# 18 Time and Distance

## IMPORTANT FACTS AND FORMULAE

**I.** Speed $= \left(\frac{\text{Distance}}{\text{Time}}\right)$, Time $= \left(\frac{\text{Distance}}{\text{Speed}}\right)$, Distance $= (\text{Speed} \times \text{Time})$

**II.** $x$ km/hr $= \left(x \times \frac{5}{18}\right)$ m/sec

**III.** $x$ m/sec $= \left(x \times \frac{18}{5}\right)$ km/hr

**IV.** If the ratio of the speeds of $A$ and $B$ is $a : b$, then the ratio of the times taken by them to cover the same distance is $\frac{1}{a} : \frac{1}{b}$ or $b : a$.

**V.** Suppose a man covers a certain distance at $x$ km / hr and an equal distance at $y$ km / hr. Then, the average speed during the whole journey is $\left(\frac{2xy}{x+y}\right)$ km/hr.

**VI.** Suppose two men are moving in the same direction at $u$ m/s and $v$ m/s respectively, where $u > v$, then their relative speed $= (u - v)$ m/s.

**VII.** Suppose two men are moving in opposite directions at $u$ m/s and $v$ m/s respectively, then their relative speed $= (u + v)$ m/s.

**VIII.** If two persons A and B start at the same time in opposite directions from two points and after passing each other they complete the journeys in $a$ and $b$ hours respectively, then
A's speed: B's speed $= \sqrt{b} : \sqrt{a}$.

## SOLVED EXAMPLES

**Ex. 1.** ***A train travels 82.6 km/hr. How many metres will it travel in 15 minutes?*** **(E.S.I.C., 2006)**

**Sol.** Distance travelled in 1 min $= \left(\frac{82.6}{60}\right)$km.

$\therefore$ Distance travelled in 15 min. $= \left(\frac{82.6}{60} \times 15\right)$km $= 20.65$ km $= (20.65 \times 1000)$ m

$= 20650$ m.

**Ex. 2.** ***How many minutes does Aditya take to cover a distance of 400 m, if he runs at a speed of 20 km/hr?***

**Sol.** Aditya's speed $= 20$ km / hr $= \left(20 \times \frac{5}{18}\right)$m/sec $= \frac{50}{9}$ m/sec.

$\therefore$ Time taken to cover 400 m $= \left(400 \times \frac{9}{50}\right)$ sec $= 72$ sec $= 1\frac{12}{60}$ min $= 1\frac{1}{5}$ min.

**Ex. 3.** ***A cyclist covers a distance of 750 m in 2 min 30 sec. What is the speed in km/hr of the cyclist?***

**Sol.** Speed $= \left(\frac{750}{150}\right)$ m/sec $= 5$ m/sec $= \left(5 \times \frac{18}{5}\right)$ km/hr $= 18$ km/hr.

[$\because$ 2 min 30 sec = 150 sec]

**Ex. 4.** ***A man walked at a speed of 4 km/hr from point A to B and came back from point B to A at the speed of 6 km/hr. What would be the ratio of the time taken by the man in walking from point A to B to that from point B to A?***

**Sol.** Ratio of speeds = 4 : 6 = 2 : 3.

$\therefore$ Ratio of times taken = $\frac{1}{2}:\frac{1}{3}=3:2.$

**Ex. 5.** ***A dog takes 4 leaps for every 5 leaps of a hare but 3 leaps of a dog are equal to 4 leaps of the hare. Compare their speeds.*** **(M.B.A., 2007)**

**Sol.** Let the distance covered in 1 leap of the dog be $x$ and that covered in 1 leap of the hare be $y$.

Then, $3x = 4y \Rightarrow x = \frac{4}{3}y \Rightarrow 4x = \frac{16}{3}y.$

$\therefore$ Ratio of speeds of dog and hare

= Ratio of distances covered by them in the same time

$= 4x:5y = \frac{16}{3}y:5y = \frac{16}{3}:5 = 16:15.$

**Ex. 6.** ***While covering a distance of 24 km, a man noticed that after walking for 1 hour and 40 minutes, the distance covered by him was $\frac{5}{7}$ of the remaining distance. What was his speed in metres per second?***

**Sol.** Let the speed be $x$ km / hr.

Then, distance covered in 1 hr. 40 min. *i.e.*, $1\frac{2}{3}$ hrs $= \frac{5x}{3}$ km.

Remaining distance $= \left(24-\frac{5x}{3}\right)$ km.

$\therefore \quad \frac{5x}{3}=\frac{5}{7}\left(24-\frac{5x}{3}\right) \Leftrightarrow \frac{5x}{3}=\frac{5}{7}\left(\frac{72-5x}{3}\right) \Leftrightarrow 7x = 72-5x$

$\Leftrightarrow 12x = 72 \Leftrightarrow x = 6.$

Hence, speed $= 6\text{ km/hr} = \left(6\times\frac{5}{18}\right)\text{m/sec} = \frac{5}{3}\text{ m/sec} = 1\frac{2}{3}\text{ m/sec.}$

**Ex. 7.** ***A trip to a destination is made in the following way : 900 km by train at an average speed of 60 km/hr, 3000 km by plane at an average speed of 500 km/hr, 400 km by boat at an average speed of 25 km/hr, 15 km by taxi at an average speed of 45 km/hr. What is the average speed for the entire journey?*** **(I.A.S., 2008)**

**Sol.** Total distance travelled = (900 + 3000 + 400 + 15) km = 4315 km.

Total time taken $= \left(\frac{900}{60}+\frac{3000}{500}+\frac{400}{25}+\frac{15}{45}\right)\text{hr}$

$= \left(15+6+16+\frac{1}{3}\right)\text{hr} = 37\frac{1}{3}\text{ hr} = \frac{112}{3}\text{ hr.}$

$\therefore$ Average speed for the whole journey

$= \left(4315\times\frac{3}{112}\right)\text{km/hr} = 115\frac{65}{112}\text{ km/hr.}$

**Ex. 8.** ***Peter can cover a certain distance in 1 hr. 24 min. by covering two-third of the distance at 4 kmph and the rest at 5 kmph. Find the total distance.***

**Sol.** Let the total distance be $x$ km. Then,

$\frac{\frac{2}{3}x}{4}+\frac{\frac{1}{3}x}{5}=\frac{7}{5} \Leftrightarrow \frac{x}{6}+\frac{x}{15}=\frac{7}{5} \Leftrightarrow 7x = 42 \Leftrightarrow x = 6.$

$\therefore$ Total distance = 6 km.

**Ex. 9.** ***One-third of a certain journey was covered at the speed of 20 km/hr, one-fourth at 30 km/hr and the rest at the speed of 50 km/hr. Find the average speed per hour for the whole journey.*** **(A.A.O. Exam., 2009)**

**Sol.** Let the total distance be $x$ km. Then,

Distance covered at 20 km/hr $= \frac{x}{3}$ km; Distance covered at 30 km/hr $= \frac{x}{4}$ km;

Distance covered at 50 km/hr $= \left[x - \left(\frac{x}{3} + \frac{x}{4}\right)\right]$ km $= \frac{5x}{12}$ km.

Total time taken $= \left[\frac{(x/3)}{20} + \frac{(x/4)}{30} + \frac{(5x/12)}{50}\right]$ hrs

$= \left(\frac{x}{60} + \frac{x}{120} + \frac{x}{120}\right)$ hrs $= \frac{4x}{120}$ hrs $= \frac{x}{30}$ hrs.

$\therefore$ Average speed for the whole journey $= \left(x \times \frac{30}{x}\right)$ km/hr $= 30$ km/hr.

**Ex. 10.** ***A man travelled from the village to the post-office at the rate of 25 kmph and walked back at the rate of 4 kmph. If the whole journey took 5 hours 48 minutes, find the distance of the post-office from the village.***

**Sol.** Average speed $= \left(\frac{2xy}{x+y}\right)$ km/hr $= \left(\frac{2 \times 25 \times 4}{25+4}\right)$ km/hr $= \frac{200}{29}$ km/hr.

Distance travelled in 5 hours 48 minutes, i.e., $5\frac{4}{5}$ hrs $= \left(\frac{200}{29} \times \frac{29}{5}\right)$ km $= 40$ km.

$\therefore$ Distance of the post-office from the village $= \left(\frac{40}{2}\right) = 20$ km.

**Ex. 11.** ***An aeroplane flies along the four sides of a square at the speeds of 100, 200, 300 and 400 km/hr. Find the average speed of the plane around the field.*** **(P.C.S., 2009)**

**Sol.** Let each side of the square be $x$ km and let the average speed of the plane around the field be $y$ km/hr.

Then, $\frac{x}{100} + \frac{x}{200} + \frac{x}{300} + \frac{x}{400} = \frac{4x}{y} \Leftrightarrow \frac{25x}{1200} = \frac{4x}{y} \Leftrightarrow y = \left(\frac{1200 \times 4}{25}\right) = 192.$

$\therefore$ Average speed $= 192$ km/hr.

**Ex. 12.** ***A fast train takes 3 hours less than a slow train for a journey of 600 km. If the speed of the slow train is 10 km/hr less than that of the fast train, then find the speeds of the two trains.*** **(M.A.T., 2006)**

**Sol.** Let the speed of the fast train be $x$ km/hr.

The, speed of the slow train $= (x - 10)$ km/hr.

$\therefore \quad \frac{600}{(x-10)} - \frac{600}{x} = 3 \Leftrightarrow 600x - 600(x-10) = 3x(x-10)$

$\Leftrightarrow x^2 - 10x - 2000 = 0 \Leftrightarrow x^2 - 50x + 40x - 2000 = 0$

$\Leftrightarrow x(x-50) + 40(x-50) = 0 \Leftrightarrow (x-50)(x+40) = 0 \Leftrightarrow x = 50.$

Hence, speed of fast train $= 50$ km/hr and speed of slow train $= 40$ km/hr.

**Ex. 13.** ***By walking at $\frac{3}{4}$ of his usual speed, a man reaches his office 20 minutes later than his usual time. Find the usual time taken by him to reach his office.*** **(S.S.C., 2010)**

**Sol.** New speed $= \frac{3}{4}$ of usual speed.

$\therefore$ New time taken $= \frac{4}{3}$ of usual time.

So, $\left(\frac{4}{3}\text{ of the usual time}\right) - (\text{usual time}) = 20$ min

$\Rightarrow \frac{1}{3}$ of the usual time $= 20$ min $\Rightarrow$ Usual time $= 60$ min $= 1$ hr.

**Ex. 14.** ***A person reaches his destination 40 minutes late if his speed is 3 km/hr, and reaches 30 minutes before time if his speed is 4 km/hr. Find the distance of his destination from his starting point.*** **(S.S.C., 2007)**

**Sol.** Let the required distance be $x$ km.

Difference in the times taken at two speeds = 70 min = $\frac{7}{6}$ hr.

$\therefore \quad \frac{x}{3}-\frac{x}{4}=\frac{7}{6} \Leftrightarrow 4x-3x=14 \Leftrightarrow x=14.$

Hence, the required distance is 14 km.

**Ex. 15.** ***A carriage driving in a fog passed a man who was walking at the rate of 3 kmph in the same direction. He could see the carriage for 4 minutes and it was visible to him upto a distance of 100 m. What was the speed of the carriage?***

**Sol.** Let the speed of the carriage be $x$ kmph. Then, relative speed = $(x - 3)$ kmph.

Distance covered in 4 min *i.e.*, $\frac{1}{15}$ hr at relative speed = $100\text{ m}=\frac{1}{10}\text{km}$.

$\therefore \quad (x-3)=\frac{1}{10}\times 15=\frac{3}{2} \Leftrightarrow x=3+\frac{3}{2}=\frac{9}{2}=4\frac{1}{2}.$

Hence, speed of the carriage = $4\frac{1}{2}$ kmph.

**Ex. 16.** ***A train after travelling 150 km meets with an accident and then proceeds at $\frac{3}{5}$ of its former speed and arrives at its destination 8 hours late. Had the accident occurred 360 km further, it would have reached the destination 4 hours late. What is the total distance travelled by the train?*** **(M.A.T., 2007)**

**Sol.** Let the original speed of the train be $x$ km/hr.

Then, $\frac{360}{\left(\frac{3}{5}x\right)}-\frac{360}{x}=4 \Leftrightarrow \frac{600}{x}-\frac{360}{x}=4 \Leftrightarrow \frac{240}{x}=4 \Leftrightarrow x=60.$

Let the total distance travelled by the train be $y$ km.

