3) 14 kmph (4) 15 kmph

15. If a boy walks from his house to school at the rate of 4 km per hr, he reaches the school 10 minutes earlier than the scheduled time. However if he walks at the rate of 3 km per hr, he reaches 10 minutes late. Find the distance of his school from his house.
(1) 3.5 km (2) 3 km
(3) 4 km (4) 4.5 km

16. A man has to reach a place 40 kms away. He walks at the rate of 4 km per hr. for the first 16 kms and then he hires a rickshaw for the rest of the journey. However if he had travelled by the rickshaw for the first 16 kms and the remaining distance on foot at 4 km per hr, he would have taken an hour longer to complete the journey. Find the speed of rickshaw.
(1) 6.5 kmph (2) 7.5 kmph
(3) 6 kmph (4) 8 kmph

17. Walking $\frac{3}{4}$ of my usual speed, a late is marked on my cards by 10 minutes. Find my usual time.
(1) 30 minutes (2) 35 minutes
(3) 32 minutes (4) 36 minutes

18. By walking $\frac{5}{3}$ of usual speed a student reaches school 20 minutes earlier. Find his usual time.
(1) 45 minutes
(2) 50 minutes
(3) 60 minutes
(4) None of these

19. Walking at $\frac{3}{4}$ of his usual speed a man is late by $2\frac{1}{2}$ hours. The usual time would have been what?
(1) 7 hours (2) 7.5 hours
(3) 8 hours (4) 8.5 hours

20. Two men *A* and *B* walk from *X* to *Y* a distance of 42 kms at 5 km and 7 km an hour respectively. *B* reaches *Y* and returns immediately and meets *A* at *R*. Find the distance from *X* to *R*.
(1) 32 km (2) 30 km
(3) 35 km (4) 40 km

21. Two men *A* and *B* start walking simultaneously from *P* to *Q*, a distance of 21 kms, at the speed of 3 km and 4 km an hour respectively. *B* reaches *Q*, returns immediately and meets *A* at *R*. Find the distance from *P* to *R*.
(1) 22 km (2) 20 km
(3) 16 km (4) 18 km

22. Ram travelled one-third of a journey with a speed of 10 km per hr, the next one-third with a speed of 9 km per hr. and the rest at a speed of 8 km per hr. If he had travelled half the journey at speed of 10 km per hr. and the other half with a speed of 8 km per hr, he would have been 1 minute longer on the way. What distance did he travel?
(1) 36 km (2) 32 km
(3) 35 km (4) 40 km

23. A man walks a distance of 35 kms. He walks for some time at 4 km per hour and for some time at 5 km per hr. If he walks at 5 km per hr. instead of 4 km per hr. and 4 km per hr. instead of 5 km per hr, he will walk 2 kms more in the same span of time. Find his total time of total journey.
(1) 8.5 hours (2) 7.5 hours
(3) 8 hours (4) 7 hours

24. A man travels 400 kms in 4 hours partly by air and partly by train. If he had travelled all the way by air, he would have saved $\frac{4}{5}$ of the time he was in train and would have arrived his destination 2 hours early. Find the distance he travelled by train.
(1) 95 km. (2) 85 km.
(3) 90 km. (4) 100 km.

25. On increasing the speed of a train at the rate of 10 km per hr, 30 minutes is saved in a journey of 100 kms. Find the initial speed of train.
(1) 40 kmph (2) 45 kmph
(3) 42 kmph (4) 44 kmph

26. Ravi can walk a certain distance in 40 days when he rests 9 hours a day. How long will he take to walk twice the distance, twice as fast and rest twice as long each day?
(1) 80 days (2) 100 days
(3) 90 days (4) 95 days

27. A monkey climbing up a greased pole ascends 12 metres and slips down 5 metres in alternate minutes. If the pole is 63 metres high, how long will it take him to reach the top?
(1) 18 minutes
(2) 16 minutes
(3) $16\frac{7}{12}$ minutes
(4) 18 minutes 20 seconds

28. A hare sees a dog 100 metres away from her and scuds off in the opposite direction at a speed of 12 km per hr. A minute later the dog perceives her and chases her at a speed of 16 km per hr. How soon will the dog overtake the hare and at what distance from the spot when the hare took flight?
(1) 900 metres (2) 950 metres
(3) 1000 metres (4) 1100 metres

29. A hare, pursued by a grey hound is 50 of her own leaps before him. While the hare takes 4 leaps, the grey hound takes 3 leaps. In one leap, the hare goes 1.75 metres and the grey hound 2.75 metres. In how many leaps, will the grey hound overtake the hare?
(1) 210 leaps (2) 220 leaps
(3) 230 leaps (4) 250 leaps

30. In a flight of 600 kms, an aircraft was slowed down due to bad weather. Its average speed for the trip was reduced by 200 km per hr. and the time of flight increased by 30 minutes. Find the duration of flight.
(1) 1.2 hours (2) 1 hour
(3) 1.5 hours (4) 2 hours

31. Two trains leave a railway station at the same time. The first train travels due west and the second train due north. The first train travels 5 km per hr. faster than the second train. If after two hours they are 50 km apart, find the average speed of faster train.
(1) 18 kmph (2) 15 kmph
(3) 20 kmph (4) 25 kmph

32. A carriage driving in a fog passed a man who was walking at the rate of 6 km per hr. in the same direction. He could see the carriage for 4 minutes and it was visible to him up to a distance of 200 metres. Find the speed of the carriage.
(1) 8.75 kmph (2) 8.5 kmph
(3) 8 kmph (4) 9 kmph

33. Two bullets were fired at a place at an interval of 12 minutes. A person approaching the firing point in his car hears the two sounds at an interval of 11 minutes 40 seconds. The speed of sound is 330 metres per second. What is the approximate speed of the car?
(1) 34 kmph (2) 32 kmph
(3) 36 kmph (4) 38 kmph

34. *A* and *B* start simultaneously at 5 km per hr. and 4 km per hr. from *P* and *Q*, 180 kms apart, towards *Q* and *P* respectively. They cross each other at *M* and after reaching *Q* and *P* turn back immediately and meet again at *N*. Find the distance *MN*.
(1) 45 km (2) 40 km
(3) 35km (4) 42 km

35. A car driving in the morning fog passes a man walking at 4 km per hr. in the same direction. The man can see the car for 3 minutes and visibility is upto a distance of 130 metres. Find the speed of the car.
(1) 7.5 kmph (2) 6.6 kmph
(3) 6 kmph (4) 7 kmph

36. Ram starts his journey from Bombay to Pune and simultaneously Mohan starts from Pune to Bombay. After crossing each other they finish their remaining journey in $6\frac{1}{4}$ and 4 hours re-

spectively. What is Mohan's speed if Ram's speed is 20 km per hr. ?
(1) 28 kmph (2) 24 kmph
(3) 25 kmph (4) 30 kmph

37. A train meets with an accident after travelling 30 kms, after which it moves with $\frac{4}{5}$ th of its original speed and arrives at the destination 45 minutes late. Had the accident happened 18 kms further on, it would have been 9 minutes before. Find the distance of journey and original speed of the train.
(1) 120 km ; 25 kmph
(2) 125 km ; 25 kmph
(3) 130 km ; 30 kmph
(4) 120 km ; 30 kmph

38. A train met with an accident 3 hours after starting, which detains it for one hour, after which it proceeds at 75% of its original speed. It arrives at the destination 4 hours late. Had the accident taken place 150 km further along the railway line, the train would have arrived only $3\frac{1}{2}$ hours late. Find the length of the trip and the original speed of the train.
(1) 1100 km ; 100 kmph
(2) 1200 km ; 100 kmph
(3) 1200 km ; 90 kmph
(4) 1600 km ; 90 kmph

39. A train after travelling 100 kms from *P* meets with an accident and then proceeds at $\frac{3}{4}$ th of its original speed and arrives at the terminus *Q* 90 minutes late. Had the accident occurred 60 kms further on, it would have reached 15 minutes sooner. Find the original speed of the train and the distance *PQ*.
(1) 65 kmph; 480 km
(2) 75 kmph; 450 km
(3) 80 kmph; 460 km
(4) 85 kmph; 460 km

40. Two trains *A* and *B* are 110 km apart on a straight line. One train starts from *A* at 7 a.m. and travels towards *B* at 20 km per hr. Another train starts from *B* at 8 am. and travels towards *A* at a speed of 25 km per hr. At what time will they meet?
(1) 10 : 15 a.m.
(2) 09 : 50 a.m.
(3) 09 : 30 a.m.
(4) 10 : 00 a.m.

