Chapter 5

Time and Distance

1. A person travelled from one place to another at an average speed of 40 kilometres/hour and back to the original place at an average speed of 50 kilometres/hour. What is his average speed (in kilometres/hour) during the entire round-trip? *[1995]*

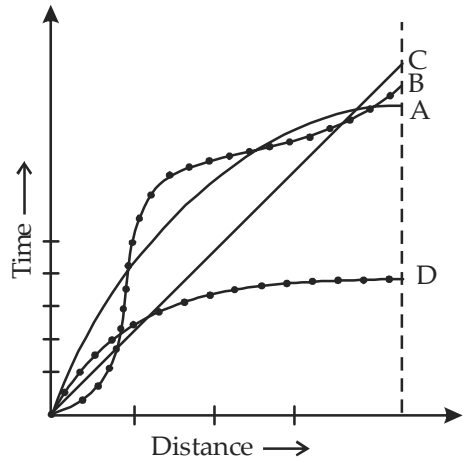
(a) 45

(b) $20\sqrt{5}$

(c) 400 / 9

(d) impossible to find out unless the distance between the two places is known

2. Distance time graph in respect of a race among four persons is shown in the given figure. Consider the following statements in this regard: *[1996]*



1. 'A' stood first in the race
2. 'C' led all the way
3. 'D' ran faster than others in the later part of the race

Of these statements

(a) 1 and 3 are false and 2 is true

(b) 1 and 2 are false and 3 is true

(c) 1 and 3 are true and 2 is false

(d) 1 is true and 2 and 3 are false

3. A boat which has a speed of 5 km/hr in still water crosses a river of width 1 km along the shortest possible path in 15 minutes. The velocity of the river water (in km/hr) is *[1997]*

(a) 1 (b) 3

(c) 4 (d) $\sqrt{41}$

4. One local and another express train were proceeding in the same direction on parallel tracks at 29 km/hour and 65 km/hour respectively. The driver of the former noticed that it took exactly 16 seconds for the faster train to pass by him. What is the length of the faster train? *[1998]*

(a) 60 m (b) 120 m

(c) 160 m (d) 240 m

5. The average speed of a train in the onward journey is 25% more than that of the return journey. The train halts for one hour on reaching the destination. The total time taken for the complete to and fro journey is 17 hours covering a distance of 800 km. The speed of the train in the onward journey is *[1999]*

(a) 45 km per hour

(b) 47.06 per hour

(c) 50.00 km per hour

(d) 56.25 km per hour

6. A person starts from a point A and travels 3 km eastwards to B and then turns left and travels thrice that distance to reach C. He again turns left and travels five times the distance he covered between A and B and reaches his destination D. The shortest distance between the starting point and destination is *[2000]*

(a) 18 km (b) 16 km

(c) 15 km (d) 12 km

7. A person travels from *X* to *Y* at a speed of 40 kmph and returns by increasing his speed 50%. What is his average speed for both the trips? *[2001]*

(a) 36 kmph (b) 45 kmph

(c) 48 kmph (d) 50 kmph

8. A worker reaches his factory 3 minutes late if his speed from his house to the factory is 5 km/hr If he walks at a speed of 6 km/hr, then he reaches the factory 7 minutes early. The distance of the factory from his house is *[2001]*

(a) 4 km (b) 5 km

(c) 6 km (d) 7 km

9. A conveyer belt delivers baggage at the rate of 3 tonns in 5 minutes and a second conveyer belt delivers baggage at the rate of 1 tonns in 2 minutes. How much time will it take to get 33 tonns of baggage delivered using both the conveyer belts? *[2001]*

(a) 25 minutes and 30 seconds
(b) 30 minutes
(c) 35 minutes
(d) 40 minutes and 45 seconds

10. Two ladies simultaneously leave cities *A* and *B* connected by a straight road and travel towards each other. The first lady travels 2 km/hr faster than the second lady and reaches *B* one hour before the second lady reaches *A*. The two cities *A* and *B* are 24 km. apart. How many kilometers does each lady travel in one hour? *[2002]*

(a) 5 km, 3 km (b) 7 km, 5 km
(c) 8 km, 6 km (d) 16 km, 14 km

11. A bus is moving at a speed of 30 km/hr ahead of a car with speed of 50 km/hr. How many kilometres apart are they if it takes 15 minutes for the car to catch up the bus? *[2002]*