Then, $\left[\frac{150}{60}+\frac{(y-150)}{\left(\frac{3}{5}\times 60\right)}\right]-\frac{y}{60}=8 \Leftrightarrow \frac{5}{2}+\frac{(y-150)}{36}-\frac{y}{60}=8 \Leftrightarrow 2x = 1740 \Leftrightarrow x = 870.$

Hence, required distance = 870 km.

**Ex. 17.** ***A ship 77 km from the shore, springs a leak which admits $2\frac{1}{4}$ tonnes of water in $5\frac{1}{2}$ minutes. 92 tonnes of water would sink it. But the pumps can throw out 12 tonnes of water per hour. Find the average rate of sailing so that the ship may just reach the shore as it begins to sink.***

**Sol.** Quantity of water let in by the leak in 1 min

$$=\frac{\left(2\frac{1}{4}\right)}{\left(5\frac{1}{2}\right)}\text{tonnes}=\left(\frac{9}{4}\times\frac{2}{11}\right)\text{tonnes}=\frac{9}{22}\text{tonnes}.$$

Quantity of water thrown out by the pumps in 1 min = $\left(\frac{12}{60}\right)\text{tonnes}=\frac{1}{5}\text{tonnes}.$

Net quantity of water filled in the ship in 1 min = $\left(\frac{9}{22}-\frac{1}{5}\right)\text{tonnes}=\frac{23}{110}\text{tonnes}.$

$\frac{23}{110}$ tonnes water is filled in 1 min.

92 tonnes water is filled in $\left(\frac{110}{23}\times 92\right)\text{min}=440\text{ min}=\frac{22}{3}\text{hrs}.$

Hence, required speed $= \frac{77}{(22/3)}\text{ km/hr} = \left(77 \times \frac{3}{22}\right)\text{km/hr} = 10.5\text{ km/hr}.$

**Ex. 18.** ***Excluding the stoppages, the speed of a bus is 64 km/hr and including the stoppages, the speed of the bus is 48 km/hr. For how many minutes does the bus stop per hour?*** **(Bank P.O., 2009)**

**Sol.** Due to stoppage, the bus covers (64 – 48) = 16 km less per hour.

Time taken to cover 16 km $= \left(\frac{16}{64} \times 60\right)\text{min} = 15\text{ min}.$

Hence, stoppage time per hour = 15 min.

**Ex. 19.** ***An aeroplane started 30 minutes later than the scheduled time from a place 1500 km away from its destination. To reach the destination at the scheduled time the pilot had to increase the speed by 250 km/hr. What was the speed of the aeroplane per hour during the journey?*** **(P.C.S., 2006)**

**Sol.** Let the original speed of the aeroplane be $x$ km/hr.

$$\therefore \quad \frac{1500}{x} - \frac{1500}{(x+250)} = \frac{1}{2} \Leftrightarrow 3000(x+250) - 3000x = x(x+250)$$

$\Leftrightarrow x^2 + 250x - 750000 = 0$

$\Leftrightarrow x^2 + 1000x - 750x - 750000 = 0$

$\Leftrightarrow x(x + 1000) - 750(x + 1000) = 0$

$\Leftrightarrow (x + 1000)(x - 750) = 0 \Leftrightarrow x = 750.$

Hence, speed of the aeroplane during the journey = (750 + 250) km/hr = 1000 km/hr.

**Ex. 20.** ***Two boys A and B start at the same time to ride from Delhi to Meerut, 60 km away. A travels 4 km an hour slower than B. B reaches Meerut and at once turns back meeting A 12, km from Meerut. Find A's speed.*** **(M.B.A., 2011)**

**Sol.** Let $A$'s speed = $x$ km/hr. Then, $B$'s speed = $(x + 4)$ km/hr.

Clearly, time taken by $B$ to cover (60 + 12), i.e., 72 km = time taken by $A$ to cover (60 – 12) *i.e.*, 48 km

$$\therefore \quad \frac{72}{x+4} = \frac{48}{x} \Leftrightarrow 72x = 48x + 192 \Leftrightarrow 24x = 192 \Leftrightarrow x = 8.$$

Hence, $A$'s speed = 8 km/hr.

**Ex. 21.** ***A man covers a certain distance on a toy train. Had the train moved 4 km/hr faster, it would have taken 30 minutes less. If it moved 2 km/hr slower, it would have taken 20 minutes more. Find the distance.*** **(M.A.T., 2010)**

**Sol.** Let the distance be $x$ km and initial speed be $y$ km/hr.

Then, $\frac{x}{y} - \frac{x}{y+4} = \frac{30}{60} = \frac{1}{2} \Leftrightarrow \frac{4x}{y(y+4)} = 2 \Leftrightarrow 8x = y^2 + 4y \Leftrightarrow x = \frac{y^2+4y}{8}$ ...(*i*)

And, $\frac{x}{y-2} - \frac{x}{y} = \frac{20}{60} = \frac{1}{3} \Leftrightarrow \frac{2x}{y(y-2)} = \frac{1}{3} \Leftrightarrow 6x = y^2 - 2y \Leftrightarrow x = \frac{y^2-2y}{6}$ ...(*ii*)

From (*i*) and (*ii*), we have :

$$\frac{y^2+4y}{8} = \frac{y^2-2y}{6} \Leftrightarrow 6y^2 + 24y = 8y^2 - 16y \Leftrightarrow 2y^2 = 40y \Leftrightarrow 2y = 40 \Leftrightarrow y = 20.$$

Putting $y = 20$ in (*i*), we get : $x = 60$.

Hence, required distance = 60 km.

**Ex. 22.** ***A and B are two stations 390 km apart. A train starts from A at 10 a.m. and travels towards B at 65 kmph. Another train starts from B at 11 a.m. and travels towards A at 35 kmph. At what time do they meet?*** **(M.B.A., 2007)**

**Sol.** Suppose they meet $x$ hours after 10 a.m. Then,

(Distance moved by first in $x$ hrs) + [Distance moved by second in $(x - 1)$ hrs] = 390

$\therefore \quad 65x + 35(x-1) = 390 \Rightarrow 100x = 425 \Rightarrow x = 4\frac{1}{4}.$

So, they meet 4 hrs. 15 min. after 10 a.m., i.e., at 2.15 p.m.

**Ex. 23.** ***A goods train leaves a station at a certain time and at a fixed speed. After 6 hours, an express train leaves the same station and moves in the same direction at a uniform speed of 90 kmph. This train catches up the goods train in 4 hours. Find the speed of the goods train.***

**Sol.** Let the speed of the goods train be $x$ kmph.

Distance covered by goods train in 10 hours = Distance covered by express train in 4 hours

$\therefore \quad 10x = 4 \times 90$ or $x = 36$.

So, speed of goods train = 36 kmph.

**Ex. 24.** ***A thief is spotted by a policeman from a distance of 100 metres. When the policeman starts the chase, the thief also starts running. If the speed of the thief be 8 km/hr and that of the policeman 10 km/hr, how far the thief will have run before he is overtaken?***

**Sol.** Relative speed of the policeman = (10 – 8) km / hr = 2 km / hr.

Time taken by policeman to cover 100 m $= \left(\frac{100}{1000} \times \frac{1}{2}\right)$ hr $= \frac{1}{20}$ hr.

In $\frac{1}{20}$ hrs, the thief covers a distance of $\left(8 \times \frac{1}{20}\right)$ km $= \frac{2}{5}$ km = 400 m.

**Ex. 25.** ***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 speeds of the cars.***

**(S.S.C., 2006)**

**Sol.** Let their speeds be $x$ kmph and $y$ kmph respectively.

Then, $\frac{80}{x-y} = 8 \Rightarrow x - y = 10$ ...(*i*)

And, $\frac{80}{x+y} = 1\frac{1}{3} = \frac{4}{3} \Rightarrow x + y = 60$ ...(*ii*)

Adding (*i*) and (*ii*), we get : $2x = 70$ or $x = 35$.

Putting $x = 35$ in (*i*), we get : $y = 25$.

Hence, the speeds of the two cars are 35 kmph and 25 kmph.

**Ex. 26.** ***A man takes 6 hours 30 min in going by a cycle and coming back by scooter. He would have lost 2 hours 10 min by going on cycle both ways. How long would it take him to go by scooter both ways?***

**(M.A.T., 2006)**

**Sol.** Let the distance be $x$ km. Then,

(Time taken to cover $x$ km by cycle) + (Time taken to cover $x$ km by scooter) = 6 hr 30 min

$\Rightarrow$ (Time taken to cover $2x$ km by cycle) + (Time taken to cover $2x$ km by scooter) = 13 hrs

But, time taken to cover $2x$ km by cycle = 8 hr 40 min.

$\therefore$ Time taken to cover $2x$ km by scooter = 13 hrs – 8 hr 40 min = 4 hr 20 min.

Hence, required time = 4 hr 20 min.

**Ex. 27.** ***Sneha is picked up by her father by car from college everyday. The college gets over at 4 p.m. daily. One day, the college got over an hour earlier than usual. Sneha started walking towards her house. Her father, unaware of this fact, leaves his house as usual, meets his daughter on the way, picks her up and they reach the house 15 minutes earlier than usual. What is the ratio of the father's driving speed to Sneha's walking speed?***

**Sol.** Since 15 minutes are saved, it means that Sneha's father drives from the meeting point to the college and back to the meeting point in 15 min. i.e. he can drive from the meeting point to the college in $\left(\frac{15}{2}\right) = 7.5$ min.

But he reaches the college daily at 4 p.m. So Sneha and her father meet on the way at $3:52\frac{1}{2}$ p.m.

Thus, Sneha walked for 52.5 min and covered the same distance as covered by her father in 7.5 min.
Since speed varies inversely as time taken to cover a distance, we have:

$$\frac{\text{Father's driving speed}}{\text{Sneha's walking speed}} = \frac{52.5}{7.5} = \frac{7}{1}.$$

Hence, required ratio = 7 : 1.

## EXERCISE

## (OBJECTIVE TYPE QUESTIONS)

**Directions:** *Mark (✓) against the correct answer:*

**1.** A speed of 30.6 km/hr is the same as **(R.R.B., 2008)**
(*a*) 5.1 m/sec (*b*) 8.5 m/sec
(*c*) 110.16 m/sec (*d*) None of these

**2.** A man riding his bicycle covers 150 metres in 25 seconds. What is his speed in km per hour? **(S.S.C., 2005)**
(*a*) 20 (*b*) 21.6
(*c*) 23 (*d*) 25

**3.** A bus covers a distance of 2924 km in 43 hours. What is the speed of the bus? **(Bank Recruitment, 2008)**
(*a*) 60 km/hr
(*b*) 68 km/hr
(*c*) 72 km/hr
(*d*) Cannot be determined
(*e*) None of these

**4.** *A* is travelling at 72 km per hour on a highway while *B* is travelling at a speed of 25 metres per second. What is the difference in their speeds in metres per second? **(Campus Recruitment, 2010)**
(*a*) $1\frac{1}{2}$ m/sec (*b*) 2 m/sec
(*c*) 3 m/sec (*d*) 5 m/sec

**5.** A motorist travelled between two towns, which are 65 km apart, in 2 hours and 10 minutes. Find the speed in metres per minute. **(R.R.B., 2006)**
(*a*) 200 (*b*) 500
(*c*) 600 (*d*) 700

**6.** In track meets both 100 yards and 100 metres are used as distances. By how many metres is 100 metres longer than 100 yards?
(*a*) 0.0856 m (*b*) 0.856 m
(*c*) 1 m (*d*) 8.56 m

**7.** Which of the following trains is the fastest?
(*a*) 25 m/sec (*b*) 1500 m/min
(*c*) 90 km/hr (*d*) None of these

**8.** A person crosses a 600 m long street in 5 minutes. What is his speed in km per hour?
(*a*) 3.6 (*b*) 7.2
(*c*) 8.4 (*d*) 10