41. Two boys begin together to write out a booklet containing 817 lines. The first boy starts with the first line, writing at the rate of 200 lines an hour and the second boy starts with the last lines then writes line 816 and so on. Backward proceeding at the rate of 150 lines an hour. At what line will they meet?
(1) 467^{th} line (2) 468^{th} line
(3) 470^{th} line (4) 475^{th} line

42. Two men set out the same time to walk towards each other from two points *A* and *B*, 72 km apart. The first man walks at the rate of 4 km per hr. The second man walks 2 km in the first hour, $2\frac{1}{2}$ km in the second hour, 3 km in the third hour and so on. Find the time after which the two men will meet.
(1) 8 hours (2) 9 hours
(3) 8.5 hours (4) 9.5 hours

43. A man is standing on a railway bridge which is 50 metres long. He finds that a train crosses the bridge in $4\frac{1}{2}$ seconds but himself in 2 seconds. Find the length of the train and its speed.
(1) 60 m ; 20 m/sec
(2) 40 m ; 20 kmph
(3) 40 m ; 20 m/sec
(4) 40 m ; 25 m/sec

44. Two places *A* and *B* are 162 kms apart. A train leaves *A* for *B* and at the same time another train leaves *B* for *A*. The two trains meet at the end of 6 hours. If the train travelling from *A* to *B* travels 8 km per hr. faster than the other, find the speed of the faster train.
(1) 16.5 kmph (2) 16 kmph
(3) 17 kmph (4) 17.5 kmph

45. A train running at 25 km per hour take 18 seconds to pass a platform. Next, it takes 12 seconds to pass a man walking at the rate of 5 km per hr. in the same direction. Find the length of the platform.
(1) 25 metres (2) 20 metres
(3) 24 metres (4) 28 metres

46. Two trains 200 metres and 175 metres long are running on parallel lines.They take $7\frac{1}{2}$ seconds when running in opposite directions and $37\frac{1}{2}$ seconds when running in the same direction to pass each other. Find their speeds in km per hour.
(1) 118 kmph ; 75 kmph
(2) 108 kmph ; 72 kmph
(3) 120 kmph ; 75 kmph
(4) 125 kmph ; 80 kmph

47. A train travelling at the rate of 60 km per hr, while inside a tunnel, meets another train of half its length travelling at 90 km per hr. and passes completely in $4\frac{1}{2}$ seconds. Find the length of the tunnel if the first train passes completely through it in 4 minutes $37\frac{1}{2}$ seconds.
(1) 5 km (2) 3.5 km
(3) 4.5 km (4) 6 km

48. A train overtakes two person walking at 2 km per hr. and 4 km per hr. respectively and passes completely them in 9 sec. and 10 sec. respectively. What is the length of the train?
(1) 65 metres (2) 60 metres
(3) 55 metres (4) 50 metres

49. A train takes 18 seconds to pass completely through a station 162 metres long and 15 seconds to pass completely through another station 120 metres long. Find the speed of train in km per hr.
(1) 50.4 kmph (2) 52 kmph
(3) 55 kmph (4) 60 kmph

50. Two trains of which one is 50 metres longer than the other are running in opposite directions and cross each other in 10 seconds. If they be running in the same direction then faster train would have passed the other train in 1 minute 30 seconds. The speed of faster train is 90 km per hr. Find the speed of other train.
(1) 25 m/sec. (2) 20 m/sec.
(3) 30 m/sec. (4) 35 m/sec.

51. A man standing on a 170 metre long platform watches that a train takes $7\frac{1}{2}$ seconds to pass him and 21 seconds to cross the platform. Find the speed of train.
(1) $12\frac{16}{27}$ m/sec.
(2) 12.5 m/sec.
(3) $12\frac{13}{27}$ m/sec.
(4) None of these

52. A goods train 158 metres long and travelling at the speed of 32 km per hr. leaves Delhi at 6 am. Another mail train 130 metres long and travelling at the average speed of 80 km per hr. leaves Delhi at 12 noon and follows the goods train. At what time will the mail train completely cross the goods train?
(1) 4 hours
(2) 4 hours 21.6 sec.
(3) 5 hours 21.6 sec.
(4) None of these

53. A motor-boat goes 2 km upstream in a stream flowing at 3 km per hr. and then returns downstream to the starting point in 30 minutes. Find the speed of the motor-boat in still water.
(1) 9.5 kmph (2) 8.5 kmph
(3) 9 kmph (4) 8 kmph

54. A person can row a boat 32 km upstream and 60 km downstream in 9 hours. Also, he can row 40 km upstream and 84 km downstream in 12 hours. Find the rate of the current.
(1) 3 kmph (2) 2.5 kmph
(3) 1.5 kmph (4) 2 kmph

55. A boatman takes his boat in a river against the stream from a place *A* to a place *B* where *AB* is 21 km and again returns to *A*. Thus he takes 10 hours in all. The time taken by him downstream in going 7 km is equal to the time taken by him against stream in going 3 km. Find the speed of river.
(1) 2 kmph (2) 2.5 kmph
(3) 3 kmph (4) 3.5 kmph

56. A motorist and a cyclist start from *A* to *B* at the same time. *AB* is 18 km. The speed of motorist is 15 m per hr. more than the cyclist. After covering half the distance, the motorist rests for 30 minutes and thereafter his speed is reduced by 20%. If the motorist reaches the destination *B*, 15 minutes earlier than that of the cyclist, then find the speed of the cyclist.
(1) 16 kmph (2) 12 kmph
(3) 14 kmph (4) 15 kmph

57. A man covered a distance of 3990 km partly by air, partly by sea and remaining by land. The time spent in air, on sea and on land is in the ratio 1 : 16 : 2 and the ratio of average speed is 20 : 1 : 3 respectively. If total average speed is 42 km per hr, find the distance covered by sea.
(1) 1720 km. (2) 1620 km.
(3) 1520 km. (4) 1820 km.

58. A railway engine is proceeding towards *A* at uniform speed of 30 km/hr. While the engine is 20 kms away from *A* an insect starting from *A* flies again and again between *A* and the engine relentlessly. The speed of insect is 42 km per hr. Find the distance covered by the insect till the engine reaches *A*.
(1) 25 km. (2) 32 km.
(3) 30 km. (4) 28 km.

59. Distance between two stations *X* and *Y* is 220 km. Trains *P* and *Q* leave station *X* at 8 a.m. and 9.51 a.m. respectively at the speed of 25 kmph and 20 kmph respectively for journey towards *Y*. A train *R* leaves station *Y* at 11.30 a.m. at a speed of a 30 kmph. for journey towards *X*. When will *P* be at equal distance from *Q* and *R*?
(1) 12:48 pm. (2) 12:30 pm.
(3) 12:45 pm. (4) 11:48 pm.

60. A person travels a certain distance on a bicycle at a certain speed. Had he moved 3 km/hour faster, he would have taken 40 minutes less. Had he moved 2km/hour slower, he would have taken 40 minutes more. Find the distance.
(1) 45 km. (2) 40 km.
(3) 50 km. (4) 55 km.

61. A steamer goes downstream from one port to another in 4 hours. It covers the same distance upstream in 5 hours. If the speed of the stream be 2 km/hr, find the distance between the two ports.
(1) 60 km. (2) 45 km.
(3) 80 km. (4) 65 km.

62. In a 200 metre race, A beats B by 20 metres; while in a 100 metres race, B beats C by 5 metres. Assuming that the speed of A, B and C remain the same in various races, by how many metres will A beat C in one kilometre race ?
(1) 140 metre (2) 145 metre
(3) 135 metre (4) 125 metre

63. Two places A and B are 80 km apart from each other on a highway. A car starts from A and another from B at the same time. If they move in the same direction, they meet each other in 8 hours. If they move in opposite directions towards each other, they meet in 1 hour 20 minutes. Determine the speed of the faster car.
(1) 20 kmph (2) 25 kmph
(3) 35 kmph (4) 30 kmph

64. In a one-kilometre race, A beats B by 15 seconds and B beats C by 15 seconds. If C is 100 metres away from the finishing mark, when B has reached it, find the speed of A.
(1) 9.5 m/sec. (2) 9 m/sec.
(3) 8 m/sec. (4) 8.3 m/sec.

65. A train running at the speed of 72 km/hr passes a tunnel completely in 3 minutes. While inside the tunnel, it meets another train of $\frac{3}{4}$ of its length coming from opposite direction at the speed of 90km/hr and passes it completely in $3\frac{1}{2}$ seconds. Find the length of the tunnel.
(1) 3510 metre (2) 3500 metre
(3) 3400 metre (4) 3600 metre

SHORT ANSWERS

1. (1)	**2.** (2)	**3.** (3)	**4.** (4)
5. (1)	**6.** (2)	**7.** (3)	**8.** (4)
9. (1)	**10.** (2)	**11.** (3)	**12.** (4)
13. (1)	**14.** (2)	**15.** (3)	**16.** (4)
17. (1)	**18.** (2)	**19.** (2)	**20.** (3)
21. (4)	**22.** (1)	**23.** (3)	**24.** (4)
25. (1)	**26.** (2)	**27.** (3)	**28.** (4)
29. (1)	**30.** (2)	**31**. (3)	**32.** (4)
33. (1)	**34.** (2)	**35.** (2)	**36.** (3)
37. (4)	**38.** (2)	**39.** (3)	**40.** (4)
41. (1)	**42.** (2)	**43.** (3)	**44.** (4)
45. (1)	**46.** (2)	**47.** (3)	**48.** (4)
49. (1)	**50.** (2)	**51.** (1)	**52.** (2)
53. (3)	**54.** (4)	**55.** (1)	**56.** (2)
57. (3)	**58.** (4)	**59.** (1)	**60.** (2)
61. (3)	**62.** (2)	**63.** (3)	**64.** (4)
65. (1)			

EXPLANATIONS

1. (1) 36 km/hr.

$= \left(36 \times \frac{5}{18}\right)$ m/sec.

= 10 m/sec.

2. (2) 60 metres per sec.

$= \left(60 \times \frac{18}{5}\right)$ km per hr.