(a) 5 km (b) 7.5 km
(c) 12.5 km (d) 15 km

12. A train of length 150 metres, moving at a speed of 90 km/hr can cross a 200 metres bridge in *[2002]*

(a) 8 seconds (b) 14 seconds
(c) 6 seconds (d) 15 seconds

13. A car travels the first one-third of a certain distance with a speed of 10 km/hrs. The next one-third of distance with a speed of 20 km/hrs. and the last one-third distance with a speed of 60 km/hrs. The average speed of the car for the whole journey is : *[2003]*

(a) 18 km/hrs (b) 24 km/hrs
(c) 30 km/hrs (d) 36 km/hrs

14. Total time taken by a person in going to a place by walking and returning on cycle is 5 hours 45 minutes. He would have gained 2 hours by cycling both ways. The time taken by him to walk both ways, is *[2003]*

(a) 6 hours 45 minutes
(b) 7 hours 45 minutes
(c) 8 hours 15 minutes
(d) 8 hours 30 minutes,

15. Two cars *X* and *Y* starts from two places *A* and *B* respectively which are 700 km apart at 9 a.m. Both the cars run at an average speed of 60 km/hr. Car *X* stops at 10 a.m. and again starts at 11 a.m., while the other car *Y* continues to run without stopping. When do the two cars cross each other? *[2004]*

(a) 2:40 p.m. (b) 3.20 p.m.
(c) 4:10 p.m. (d) 4: 20 p.m.

16. *A* and *B* start form the same point and in the same direction at 7 a.m. to walk around a rectangular field 400 m × 300 m. *A* and *B* walk at the rate of 3 km/hr and 2.5 km/hr respectively. How many times shall they cross each other, if they continue to walk till 12:30 p.m.? *[2004]*

(a) Not even once (b) Once
(c) Twice (d) Thrice

17. 50 men or 80 women can finish a job in 50 days. A contractor deploys 40 men and 48 women for this work, but after every duration of 10 days, 5 completed. The work is completed in *[2004]*

(a) 45 days (b) 50 days
(c) 54 days (d) 62 days

18. Aryan runs at a speed of 40 metres/minute. Rahul follows him after an interval of 5 minutes and runs at a speed of 50 metres/minute. Rahul's dog runs at a speed of 60 metres/minute and starts along with Rahul. The dog reaches Aryan and then comes back to Rahul, and continues to do so till Rahul reaches Aryan. What is the total distance covered by the dog? *[2005]*

(a) 600 metres (b) 750 metres
(c) 980 metres (d) 1200 metres

19. There are eight equidistant points 'A', 'B', 'C', 'D', 'E', 'F', 'G', and 'H' in the clockwise direction on the periphery of a circle. In a time interval t, a person reaches from' A' to 'C' with uniform motion while another person reaches the point 'E' from the point 'B' during the same time interval with uniform motion. Both the persons move in the same direction along the circumference of the circle and start at the same instant. How much time after the start, will the two persons meet each other? *[2006]*

(a) 4t (b) 7t
(c) 9t (d) Never

20. Amit starts from a point A and walks to another point B, and then returns from B to A by his car and thus takes a total time of 6 hours and 45 minutes. If he had driven both ways in his car, he would have taken 2 hours less. How long would it take for him to walk both ways? *[2007]*

(a) 7 hours 45 minutes
(b) 8 hours 15 minutes
(c) 8 hours 30 minutes
(d) 8 hours 45 minutes

21. A and B can complete work together in 5 days. If A works at twice his speed and B at half of his speed, this work can be finished in 4 days. How many days would it take for A alone to complete the job? *[2007]*

(a) 10 (b) 12
(c) 15 (d) 18

22. A train completes a journey with a few stoppages in between at an average speed of 40 km per hour. If the train had not stopped anywhere, it would have completed the journey at an average speed of 60 km per hour. On an average, how many minutes per hour does the train stop during the journey? *[2007]*
(a) 20 minutes per hour
(b) 18 minutes per hour
(c) 15 minutes per hour
(d) 10 minutes per hour

23. Carpenter A can make a chair in 6 hours, carpenter B in 7 hours and carpenter C in 8 hours. If each carpenter works for 8 hours per day, how many chairs will be made in 21 days? *[2008]*
(a) 61 (b) 67
(c) 73 (d) 79