**9.** A car covers a distance of 432 km at the speed of 48 km/hr. In how many hours will the car cover this distance? **(Bank Recruitment, 2009)**
(*a*) 6 hours (*b*) 7 hours
(*c*) 9 hours (*d*) 12 hours
(*e*) None of these

**10.** A man covered a distance of 180 km in 4 hours on a bike. How much distance will be cover on a bicycle in 8 hours if he rides the bicycle at one-sixth the speed of the bike? **(Bank Recruitment, 2010)**
(*a*) 54 km (*b*) 60 km
(*c*) 72 km (*d*) 84 km
(*e*) None of these

**11.** The ratio of the speeds of a car, a train and a bus is 5 : 9 : 4. The average speed of the car, the bus and the train is 72 km/hr. What is the average speed of the car and the train together? **(Bank P.O., 2010)**
(*a*) 78 km/hr
(*b*) 82 km/hr
(*c*) 84 km/hr
(*d*) Cannot be determined
(*e*) None of these

**12.** Car A travels at the speed of 65 km/hr and reaches its destination in 8 hours. Car B travels at the speed of 70 km/hr and reaches its destination in 4 hours. What is the ratio of the distance covered by car A and car B respectively? **(Bank P.O., 2010)**
(*a*) 7 : 11 (*b*) 13 : 7
(*c*) 7 : 13 (*d*) 11 : 7
(*e*) None of these

**13.** The average speed of a bus is one-third of the speed of a train. The train covers 1125 km in 15 hours. How much distance will the bus cover in 36 minutes? **(Bank Recruitment, 2010)**
(*a*) 12 km (*b*) 18 km
(*c*) 21 km (*d*) 75 km
(*e*) None of these

**14.** The mileage of a motorbike *A* and a motorbike *B* is 42 km per litre and 52 km per litre respectively. Motorbike *A* covered 294 km and motorbike *B* covered 208 km. If the cost of 1 litre of petrol is ₹ 48, how much amount would be spent on petrol to cover the total distance by both the motor bikes together? **(Bank P.O., 2010)**

(*a*) ₹ 480
(*b*) ₹ 528
(*c*) ₹ 576
(*d*) Cannot be determined
(*e*) None of these

**15.** A train leaves Delhi at 4.10 P.M. and reaches Aligarh at 7.25 P.M. The average speed of the train is 40 km/hr. What is the distance from Delhi to Aligarh? **(R.R.B., 2006)**

(*a*) 120 km (*b*) 130 km
(*c*) 135 km (*d*) 140 km

**16.** *A* is 10 miles west of *B*. *C* is 30 miles north of *B*. *D* is 20 miles east of *C*. What is the distance from *A* to *D*? **(M.B.A., 2006)**

(*a*) 10 miles (*b*) 30 miles
(*c*) $10\sqrt{10}$ miles (*d*) $10\sqrt{13}$ miles
(*e*) $30\sqrt{2}$ miles

**17.** A plane flying north at 500 mph passes over a city at 12 noon. A plane flying east at the same altitude passes over the same city at 12 : 30 P.M. The plane is flying east at 400 mph. To the nearest hundred miles, how far apart are the two planes at 2 P.M.?

(*a*) 600 miles (*b*) 1000 miles
(*c*) 1100 miles (*d*) 1200 miles
(*e*) 1300 miles

**18.** A train travels at the speed of 65 km/hr and halts at 8 junctions for a certain time. It covers a distance of 1300 km in 1 day (24 hours). How long does the train stop at each junction, if it halts for the same period of time at all the junctions? **(Bank P.O., 2006)**

(*a*) 20 minutes (*b*) 30 minutes
(*c*) 40 minutes (*d*) 60 minutes
(*e*) None of these

**19.** Jane travelled $\frac{4}{7}$ as many miles on foot as by water and $\frac{2}{5}$ as many miles on horseback as by water. If she covered a total of 3036 miles, how many miles did she travel on foot? **(SNAP, 2005)**

(*a*) 1540 (*b*) 880
(*c*) 756 (*d*) 616

**20.** A star is $8.1 \times 10^{13}$ km away from the earth. Suppose light travels at the speed of $3.0 \times 10^5$ km per second. How long will it take the light from the star to reach the earth? **(R.R.B., 2005)**

(*a*) $7.5 \times 10^3$ hours (*b*) $7.5 \times 10^4$ hours
(*c*) $2.7 \times 10^{10}$ seconds (*d*) $2.7 \times 10^{11}$ seconds

**21.** Akash leaves home for school which is 12 km from his house. After the school, he goes to his club which is 7 km from his school. If his house, school and club all fall in a line, then what is the minimum distance he has to travel to get back home?

(*a*) 5 km (*b*) 7 km
(*c*) 12 km (*d*) 17 km
(*e*) 19 km

**22.** A train covers a distance of $193\frac{1}{3}$ km in $4\frac{1}{4}$ hours with one stoppage of 10 minutes, two of 5 minutes and one of 3 minutes on the way. The average speed of the train is

(*a*) 48 km/hr (*b*) 50 km/hr
(*c*) 55 km/hr (*d*) 60 km/hr

**23.** Deepa rides her bike at an average speed of 30 km/hr and reaches her destination in 6 hours. Hema covers the same distance in 4 hours. If Deepa increases her average speed by 10 km/hr and Hema increases her average speed by 5 km/hr, what would be the difference in their time taken to reach the destination?

(*a*) 40 minutes (*b*) 45 minutes
(*c*) 54 minutes (*d*) 1 hour
(*e*) None of these

**24.** A monkey climbing up a pole ascends 6 metres and slips 3 metres in alternate minutes. If the pole is 60 metres high, how long will it take the monkey to reach the top? **(Campus Recruitment, 2010)**

(*a*) 31 min (*b*) 33 min
(*c*) 35 min (*d*) 37 min

**25.** An aeroplane flies twice as fast as a train which covers 60 miles in 80 minutes. What distance will the aeroplane cover in 20 minutes? **(E.S.I.C., 2006)**

(*a*) 30 miles (*b*) 35 miles
(*c*) 40 miles (*d*) 50 miles

**26.** A boy is running at a speed of $p$ kmph to cover a distance of 1 km. But, due to the slippery ground, his speed is reduced by $q$ kmph ($p > q$). If he takes $r$ hours to cover the distance, then **(M.B.A., 2006)**

(*a*) $\frac{1}{r} = p - q$ (*b*) $r = p - q$
(*c*) $\frac{1}{r} = p + q$ (*d*) $r = p + q$

**27.** 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? **(A.A.O. Exam, 2010)**

(*a*) 40 days (*b*) 50 days

(*c*) 80 days (*d*) 100 days

**28.** A car is driven at the speed of 100 km/hr and stops for 10 minutes at the end of every 150 km. To cover a distance of 1000 km, it will take

(*a*) 9 hours (*b*) 10 hours

(*c*) 11 hours (*d*) 12 hours

**29.** A man takes 50 minutes to cover a certain distance at a speed of 6 km/hr. If he walks with a speed of 10 km/hr, he covers the same distance in

(*a*) 10 minutes (*b*) 20 minutes

(*c*) 30 minutes (*d*) 40 minutes

**30.** 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 speeds is

(*a*) 3 : 4 (*b*) 4 : 3

(*c*) 3 : 5 (*d*) 50 : 3

**31.** The ratio between the speeds of two trains is 7 : 8. If the second train runs 400 kms in 4 hours, then the speed of the first train is

(*a*) 70 km/hr (*b*) 75 km/hr

(*c*) 84 km/hr (*d*) 87.5 km/hr

**32.** A train travels at an average of 50 miles per hour for $2\frac{1}{2}$ hours and then travels at a speed of 70 miles per hour for $1\frac{1}{2}$ hours. How far did the train travel in the entire 4 hours?

(*a*) 120 miles (*b*) 150 miles

(*c*) 200 miles (*d*) 230 miles

**33.** A man in a train notices that he can count 21 telephone posts in one minute. If they are known to be 50 metres apart, then at what speed is the train travelling?

(*a*) 55 km/hr (*b*) 57 km/hr

(*c*) 60 km/hr (*d*) 63 km/hr

**34.** Sound is said to travel in air at about 1100 feet per second. A man hears the axe striking the tree, $\frac{11}{5}$ seconds after he sees it strike the tree. How far is the man from the wood chopper? **(M.B.A., 2002)**

(*a*) 2197 ft (*b*) 2420 ft

(*c*) 2500 ft (*d*) 2629 ft

**35.** An express train travelled at an average speed of 100 km/hr, stopping for 3 minutes after every 75 km. How long did it take to reach its destination 600 km from the starting point? **(M.A.T., 2003)**

(*a*) 6 hrs 21 min (*b*) 6 hrs 24 min

(*c*) 6 hrs 27 min (*d*) 6 hrs 30 min

**36.** 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 :

(*a*) 1 : 2 (*b*) 2 : 1

(*c*) 1 : 4 (*d*) 4 : 1

**37.** A motor car starts with the speed of 70 km/hr with its speed increasing every two hours by 10 kmph. In how many hours will it cover 345 kms?

(*a*) $2\frac{1}{4}$ hrs

(*b*) 4 hrs 5 min

(*c*) $4\frac{1}{2}$ hrs

(*d*) Cannot be determined

(*e*) None of these

**38.** A bus moving at a speed of 24 m/s begins to slow at a rate of 3 m/s each second. How far does it go before stopping? **(N.D.A., 2007)**

(*a*) 48 m (*b*) 60 m

(*c*) 72 m (*d*) 96 m

**39.** A boy goes three equal distances, each of length $x$ km, with a speed of $y$ km/hr, $\frac{3y}{5}$ km/hr and $\frac{2y}{5}$ km/hr respectively. If the total time taken is 1 hour, then $x : y$ is equal to

(*a*) 6 : 13 (*b*) 6 : 23

(*c*) 6 : 31 (*d*) 6 : 37

**40.** A long distance runner runs 9 laps of a 400 metres track everyday. His timings (in min) for four consecutive days are 88, 96, 89 and 87 respectively. On an average, how many metres/minute does the runner cover? **(M.A.T., 2008)**

(*a*) 17.78 (*b*) 40

(*c*) 90 (*d*) None of these

**41.** An express train travelled at an average speed of 100 kmph, stopping for 3 minutes after 75 km. A local train travelled at a speed of 50 kmph, stopping for 1 minute after every 25 km. If the trains began travelling at the same time, how many kilometres did the local train travel in the time it took the express train to travel 600 km? **(M.A.T., 2005)**

(*a*) 287.5 km (*b*) 307.5 km

(*c*) 325 km (*d*) 396 km

**42.** A car starts running with the initial speed of 40 kmph, with its speed increasing every hour by 5 kmph. How many hours will it take to cover a distance of 385 km? **(M.A.T., 2007)**

(*a*) 7 hours (*b*) $8\frac{1}{2}$ hours

(*c*) 9 hours (*d*) $9\frac{1}{2}$ hours

**43.** The speed of a car increases by 2 kms after every one hour. If the distance travelled in the first one hour was 35 kms, what was the total distance travelled in 12 hours?

(*a*) 456 kms (*b*) 482 kms

(*c*) 552 kms (*d*) 556 kms

(*e*) None of these

**44.** A bus started its journey from Ramgarh and reached Devgarh in 44 minutes at its average speed of 50 km/hr. If the average speed of the bus is increased by 5 km/hr, how much time will it take to cover the same distance? **(Bank P.O., 2009)**

(*a*) 31 min (*b*) 36 min

(*c*) 38 min (*d*) 40 min

(*e*) 49 min

**45.** The speeds of three cars are in the ratio 2 : 3 : 4. The ratio of the times taken by these cars to travel the same distance is **(S.S.C., 2005)**

(*a*) 2 : 3 : 4 (*b*) 4 : 3 : 2

(*c*) 4 : 3 : 6 (*d*) 6 : 4 : 3

**46.** The speeds 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? **(S.S.C. , 2007)**

(*a*) $1\frac{1}{3}$ hours (*b*) $1\frac{2}{3}$ hours

(*c*) 2 hours (*d*) $2\frac{2}{3}$ hours

**47.** The speed of electric train is 25% more than that of steam engine train. What is the time taken by an electric train to cover a distance which a steam engine takes 4 hours 25 minutes to cover? **(P.C.S., 2004)**

(*a*) $3\frac{1}{10}$ hr (*b*) $3\frac{11}{15}$ hr

(*c*) $3\frac{11}{12}$ hr (*d*) $3\frac{8}{15}$ hr

**48.** *A* takes 2 hours more than *B* to walk *d* km, but if *A* doubles his speed, then he can make it in 1 hour less than *B*. How much time does *B* require for walking *d* km? **(R.R.B., 2005)**

(*a*) $\frac{d}{2}$ hours (*b*) 3 hours

(*c*) 4 hours (*d*) $\frac{2d}{3}$ hours

**49.** 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

(*a*) 10 min (*b*) 11 min 20 sec

(*c*) 13 min (*d*) 13 min 20 sec

**50.** Anna left for city *A* from city *B* at 5.20 a.m. She travelled at the speed of 80 km/hr for 2 hours 15 minutes. After that the speed was reduced to 60 km/hr. If the distance between two cities is 350 kms, at what time did Anna reach city *A*?