= 216 km per hr.

3. (3) Distance = 20 kms
Time = 2 hours

$\therefore$ Speed $= \frac{\text{Distance}}{\text{Time}}$

$= \frac{20}{2}$ = 10 km per hr.

Now, we have, Speed = 10 km per hr.

Time $= \frac{11}{2}$ hr.

$\therefore$ Distance = Speed × Time

$= 10 \times \frac{11}{2}$ = 55 km.

4. (4) Man's speed $= \frac{1}{3}$ of the speed of car

$= \frac{1}{3} \times 60 = 20$ km per hr.

Time taken to reach office= 15 minutes $= \frac{15}{60} = \frac{1}{4}$ hr.

$\therefore$ Distance between his house and office
= Speed × Time

$= 20 \times \frac{1}{4} = 5$ km.

5. (1) Speed = 6 km/hr
Time taken = 5 hours
$\therefore$ Distance covered
= 6 × 5 = 30 kms
$\therefore$ Time required to cover 30 kms at the speed of 8 km/hr.

$= \frac{\text{Distance}}{\text{Speed}} = \frac{30}{8} = \frac{15}{4}$ hours

$= 3\frac{3}{4}$ hours

6. (2) **Case I.**
Distance = 10 kms
Speed = 4 km/hr.

$\therefore$ Time taken $(t_1) = \frac{10}{4} = \frac{5}{2}$ hrs.

Case II.
Distance = 21 kms
Speed = 6 km/hr.

$\therefore$ Time taken $(t_2) = \frac{21}{6} = \frac{7}{2}$ hrs.

Total time taken $= \frac{5}{2} + \frac{7}{2}$

$= \frac{5+7}{2} = 6$ hrs.

Total distance covered
= 10 + 21 = 31 kms
$\therefore$ Average Speed

$= \frac{\text{Total distance}}{\text{Total time}}$

$= \frac{31}{6}$ km per hr.

$= 5\frac{1}{6}$ km per hr.

7. (3) Let the speed between P and Q be x km.
Then time taken to cover x km.

P to $Q = \frac{x}{20}$ hrs.

Time taken to cover x km from Q to P at 10 km per hr. P to Q

$= \frac{x}{10}$ hrs.

$\therefore$ Total distance covered
= $x + x = 2x$ km.
Time taken to cover $2x$ km.

$= \frac{x}{20} + \frac{x}{10} = \frac{x+2x}{20} = \frac{3x}{20}$ hrs.

$\therefore$ Average Speed

$= \frac{2x}{\frac{3x}{20}} = \frac{2x \times 20}{3x}$

$= \frac{40}{3}$ km per hr.

$= 13\frac{1}{3}$ km per hr.

Method 2 :
Here, x = 20 km per hr.
y = 10 km per hr.
$\therefore$ Average speed
[$\because$ Distance is same]

$= \frac{2xy}{x+y} = \frac{2 \times 20 \times 10}{20+10}$

$= \frac{400}{30} = \frac{40}{3} = 13\frac{1}{3}$ km per hr.

8. (4) Here, the man covers equal distance at different speeds. Using the formula, the Average Speed is given by

$= \frac{3}{\frac{1}{5} + \frac{1}{10} + \frac{1}{15}} = \frac{3}{\frac{6+3+2}{30}}$

$= \frac{90}{11} = 8\frac{2}{11}$ km per hour.

9. (1) As distance is covered along four sides (equal) of a square at different speeds, the average speed of the aeroplane

$= \frac{4}{\frac{1}{400} + \frac{1}{600} + \frac{1}{800} + \frac{1}{1200}}$

[$\because$ All the sides of square are equal, so distance between them is same]

$$= \frac{4}{\frac{30+20+15+10}{12000}}$$

$$= \frac{48000}{75} = 640 \text{ km per hr.}$$

10. (2) Length of journey = 150 kms

$\frac{1}{3}$ rd of journey $= \frac{150}{3} = 50$ kms

Remaining $\frac{2}{3}$ journey

= 150 – 50 = 100 kms

Time taken in $\frac{1}{3}$ rd journey at 30 km per hr.

$t_1 = \frac{50}{30} = \frac{5}{3}$ hrs.

Time taken in $\frac{2}{3}$ rd journey at 45 km per hr.

$t_2 = \frac{100}{45} = \frac{20}{9}$ hrs.

Total time taken in whole journey = $t_1 + t_2$

$= \frac{5}{3} + \frac{20}{9} = \frac{15+20}{9} = \frac{35}{9}$ hrs.

Average Speed

$$= \frac{150}{\frac{35}{9}} = \frac{150 \times 9}{35} = \frac{270}{7}$$

$= 38\frac{4}{7}$ km per hr.

11. (3) Let time taken to reach office at 50 kmph be x hrs

Then time taken to reach office at 60 kmph = $\left(x + \frac{30}{60}\right)$ hrs

As, distance covered is same,

$\therefore x \times 50 = 60\left(x + \frac{30}{60}\right)$

$50x = 60x + 30$

$\Rightarrow x = 3$ hrs

Hence, distance = 3 × 50

= 150 km

12. (4) Let time taken to reach school at 4 kmph be x hrs.

Then time taken to reach school at 5 kmph = $\left(x + \frac{15}{60}\right)$ hrs

Since, distance is equal.

$\therefore 4x = 5\left(x + \frac{15}{60}\right)$

$x = \frac{5}{4}$ hrs.

Hence, distance between school & house = $4 \times \frac{5}{4}$ km = 5 km

13. (1) Let the original speed of the car = x km per hr.

When it is increased by 5 km per hr, the speed = $x + 5$ km per hr.

As per the given information in the question,

$$\frac{300}{x} - \frac{300}{x+5} = 2$$

$$\Rightarrow \frac{300(x+5) - 300x}{x(x+5)} = 2$$

$$\Rightarrow \frac{300x + 1500 - 300x}{x^2 + 5x} = 2$$

$$\Rightarrow \frac{1500}{x^2 + 5x} = 2$$

$$\Rightarrow \frac{750}{x^2 + 5x} = 1$$

$\Rightarrow x^2 + 5x = 750$

$\Rightarrow x^2 + 5x - 750 = 0$

$\Rightarrow x^2 + 30x - 25x - 750 = 0$

$\Rightarrow x(x + 30) - 25(x + 30) = 0$

$\Rightarrow (x + 30)(x - 25) = 0$

$\Rightarrow x = -30$ or 25

The negative value of speed is inadmissible.

Hence, the required speed = 25 km per hr.

14. (2) Time = 10 hours,

Speed = 48 km per hr.

$\therefore$ Distance = Speed × Time

= 48 × 10 = 480 km

Now, this distance of 480 kms is to be covered in 8 hours. Hence, the required Speed

$$= \frac{\text{Distance}}{\text{New time}} = \frac{480}{8}$$

= 60 km per hr.

$\therefore$ Increase in speed

= 60 – 48 = 12 km per hr.

15. (3) Let the distance be x kms.

$\therefore$ Time taken at 4 km per hr. t_1

$= \frac{x}{4}$ hrs.

Time taken at 3 km per hr. t_2

$= \frac{x}{3}$ hrs.

Difference in timings

= 10 + 10 = 20 minutes

or $\frac{20}{60} = \frac{1}{3}$ hour

$\therefore \frac{x}{3} - \frac{x}{4} = \frac{1}{3}$

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

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

$\therefore x = 4$ km.

Hence the required distance

= 4 kms.

16. (4) Let the speed of Rickshaw be 'x' .

Then, time taken to cover 16 km on foot and 24 km on Rikshaw $= \frac{16}{4} + \frac{24}{x}$ hrs

and time taken to travel 24 km on foot & 16 km on Rikshaw

$= \frac{16}{x} + \frac{24}{4}$ hrs

According to question,

$= \frac{16}{4} + \frac{24}{x} + 1 = \frac{16}{x} + \frac{24}{4}$

$\Rightarrow \frac{5 + 24}{x} = \frac{16}{x} + 6$

$\Rightarrow \frac{24 - 16}{x} = 1$

$\Rightarrow x = 8$ km/hr

17. (1) Since I walk at $\frac{3}{4}$ of my usual speed the time taken is $\frac{4}{3}$ of my usual time.

[$\because$ the speed and time are in the inverse ratio]

$\therefore$ $\frac{4}{3}$ of usual time

= Usual time + Time I reach late

$\therefore$ $\frac{1}{3}$ of usual time

= 10 minutes

$\therefore$ Usual time

= 10 × 3 = 30 minutes.

18. (2) $\frac{5}{3}$ of usual speed means $\frac{3}{5}$ of usual time as he reaches earlier.

$\therefore$ $\frac{3}{5}$ usual time + 20 minutes= Usual time

20 minutes $= \left(1-\frac{3}{5}\right)$ usual time

$= \frac{2}{5}$ usual time

$\therefore$ Usual time

$= \frac{20\times 5}{2}$ = 50 minutes.