24. Two trains leave New Delhi at the same time. One travels north at 60 kmph and the other travels south at 40 kmph. After how many hours will the trains, be 150 km apart ? *[2010]*
(a) $\frac{3}{2}$ (b) $\frac{4}{3}$
(c) $\frac{3}{4}$ (d) $\frac{15}{2}$

25. Running at a speed of 60 km per hour, a train passed through a 1.5 km long tunnel in two minutes. What is the length of the train? *[2010]*
(a) 250 m (b) 500 m
(c) 1000 m (d) 1500 m

26. A person travelled a distance of 50 km in 8 hours. He covered a part of the distance, on foot at the rate of 4 km per hour and a part on a bicycle at the rate of 10 km per hour. How much distance did he travel on foot? *[2010]*
(a) 10 km (b) 20 km
(c) 30 km (d) 40 km

27. Three men start together to travel the same way around a circular track of 11 km. Their speeds are 4, 5.5 and 8 kmph respectively. When will they meet at the starting point for the first time? *[2010]*
(a) After 11 hours (b) After 21 hours
(c) After 22 hours (d) After 33 hours

28. If a bus travels 160 km in 4 hours and a train travels 320 km in 5 hours at uniform speeds, then what is the ratio of the distances travelled by them in one hour ? *[2011 - II]*
(a) 8 : 5 (b) 5 : 8
(c) 4 : 5 (d) 1 : 2

29. Mr. Kumar drives to work at an average speed of 48 km per hour. The time taken to cover the first 60% of the distance is 10 minutes more than the time taken to cover the remaining distance. How far is his office? *[2012 - II]*
(a) 30 km (b) 40 km
(c) 45 km (d) 48 km

30. A person can walk a certain distance and drive back in six hours. He can also walk both ways in 10 hours. How much time will he take to drive both ways? *[2013 - II]*
(a) Two hours
(b) Two and a half hours
(c) Five and a half hours
(d) Four hours

31. Four cars are hired at the rate of ₹ 6 per km plus the cost of diesel at ₹ 40 a litre. In this context, consider the details given in the following table: *[2013 - II]*

Car	Mileage (km / *l*)	Hours	Total Payment(₹)
A	8	20	2120
B	10	25	1950
C	9	24	2064
D	11	22	1812

Which car maintained the maximum average speed?
(a) Car A (b) Car B
(c) Car C (d) Car D

32. A thief running at 8 km/hr is chased by a policeman whose speed is 10 km/hr. If the thief is 100 m ahead of the policeman, then the time required for the policeman to catch the thief will be *[2013 - II]*
(a) 2 min (b) 3 min
(c) 4 min (d) 6 min

33. A train travels at a certain average speed for a distance of 63 km and then travels a distance of 72 km at an average speed of 6 km/hr more than its original speed. If it takes 3 hours to complete the total journey, what is the original speed of the train in km/hr? *[2013 - II]*
(a) 24 (b) 33
(c) 42 (d) 66

34. Location of B is north of A and location of C is east of A. The distances AB and AC are 5 km and 12 km respectively. The shortest distance (in km) between the locations B and C is *[2014 - II]*
(a) 60 (b) 13
(c) 17 (d) 7

35. Two cars start towards each other, from two places A and B which are at a distance of 160 km. They start at the same time 08 :10 AM. If the speeds of the cars are 50 km and 30 km per hour respectively, they will meet each other at *[2014 - II]*
(a) 10 :10 AM (b) 10 :30 AM
(c) 11:10 AM (d) 11:20 AM

36. A straight line segment is 36 cm long. Points are to be marked on the line from both the end points. From each end, the first point is at a distance of 1cm from the end, the second point is at a distance of 2 cm from the first point and the third point is at a distance of 3 cm from the second point and so on. If the points on the ends are not counted and the common points are counted as one, what is the number of points ? *[2014 - II]*

(a) 10 (b) 12
(c) 14 (d) 16

37. A and B decide to travel from place X to place Y by bus. A has ₹ 10 with him and he finds that it is 80% of the bus fare for two persons. B finds that he has ₹ 3 with him and hands it over to A. In this context, which one of the following statements is correct ? *[2014 - II]*

(a) Now the money A has is just enough to buy two tickets.
(b) A stillneeds ₹ 2 for buying the tickets.
(c) After buying the two tickets A will be left with 50 paise.
(d) The money A now has is still not sufficient to buy two tickets.