(*a*) 9.20 a.m. (*b*) 9.25 a.m.

(*c*) 9.35 a.m. (*d*) 10.05 a.m.

(*e*) None of these

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

(*a*) 300 kmph (*b*) 360 kmph

(*c*) 600 kmph (*d*) 720 kmph

**52.** A salesman travels a distance of 50 km in 2 hours and 30 minutes. How much faster, in kilometres per hour, on an average, must he travel to make such a trip in $\frac{5}{6}$ hour less time? **(Hotel Management, 2002)**

(*a*) 10 (*b*) 20

(*c*) 30 (*d*) None of these

**53.** A person has to cover a distance of 6 km in 45 minutes. If he covers one-half of the distance in two-thirds of the total time; to cover the remaining distance in the remaining time, his speed (in km/hr) must be

(*a*) 6 (*b*) 8

(*c*) 12 (*d*) 15

**54.** A man performs $\frac{3}{5}$ of the total journey by rail, $\frac{7}{20}$ by bus and the remaining 6.5 km on foot. His total journey is

(*a*) 65 km (*b*) 100 km

(*c*) 120 km (*d*) 130 km

**55.** A person wishes to reach his destination 90 km away in 3 hours but for the first half of the journey his speed was 20 km/hr. His average speed for the rest of the journey should be **(P.C.S., 2008)**

(*a*) 40 km/hr (*b*) 0.75 km/min

(*c*) 1 km/min (*d*) None of these

**56.** A train is scheduled to cover the distance between two stations 46 km apart in one hour. If it travels 25 km at a speed of 40 km/hr, find the speed for the remaining journey to complete it in the scheduled time. **(M.A.T., 2009)**

(*a*) 36 km/hr (*b*) 46 km/hr
(*c*) 56 km/hr (*d*) 66 km/hr

**57.** How long must a driver take to drive the final 70 miles of a trip if he wants to average 50 miles an hour for the entire trip and during the first part of the trip he drove 50 miles in $1\frac{1}{2}$ hours? **(M.B.A., 2006)**

(*a*) 54 min (*b*) 1 hour
(*c*) 66 min (*d*) 70 min

**58.** A can complete a journey in 10 hours. He travels first half of the journey at the rate of 21 km/hr and second half at the rate of 24 km/hr. Find the total journey in km.

(*a*) 220 km (*b*) 224 km
(*c*) 230 km (*d*) 234 km

**59.** A motorcyclist completes a certain journey in 5 hours. He covers one-third distance at 60 km/hr and the rest at 80 km/hr. The length of the journey is

(*a*) 180 km (*b*) 240 km
(*c*) 300 km (*d*) 360 km

**60.** A person travels equal distances with speeds of 3 km/hr, 4 km/hr and 5 km/hr and takes a total time of 47 minutes. The total distance (in km) is

(*a*) 2 (*b*) 3
(*c*) 4 (*d*) 5

**61.** A person travels 285 km in 6 hours in two stages. In the first part of the journey, he travels by bus at the speed of 40 km per hour. In the second part of the journey, he travels by train at the speed of 55 km per hour. How much distance did he travel by train? **(M.A.T., 2007)**

(*a*) 145 km (*b*) 165 km
(*c*) 185 km (*d*) 205 km

**62.** *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

(*a*) 3 km/hr (*b*) 4 km/hr
(*c*) 5 km/hr (*d*) 7 km/hr

**63.** A person travels from *P* to *Q* at a speed of 40 kmph and returns by increasing his speed by 50%. What is his average speed for both the trips? **(M.B.A., 2003)**

(*a*) 36 kmph (*b*) 45 kmph
(*c*) 48 kmph (*d*) 50 kmph

**64.** An aeroplane flies from place A to place B at the speed of 500 km/hr. On the return journey, its speed is 700 km/hr. The average speed of the aeroplane for the entire journey is **(P.C.S. 2009)**

(*a*) $566\frac{2}{3}$ km/hr (*b*) $583\frac{1}{3}$ km/hr
(*c*) $583\frac{2}{3}$ km/hr (*d*) 600 km/hr

**65.** A car covers a distance from Town I to Town II at the speed of 56 km/hr and from Town II to Town I at the speed of 53 km/hr. What is the average speed of the car? **(Bank Recruitment, 2007)**

(*a*) 53.5 km/hr (*b*) 54 km/hr
(*c*) 55 km/hr (*d*) 55.5 km/hr
(*e*) None of these

**66.** A man can walk uphill at the rate of $2\frac{1}{2}$ km/hr and downhill at the rate of $3\frac{1}{4}$ km/hr. If the total time required to walk a certain distance up the hill and return to the starting point was 4 hr 36 min, then what was the distance walked up the hill by the man? **(C.D.S., 2005)**

(*a*) 4 km (*b*) $4\frac{1}{2}$ km
(*c*) $5\frac{1}{2}$ km (*d*) $6\frac{1}{2}$ km

**67.** A man drives 150 km to the seashore in 3 hours 20 min. He returns from the shore to the starting point in 4 hours 10 min. Let *r* be the average rate for the entire trip. Then the average rate for the trip going exceeds *r*, in kilometres per hour, by **(M.B.A., 2010)**

(*a*) 2 (*b*) 4
(*c*) $4\frac{1}{2}$ (*d*) 5

**68.** The average speed of a train in the onward journey is 25% more than that in 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

(*a*) 45 km/hr (*b*) 47.5 km/hr
(*c*) 52 km/hr (*d*) 56.25 km/hr

**69.** I started on my bicycle at 7 a.m. to reach a certain place. After going a certain distance, my bicycle went out of order. Consequently, I rested for 35 minutes and came back to my house walking all the way. I reached my house at 1 p.m. If my cycling speed is 10 kmph and my walking speed is 1 kmph, then on my bicycle I covered a distance of

(*a*) $4\frac{61}{66}$ km (*b*) $13\frac{4}{9}$ km
(*c*) $14\frac{3}{8}$ km (*d*) $15\frac{10}{21}$ km

**70.** *A*, *B* and *C* are on a trip by a car. *A* drives during the first hour at an average speed of 50 km/hr. *B* drives during the next 2 hours at an average speed of 48 km/hr. *C* drives for the next 3 hours at an average speed of 52 km/hr. They reached their destination after exactly 6 hours. Their mean speed was :

(*a*) 50 km/hr (*b*) $50\frac{1}{3}$ km/hr

(*c*) $51\frac{1}{3}$ km/hr (*d*) 52 km/hr

**71.** A car covers the first 39 kms of its journey in 45 minutes and covers the remaining 25 km in 35 minutes. What is the average speed of the car? **(Bank P.O., 2007)**

(*a*) 40 km/hr (*b*) 48 km/hr

(*c*) 49 km/hr (*d*) 64 km/hr

(*e*) None of these

**72.** A train travels at a speed of 30 km/hr for 12 minutes and at a speed of 45 km/hr for the next 8 minutes. The average speed of the train for this journey is **(S.S.C., 2005)**

(*a*) 30 km/hr (*b*) 36 km/hr

(*c*) 37.5 km/hr (*d*) 48 km/hr

**73.** A man on tour travels 160 km by car at 64 km/hr and another 160 km by bus at 80 km/hr. The average speed for the whole journey is **(L.I.C.A.D.O., 2008)**

(*a*) 35.55 km/hr (*b*) 36 km/hr

(*c*) 71.11 km/hr (*d*) 71 km/hr

**74.** A boy rides his bicycle 10 km 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 **(M.B.A., 2008)**

(*a*) 10.4 km/hr (*b*) 10.8 km/hr

(*c*) 11 km/hr (*d*) 12.2 km/hr

**75.** A man travels 600 km by train at 80 km/hr, 800 km by ship at 40 km/hr, 500 km by aeroplane at 400 km/hr and 100 km by car at 50 km/hr. What is the average speed for the entire distance? **(Teachers' Exam., 2009)**

(*a*) 60 km/hr (*b*) $60\frac{5}{123}$ km/hr

(*c*) 62 km/hr (*d*) $65\frac{5}{123}$ km/hr

**76.** A cyclist rides 24 km at 16 kmph and further 36 km at 15 kmph. Find his average speed for the journey. **(R.R.B., 2008)**

(*a*) 15.38 kmph (*b*) 15.5 kmph

(*c*) 16 kmph (*d*) None of these

**77.** A person travels three equal distances at a speed of $x$ km/hr, $y$ km/hr and $z$ km/hr respectively. What is the average speed for the whole journey? **(S.C.C., 2007)**

(*a*) $\frac{xyz}{3(xy+yz+zx)}$ (*b*) $\frac{xyz}{(xy+yz+zx)}$

(*c*) $\frac{(xy+yz+zx)}{xyz}$ (*d*) $\frac{3xyz}{(xy+yz+zx)}$

**78.** A car travels the first one-third of a certain distance with a speed of 10 km/hr, the next one-third distance with a speed of 20 km/hr, and the last one-third distance with a speed of 60 km/hr. The average speed of the car for the whole journey is

(*a*) 18 km/hr (*b*) 24 km/hr

(*c*) 30 km/hr (*d*) 36 km/hr

**79.** A motorist covers a distance of 39 km in 45 minutes by moving at a speed of $x$ kmph for the first 15 minutes, then moving at double the speed for the next 20 minutes and then again moving at his original speed for the rest of the journey. Then, $x$ is equal to :

(*a*) 31.2 (*b*) 36

(*c*) 40 (*d*) 52

**80.** Mary jogs 9 km at a speed of 6 km per hour. At what speed would she need to jog during the next 1.5 hours to have an average of 9 km per hour for the entire jogging session?