19. (2) New speed is $\frac{3}{4}$ of the usual speed

$\therefore$ New time taken $= \frac{4}{3}$ of the usual time

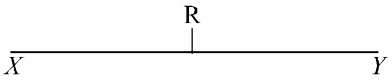
$\therefore$ $\frac{4}{3}$ of the usual time – Usual time $= \frac{5}{2}$

$\Rightarrow$ $\frac{1}{3}$ of the usual time $= \frac{5}{2}$

$\therefore$ Usual time $= \frac{5}{2}\times 3$

$= \frac{15}{2}$ hours or 7.5 hrs

20. (3) When *B* meets *A* at *R*, by then B has walked a distance (*XY* + *YR*) and *A*, the distance *XR*. That is both of them have together walked twice the distance from *X* to *Y*, i.e., 42 kms.

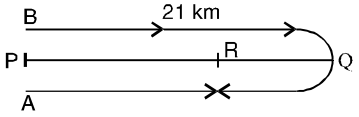


Now, the ratio of speed of *A* and *B* is 5 : 7 and they walk 84 kms.

$\therefore$ Hence, the distance *XR* travelled by

A $= \frac{5}{5+7}\times 84$ = 35 kms.

21. (4) Let *A* and *B* meet after time *t* hours.



Distance covered by *A* in *t* hours = 3 *t* km.

Distance covered by *B* in *t* hours = 4 *t* km.

Total distance covered by *A* and *B* = (3*t* + 4*t*) km = 7 *t* km.

From the diagram we can see that the total distance covered by *A* and *B* is equal to twice the distance between *P* and *Q*.

$\therefore$ 7*t* = 2 × 21

$t = \frac{2\times 21}{7}$

t = 6 hours

Distance *PR* = 6 × 3 = 18 km.

22. (1) Let the total distance travelled be *x* kms.

Case I :

Speed for the first one-third distance i.e. $\frac{x}{3}$ kms =10 km per hr.

$\therefore$ Time taken $= \frac{x}{30}$ hours

Similarly, time taken for the next one-third distance

$= \frac{x}{27}$ hours

and time taken for the last one-third distance $= \frac{x}{24}$ hours.

$\therefore$ Total time taken to cover *x* kms.

$= \left(\frac{x}{30}+\frac{x}{27}+\frac{x}{24}\right)$ hours.

Case II :

Time taken for one-half distance at the speed of 10 km per hr.

$= \frac{x}{20}$ hrs.

and time taken for remaining $\frac{1}{2}$ of distance $= \frac{x}{16}$ hrs. at 8 km per hr.

Total time taken

$= \left(\frac{x}{20}+\frac{x}{16}\right)$ hrs.

Time taken in (Case II – Case I)

= 1 minute $= \frac{1}{60}$ hr.

$\therefore$ According to the question

$$\frac{x}{20}+\frac{x}{16}-\left(\frac{x}{30}+\frac{x}{27}+\frac{x}{24}\right)$$

$$= \frac{1}{60}$$

$$\Rightarrow \frac{108x+135x-72x-80x-90x}{2160}$$

$$= \frac{1}{60}$$

$$\Rightarrow \frac{243x-242x}{2160} = \frac{1}{60}$$

$$\Rightarrow \frac{x}{2160} = \frac{1}{60}$$

$$\Rightarrow x = \frac{2160}{60} = 36 \text{ km.}$$

Hence the required distance = 36 km.

23. (3) Let the man walks for *x* hours at 4 km per hr. and *y* hours at 5 km per hr. and covers a distance of 35 kms.

$\therefore$ Distance = 4*x* + 5*y* = 35 ...(*i*)

Now, he walks at 5 km per hr.

for x hours and at 4 km per hr. for y hours and covers a distance (35 + 2) = 37 kms

$\therefore$ Distance = $5x + 4y = 37$...(*ii*)

By 5 × (*i*) – 4 × (*ii*) we have

$20x + 25y = 175$

$20x + 16y = 148$

– – –

$9y = 27$

$\Rightarrow y = 3$

Putting the value of (y) in equation (*i*), we have

$4x + 5 \times 3 = 35$

$\Rightarrow 4x = 35 - 15 = 20$

$\Rightarrow x = 5$

$\therefore$ Total time taken

$= x + y = 5 + 3 = 8$ hours.

24. (4) Obviously, $\frac{4}{5}$ of total time in train = 2 hours

$\therefore$ Total time in train

$$= \frac{5}{4} \times 2 = \frac{5}{2} \text{ hours}$$

Total time to cover 400 km is 4 hours

$\therefore$ Time spent in travelling by air $= 4 - \frac{5}{2} = \frac{8-5}{2} = \frac{3}{2}$ hours

If 400 kms is travelled by air, then time taken = 2 hours

$\therefore$ In 2 hours, distance covered by air = 400 kms

In $\frac{3}{2}$ hours distance covered

$$= \frac{400}{2} \times \frac{3}{2} = 300 \text{ kms}$$

Distance covered by the train = 400 – 300 = 100 kms.

25. (1) Let the original speed be x km/hr

then, increased speed = (x + 10) km/hr

According to question,

$$\frac{100}{x} - \frac{100}{x+10} = \frac{30}{60}$$

$\left[\because \text{Original time} - \text{New time} = 30 \text{ minute or } \frac{30}{60} hr\right]$

$$\Rightarrow 100\left[\frac{1}{x} - \frac{1}{x+10}\right] = \frac{1}{2}$$

$$\Rightarrow \frac{x+10-x}{x(x+10)} = \frac{1}{200}$$

$\Rightarrow 10 \times 200 = x(x + 10)$

$\Rightarrow x^2 + 10x - 2000 = 0$

$\Rightarrow x^2 + 50x - 40x - 2000 = 0$

$\Rightarrow x(x + 50) - 40(x + 50) = 0$

$\Rightarrow x = -50, 40$

Speed can't be negative.

Hence, Original speed = 40 kmph

26. (2) Working hours per day= 24 – 9 = 15 hrs.

Total working hours for 40 days = 15 × 40 = 600 hrs.

On doubling the distance, the time required becomes twice but on walking twice as fast, the time required gets halved. Therefore, the two together cancel each other with respect to time required. Increasing rest to twice reduces walking hours per day to

24 – (2 × 9) = 6 hrs.

$\therefore$ Total number of days required to cover twice the distance, at twice speed with twice the rest.

$$= \frac{600}{6} = 100 \text{ days}$$

27. (3) In 1 minute the monkey climbs 12 metres but then he takes 1 minute to slip down 5 metres. So, at the end of 2 minutes the net ascending of the monkey is 12 – 5 = 7 metres. So, to cover 63 metres the above process is repeated $\frac{63}{7} = 9$ times. Obviously, in 9 such happenings the monkey will slip 8 times, because on 9th time, it will climb to the top.

Thus, in climbing 8 times and slipping 8 times, he covers 8 × 7 = 56 metres.

Time taken to cover 56 metres

$$= \frac{56 \times 2}{7} = 16 \text{ minutes}$$

Remaining distance = 63 – 56 = 7 metres

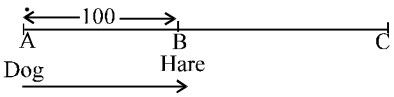
Time taken to ascend 7 metres

$$= \frac{7}{12} \text{ minutes}$$

$\therefore$ Total time taken $= 16 + \frac{7}{12}$

$$= 16\frac{7}{12} \text{ minutes.}$$

28. (4)



Let the hare at B sees that dog is at A.

$\therefore AB$ = 100 metres

Again, let C be the position of the hare when the dog sees her.

$\therefore BC$= the distance covered by the hare in 1 minute

$$= \frac{12 \times 1000 \times 1}{60} = 200 \text{ metres}$$

$\therefore AC = AB + BC$

= 100 + 200 = 300 metres

Thus, hare has a start of 300 metres.

Now, the dog gains 16 – 12 = 4 kms

4000 metres in 1 hour i.e. 60 minutes

$\therefore$ The distance gained by dog in 1 minute

$$= \frac{4000}{60} = \frac{200}{3} \text{ metres}$$

$\because \frac{200}{3}$ metres is covered in 1 minute

$\therefore$ 300 metres is covered in $\frac{300 \times 3}{200} = \frac{9}{2}$ minutes

Again the distance walked by hare in $\frac{9}{2}$ minutes

$$= \frac{12000}{60} \times \frac{9}{2} = 900 \text{ metres}$$

$\therefore$ Total distance from B = 200 + 900 = 1100 metres.

29. (1) Grey hound and hare make 3 leaps and 4 leaps respectively. This happens at the same time.

The hare goes 1.75 metres in 1 leap.

$\therefore$ Distance covered by hare in 4 leaps = 4 × 1.75 = 7 metres

The grey hound goes 2.75 metres in one leap.

$\therefore$ Distance covered by it in 3 leaps

= 3 × 2.75 = 8.25 metres

Distance gained by grey hound in 3 leaps $= (8.25 - 7)$

= 1.25 metres

Distance covered by hare in 50 leaps = 50 × 1.75 metres

= 87.5 metres

Now, 1.25 metres is gained by grey hound in 3 leaps

$\therefore$ 87.5 metres is gained in $\frac{3}{1.25} \times 87.5$ = 210 leaps.