38. In a 500 metres race, B starts 45 metres ahead of A, but A wins the race while B is still 35 metres behind. What is the ratio of the speeds of A to B assuming that both start at the same time? *[2015-II]*

(a) 25: 21 (b) 25: 20
(c) 5:3 (d) 5:7

39. Two cities A and B are 360 km apart. A car goes from A to B with a speed of 40 km/hr and returns to A with a speed of 60 km/hr. What is the average speed of the car? *[2015-II]*

(a) 45 km/hr (b) 48 km/hr
(c) 50 km/hr (d) 55 km/hr

40. Two pipes A and B can independently fill a tank completely in 20 and 30 minutes respectively. If both the pipes are opened simultaneously, how much time will they take to fill the tank completely? *[2015-II]*

(a) 10 minutes (b) 12 minutes
(c) 15 minutes (d) 25 minutes

HINTS & SOLUTIONS

1. **(c)** Let the distance covered by the person be x km in each lap.

$$\text{Total time taken} = \frac{x}{40} + \frac{x}{50} = \frac{9x}{200}$$

Total distance covered $= x + x = 2x$ km

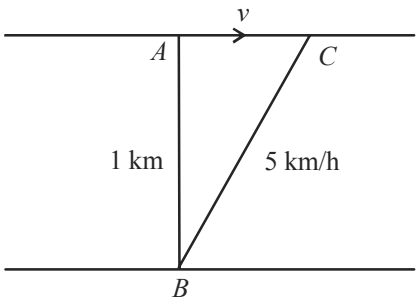
$$\therefore \quad \text{Average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

$$= \frac{2x}{(9x/200)} = \frac{400}{9} \text{ km/h.}$$

2. **(b)** 'A' never stood 1st in the race, it was 'D' who stood 1st. From the graph, it can be seen that 'C' do not lead all the way. While 'D' after starting slower, ran faster than others in the later part of the race.

3. **(b)** The speed of the boat along the shortest possible path

$$AB = \frac{1}{\frac{15}{60}} = 4 \text{ km/h}$$



Now the velocity of the riverwater

$$v = \sqrt{5^2 - 4^2}$$

$$= \sqrt{25 - 16}$$

$$v = \sqrt{9}$$

$$v = 3 \text{ km/h}$$

4. **(c)** Relative speed of faster train with respect to the slower train $= \frac{(65 - 29) \times 1000}{3600} = 10$ m/s

$\therefore$ Length of the faster train = Relative speed × time taken

$= 10 \times 16 = 160$ m

5. **(d)** Distance covered during onward journey = Distance covered during return journey $= \frac{800}{2} = 400$ km

Let the time taken during onward journey be t hr.

Since 1 hour is the halt time, so time taken during the return journey $= (17 - 1 - t) = 16 - t$ hr.

Let the average speed during the return journey be v km/hr

$\therefore$ Average speed during the onward journey

$$= v\left(1 + \frac{1}{4}\right) = \frac{5v}{4} \text{ km/hr}$$

Now, $$400 = \left(\frac{5v}{4}\right) \times t$$

$$t = \frac{320}{v} \qquad \text{.....(i)}$$

Also, $$400 = v(16 - t) \qquad \text{.....(ii)}$$

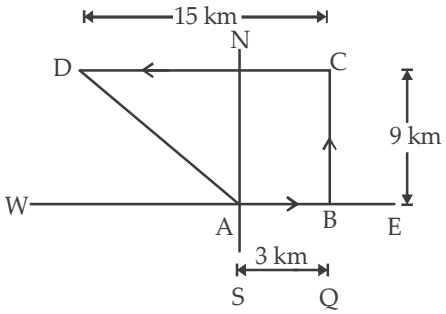
Putting value of (i) in (ii),

$$v\left(16 - \frac{320}{v}\right) = 400$$

$$v = 45 \text{ km/hr}$$

$\therefore$ Speed during onward journey $= \frac{5}{4}(45) = 56.25$ km/hr.

6. **(c)**



CN = AB = 3 km

ND = CD – CN = 15 – 3 = 12 km

AN = BC = 9 km

AD is the required shortest distance. By paythagrous theorem,

$$AD = \sqrt{(AN)^2 + (ND)^2} = \sqrt{(9)^2 + (12)^2} = 15 \text{ km}$$

7. **(c)** Let the distance from X to Y = x km

Speed towards form X to Y = 40 km/hr.

$$\text{Time taken} = \frac{x}{40}$$

Returning speed from Y to X = 40 + (50% of 40)

= 40 + 20 = 60 km/hr

$$\therefore \text{ Time taken in journey} = \frac{x}{60}$$

Now, average speed for whole journey = $\frac{\text{Total Distance}}{\text{Total time}}$

$= \frac{2x}{\frac{x}{40}+\frac{x}{60}} = \frac{4800}{100} = 48$ km.