(*a*) 9 kmph (*b*) 10 kmph

(*c*) 12 kmph (*d*) 14 kmph

**81.** A family, planning a weekend trip, decides to spend not more than a total of 8 hours driving. By leaving early in the morning, they can average 40 miles per hour on the way to their destination. Due to the heavy Sunday traffic, they average only 30 miles per hour on the return trip. What is the farthest distance from home they can plan to go? **(Campus Recruitment, 2010)**

(*a*) 120 miles or less

(*b*) Between 120 and 140 miles

(*c*) 140 miles

(*d*) Between 140 and 160 miles

(*e*) 160 miles or more

**82.** A car travelling with $\frac{5}{7}$ of its actual speed covers 42 km in 1 hr 40 min 48 sec. Find the actual speed of the car. **(S.S.C., 2005)**

(*a*) $17\frac{6}{7}$ km/hr (*b*) 25 km/hr

(*c*) 30 km/hr (*d*) 35 km/hr

**83.** 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 have run at its own speed?

(*a*) 7 hours (*b*) 8 hours

(*c*) 14 hours (*d*) 16 hours

**84.** 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. **(S.S.C., 2002)**

(*a*) 4 km/hr (*b*) 5 km/hr

(c) $5\frac{1}{2}$ km/hr (*d*) 6 km/hr

**85.** Walking $\frac{6}{7}$ th of his usual speed, a man is 12 minutes too late. The usual time taken by him to cover that distance is

(*a*) 1 hour (*b*) 1 hr 12 min

(*c*) 1 hr 15 min (*d*) 1 hr 20 min

**86.** The average speed of a train is 20% less on the return journey than on the onward journey. The train halts for half an hour at the destination station before starting on the return journey. If the total time taken for the to and fro journey is 23 hours, covering a distance of 1000 km, the speed of the train on the return journey is **(M.A.T., 2010)**

(*a*) 40 km/hr (*b*) 50 km/hr

(*c*) 55 km/hr (*d*) 60 km/hr

**87.** A train increases its normal speed by 12.5% and reaches its destination 20 minutes earlier. What is the actual time taken by the train in the journey? **(P.C.S., 2008)**

(*a*) 145 min (*b*) 160 min

(*c*) 180 min (*d*) 220 min

**88.** 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? **(S.S.C., 2007)**

(*a*) $1\frac{1}{4}$ km (*b*) $1\frac{3}{4}$ km

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

**89.** With an average speed of 50 km/hr, a train reaches its destination in time. If it goes with an average speed of 40 km/hr, it is late by 24 minutes. The total journey is **(N.M.A.T., 2008)**

(*a*) 30 km (*b*) 40 km

(*c*) 70 km (*d*) 80 km

**90.** If a train runs at 40 kmph, it reaches its destination late by 11 minutes but if it runs at 50 kmph, it is late by 5 minutes only. The correct time for the train to complete its journey is

(*a*) 13 min (*b*) 15 min

(*c*) 19 min (*d*) 21 min

**91.** Robert is travelling on his cycle and has calculated to reach point A at 2 P.M. if he travels at 10 kmph; he will reach there at 12 noon if he travels at 15 kmph. At what speed must he travel to reach A at 1 P.M.? **(D.M.R.C., 2003)**

(*a*) 8 kmph (*b*) 11 kmph

(*c*) 12 kmph (*d*) 14 kmph

**92.** Ravi walks to and fro to a shopping mall. He spends 30 minutes shopping. If he walks at a speed of 10 km an hour, he returns home at 19.00 hours. If he walks at 15 km an hour, he returns home at 18.30 hours. How far must he walk in order to return home at 18.15 hours? **(M.B.A., 2009)**

(*a*) 17 km/hr (*b*) 17.5 km/hr

(*c*) 18 km/hr (*d*) 19 km/hr

(*e*) None of these

**93.** A person travels 285 km in 6 hours in two stages. In the first part of the journey, he travels by bus at the speed of 40 km/hr. In the second part of the journey, he travels by train at the speed of 55 km/hr. How much distance does he travel by train? **(M.A.T., 2007)**

(*a*) 145 km (*b*) 165 km

(*c*) 185 km (*d*) 205 km

**94.** A man covered a certain distance at some speed. Had he moved 3 kmph faster, he would have taken 40 minutes less. If he had moved 2 kmph slower, he would have taken 40 minutes more. The distance (in km) is

(*a*) 35 (*b*) $36\frac{2}{3}$

(*c*) $37\frac{1}{2}$ (*d*) 40

**95.** A train covered a certain distance at a uniform speed. If the train had been 6 km/hr faster, then it would have taken 4 hours less than the scheduled time. And, if the train were slower by 6 km/hr, then the train would have taken 6 hours more than the scheduled time. The length of the journey is **(M.A.T., 2006)**

(*a*) 700 km (*b*) 720 km

(*c*) 740 km (*d*) 760 km

**96.** A car travels from *P* to *Q* at a constant speed. If its speed were increased by 10 km/hr, it would have 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/hr. What is the distance between the two cities?

(*a*) 420 km (*b*) 540 km

(*c*) 600 km (*d*) 650 km

**97.** A train can travel 50% faster than a car. Both start from point *A* at the same time and reach point *B* 75 kms away from *A* at the same time. On the way, however, the train lost about 12.5 minutes while stopping at the stations. The speed of the car is **(M.A.T., 2003)**

(*a*) 100 kmph (*b*) 110 kmph
(*c*) 120 kmph (*d*) 130 kmph

**98.** Excluding stoppages, the speed of a bus is 54 kmph and including stoppages, it is 45 kmph. For how many minutes does the bus stop per hour?

(*a*) 9 (*b*) 10
(*c*) 12 (*d*) 20

**99.** A flight of Jet Airways from Delhi to Mumbai has an average speed of 700 km/hr without any stoppage, whereas a flight of Kingfisher from Delhi to Mumbai has an average speed of 560 km/hr with stoppage at Baroda. What is the average stoppage time per hour of Kingfisher flight if both the planes fly at the same speed? **(M.B.A., 2009)**

(*a*) 8 min (*b*) 12 min
(*c*) 16 min (*d*) 24 min

**100.** A bus covered a certain distance from village *A* to village *B* at the speed of 60 km/hr. However on its return journey it got stuck in traffic and covered the same distance at the speed of 40 km/hr and took 2 hours more to reach its destination. What is the distance covered between villages *A* and *B*? **(Bank P.O., 2010)**

(*a*) 200 km (*b*) 240 km
(*c*) 260 km (*d*) Cannot be determined
(*e*) None of these

**101.** A train covers a distance between two stations *A* and *B* in 45 minutes. If the speed of the train is reduced by 5 km/hr, then it covers the distance in 48 minutes. The distance between the stations *A* and *B* is **(P.C.S., 2009)**

(*a*) 55 km (*b*) 60 km
(*c*) 64 km (*d*) 80 km

**102.** A train travels a distance of 600 km at a constant speed. If the speed of the train is increased by 5 km/hr, the journey would take 4 hours less. Find the speed of the train. **(M.A.T., 2010)**

(*a*) 25 km/hr (*b*) 50 km/hr
(*c*) 100 km/hr (*d*) None of these

**103.** A car takes 15 minutes less to cover a distance of 75 km, if it increases its speed by 10 km/hr from its usual speed. How much time would it take to cover a distance of 300 km using this speed? **(M.A.T., 2010)**

(*a*) 5 hours (*b*) $5\frac{1}{2}$ hours
(*c*) 6 hours (*d*) $6\frac{1}{2}$ hours

**104.** With a uniform speed a car covers the distance in 8 hours. Had the speed been increased by 4 km/hr, the same distance could have been covered in $7\frac{1}{2}$ hours. What is the distance covered?

(*a*) 420 km
(*b*) 480 km
(*c*) 640 km
(*d*) Cannot be determined
(*e*) None of these

**105.** Two men start together to walk to a certain destination, one at 3 kmph and another at 3.75 kmph. The latter arrives half an hour before the former. The distance is

(*a*) 6 km (*b*) 7.5 km
(*c*) 8 km (*d*) 9.5 km

**106.** If a person walks at 14 km/hr instead of 10 km/hr, he would have walked 20 km more. The actual distance travelled by him is

(*a*) 50 km (*b*) 56 km
(*c*) 70 km (*d*) 80 km

**107.** In covering a certain distance, the speeds 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

(*a*) 1 hour (*b*) $1\frac{1}{2}$ hours
(*c*) 2 hours (*d*) $2\frac{1}{2}$ hours

**108.** 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 is

(*a*) 5 kmph (*b*) 6 kmph
(*c*) 6.25 kmph (*d*) 7.5 kmph

**109.** Three persons are walking from a place A to another place B. Their speeds are in the ratio of 4 : 3 : 5. The time ratio to reach B by these persons will be

(*a*) 4 : 3 : 5 (*b*) 5 : 3 : 4
(*c*) 15 : 9 : 20 (*d*) 15 : 20 : 12

**110.** A journey of 192 km between two cities takes 2 hours less by a fast train than by a slow train. If the average speed of the slow train is 16 km/hr less than that of the fast train, then the average speed of the fast train is

(*a*) 32 km/hr (*b*) 36 km/hr
(*c*) 48 km/hr (*d*) 64 km/hr

**111.** In a flight of 6000 km, an aircraft was slowed down due to bad weather. The average speed for the trip was reduced by 400 kmph and the time of flight increased by 30 minutes. The original planned duration of the flight was **(M.A.T., 2006)**

(*a*) $2\frac{1}{2}$ hours (*b*) $3\frac{1}{3}$ hours

(*c*) $4\frac{1}{3}$ hours (*d*) $5\frac{1}{3}$ hours

**112.** An aeroplane first flew with a speed of 440 kmph and covered a certain distance. It still had to cover 770 km less than what it had already covered, but it flew with a speed of 660 kmph. The average speed for the entire flight was 500 kmph. Find the total distance covered. **(M.A.T., 2005)**

(*a*) 1375 km (*b*) 2750 km

(*c*) 3250 km (*d*) 4400 km

**113.** Two boys *A* and *B* start at the same time to ride from Delhi to Meerut, 60 km away. A travels 4 km an hour slower than *B*, *B* reaches Meerut and at once turns back meeting A, 12 km from Meerut. A's rate was **(M.B.A., 2011)**

(*a*) 4 km/hr (*b*) 8 km/hr

(*c*) 12 km/hr (*d*) 16 km/hr

**114.** A cyclist drove one kilometre, with the wind in his back, in 3 minutes and drove the same way back, against the wind, in 4 minutes. If we assume that the cyclist always puts constant force on the pedals, how much time would it take him to drive 1 km without wind? **(SNAP, 2008)**

(*a*) $2\frac{1}{3}$ min (*b*) $2\frac{3}{7}$ min

(*c*) $3\frac{3}{7}$ min (*d*) $3\frac{7}{12}$ min

**115.** Ramesh travels 760 km to his home, partly by train and partly by car. He takes 8 hours, if he travels 160 km by train and the rest by car. He takes 12 minutes more, if he travels 240 km by train and the rest by car. What are the speeds of the car and the train respectively? **(M.A.T., 2006)**

(*a*) 90 km/hr, 60 km/hr (*b*) 100 km/hr, 80 km/hr

(*c*) 80 km/hr, 70 km/hr (*d*) 100 km/hr, 90 km/hr

**116.** Two sea trawlers left a sea port simultaneously in two mutually perpendicular directions. Half an hour later, the shortest distance between them was 17 km, and another 15 minutes later, one sea trawler was 10.5 km farther from the origin than the other. Find the speed of each sea trawler. **(SNAP, 2008)**

(*a*) 16 km/hr, 30 km/hr (*b*) 18 km/hr, 24 km/hr

(*c*) 20 km/hr, 22 km/hr (*d*) 18 km/hr, 36 km/hr

**117.** *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 **(C.P.O., 2007; R.R.B., 2006)**

(*a*) 12 minutes (*b*) 16 minutes

(*c*) 18 minutes (*d*) 24 minutes

**118.** A ship, 40 kilometres from the shore, springs a leak which admits $3\frac{3}{4}$ tonnes of water in 12 minutes. 60 tonnes would suffice to sink her, but the ship's pumps can throw out 12 tonnes of water in one hour. Find the average rate of sailing, so that she may reach the shore just as she begins to sink. **(M.A.T. 2006, 2008)**

(*a*) $1\frac{1}{2}$ km per hour (*b*) $2\frac{1}{2}$ km per hour

(*c*) $3\frac{1}{2}$ km per hour (*d*) $4\frac{1}{2}$ km per hour

**119.** Amit travelled back to home in a car, after visiting his friend in a distant village. When he started at his friend's house the car had exactly 18 litres of petrol in it. He travelled along at a steady 40 kilometres per hour and managed a 10 kilometres per litre of petrol. As the car was old, the fuel tank lost fuel at the rate of half a litre per hour. Amit was lucky as his car stopped just in front of his home because it had run out of fuel and he only just made it. How far was it from his friend's home to Amit's home? **(I.I.F.T., 2005)**

(*a*) 150 km (*b*) 170 km

(*c*) 180 km (*d*) None of these

**120.** Two men starting from the same place walk at the rate of 5 kmph and 5.5 kmph respectively. What time will they take to be 8.5 km apart, if they walk in the same direction?

(*a*) 4 hrs 15 min (*b*) 8 hrs 30 min

(*c*) 16 hrs (*d*) 17 hrs

**121.** A walks around a circular field at the rate of one round per hour while B runs around it at the rate of six rounds per hour. They start in the same direction from the same point at 7.30 a.m. They shall first cross each other at :

(*a*) 7.42 a.m. (*b*) 7.48 a.m.

(*c*) 8.10 a.m. (*d*) 8.30 a.m.