30. (2) Let the original speed be x kmph

then, new speed = $(x - 200)$ kmph

According to question,

Time taken with new speed – time taken with original speed = 30 min. i.e $\frac{1}{2}$ hr.

$$\therefore \frac{600}{x-200} - \frac{600}{x} = \frac{1}{2}$$

$$\Rightarrow 600\left[\frac{1}{x-200} - \frac{1}{x}\right] = \frac{1}{2}$$

$$\Rightarrow \frac{x - x + 200}{x(x-200)} = \frac{1}{1200}$$

$\Rightarrow 24000 = x(x - 200)$

$\Rightarrow x^2 - 200x - 24000 = 0$

$\Rightarrow x^2 - 600x + 400x - 24000 = 0$

$\Rightarrow x(x - 600) + 400(x - 600) = 0$

$\Rightarrow (x - 600)(x + 400) = 0$

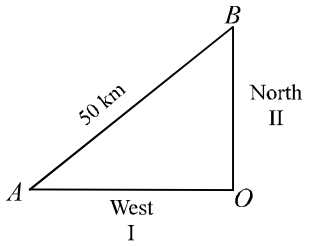
$\Rightarrow x = 600, -400$

Speed cannot be negative

Hence, original speed = 600 kmph and duration of flight

$= \frac{600}{600}$ hr. = 1 hr.

31. (3) Let the speed of the second train be x km per hr. Then the speed of the first train is $x + 5$ km per hr.



Let O be the position of the railway station from which the two trains leave. Distance travelled by the first train in 2 hours = $OA = 2(x + 5)$ km.

Distance travelled by the 2nd train in 2 hours= $OB = 2x$ km.

By Pythagoras theorem, $AB^2 = OA^2 + OB^2$

$\Rightarrow 50^2 = [2(x + 5)]^2 + [2x]^2$

$\Rightarrow 2500 = 4(x + 5)^2 + 4x^2$

$\Rightarrow 2500 = 4(x^2 + 10x + 25) + 4x^2$

$\Rightarrow 8x^2 + 40x - 2400 = 0$

$\Rightarrow x^2 + 5x - 300 = 0$

$\Rightarrow x^2 + 20x - 15x - 300 = 0$

$\Rightarrow x(x + 20) - 15(x + 20) = 0$

$\Rightarrow (x - 15)(x + 20) = 0$

$\Rightarrow x = 15, -20$

But x cannot be negative

$\therefore x = 15$

$\therefore$ The speed of the second train is 15 km per hr. and the speed of the first train is 20 km per hr.

32. (4) The distance covered by man in 4 minutes

$= \frac{6 \times 1000 \times 4}{60}$ = 400 metres

The distance covered by carriage in 4 minutes

= 200 + 400 = 600 metres

$\therefore$ Speed of carriage

$= \frac{600}{4} \times \frac{60}{1000}$ km per hr.

= 9 km per hr.

33. (1) If the car were not moving, the person would have heard the two sounds at an interval of 12 minutes. Therefore, the distance travelled by car in 11 minutes 40 seconds is equal to the distance that could have been covered by sound in 12 min – 11 min. 40 seconds = 20 seconds.

Distance covered by sound in 20 seconds

= 330 × 20 = 6600 m

In 11 min 40 seconds

or 700 seconds the car travels 6600 m.

In 1 second the car will travel

$\frac{6600}{700}$ metre $= \frac{66}{7}$ metre

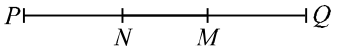
$\therefore$ Speed of the car $= \frac{66}{7}$ metre per second

$= \frac{66}{7} \times \frac{18}{5}$ km per hr.

$= \frac{1188}{35}$ km per hr.

$= 33\frac{33}{35}$ km per hr. $\approx$ 34 kmph

34. (2)



When A and B cross each other at M for the first time, they have together covered the whole distance PQ = 180 km.

When they meet again at N, they have together covered total distance equal to 3 times of PQ = 3 × 180 = 540 km.

$$PM = \frac{5}{5+4} \times 180 = 100 \text{ km}$$

[Distance covered by each will be in the ratio of their speeds)

$$QP + PN = \frac{4}{5+4} \times 540$$

= 240 km

or PN= 240 – QP = 240 – 180

= 60 km.

Then, $MN = PM - PN$

= 100 – 60 = 40 km.

35. (2) Distance covered by man in 3 minutes

$= \left(\frac{4 \times 1000}{60}\right) \frac{\text{m}}{\text{minutes}} \times 3 \text{ minutes}$

=200 metres

Total distance covered by the car in 3 min.

= (200 + 130) m = 330 metres

$\therefore$ Speed of the car

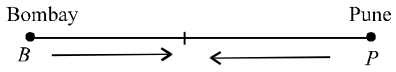
$= \frac{330}{3}$ m per min.

= 110 m per minutes

$$= \frac{\frac{110}{1000}}{\frac{1}{60}} = \frac{33}{5} \text{ km per hr.}$$

or 6.6 kmph

36. (3)



Suppose that Ram and Mohan meet at *A*. Let Ram's speed be *x* km per hr. and Mohan's speed be *y* km per hr. Then $AP = \frac{25}{4}x$ km and $AB = 4y$ km.

Now, time taken by Ram in going from *B* to *A* $= \frac{4y}{x}$

and the time taken by Mohan in going from *P* to *A* $= \frac{25x}{4y}$.

Obviously time taken is equal

$$\therefore \frac{4y}{x} = \frac{25x}{4y}$$

$$\Rightarrow 16y^2 = 25x^2$$

$$\Rightarrow \frac{y^2}{x^2} = \frac{25}{16}$$

$$\Rightarrow \frac{y}{x} = \frac{5}{4}$$

$$\Rightarrow y = \frac{5}{4}x$$

Here, $x = 20$ km per hr.

$\therefore$ y = Mohan's speed

$$= \frac{5}{4} \times 20 = 25 \text{ km per hr.}$$

37. (4) Let the original speed be *x* and distance be *y*

Case I.

Time taken by train to travel

30 km = $\frac{30}{x}$

Time taken by train after accident

$= \frac{y-30}{4/5x}$

Total time taken = $\frac{30}{x} + \frac{y-30}{4/5x}$

Case II :

Time taken by train to travel

48 km = $\frac{48}{x}$

Time taken by train after accident = $\frac{y-48}{4/5x}$

Total time taken = $\frac{48}{x} + \frac{y-48}{4/5x}$

According to question,

$$\left(\frac{30}{x} + \frac{y-30}{4/5x}\right) - \left(\frac{48}{x} + \frac{y-48}{4/5x}\right)$$

$= \frac{9}{60}$ [$\because$ Difference between time is 9 minutes]

$$\left(\frac{y-30}{4/5x} - \frac{y-48}{4/5x}\right) + \left(\frac{30}{x} - \frac{48}{x}\right)$$

$$= \frac{9}{60}$$

$$\frac{y-y-30+48}{4/5x} + \frac{(-18)}{x} = \frac{9}{60}$$

$$\frac{5(18)}{4x} - \frac{18}{4x} = \frac{9}{60}$$

$$\Rightarrow \frac{90-72}{4x} = \frac{9}{60}$$

$$x = \frac{18 \times 60}{4 \times 9} = 30$$

Hence, original speed = 30 kmph

Also,

$$\frac{30}{x} + \frac{y-30}{4/5x} = \frac{y}{x} + \frac{45}{60}$$

[Original time + 45 minute = New time]

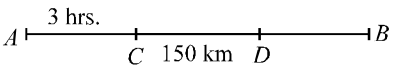
$\Rightarrow 3x - y = -30$

$\Rightarrow 3(30) - y = -30$

$\Rightarrow y = 120$ km

i.e. Distance = 120 km

38. (2) Let *A* be the starting point, *B* the terminus. *C* and *D* are points where accidents take place.



$$\therefore 0.75 = \frac{3}{4}$$

By travelling at $\frac{3}{4}$ of its original speed, the train would take $\frac{4}{3}$ of its usual time i.e., $\frac{1}{3}$ more of the usual time.

$\therefore$ $\frac{1}{3}$ of the usual time taken to travel the distance *CB*.

= 4 – 1 = 3 hrs. ...(*i*)

and $\frac{1}{3}$ of the usual time taken to travel the distance

$$DB = 3\frac{1}{2} - 1 = 2\frac{1}{2} \text{ hrs.} \quad ...(ii)$$

Subtracting equation (*ii*) from (*i*) we can write,

$\frac{1}{3}$ of the usual time taken to travel the distance

$$CD = 3 - 2\frac{1}{2} = \frac{1}{2} \text{hr.}$$

$\therefore$ Usual time taken to travel

$$CD \text{ (150 km)} = \frac{\frac{1}{2}}{\frac{1}{3}} = \frac{3}{2} \text{ hr.}$$

Usual speed of the train

$$= \frac{150}{\frac{3}{2}} = 100 \text{ km per hr.}$$

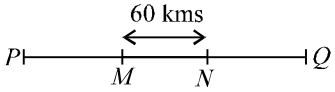
Usual time taken to travel *CB*

$$= \frac{3}{\frac{1}{3}} = 9 \text{ hrs.}$$

Total time = 3 + 9 = 12 hrs.

$\therefore$ Length of the trip = 12 × 100 = 1200 km.

39. (3)



Let P be the starting point, Q the terminus, M and N the places where accidents occur.

At $\frac{3}{4}$ th of the original speed, the train will take $\frac{4}{3}$ of its usual time to cover the same distance i.e., $\frac{1}{3}$ rd more than the usual time.

$\frac{1}{3}$ rd of the usual time to travel a distance of 60 kms between MN = 15 min.