8. **(b)** Let the distance be x km
As per question,

$\frac{x}{5}-\frac{3}{60}=\frac{x}{6}+\frac{7}{60}$

$\frac{x}{5}-\frac{x}{6}=\frac{10}{60}=\frac{1}{6}$

$\frac{x}{30}=\frac{1}{6}$

x = 5 km

9. **(b)** For 1st belt, baggage delivered in 1 min = $\frac{3}{5}$ tonns

For 2nd belt, baggage delivered in 1 min = $\frac{1}{2}$ tonns

Total baggage delivered in 1 min = $\frac{3}{5}+\frac{1}{2}=\frac{11}{10}$ tonns

Now, Time taken to deliver $\frac{11}{10}$ tonns baggage = 1 min.

Time taken to deliver 1 tonns = $\frac{10}{11}$ min

Hence, time taken to deliver 33 tonns = $\frac{10}{11}\times 33 = 30$ min

10. **(c)** Let the speed of the second lady be v. Then, the speed of the 1st lady = $v+2$
Also, let the time taken by the 2nd lady to reach $A = t$.
Then, the time taken by the 1st lady to reach $B = (t-1)$
Now, $24 = (v+2)(t-1) = vt$ .....(i)

$vt = 24$

$v = \frac{24}{t}$ ....(ii)

Putting value of v from equation (ii) in equation (i),

$(v+2)(t-1) = 24$

$\left(\frac{24}{t}+2\right)(t-1) = 24$

$t^2 - t - 12 = 0$

$t^2 - 4t + 3t - 12 = 0$

$t(t-4)+3(t-4) = 0$

$t-4=0;\ t+3=0$

$t = -3$ and $t = 4$

neglecting $t = -3$

$\therefore$ $t = 4$

$\therefore$ $v = \frac{24}{4} = 6$ km.

Hence, Distance travelled by the 1st lady in one hour
$= (v+2)\times 1 = 8$ km
Distance travelled by the 2nd lady in one hour
$= v \times 1 = 6$ km

11. **(a)** According to question relative speed of the car with respect to the bus
= 50 – 30 = 20 km/hr.
Now, Distance between the car and the bus, when the car catches the bus = Distance travelled by the car in 15 min

$= \frac{15}{60}\times 20 = 5$ km.

12. **(b)** Length of train = 150 m

Speed of train = 90 km/h = $90\times\frac{5}{18} = 25$ m/s

Length of bridge = 200 m
To cross the bridge, the train has to travel a distance equal to sum of the length of bridge and the length of train.
Total distance to be covered = 150 + 200 = 350 m

Time taken = $\frac{\text{Distance}}{\text{Speed}} = \frac{350}{25} = 14$ seconds.

13. **(a)** Let the total distance be 'd'
First 1/3rd distance i.e. $d/3$ km is covered at speed of 10 km/hrs.

$\therefore$ Time taken = $\frac{d/3}{10}$ hrs.

Second 1/3rd distance i.e., $d/3$ km is covered at speed of 20 km/hrs.

$\therefore$ Time taken = $\frac{d/3}{20}$ hrs.

Last 1/3rd distance i.e. $d/3$ km is covered at speed of 60 km/hrs.

$\therefore$ Average speed = $\frac{\text{Total covered distance}}{\text{Total taken time}}$

$= \frac{d/3+d/3+d/3}{\frac{d/3}{10}+\frac{d/3}{20}+\frac{d/3}{60}} = \frac{180}{6+3+1}$

So Average speed = 18 km/hrs.

14. **(b)** Walking time + cycling time
= 5 Hours 45 minutes = 345 min. ...(i)
if he had cycled both way he would have gain 2 hrs (120 min.)
2 × cycling time = 345 – 120 = 225 min ...(ii)

cycling time = $\frac{225}{2} = 112.5$

Walking time = 345 – 112.5 = 232.5
$\therefore$ Time taken by him to walk both ways
= 2(232.5) = 465 min = 7 hr 45 min

15. **(b)** Distance travelled by X upto 11 a.m. = Distance travelled by X upto 10 a.m. = 60 × 1 = 60 km.
Distance travelled by Y upto 11 a.m. = 2 × 60 = 120
Now, at 11 a.m., distance between X and Y
= 700 – (120 + 60) = 520 km.hr.
Relative speed of X with respect to Y
= 60 – (–60) = 120 km/hr.
Now, they will cross each other, when they cover a distance of 520 km with a relative speed of 120 km/hr after 11 a.m.