**122.** *A* and *B* start from 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.? **(Civil Services, 2004)**

(*a*) Not even once (*b*) Once

(*c*) Twice (*d*) Thrice

**123.** There are 8 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? (Civil Services, 2006)

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

**124.** *A* walks at 4 kmph and 4 hours after his start, *B* cycles after him at 10 kmph. How far from the start does *B* catch up with *A*?

(*a*) 16.7 km (*b*) 18.6 km
(*c*) 21.5 km (*d*) 26.7 km

**125.** Paschim Express left Delhi for Mumbai at 14.30 hrs travelling at a speed of 60 kmph and August Kranti Express left Delhi for Mumbai on the same day at 16.30 hrs travelling at a speed of 80 kmph. How far away from Delhi will the two trains meet (excluding stoppages)? (M.B.A., 2004)

(*a*) 120 km (*b*) 360 km
(*c*) 480 km (*d*) 500 km

**126.** A thief is noticed by a policeman from a distance of 200 m. The thief starts running and the policeman chases him. The thief and the policeman run at the rate of 10 km and 11 km per hour respectively. What is the distance between them after 6 minutes?

(*a*) 100 m (*b*) 150 m
(*c*) 190 m (*d*) 200 m

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

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

**128.** A thief running at 8 km/hr is chased by a policeman whose speed is 10 km/hr. If the thief is 100 metres ahead of the policeman, then the time required for the policeman to catch the thief will be

(*a*) 2 minutes (*b*) 3 minutes
(*c*) 6 minutes (*d*) 10 minutes

**129.** A thief steals a car at 2.30 p.m. and drives it at 60 kmph. The theft is discovered at 3 p.m. and the owner sets off in another car at 75 kmph. When will he overtake the thief?

(*a*) 4.30 p.m. (*b*) 4.45 p.m.
(*c*) 5 p.m. (*d*) 5.15 p.m.

**130.** 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? (Civil Services, 2005)

(*a*) 600 m (*b*) 750 m
(*c*) 980 m (*d*) 1200 m

**131.** A thief, pursued by a policeman, was 100 m ahead at the start. If the ratio of the speed of the policeman to that of the thief was 5 : 4, then how far could the thief go before he was caught by the policeman? (S.S.C., 2005)

(*a*) 80 m (*b*) 200 m
(*c*) 400 m (*d*) 600 m

**132.** 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? (C.P.O., 2005)

(*a*) 16.7 km (*b*) 18.6 km
(*c*) 21.5 km (*d*) 26.7 km

**133.** A passenger train runs at the rate of 80 kmph. It starts from the station, 6 hours after a goods train leaves the station. The passenger train overtakes the goods train after 4 hours. The speed of goods train is (R.R.B., 2008)

(*a*) 32 km/hr (*b*) 45 km/hr
(*c*) 50 km/hr (*d*) 64 km/hr

**134.** An athlete claimed that his timing for a 100 m dash should be corrected because the starting signal was given by a gun fired from a point 10 m away from him and the timekeeper was standing close to the gun. The error due to this could be (in seconds)

[Given: speed of sound = 300 m/s]

(*a*) 0.03 (*b*) 0.1
(*c*) 0.5 (*d*) 0.7

**135.** Sound waves travel at 300 m/s. Sound produced at a point is heard by a person after 5 seconds while the same sound is heard by another person after 6 seconds. What could be the maximum and minimum distance between the two persons?

(*a*) 1.8 km, 0.15 km (*b*) 2.2 km, 0.20 km
(*c*) 2.8 km, 0.25 km (*d*) 3.3 km, 0.3 km

**136.** Two guns were fired from the same place at an interval of 8 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 the place at what speed (in km/hr)? (S.S.C., 2007)

(*a*) 24 (*b*) 27
(*c*) 30 (*d*) 36

**137.** Two cyclists start from the same place in opposite directions. One goes towards north at 18 kmph and the other goes towards south at 20 kmph. What time will they take to be 47.5 km apart?

(*a*) $1\frac{1}{4}$ hrs (*b*) $2\frac{1}{4}$ hrs
(*c*) 2 hrs. 23 min. (*d*) $2\frac{1}{2}$ hrs

**138.** $A$ and $B$ are two stations 10 km apart. $A$ man, $P$ starts from $A$ and travels towards $B$ at the rate of 3 km/hr, whereas another man $Q$ starts from $B$ and travels to wards A at the rate of 2 km/hr. When and where do they meet? **(P.C.S., 2008)**

($a$) After 2 hours, 6 km from A

($b$) After 3 hours, 9 km from A

($c$) After $2\frac{1}{2}$ hours, 7.5 km from A

($d$) After 2 hours, 4 km from A

**139.** Two cars $X$ and $Y$ start from 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 continues to run without stopping. The two cars cross each other at **(P.C.S., 2009)**

($a$) 2 : 40 p.m ($b$) 3 : 20 p.m

($c$) 4 : 10 p.m ($d$) 4 : 20 p.m

**140.** A train started from station $A$ and proceeded towards station $B$ at a speed of 48 km/hr. Forty-five minutes later another train started from station $B$ and proceeded towards station a at 50 km/hr. If the distance between the two stations is 232 km, at what distance from station A will the trains meet? **(M.A.T., 2009)**

($a$) 108 km ($b$) 132 km

($c$) 144 km ($d$) None of these

**141.** The jogging track in a sports complex is 726 metres in circumference. Deepak and his wife start from the same point and walk in opposite directions at 4.5 km/hr and 3.75 km/hr respectively. They will meet for the first time in

($a$) 4.9 min ($b$) 5.28 min

($c$) 5.5 min ($d$) 6 min

**142.** $A$ and B walk around a circular track. They start at 8 a.m. from the same point in the opposite directions. A and B walk at a speed of 2 rounds per hour and 3 rounds per hour respectively. How many times shall they cross each other before 9.30 a.m.?

($a$) 5 ($b$) 6

($c$) 7 ($d$) 8

**143.** Two cyclists start on a circular track from a given point but in opposite directions with speeds of 7 m/sec and 8 m/sec respectively. If the circumference of the circle is 300 metres, after what time will they meet at the starting point? **(M.A.T., 2007)**

($a$) 20 sec ($b$) 100 sec

($c$) 200 sec ($d$) 300 sec

**144.** A distance of 425 km separates two trains moving towards each other at a speed of 200 km/hr each. What will be the distance between them after 1 hr 30 min, if they reduce their speed by half, every half an hour?

($a$) 75 km ($b$) 120 km

($c$) 150 km ($d$) 200 km

**Directions (*Questions 145 to 147*): *These questions are based on the following information*:**

$P$ and $Q$ are 120 km apart. A starts from $P$ towards $Q$ at 6 a.m. $B$ starts from $Q$ towards $P$ at 11 a.m. on the same day. $A$ is 50 % faster than $B$. They cross each other at 8 p.m.

**145.** At what time will $A$ reach his destination?

($a$) Midnight ($b$) 2 a.m. the next day

($c$) 11 p.m. ($d$) 11 a.m. the next day

**146.** In reaching his destination, how many more hours than $A$, will $B$ take?

($a$) 8 ($b$) 9

($c$) 10 ($d$) 12

**147.** $A$'s speed (in km/hr) is

($a$) 4 ($b$) 4.5

($c$) 5 ($d$) 6

**148.** Train $X$ leaves New York at 1 A.M. and travels east at a constant speed of $x$ mph. If train $Z$ leaves New York at 2 A.M. and travels east, at what constant rate of speed will train $Z$ have to travel in order to catch train $X$ at exactly 5 : 30 A.M.? **(M.B.A., 2006)**

($a$) $\frac{5}{6}x$ ($b$) $\frac{9}{8}x$

($c$) $\frac{6}{5}x$ ($d$) $\frac{9}{7}x$

($e$) $\frac{3}{2}x$

**149.** 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 kilometres does each lady travel in one hour?

($a$) 5 km, 3 km ($b$) 7 km, 5 km

($c$) 8 km, 6 km ($d$) 6 km, 14 km

**150.** 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? **(S.S.C., 2010)**

($a$) 3 km/hr ($b$) 4 km/hr

($c$) 5 km/hr ($d$) 7 km/hr

**151.** Two men at points $R$ and $S$, 76 km apart, set out at the same time to walk towards each other. The man at $R$ walks uniformly at the rate of $4\frac{1}{2}$ km/hr ; the man at S walks at the constant rate of $3\frac{1}{4}$ km/hr for the first hour, at $3\frac{3}{4}$ km/hr for the second hour, and so on, in arithmetic progression. If the men meet $x$ km nearer $R$ than $S$ in an integral number of hours, then $x$ is **(M.B.A., 2010)**

($a$) 4 ($b$) 6

($c$) 8 ($d$) 10

**152.** Two planes move along a circle of circumference 1.2 kms with constant speeds. When they move in different directions, they meet every 15 seconds and when they move in the same direction one plane overtakes the other every 60 seconds. The speed of the slower plane is **(M.B.A., 2004)**

($a$) 0.02 km/s ($b$) 0.03 km/s

($c$) 0.04 km/s ($d$) 0.05 km/s

**153.** Two cyclists, $k$ kilometres apart, and starting at the same time, would be together in $r$ hours if they travelled in the same direction, but would pass each other in $t$ hours if they travelled in opposite directions. The ratio of the speed of the faster cyclist to that of the slower is **(M.B.A., 2011)**

($a$) $\frac{r+t}{r-t}$ ($b$) $\frac{r}{r-t}$

($c$) $\frac{r+t}{r}$ ($d$) $\frac{r}{t}$

**154.** A bus left $X$ for point $Y$. Two hours later a car left point $X$ for $Y$ and arrived at Y at the same time as the bus. If the car and the bus left simultaneously from the opposite ends $X$ and $Y$ towards each other, they would meet $1\frac{1}{3}$ hours after the start. How much time did it take the bus to travel from $X$ to $Y$?

($a$) 2 hours ($b$) 4 hours

($c$) 6 hours ($d$) 8 hours

**155.** Two trains starting at the same time from two stations 200 km apart and going in opposite directions cross each other at a distance of 110 km from one of the stations. What is the ratio of their speeds?

($a$) 9 : 20 ($b$) 11 : 9

($c$) 11 : 20 ($d$) None of these

**156.** Two trains start from stations $A$ and $B$ and travel towards each other at a speed of 50 kmph and 60 kmph respectively. A the time of their meeting, the second train had travelled 120 km more than the first. The distance between $A$ and $B$ is **(R.R.B. 2006 ; C.P.O. 2005 ; M.A.T. 2009 ; Bank P.O. 2008)**

($a$) 600 km ($b$) 1320 km

($c$) 1440 km ($d$) 1660 km

**157.** Train A leaves Ludhiana for Delhi at 11 a.m, running at the speed of 60 km/hr. Train B leaves Ludhiana for Delhi by the same route at 2 p.m. on the same day, running at the speed of 72 km/hr. At what time will the two trains meet each other? **(M.A.T., 2008)**

($a$) 2 a.m. on the next day ($b$) 5 a.m. on the next day

($c$) 5 p.m. on the next day ($d$) None of these

**158.** A train $M$ leaves station $X$ at 5 a.m and reaches station $Y$ at 9 a.m. Another train $N$ leaves station $Y$ at 7 a.m. and reaches station $X$ at 10.30 a.m. At what time do the two trains cross each other? **(M.A.T., 2006)**

($a$) 7.36 a.m ($b$) 7.56 a.m

($c$) 8.36 a.m ($d$) 8.56 a.m

**159.** Train A travelling at 60 km/hr leaves Mumbai for Delhi at 6 p.m. Train B travelling at 90 km/hr also leaves Mumbai for Delhi at 9 p.m. Train C leaves Delhi for Mumbai at 9 p.m. If all the three trains meet at the same time between Mumbai and Delhi, then what is the speed of train C if the distance between Delhi and Mumbai is 1260 km?