$\therefore$ Usual time to travel 60 kms

$= 15 \times 3 = 45$ min. $= \frac{3}{4}$ hr.

$\therefore$ Usual speed of the train per hour $= 60 \times \frac{4}{3} = 80$ km per hr.

Usual time taken to travel MQ = 90×3

$= 270$ min. or $\frac{9}{2}$ hrs.

$\therefore$ The distance MQ

$= 80 \times \frac{9}{2} = 360$ km.

Therefore, the total distance PQ = $PM + MQ$

= 100 + 360 = 460 kms.

40. (4) Let they meet x hrs after 7 am.

Distance covered by A in x hours = $20x$ km

Distance covered by B in $(x-1)$ hr. = $25(x-1)$ km

$\therefore 20x + 25(x-1) = 110$

$\Rightarrow 20x + 25x - 25 = 110$

$\Rightarrow 45x = 110 + 25 = 135$

$\Rightarrow x = 3$

$\therefore$ Trains meet at 10 a.m.

41. (1) Writing ratio = 200 : 150 = 4 : 3

In a given time first boy will be writing the line number

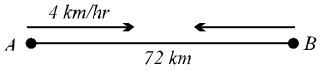
$\frac{4}{7} \times 817$

$= \frac{3268}{7}$ th line $= 466\frac{6}{7}$ th line

or, 467 th line

Hence, both of them shall meet on 467th line.

42. (2) Let the two men meet after t hours.



Distance covered by the first man starting from A = 4 t km.

Distance covered by the second man starting from B

$$= 2 + 2.5 + 3 + \ldots + \left[2 + \left(\frac{t-1}{2}\right)\right]$$

This is an arithmetic series of t terms with $\frac{1}{2}$ as common difference.

$\therefore$ By applying formula

$$S = \frac{n}{2}\left[2a + (n-1)d\right]$$

Where, n = no. of terms

a = first term

d = common difference

We have its sum

$$= \frac{t}{2}\left[(2 \times 2) + (t-1) \times \frac{1}{2}\right]$$

$$= 2t + \frac{t^2 - t}{4}$$

Total distance covered by two men $= 4t + 2t + \frac{t^2 - t}{4} = 72$

or $6t + \frac{t^2 - t}{4} = 72$

or $24t + t^2 - t = 288$

or $t^2 + 23t - 288 = 0$

or $t^2 - 9t + 32t - 288 = 0$

or $t(t-9) + 32(t-9) = 0$

or $(t-9)(t+32) = 0$

$\therefore$ Either $t - 9 = 0 \Rightarrow t = 9$

or, $(t + 32) = 0 \Rightarrow t = -32$

Time cannot be negative. Hence, the two men will meet after 9 hrs.

43. (3) Let the length of the train be x metres

Then, the time taken by the train to cover $(x + 50)$ metres is $4\frac{1}{2}$ seconds

$\therefore$ Speed of the train

$= \frac{x+50}{\frac{9}{2}}$ m/s

or $\frac{2x+100}{9}$ m per second ...(*i*)

Again, the time taken by the train to cover x metres in 2 seconds.

$\therefore$ Speed of the train $= \frac{x}{2}$ metre per second ..(*ii*)

From equations (*i*) and (*ii*), we have

$\frac{2x+100}{9} = \frac{x}{2}$

$\Rightarrow 4x + 200 = 9x$

$\Rightarrow 5x = 200$

$\Rightarrow x = 40$

$\therefore$ Length of the train

= 40 metres

$\therefore$ Speed of the train

$= \frac{x}{2} = \frac{40}{2} = 20$ m per sec.

44. (4) Both trains meet after 6 hours.

$\therefore$ The relative speed of two trains $= \frac{162}{6} = 27$ km per hr.

The speed of the slower train starting from B

$= \frac{27-8}{2} = \frac{19}{2} = 9\frac{1}{2}$ km per hr.

$\therefore$ The speed of the faster train

$= 9\frac{1}{2} + 8 = 17\frac{1}{2}$ km per hr.

45. (1) Let the length of train be x metres and the length of platform be y metres.

Speed of the train

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

$= \frac{125}{18}$ m per sec.

Time taken by train to pass the platform

$= \left[(x+y) \times \frac{18}{125}\right]$ sec.

$\therefore \ (x+y) \times \frac{18}{125} = 18$

or, $x + y = 125$ ...(*i*)

Speed of train relative to man
= (25 + 5) km per hr.

$= \left(30 \times \frac{5}{18}\right)$ m per sec.

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

Time taken by the train to pass the man

$= \left(x \times \frac{3}{25}\right)$ sec. $= \frac{3x}{25}$ sec.

$\therefore \ \frac{3x}{25} = 12$

$\Rightarrow x = \left(\frac{25 \times 12}{3}\right) = 100$ metres

Putting $x = 100$ in equation (*i*), we get, $y = 25$ metres.

$\therefore$ Length of train = 100 metres and length of the platform = 25 metres.

46. (2) Let the speed of the train be x metre per sec. and y metre per sec. respectively.

Sum of the length of the trains = 200 + 175 = 375 metres

Case : I

When the trains are moving in opposite directions

Relative speed = $(x + y)$ m per sec.

In this case the time taken by the trains to cross each other

$= \frac{375}{x+y}$ sec.

$\therefore \ \frac{375}{x+y} = \frac{15}{2}$

$\Rightarrow x + y = 50$ ...(*i*)

Case : II

When the trains are moving in the same direction.

Relative speed = $(x - y)$ m per sec.

In this case, the time taken by the trains to cross each other

$= \frac{375}{x-y}$ sec.

$\therefore \ \frac{375}{x-y} = \frac{75}{2}$

$\Rightarrow x - y = 10$ ...(*ii*)

Now, $x + y = 50$

$x - y = 10$

$2x = 60$

$\Rightarrow x = 30$

Putting this value in equation (*i*), we have

$y = 50 - 30 = 20$

$\therefore$ Speed of trains = 30 m per sec.

$= 30 \times \frac{18}{5} = 108$ km per hr.

and 20 m per sec. $= 20 \times \frac{18}{5}$

= 72 km per hr.

47. (3) Trains are running in opposite direction.

$\therefore$ Relative speed of the two trains = 90 + 60 = 150 km per hr.

Distance travelled in $4\frac{1}{2}$ seconds with speed of 150 km per hr. $= 150 \times \frac{5}{18}$ m per sec.

$= 150 \times \frac{5}{18} \times \frac{9}{2} = \frac{375}{2}$ metres

Let the length of the first train be x metres.

Then the length of the second train be $\frac{x}{2}$ metres

$\therefore \ x + \frac{x}{2} = \frac{375}{2}$

$\Rightarrow \frac{3x}{2} = \frac{375}{2}$

$\Rightarrow 3x = 375$

$\Rightarrow x = 125$ metres

Hence, the length of the first train = 125 metres

Speed of the first train = 60 km per hr.

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

Time taken by the first train to cross the tunnel = 4 minutes and $37\frac{1}{2}$ sec.

$= 240 + \frac{75}{2}$ sec. $= \frac{480+75}{2}$

$= \frac{555}{2}$ sec.

Speed of first train

$= \frac{50}{3}$ m per sec.

$\therefore$ Distance covered by it in $\frac{555}{2}$ sec.

$= \frac{50}{3} \times \frac{555}{2}$ = 4625 metres

Hence, length of tunnel
= 4625 – 125 = 4500 metres
= 4.5 km

48. (4) Let the length of the train be x km and its speed y km per hr.

Case I : When it passes the man walking at 2 km per hr. in the same direction

Relative speed of train
= $(y - 2)$ km per hr.

$\therefore \ \frac{x}{y-2}$ = 9 seconds

$= \frac{9}{3600} = \frac{1}{400}$ hour ..(*i*)

Case II : When the train crosses the man walking at 4 km per hr. in the same direction.

Relative speed of train= (y – 4) km per hr.

$\therefore \ \frac{x}{y-4} = 10$ sec.

$\Rightarrow \frac{x}{y-4} = \frac{10}{3600}$ hrs.

$\Rightarrow \frac{x}{y-4} = \frac{1}{360}$ hrs. ..(*ii*)

On dividing equation (*i*) by (*ii*), we have

$$\frac{y-4}{y-2} = \frac{\frac{1}{400}}{\frac{1}{360}} = \frac{360}{400} = \frac{9}{10}$$

$\Rightarrow 10y - 40 = 9y - 18$

$\Rightarrow 10y - 9y = 40 - 18$

$\Rightarrow y = 22$ km per hr.

$\therefore$ From equaton (*i*), we have

$$\frac{x}{22-2} = \frac{1}{400}$$

$$\Rightarrow x = \frac{1}{20} \text{ km}$$

$$= \frac{1000}{20} = 50 \text{ metres.}$$

49. (1) Let the length of the train be x metres

Then, in 18 sec. the train travels $(x + 162)$ metres ...(*i*)

and in 15 sec. the train travels $(x + 120)$ metres

$\therefore$ In $(18 - 15) = 3$ sec. the train travels $(x + 162) - (x + 120) = 42$m.