Time taken after 11 a.m. $= \frac{520}{120} = \frac{13}{3} \times 60$ min
$= 260$ min $= 4$ hr. 20 min.

$\therefore$ Time = 11 + 4 hr. 20 min = 3:20 p.m.

16. **(b)** Total time for which A and B travel

$= 5$ hr 30 min $= 5\frac{1}{2}$ hrs (from 7 a.m. – 12:30 p.m.)

Distance travelled by A in $5\frac{1}{2}$ hours $= 3 \times 11/2 = 16.5$ km

Distance traveled by B in $5\frac{1}{2}$ hours $= 2.5 \times 11/2$
$= 13.75$km

Therefore in $5\frac{1}{2}$ hours, difference in distance travelled by A and B is (16.5 – 13.75) km, i.e. 2.75 km. The total extra distance need to be travelled by one in order to cross the other by at least once.
Length of path around the field = perimeter of rectangle
$= 2(l + b) = 2(400 + 300) = 1400$ m $= 1.4$ km
A might cross B more than once, for that they may need at least 1.4 × 2 = 2.8 km difference between themselves, but the difference is 2.75 km. Hence, they will cross each other only once.

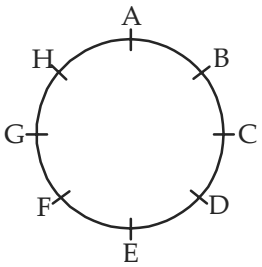
17. **(b)** Total number of working day = 50 × 50 = 2500 days for men
For women it is equal to 4000 days
For 1st 10 day means 40 men × 10 = 400 day,
48 women × 10 = 480 days
2nd after 10 days means 35 men × 10 = 350 day,
40 women × 10 = 400 days
3rd 10 day 30 men × 10 = 300 days, 32 women × 10 = 320 days
4th 10 day 25 men × 10 = 250 days, 24 women × 10 = 240 days
5th 10 day 20 men × 10 = 200 days, 16 women × 10 = 160 days
Men = 1500 days, Women = 1600 days
1 man = 1.6 women
1600 days of women = 1000 day of men
So, 2500 days need to complete work mean after 50 day
i.e., Man of 1600 working days + woman of 1600 days i.e., 50 days.

18. **(d)** Let they meet at a distance of 'x' from start, after time 't' since Rahul starts.

$$40 \times (5 + t) = 50\,t$$
$$\Rightarrow \quad 200 + 40\,t = 50\,t$$
$$\Rightarrow \quad t = \frac{200}{10} = 20 \text{ min.}$$
$$\therefore \quad x = 50 \times t = 50 \times 20 = 1000 \text{ metres}$$

From the given options it is clear that all options except 1200 metres are smaller than 1000 m and dog in any case has to move more than 1000 m.

19. **(b)**



Let distance between each point be x. Also, let speed of persons from point A and B be u and v respectively.
Distance between A to $C = 2x = ut$

$$u = \frac{2x}{t}$$

Distance between B to E = $3x$ = vt

$$v = \frac{3x}{t}$$

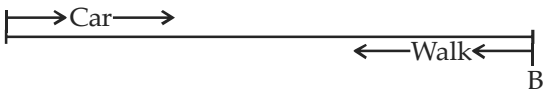
Relative speed of person from B with respect toA

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

Distance between A and B = $7x$

$$\therefore \text{ Persons will meet after time } = \frac{7x}{(x/t)} = 7t$$

20. **(d)**



Let the time taken by car = C
and the time taken by walking = W

C + W = 6 hrs 45 minutes $= 6\frac{3}{4}$ or $\frac{27}{4}$ hrs

C + C = 6 hrs 45 minutes – 2 hrs = 4 hr 45 minutes

or $= 6\frac{3}{4} - 2\text{hr} = 4\frac{3}{4}$ hrs

$$W + W = 2 \times \frac{27}{4} - 4\frac{3}{4} \text{ hrs}$$
$$= \frac{54}{4} - \frac{19}{4} = \frac{35}{4}\text{hrs} = 8\frac{3}{4}\text{hrs}$$
$$= 8 \text{ hrs } 45 \text{ minutes}$$

21. (a) Let alone time for A and B be x and y respectively.