($a$) 60 km/hr ($b$) 90 km/hr

($c$) 120 km/hr ($d$) 135 km/hr

**160.** 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? **(Civil Services, 2007)**

($a$) 7 hours 45 minutes ($b$) 8 hours 15 minutes

($c$) 8 hours 30 minutes ($d$) 8 hours 45 minutes

**161.** Reena leaves office at 6.00 p.m. and catches a 6.30 p.m. local train that arrives in her town at 7.00 p.m. Her father leaves home to pick her up at 7.00 p.m. from the station as she gets off the train. Yesterday, Reena left her office early and took a 6.00 p.m. train and arrived at 6.30 p.m. As her father was not there to pick her up, she started walking towards home. Her father left home at the usual time, saw her daughter walking, turned around, picked her up and drove home, arriving there 10 minutes earlier than the usual. For how long did Reena walk before her father picked her up?

($a$) 10 min ($b$) 15 min

($c$) 20 min ($d$) 25 min

**162.** On return from a business trip, Mr X was to be picked up from the railway station by his coachman. However, his meeting having finished before schedule, he left his destination earlier by catching an earlier train as a result of which he arrived 2 hours early. Immediately on arrival he rang up home for the coach and was told that it had just left in order to be exactly in time for the train by which he was scheduled to come. To save time he started walking home ward a 4 mph. On the way he met the coachman who brought him home an hour before schedule. How far is Mr X's house from the railway station?

(*a*) 12 miles (*b*) 16 miles
(*c*) 18 miles (*d*) 24 miles

**163.** A train approaches a tunnel *AB*. Inside the tunnel is a cat located at a point that is $\frac{3}{8}$ of the distance *AB* measured from the entrance *A*. When the train whistles, that cat runs. If the cat moves to the entrance *A* of the tunnel, the train catches the cat exactly at the entrance. If the cat moves to the exit *B*, the train catches the cat at exactly the exit. The ratio of the speed of the train to that of the cat is of the order

(*a*) 3 : 1 (*b*) 4 : 1
(*c*) 5 : 1 (*d*) None of these

**164.** The speed of a railway engine is 42 km/hr when no compartment is attached and the reduction in speed is directly proportional to the square root of the number of compartments attached. If the speed of the train carried by this engine is 24 km/hr with 9 compartments attached, the maximum number of compartments that the engine can pull is

(*a*) 35 (*b*) 41
(*c*) 48 (*d*) None of these

**Direction (*Questions 165-166*): *These questions are based on the following information:*** **(C.A.T., 2005)**

Ram and Shyam run a race between points *A* and *B*, 5 km apart. Ram starts at 9 a.m. from *A* at a speed of 5 km/hr, reaches *B* and returns to *A* at the same speed. Shyam starts at 9 : 45 a.m. from *A* at a speed of 10 km/hr, reaches *B* and comes back to A at the same speed.

**165.** At what time do Ram and Shyam meet each other?

(*a*) 10 a.m. (*b*) 10 : 10 a.m.
(*c*) 10 : 20 a.m. (*d*) 10 : 30 a.m.

**166.** At what time does Shyam overtake Ram?

(*a*) 10 : 20 a.m. (*b*) 10 : 30 a.m.
(*c*) 10 : 40 a.m. (*d*) 10 : 50 a.m.

**167.** A man can walk up a 'moving-up' escalator in 30 seconds. The same man can walk down this 'moving-up' escalator in 90 seconds. Assume that his walking speed is same upwards and downwards. How much time will he take to walk up the escalator, when it is not moving?

(*a*) 30 sec (*b*) 45 sec
(*c*) 60 sec (*d*) 90 sec

**168.** A hare pursued by a hound is 60 of her own leaps before him. When the hare takes 4 leaps, the hound takes 3. In one leap, the hare goes $1\frac{3}{4}$ metres and the hound $2\frac{3}{4}$ metres. In how many leaps will the hound overtake the hare?

(*a*) 84 (*b*) 188
(*c*) 252 (*d*) 356

**169.** Arun had ridden one-third the total distance of his trip when his scooter got punctured. He finished the journey on foot, spending twenty times as long walking as he had spent riding. What was the ratio of his riding speed to his walking speed?

(*a*) 4 : 1 (*b*) 5 : 1
(*c*) 10 : 1 (*d*) 20 : 1

**170.** A car overtakes a bus travelling from Delhi to Jaipur at 4 : 30 p.m. The car reaches Jaipur at 6 : 00 p.m. After stopping there for 1 hour, it starts back towards Delhi and meets the same bus at 7 : 30 p.m. which was moving towards Jaipur at that time. If both the bus and the car were travelling with uniform speeds on the same route, at what time would the bus reach Jaipur?

(*a*) 8 : 30 p.m. (*b*) 9 : 00 p.m.
(*c*) 9 : 15 p.m. (*d*) 9 : 30 p.m.

**171.** If Karan travels at a speed of 60 kmph and covers a distance in 9 hrs., then how much time will he take to travel the same distance at a speed of 90 kmph? **[Indian Railway Gr. 'D' Exam, 2014]**

(*a*) 8 hrs (*b*) 6 hrs
(*c*) 12 hrs (*d*) 9 hrs

**172.** The speed of a bus is 72 kmph. The distance covered by the bus in 5 sec is **[Indian Railway Gr. 'D' Exam, 2014]**

(*a*) 50 m (*b*) 74.5 m
(*c*) 100 m (*d*) 60 m

**173.** A man travels for 5 hours 15 minutes. If he covers the first half of the journey at 60km/h and rest at 45km/h. Find the total distance travelled by him. **[SSC—CHSL (10 + 2) Exam, 2015]**

(*a*) $1028\frac{6}{7}$ km (*b*) 189 km
(*c*) 378 km (*d*) 270 km

**174.** Ashok left from place A for place B at 8 a.m. and Rahul left place B for place A at 10.00 a.m. the distance between place A and B is 637 km. If Ashok and Rahul are travelling at a uniform speed of 39kmph and 47 kmph respectively, at what time will they meet? **[IBPS—Bank Spl. Officers (IT) Exam, 2015]**

(*a*) 5 : 30 pm (*b*) 4 : 30 pm
(*c*) 5 pm (*d*) 4 pm

**175.** A car goes 20 metres in a second. Find its speed in km/hr [SSC—CHSL (10+2) Exam, 2015]
(*a*) 18 (*b*) 72
(*c*) 36 (*d*) 20

**176.** Two men P and Q start a journey form same place at a speed of 3 km/hr and $3\frac{1}{2}$ km/hr respectively. If they move in the same direction then what is the distance between them after 4 hours? [IDBI—Executive Officer's Exam, 2015]
(*a*) 3 km (*b*) $2\frac{1}{2}$ km
(*c*) 2 km (*d*) $\frac{1}{2}$ km

**177.** Rohan covers $\frac{2}{3}$rd of a certain distance in 2 hours 30 minutes at the rate of $x$ kmph. He covers the remaining distance at the rate of $(x + 2)$ kmph in 50 minutes. What is the total distance? [RBI Officer's Gr. 'B' (Phase I) Exam, 2015]
(*a*) 21 km (*b*) 18 km
(*c*) 16 km (*d*) 15 km

**178.** To reach point B from point A. At 4pm, Sara will have to travel at an average speed of 18 kmph. She will reach point B at 3 pm if she travels at an average speed of 24 kmph. At what average speed should Sara travel to reach point B at 2pm? [IBPS—Bank PO/MT (Pre.) Exam, 2015]
(*a*) 36 kmph (*b*) 28 kmph
(*c*) 25 kmph (*d*) 30 kmph

**179.** A student goes to school at the rate of $2\frac{1}{2}$ km/h and reaches 6 min late. If he travels at the speed of 3km/h he is 10 min early. What is the distance to the school ? [SSC—CHSL (10+2) Exam, 2015]
(*a*) 4 km (*b*) $3\frac{1}{4}$km
(*c*) 1 km (*d*) $3\frac{1}{2}$km

**180.** Kim and OM are travelling from point A to B, which are 400 km apart, travelling at a certain speed Kim takes one hour more than Om to reach point B. If Kim doubles her speed she will take 1 hour 30 mins less than Om to reach point B. At what speed was Kim driving from point A to B? (In kmph) [IBPS—Bank PO (Pre.) Exam, 2015]
(*a*) 90 kmph (*b*) 70 kmph
(*c*) 160 kmph (*d*) 80 kmph

**181.** A car covers 650 km in 12 hours and other 850 km in 18 hours. Find the average speed of the car. [ESIC—UDC Exam, 2016]
(*a*) 47 kmph (*b*) 50 kmph
(*c*) 48 kmph (*d*) 52 kmph

**182.** A vehicle travels at the rate of 80 kmph. What distance will it travel in 15 minutes? [ESIC—UDC Exam, 2016]
(*a*) 20000 metre (*b*) 25000 metre
(*c*) 24000 metre (*d*) 22000 metre

**183.** Aryan covers a certain distance in 1 hour 30 minutes. He covers two thirds of it at the rate of 4 kmph and remaining distance at the rate of 5 kmph. Find the total distance. [ESIC—UDC Exam, 2016]
(*a*) 6.5 km (*b*) 6.6 km
(*c*) 6.3 km (*d*) 6.4 km

**184.** Rani goes to school from her house in 30 minutes. Raja takes 45 minutes in covering the same distance. Find the ratio between time taken by Rani and Raja. [ESIC—UDC Exam, 2016]
(*a*) 2 : 3 (*b*) 4 : 3
(*c*) 3 : 2 (*d*) 1 : 3

**185.** The speeds of John and Max are 30 km/h and 40 km/h. Initially Max is at a place L and John is at a place M. The distance between L and M is 650 km. John started his journey 3 hours earlier than Max to meet each other. If they meet each other at a place P somewhere between L and M, then the distance between P and M is: [SBI—Jr. Associates (Pre.) Exam, 2016]
(*a*) 220 km (*b*) 250 km
(*c*) 330 km (*d*) 320 km

**186.** A car travels the first one third of a certain distance with a speed of 10 km/hr, the next one third distance with a speed of 20 km/hr and the last one third distance with a speed of 60 km/hr. The average speed of the car for the whole journey is [CDS, 2016]
(*a*) 18 km/hr (*b*) 24 km/hr
(*c*) 30 km/hr (*d*) 36 km/hr

**187.** With a uniform speed, a car covers a distance in 8 hours. Had the speed been increased by 4 km/hr, the same distance could have been covered in 7 hours and 30 minutes. What is the distance covered? [CDS, 2016]
(*a*) 420 km (*b*) 480 km
(*c*) 520 km (*d*) 640 km

**188.** A thief is noticed by a policeman from a distance of 200 m. The thief starts running and the policeman chases him. The thief and the policeman chases him. The thief and the policeman run at the speed

of 10km/hr and 11 km/hr respectively. What is the distance between them after 6 minutes? [CDS, 2016]

(*a*) 100m (*b*) 120m

(*c*) 150m (*d*) 160m

**189.** A man performs 2/15 of the total journey by rail, 9/20 by bus and the remaining 10 km, on the cycle. His total journey is

[UPSSSC—Lower Subordinate (Pre.) Exam, 2016]

(*a*) 31.2 km (*b*) 38.4 km

(*c*) 32.8 km (*d*) 24 km

**190.** Ramesh is walking at a speed of 10 kilometres per hour. After every kilometer he takes rest for 5 minutes. The time taken to cover a distance of 5 kilometres by Ramesh is

[DMRC—Customer Relationship Assistant (CRA) Exam, 2016]

(*a*) 30 minutes (*b*) 35 minutes

(*c*) 50 minutes (*d*) 55 minutes

**191.** If a runner takes as much time in running 20 metres as the car takes in covering 50 metres. The distance covered by the runner during the time the car covers 1 km is

[DMRC—Jr. Engineer (Electrical) Exam, 2016]