$\therefore$ In 1 sec the train travels $= \frac{42}{3} = 14$ metres ...(*ii*)

$\therefore$ In 18 sec. the train travels $= 14 \times 18 = 252$ metres ...(*iii*)

From equations (*i*) and (*iii*)

$\therefore x + 162 = 252$

$\Rightarrow x = 252 - 162 = 90$

$\therefore$ Length of the train = 90 metres

Also, from equation (*ii*) we see that in 1hr. the train travels $= 14 \times 60 \times 60$ metres

$$= \frac{14 \times 60 \times 60}{1000} \text{ km} = 50.4 \text{ km}$$

$\therefore$ The speed of the train = 50.4 km per hr.

50. (2) Let the length of trains be x m and $(x + 50)$m and the speed of other train be y m per sec.

The speed of the first train = 90 km per hr.

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

Case I : Opposite direction,

Their relative speed $= (y + 25)$m per sec.

Distance covered $= x + x + 50 = 2x + 50$ metres

$$\therefore \text{ Time taken} = \frac{2x+50}{y+25} = 10$$

$\Rightarrow 2x + 50 = 10y + 250$ ...(*i*)

Case II. Direction is Same

Their relative speed $= (25 - y)$ m per sec.

Distance covered $= x + x + 50 = 2x + 50$m

$$\therefore \text{ Time taken} = \frac{2x+50}{25-y} = 90$$

$\Rightarrow 2x + 50 = 90\ (25 - y)$ ...(*ii*)

From equations (*i*) and (*ii*)

$10y + 250 = 2250 - 90y$

$\Rightarrow 10y + 90y = 2250 - 250$

$$\Rightarrow y = \frac{2000}{100} = 20$$

Putting $y = 20$ in equation (*i*), we have

$2x + 50 = 10 \times 20 + 250 = 450$

$\Rightarrow 2x = 450 - 50 = 400$

$$\Rightarrow x = \frac{400}{2} = 200$$

$\therefore x + 50 = 200 + 50$

$= 250$ metres.

Hence,

The length of the 1st train = 200 metres.

The length of the 2nd train = 250 metres.

The speed of the 2nd train = 20 m per sec.

51. (1) Let the length of the train be x m and its speed y m/sec.

Distance covered in crossing the platform $= 170 + x$ metres

and time taken = 21 seconds

$$\therefore \text{ Speed } y = \frac{170+x}{21} \quad ...(i)$$

Distance covered to cross the man = x metres

and time taken $= 7\frac{1}{2} = \frac{15}{2}$ seconds

$$\therefore \text{ Speed } y = \frac{x}{\frac{15}{2}} = \frac{2x}{15} \quad ...(ii)$$

From equations (*i*) and (*ii*),

$$\frac{170+x}{21} = \frac{2x}{15}$$

$\Rightarrow 2550 + 15x = 42x$

$\Rightarrow 42x - 15x = 2550$

$\Rightarrow 27x = 2550$

$$\Rightarrow x = \frac{2550}{27} = 94\frac{4}{9} \text{ metres}$$

From equation (*ii*),

$$y = \frac{2 \times 2550}{15 \times 27}$$

$$= \frac{340}{27} = 12\frac{16}{27} \text{ m per sec.}$$

Hence, speed $= 12\frac{16}{27}$ m per sec

52. (2) The goods train leaves Delhi at 6 am and mail train at 12 noon, hence after 6 hours

The distance covered by the goods train in 6 hours at 32 km per hr. $= 32 \times 6 = 192$ kms

The relative velocity of mail train with respect to goods train = 80 – 32 = 48 km per hr.

To completely cross the goods train, the mail train will have to cover a distance

= 192 km + 158m + 130m

= 192km + 0.158 km + 0.130 km

= 192.288 km more

Since, the mail train goes 48 kms more in 1 hour.

$\therefore$ The mail train goes 192.288 kms more in

$$= \frac{192288}{1000} \times \frac{1}{48} = \frac{2003}{500}$$

= 4 hours 21.6 sec.

53. (3) Let the speed of the motorboat in still water be Z km per hr.

Downstream speed= $(Z + 3)$ km per hr.

Upstream speed $= (Z - 3)$ km per hr.

Total journey time

= 30 minutes $= \frac{30}{60}$ hr. $= \frac{1}{2}$ hour

We can write,

$$\frac{2}{Z-3}+\frac{2}{Z+3}=\frac{1}{2}$$

or, $2\left[\frac{(Z+3)+(Z-3)}{(Z-3)(Z-3)}\right] = \frac{1}{2}$

or, $\frac{2Z}{Z^2-9} = \frac{1}{4}$

or, $Z^2 - 9 = 8Z$

or, $Z^2 - 8Z - 9 = 0$

or, $Z^2 + Z - 9Z - 9 = 0$

or, $Z(Z + 1) - 9(Z + 1) = 0$

or, $(Z + 1)(Z - 9) = 0$

$\therefore$ $Z = -1$ or 9.

Since speed can't be negative

Therefore, the speed of the motor-boat in still water = 9 km per hr.

54. (4) Let the upstream speed be x km per hr. and downstream speed be y km per hr.

Then, we can write,

$$\frac{32}{x}+\frac{60}{y} = 9$$

and, $\frac{40}{x}+\frac{84}{y} = 12$

Let $\frac{1}{x} = m$ and $\frac{1}{y} = n$

The above two equations can now be written as

$32m + 60n = 9$ ...(*i*)

and, $40m + 84n = 12$ ...(*ii*)

$7 \times$ (*i*) $- 5 \times$ (*ii*) gives $24m = 3$

or $m = \frac{1}{8}$ or $x = 8$ km per hr.

$4 \times$ (*ii*) $- 5 \times$ (*i*) gives $36n = 3$

or, $n = \frac{1}{12}$ or $y = 12$ km per hr.

Rate of current

$= \frac{y-x}{2} = \frac{12-8}{2} = 2$ km. per hr.

55. (1) Let the speed of boat and river be x km per hr. and y km per hr. respectively. Then,

The speed of boatman downstream = $(x + y)$ km per hr.

and the speed of boatman upstream = $(x - y)$ km per hr.

Time taken by boatman in going 21 km downstream

$= \frac{21}{x+y}$ hours

Time taken by boatman in going

21 km upstream $= \frac{21}{x-y}$ hrs.

According to the question,

$$\frac{21}{x+y}+\frac{21}{x-y} = 10 \quad ..(i)$$

Now, time taken for 7 kms downstream $= \frac{7}{x+y}$ hrs.

and time taken for 3 kms upstream $= \frac{3}{x-y}$ hrs.

According to the question

$$\frac{7}{x+y}-\frac{3}{x-y} = 0 \quad ...(ii)$$

By (*ii*) $\times 7 +$ (*i*)

$$\frac{49}{x+y}-\frac{21}{x-y}+\frac{21}{x+y}+\frac{21}{x-y} = 10$$

$$\Rightarrow \frac{70}{x+y} = 10$$

$\Rightarrow x + y = 7$ ...(*iii*)

Putting $x + y = 7$ in equation (*ii*) we have

$$\frac{7}{7}-\frac{3}{x-y} = 0$$

$$\Rightarrow 1-\frac{3}{x-y} = 0$$

$\Rightarrow x - y = 3$ ..(*iv*)

On adding (*iii*) and (*iv*), we have

$2x = 10$

$\Rightarrow x = 5$

$\therefore y = 7 - x = 7 - 5 = 2$

$\therefore$ Speed of river = 2 km per hr.

56. (2) Let the speed of the cyclist be x km per hr.

Speed of the motorist= $(x + 15)$ km per hr.

Time taken by the motorist to cover half of the distance

$= \frac{18}{2\times(x+15)} = \frac{9}{x+15}$ hrs.

After covering 9 kms, the speed of motorist gets reduced by 20%

$\therefore$ New speed $= (x+15)\times\frac{80}{100}$

$= \frac{4(x+15)}{5}$ km per hr.

Time taken by the motorist to cover the remaining half distance

$= \frac{9\times5}{4(x+15)} = \frac{45}{4(x+15)}$ hrs.

Total time taken by the motorist

$= \frac{9}{x+15}+\frac{1}{2}+\frac{45}{4(x+15)}$ hrs.

Total time taken by the cyclist

$= \frac{18}{x}$ hrs.

Motorist reaches 15 minutes, i.e., $\frac{1}{4}$ hr. earlier.

$$\therefore \frac{18}{x}-\frac{9}{x+15}-\frac{1}{2}-\frac{45}{4(x+15)}$$

$$= \frac{1}{4}$$

$\Rightarrow$

$$\frac{18\times4(x+15)-36x-2x(x+15)-45x}{4x(x+15)}$$

$$= \frac{1}{4}$$

$\Rightarrow 72x + 1080 - 36x - 2x^2 - 30x - 45x = x^2 + 15x$

$\Rightarrow 3x^2 + 54x - 1080 = 0$

$\Rightarrow x^2 + 18x - 360 = 0$

$\Rightarrow x^2 + 30x - 12x - 360 = 0$

$\Rightarrow x(x + 30) - 12(x + 30) = 0$

$\Rightarrow (x + 30)(x - 12) = 0$

$\Rightarrow x = -30, 12$

The speed cannot be negative.

$\therefore$ The speed of the cyclist = 12 km per hr.