Now, $\frac{1}{x}+\frac{1}{y}=\frac{1}{5}$ ...(i)

Also, $\frac{2}{x}+\frac{1}{2y}=\frac{1}{4}$ ...(ii)

Solving (i) and (ii), we get, x = 10 and y = 10

22. (a) Without stoppage, distance travelled per hour = 60 km

With stoppage, distance travelled per hour = 40 km.

∴ Stoppage distance per hour = 60 – 40 = 20 km

Since, speed is 60 km per hour, i.e., in 60 min.(1 km – 1 min.)

Hence, stoppage time per hour = 20 min.

23. (c) In 6 hours, number of chairs made by carpenter A = 1

∴ In (21 × 8) hours, number of chairs by A = $\frac{21\times 8}{6}=28$

Similarly in (21 × 8) hours, number of chairs by B = $\frac{21\times 8}{7}=24$ and number of chairs by C in (21 × 8) hours = $\frac{21\times 8}{8}=21$

Hence, total number of chairs in 21 days

= 28 + 24 + 21 = 73

24. (a) Since, both trains are moving in opposite directions, so relative speed of one train with respect to the other

= 60 – (– 40) = 100 km/hr

∴ Time = $\frac{150}{100}=\frac{3}{2}$ hr.

25. (b) Let length of the train be x.

Then, $1.5 + x = 60\left(\frac{2}{60}\right)$

x = 2 – 1.5 = 0.5 km = 0.5 × 1000 = 500 m.

26. (b) Let the time taken to travel on foot and bicycle be t_1 and t_2 respectively

Also, let distance travelled on foot be x.

Now, $t_1 + t_2 = 8$

$$\frac{x}{4}+\frac{50-x}{10}=8$$

$$\frac{5x+100-2x}{20}=8;\ 3x = 160 - 10$$

$$x=\frac{60}{3}$$

x = 20 km.

27. (c) Let the minimum time be t, when they meet at the starting point for the first time. So, the net distance covered must be a multiple of 11.

Now, $(4 + 5.5 + 8)\ t = 11\ (n)$

where, n is an integer.

$$t=\frac{11(n)}{17.5}$$

minium value of n is 35, so that we can get an appropriate value of time.

$$\therefore\ t=\frac{11\times 35}{17.5}=22 \text{ hr.}$$

28. (b) Distance covered by a bus in 4 hours = 160 km.

$$\therefore \text{ Distance covered by a bus in 1 hour } =\frac{160}{4}=40\,\text{km}$$

Further, Distance covered by a train in 5 hours = 320 km

$$\therefore \text{ Distance covered by a train in 1 hour } =\frac{320}{5}=64\,\text{km}$$

$$\text{Required ratio } =\frac{40}{64}=\frac{5}{8}=5:8$$

29. (b) $\frac{0.6d}{48}-\frac{0.4d}{48}=\frac{10}{60}$

$$0.2\,d=\frac{10\times 48}{60}$$

$$\therefore \quad d = 40 \text{ km}$$

30. (a) 2-way walk = 10 hrs

∴ 1-way walk = 5 hrs

1-way walk + 1 way drive = 6 hrs

∴ 1 way drive = 6 – 5 = 1 hr

Hence, two way drive take 2 hrs.

31. (a) Let the distances travelled by cars A, B, C and D be a, b, c and d respectively.

Then, the total payment for car A

$$= 6\times a+40\times\frac{a}{8}=11a$$

$\Rightarrow$ $11a = 2120$

$$a=\frac{2120}{11}$$

Hence, average speed of 'A' = $\frac{a}{20}=\frac{2120}{11\times 20}=9.63$

For B, total payment for car $B = 6\times b+40\times\frac{b}{10}$

$\Rightarrow$ $10b = 1950$

∴ $b = 195$

Hence, average speed of 'B' $= \frac{b}{25}$

$\therefore \quad \frac{195}{25} = 7.8$

For C, total payment for car C

$= 6 \times c + 40 \times \frac{c}{9}$

$\Rightarrow \quad c = \frac{9 \times 1032}{47}$

Hence averge speed by 'C' $= \frac{c}{24}$

$= \frac{9 \times 1032}{47 \times 24} = 8.23$

For D, total payment for car D

$= 6 \times d + 40 \times \frac{d}{11} = 1812$

$d = \frac{11 \times 906}{53}$

Hence, the average speed of

$D = \frac{d}{22} = \frac{453}{53} = 8.5$

All speeds except A are less than 9. Hence it's greatest value.

32. (b) If we consider the difference of speeds, policeman is 2 km/hr leading speed and he can catch the thief at 100 m ahead by $\left(\frac{100 \text{ m}}{2 \text{ kmph}}\right) = \frac{100}{1000 \times 2} \times 60$

= 3 min.

33. (c) Let the original speed = x

Total time taken = 3 hr

$\Rightarrow \quad 3 = \frac{63}{x} + \frac{72}{x+6}$

$\Rightarrow \quad (x)\,(x+6) = 21(x+6) + 24(x)$

$\Rightarrow \quad x^2 - 39x - 126 = 0$

$\Rightarrow \quad x^2 - 42x + 3x = 126 = 0$

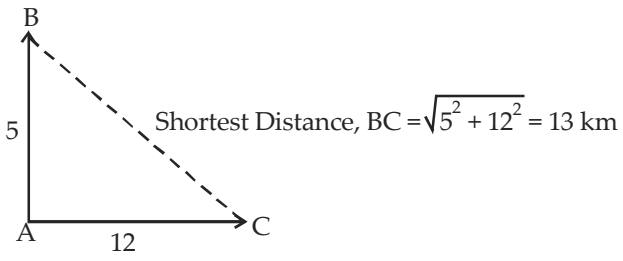
$\Rightarrow \quad (x-42)\,(x+3) = 0$

$x = 42,\ x = -3$

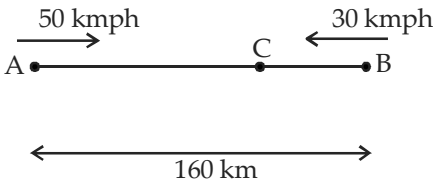
$x = -3$ is rejected.

Hence, original speed was 42 km/hr.

34. (b)



35. (a)



Suppose the cars meet at point C after 't' hrs.

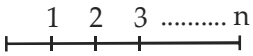
$\therefore$ AC = 50 t and BC = 30 t

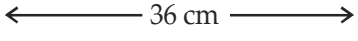
$\therefore$ 50 t + 30 t = 160

$t = \frac{160}{80} = 2$ hrs.

So, the cars will meet at 10 : 10 AM

36. (c)





$\therefore 1 + 2 + 3 + \ldots\ldots n = 36$

$\frac{n(n+1)}{2} = 36$

$n(n+1) = 72$

$\Rightarrow \quad n = 8$

$\therefore$ Leaving the end points the no. of points starting from A is 7.

Similarly starting from B, the no. of points will be 7.

And also no. of the points between A & B will coincide.

$\therefore$ Total no. of points

= 7 + 7 = 14

37. (c) Let cost of 1 ticket is ₹ x.

$\therefore$ for A, $10 = \frac{80}{100} \times 2x$

$\Rightarrow \quad x = \frac{50}{8} = \frac{25}{4} = ₹ 6.25$

Now B gives ₹ 3 to A.

So, A has 13 ₹.

Cost of 2 tickets = ₹ 12.50, which is more than enough to buy 2 tickets.

$\therefore$ (a) Rules out

(b) is clearly ruled out

(c) is true, because after buying 2 tickets.

A is left with ₹ 13 – 12.50 = 50 paise

38. (a) Total distance = 500m

Distance covered by A = 500m

Distance covered by B = 500 – 45 – 35

= 500 – 80

= 420

$$\frac{\text{speed of A}}{\text{speed of B}} = \frac{\frac{\text{distance of A}}{\text{time}}}{\frac{\text{distance of B}}{\text{time}}}$$

$$= \frac{500}{\text{time}} \times \frac{\text{time}}{420}$$

$$= \frac{500}{420}$$

$$= \frac{25}{21} = 25 : 21$$

39. (b) Average speed of two cars at a speed V_1 and V_2

$$\text{km/hr} = \frac{2V_1V_2}{V_1 + V_2}$$

$$= \frac{2 \times 40 \times 60}{60 + 40}$$

$$= \frac{2 \times 40 \times 60}{100}$$

= 48 km/hr

40. (b) Time taken by both tanks $= \frac{30 \times 20}{30 + 20}$

$$= \frac{30 \times 20}{50}$$

= 12 min

■ ◆ ■