57. (3) Total distance travelled
= 3990 km
Distance = Time × Speed
Ratio of time spent = 1 : 16 : 2
Ratio of speed = 20 : 1 : 3
∴ Ratio of time × speed
= 20 × 1 : 16 × 1 : 2 × 3
= 20 : 16 : 6
Sum of the ratios
= 20 + 16 + 6 = 42
∴ Distance covered by sea

$= \frac{3990}{42} \times 16 =$ 1520 kms

58. (4) Relative speed of insect
= 30 + 42 = 72 km per hr.
Distance between railway engine and insect = 20 km.
Engine and insect will meet for the first time after $= \frac{20}{72}$ hr.
Distance covered in this period

$= \frac{20}{72} \times 42 = \frac{35}{3}$ km

The insect will cover $\frac{35}{3}$ km in returning to A.
The distance covered by engine in this period

$= \frac{20}{72} \times 30 = \frac{25}{3}$ km

Since, the insect when reaches *A*, the engine will cover $\frac{25}{3}$ km to *A*.
∴ Remaining distance between *A* and engine

$= 20 - \left(\frac{25}{3} + \frac{25}{3}\right)$

$= 20 - \frac{50}{3} = \frac{10}{3}$ km.

Again, engine and insect will meet after $\frac{10}{3 \times 72} = \frac{5}{108}$ hr.
The distance covered by the insect in this period

$= \frac{5}{108} \times 42 = \frac{35}{18}$ km

and again the insect will cover $\frac{35}{18}$ km in returning.
∴ Total distance covered by the insect $= \frac{70}{3} + \frac{70}{18} + ...$

$\left[\begin{array}{l} \frac{35}{3} + \frac{35}{3} = \frac{70}{3} \text{ and} \\ \frac{35}{18} + \frac{35}{18} = \frac{70}{18} \text{ and so on} \end{array}\right]$

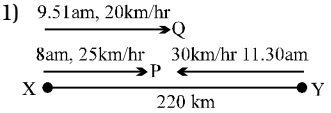
$= \frac{70}{3}\left[1 + \frac{1}{6} + ...\infty\right]$

It is a Geometric Progression to infinity with common ratio $\frac{1}{6}$.

$= \frac{70}{3}\left[\frac{1}{1 - \frac{1}{6}}\right] \quad \left[\because S_\infty = \frac{a}{1-r}\right]$

$= \frac{70}{3} \times \frac{1}{\frac{5}{6}} = \frac{70}{3} \times \frac{6}{5} = 28$ km

59. (1)



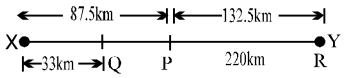
Distance covered by *P* till 11.30 a.m.
= (11.30 a.m. – 8 a.m.) × 25km

$= 3\frac{1}{2} \times 25 = 87.5$ km.

Distance covered by *Q* till 11.30 a.m.
= (11.30 – 9.51 am) × 20

$= 1\frac{39}{60}$ hrs. × 20 = 33 km

So, at 11.30 a.m. the three trains will be at positions shown below :



P gains 5 km every hour over *Q*.
Relative speed of *P* w.r.t. *R*
= 20 + 30 = 50 km per hr
Let *P* be at equal distance from *Q* and *R* after *t* hours.
∴ (87.5 – 33) + 5*t*
= 132.5 –55t
or, 54.5 + 5*t* = 132.5 – 55t
or, 60 *t* = 78

or, $t = \frac{78}{60}$ hrs.

= 1 hr 18 minutes
11.30 am + 1 hr. 18 min.
= 12.48 pm
At 12.48 pm, *P* would have covered a distance
= (12.48 pm – 8 am) × 25
= 120 km
Therefore, *P* will be at equal distance from *Q* and *R* at 12.48 pm

60. (2) Let the original speed of the person be *x* km/hr. and the distance be y km.

Case I : $\frac{y}{x} - \frac{y}{x+3} = 40$ minutes

or $\frac{40}{60}$ hr

or, $\frac{y}{x} - \frac{y}{x+3} = \frac{40}{60} = \frac{2}{3}$

or, $y\left[\frac{1}{x} - \frac{1}{(x+3)}\right] = \frac{2}{3}$

or, $y\left[\frac{x+3-x}{x(x+3)}\right] = \frac{2}{3}$

or, $\frac{3y}{x(x+3)} = \frac{2}{3}$

or, 2 *x* (*x* + 3) = 9*y* ...(i)

Case II : $\frac{y}{x-2} - \frac{y}{x} = \frac{40}{60}$

or, $y\left(\frac{1}{x-2} - \frac{1}{x}\right) = \frac{2}{3}$

or, $y\left[\frac{x-x+2}{x(x-2)}\right] = \frac{2}{3}$

or, $\frac{2y}{x(x-2)} = \frac{2}{3}$

or, *x* (*x* – 2) = 3*y* ... (ii)
On dividing equation (i) by (ii) we have,

$$\frac{2x(x+3)}{x(x-2)} = \frac{9y}{3y}$$

or, $\frac{2(x+3)}{(x-2)} = 3$

or, $2x + 6 = 3x - 6$

or, $3x - 2x = 6 + 6 = 12$

or, $x = 12$ km/hr.

$\therefore$ Original speed of the person = 12 km/hr.

Putting the value of x in equation (ii)

$12\ (12 - 2) = 3y$

or, $3y = 12 \times 10$

or, $y = \frac{12 \times 10}{3} = 40$

$\therefore$ The required distance = 40km.

61. (3) Let the speed of steamer in still water = x kmph

$\therefore$ Rate downstream = $(x + 2)$ kmph

Rate upstream = $(x - 2)$ kmph

Obviously, distance covered downstream and upstream are equal

$\Rightarrow 4\ (x + 2) = 5\ (x - 2)$

$\Rightarrow 4x + 8 = 5x - 10$

$\Rightarrow 5x - 4x = 10 + 8 \Rightarrow x = 18$

$\therefore$ Rate downstream = 18 + 2 = 20 kmph

Therefore, the required distance = Speed downstream × Time = 20 × 4 = 80 km.

62. (2) According to the question, when A covers the distance of 200 metres, B covers only 200–20 = 180 metres

Again, in 100 metre race, B beats C by 5 metres.

Hence, if B runs 100 metres, C runs 100–5 = 95 metres

$\because$ If B runs 100 m, C runs = 95 m

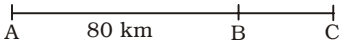
$\therefore$ If B runs 180 m, C runs

$= \frac{95 \times 180}{100} = 171$ m

$\therefore$ A : B : C = 200 : 180 : 171

Hence, A will beat C by = 200–171 = 29 m in 200 m race. i.e., 29 × 5 = 145 m in 1 km race.

63. (3) **Case I :** When the cars are moving in the same direction.



Let A and B be two places and C be the place of meeting.

Let the speed of car starting from A be x kmph, and that of car starting from B be y kmph.

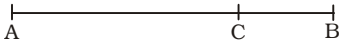
Relative speed = $(x - y)$ kmph

According to the question.

$(x - y) \times 8 = 80$

$\Rightarrow x - y = 10$ ...(i)

Case II : When the cars are moving in the opposite directions and they meet at point C.



Relative speed = $(x + y)$ kmph

Time taken = 1 hour 20 minutes

$= 1 + \frac{1}{3} = \frac{4}{3}$ hours

$\therefore (x + y) \times \frac{4}{3} = 80$

$\Rightarrow x + y = \frac{80 \times 3}{4}$

$\Rightarrow x + y = 60$ ...(ii)

Adding equations (i) and (ii),

$2x = 70$

$\Rightarrow x = 35$

From equation (ii),

$x + y = 60$

$\Rightarrow 35 + y = 60$

$\Rightarrow y = 60 - 35 = 25$

$\therefore$ Speed of the faster car = 35 kmph

64. (4) Let B take x seconds to run 1000 m.

$\therefore$ Time taken by C = $(x + 15)$ seconds

$\therefore \frac{x}{x+15} = \frac{900}{1000} = \frac{9}{10}$

$\Rightarrow 10x = 9x + 135$

$\Rightarrow x = 135$ seconds

Now in a one kilometre race, A beats B by 15 seconds.

It means A covers 1000 m in 135 – 15 = 120 seconds

$\therefore$ Speed of A

$= \frac{1000}{120} = \frac{25}{3}$ m/sec

= 8.3 m/sec.

65. (1) Trains are running in opposite directions.

$\therefore$ Relative speed = 72 + 90 = 162 kmph

$= 162 \times \frac{5}{18} = 45$ m/sec

Let the length of the first train be = x metre.

$\therefore$ Length of the second train $= \frac{3}{4}x$ meter.

Now,

distance travelled in $3\frac{1}{2}$ seconds at 45 m/sec

$= 45 \times \frac{7}{2} = \frac{315}{2}$ metre

This distance is equal to sum of the lengths of trains.

$\therefore x + \frac{3x}{4} = \frac{315}{2}$

$\Rightarrow \frac{4x + 3x}{4} = \frac{315}{2}$

$\Rightarrow \frac{7x}{4} = \frac{315}{2}$

$\Rightarrow x = \frac{315}{2} \times \frac{4}{7} = 90$

Hence, the length of the first train = 90 metre.

Speed of first train = 72 kmph

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

Time taken by the first train to cross the tunnel = 3 minutes = 180 seconds

$\therefore$ Distance covered by it in 180 seconds = 180 × 20 = 3600 metre

$\therefore$ Length of (first train + tunnel) = 3600 metre

$\therefore$ Length of tunnel = 3600 – 90 = 3510 metre

□□□