(*a*) 400 metres (*b*) 40 metres

(*c*) 440 metres (*d*) None of these

## ANSWERS

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **1.** (*b*) | **2.** (*b*) | **3.** (*b*) | **4.** (*d*) | **5.** (*b*) | **6.** (*d*) | **7.** (*d*) | **8.** (*b*) | **9.** (*c*) | **10.** (*b*) |
| **11.** (*c*) | **12.** (*b*) | **13.** (*e*) | **14.** (*b*) | **15.** (*b*) | **16.** (*e*) | **17.** (*d*) | **18.** (*b*) | **19.** (*b*) | **20.** (*b*) |
| **21.** (*a*) | **22.** (*b*) | **23.** (*c*) | **24.** (*d*) | **25.** (*a*) | **26.** (*a*) | **27.** (*c*) | **28.** (*c*) | **29.** (*c*) | **30.** (*a*) |
| **31.** (*d*) | **32.** (*d*) | **33.** (*c*) | **34.** (*b*) | **35.** (*a*) | **36.** (*c*) | **37.** (*c*) | **38.** (*d*) | **39.** (*c*) | **40.** (*b*) |
| **41.** (*b*) | **42.** (*a*) | **43.** (*c*) | **44.** (*d*) | **45.** (*d*) | **46.** (*a*) | **47.** (*d*) | **48.** (*c*) | **49.** (*d*) | **50.** (*e*) |
| **51.** (*d*) | **52.** (*a*) | **53.** (*c*) | **54.** (*d*) | **55.** (*c*) | **56.** (*c*) | **57.** (*a*) | **58.** (*b*) | **59.** (*d*) | **60.** (*b*) |
| **61.** (*b*) | **62.** (*b*) | **63.** (*c*) | **64.** (*b*) | **65.** (*e*) | **66.** (*d*) | **67.** (*d*) | **68.** (*d*) | **69.** (*a*) | **70.** (*b*) |
| **71.** (*b*) | **72.** (*b*) | **73.** (*c*) | **74.** (*b*) | **75.** (*d*) | **76.** (*a*) | **77.** (*d*) | **78.** (*a*) | **79.** (*b*) | **80.** (*c*) |
| **81.** (*b*) | **82.** (*d*) | **83.** (*b*) | **84.** (*b*) | **85.** (*b*) | **86.** (*a*) | **87.** (*c*) | **88.** (*b*) | **89.** (*d*) | **90.** (*c*) |
| **91.** (*c*) | **92.** (*e*) | **93.** (*b*) | **94.** (*d*) | **95.** (*b*) | **96.** (*a*) | **97.** (*c*) | **98.** (*b*) | **99.** (*b*) | **100.** (*b*) |
| **101.** (*b*) | **102.** (*a*) | **103.** (*a*) | **104.** (*b*) | **105.** (*b*) | **106.** (*a*) | **107.** (*c*) | **108.** (*a*) | **109.** (*d*) | **110.** (*c*) |
| **111.** (*a*) | **112.** (*b*) | **113.** (*b*) | **114.** (*c*) | **115.** (*b*) | **116.** (*a*) | **117.** (*a*) | **118.** (*d*) | **119.** (*d*) | **120.** (*d*) |
| **121.** (*a*) | **122.** (*b*) | **123.** (*b*) | **124.** (*d*) | **125.** (*c*) | **126.** (*a*) | **127.** (*a*) | **128.** (*b*) | **129.** (*c*) | **130.** (*d*) |
| **131.** (*c*) | **132.** (*d*) | **133.** (*a*) | **134.** (*a*) | **135.** (*d*) | **136.** (*b*) | **137.** (*a*) | **138.** (*a*) | **139.** (*b*) | **140.** (*b*) |
| **141.** (*b*) | **142.** (*c*) | **143.** (*d*) | **144.** (*a*) | **145.** (*b*) | **146.** (*c*) | **147.** (*d*) | **148.** (*d*) | **149.** (*c*) | **150.** (*c*) |
| **151.** (*a*) | **152.** (*b*) | **153.** (*a*) | **154.** (*b*) | **155.** (*b*) | **156.** (*b*) | **157.** (*b*) | **158.** (*b*) | **159.** (*c*) | **160.** (*d*) |
| **161.** (*d*) | **162.** (*d*) | **163.** (*b*) | **164.** (*c*) | **165.** (*b*) | **166.** (*b*) | **167.** (*b*) | **168.** (*c*) | **169.** (*c*) | **170.** (*b*) |
| **171.** (*b*) | **172.** (*c*) | **173.** (*d*) | **174.** (*b*) | **175.** (*b*) | **176.** (*c*) | **177.** (*d*) | **178.** (*a*) | **179.** (*a*) | **180.** (*d*) |
| **181.** (*b*) | **182.** (*a*) | **183.** (*d*) | **184.** (*a*) | **185.** (*c*) | **186.** (*a*) | **187.** (*b*) | **188.** (*a*) | **189.** (*d*) | **190.** (*c*) |
| **191.** (*c*) | | | | | | | | | |

## SOLUTIONS

**1.** $30.6 \text{ km/hr} = \left(30.6 \times \frac{5}{18}\right) \text{m/sec} = \frac{153}{18} \text{ m/sec} = 8.5 \text{ m/sec}.$

**2.** Speed $= \left(\frac{150}{25}\right) \text{m/sec} = 6 \text{ m/sec}$

$= \left(6 \times \frac{18}{5}\right) \text{ km/hr} = \left(\frac{108}{5}\right) \text{ km/hr} = 21.6 \text{ km/hr}.$

**3.** Speed $= \left(\frac{2924}{43}\right) \text{km/hr} = 68 \text{ km/hr}.$

**4.** *A*'s speed = 72 km/hr $= \left(72 \times \frac{5}{18}\right) \text{m/sec} = 20 \text{ m/sec}.$

*B*'s speed = 25 m/sec.

Difference = (25 – 20) m/sec = 5 m/sec.

**5.** Distance covered = 65 km = 65000 m.

Time taken = 2 hrs 10 min

= [(2 × 60) + 10] min = 130 min.

$\therefore$ Speed $= \left(\frac{65000}{130}\right) \text{m/min} = 500 \text{ m/min}.$

**6.** 1 yard = 0.9144 m $\Rightarrow$ 100 yards = (100 × 0.9144) m = 91.44 m.

$\therefore$ Required difference = (100 – 91.44) m = 8.56 m.

**7.** 25 m/sec $= \left(25 \times \frac{18}{5}\right) \text{km/hr} = 90 \text{ km/hr}.$

And, 25 m/sec = (25 × 60) m/min = 1500 m/min.

So, all the three speeds are equal.

**8.** Speed $= \left(\frac{600}{5 \times 60}\right) \text{m/sec} = 2 \text{ m/sec}$

$= \left(2 \times \frac{18}{5}\right)$ km/hr $= 7.2$ km/hr.

**9.** Required time $= \left(\frac{432}{48}\right)$ hours $= 9$ hours.

**10.** Speed of the bike $= \left(\frac{180}{4}\right)$ km/hr $= 45$ km/hr.

Speed of the bicycle $= \left(\frac{1}{6} \times 45\right)$ km/hr $= 7.5$ km/hr.

$\therefore$ Required distance $= (7.5 \times 8)$ km $= 60$ km.

**11.** Let the speeds of the car, train and bus be $5x$, $9x$ and $4x$ km/hr respectively.

Then, $\frac{5x + 9x + 4x}{3} = 72 \Leftrightarrow 6x = 72 \Leftrightarrow x = 12.$

$\therefore$ Speed of the car $= 60$ km/hr ;

speed of the train $= 108$ km/hr.

Average speed of car and train

$= \left(\frac{60 + 108}{2}\right)$ km/hr $= 84$ km/hr.

**12.** Required ratio $= (65 \times 8) : (70 \times 4) = 520 : 280 = 13 : 7.$

**13.** Speed of the train $= \left(\frac{1125}{15}\right)$ km/hr $= 75$ km/hr.

Speed of the bus $= \left(\frac{1}{3} \times 75\right)$ km/hr $= 25$ km/hr.

Distance covered by the bus in 60 min $= 25$ km.

Distance covered by the bus in 36 min

$= \left(\frac{25}{60} \times 36\right)$ km $= 15$ km.

**14.** Quantity of petrol consumed by both the motorbikes

$= \left(\frac{294}{42} + \frac{208}{52}\right)$ litres $= 11$ litres.

$\therefore$ Total amount spent on petrol $=$ Rs $(48 \times 11) =$ ₹ 528.

**15.** Time taken $= 3$ hrs 15 min $= 3\frac{1}{4}$ hrs $= \frac{13}{4}$ hrs.

$\therefore$ Required distance $= \left(40 \times \frac{13}{4}\right)$ km $= 130$ km.

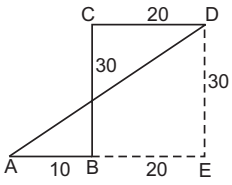
**16.** Required distance

$= AD \sqrt{(AE)^2 + (DE)^2}$

$= \sqrt{(30)^2 + (30)^2}$

$= \sqrt{900 + 900} = \sqrt{1800}$

$= 30\sqrt{2}$ miles.



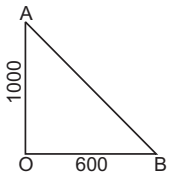

**17.** Distance covered by the first plane till 2 P.M., i.e., in 2 hrs $= (500 \times 2)$ miles $= 1000$ miles.

Distance covered by the second plane till 2 P.M., i.e., in $1\frac{1}{2}$ hrs $= \left(400 \times \frac{3}{2}\right)$ miles $= 600$ miles.

$\therefore$ Required distance

$= AB = \sqrt{(1000)^2 + (600)^2}$

$= \sqrt{1000000 + 360000}$




$= \sqrt{1360000}$ miles $= 200\sqrt{34}$ miles

$= 1166$ miles $\approx 1200$ miles.

**18.** Time taken to cover 1300 km $= \left(\frac{1300}{65}\right)$ hrs $= 20$ hrs.

Halt time $= (24 - 20)$ hrs $= 4$ hrs.

Halting time at each junction $= \left(\frac{4 \times 60}{8}\right)$ min $= 30$ min.

**19.** Suppose Jane travelled $x$ miles by water, $\left(\frac{4x}{7}\right)$ miles on foot and $\left(\frac{2x}{5}\right)$ miles on horseback.

Then, $x + \frac{4x}{7} + \frac{2x}{5} = 3036 \Leftrightarrow \frac{69x}{35} = 3036$

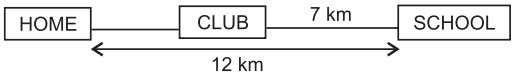
$\Leftrightarrow x = \left(\frac{3036 \times 35}{69}\right) = 1540.$

$\therefore$ Distance travelled on foot $= \left(\frac{4}{7} \times 1540\right)$ miles $= 880$ miles.

**20.** Required time $= \left(\frac{8.1 \times 10^{13}}{3.0 \times 10^{5}}\right)$ seconds $= 2.7 \times 10^{8}$ sec

$= \left(\frac{2.7 \times 10^{8}}{60 \times 60}\right)$ hrs $= 7.5 \times 10^{4}$ hrs.

**21.** For the distance to be minimum, the club must lie between Akash's home and school.




Hence, required distance $= (12 - 7)$ km $= 5$ km.

**22.** Actual time taken for the journey

$= 4$ hrs 15 min $- (10 + 2 \times 5 + 3)$ min

$= 4$ hrs 15 min $- 23$ min $= 3$ hrs 52 min $= 3\frac{26}{30}$ hrs $= \frac{116}{30}$ hrs.

$\therefore$ Average speed $= \left(\frac{580}{3} \times \frac{30}{116}\right)$ km/hr $= 50$ km/hr.

**23.** Deepa's original speed $= 30$ km/hr.

Deepa's new speed $= (30 + 10)$ km/hr $= 40$ km/hr.

Distance $= (30 \times 6)$ km $= 180$ km.

Hema's original speed $= \left(\frac{180}{4}\right)$ km/hr $= 45$ km/hr.

Hema's new speed

$= (45 + 5)$ km/hr $= 50$ km/hr.

Difference in time

$= \left(\frac{180}{40} - \frac{180}{50}\right)$ hrs $= \frac{9}{10}$ hrs $= \left(\frac{9}{10} \times 60\right)$ min $= 54$ min.

**24.** Net height ascended in 2 min $= (6 - 3)$ m $= 3$ m.

Net height ascended in 36 min $= \left(\frac{3}{2} \times 36\right)$ m $= 54$ m.

In the 37th min, the monkey ascends 6 m and reaches the top.

Hence, total time taken $= 37$ minutes.

**25.** Time taken to cover 60 miles = 80 min = $\frac{4}{3}$ hrs.

$\therefore$ Speed of the train = $\left(60\times\frac{3}{4}\right)$ mph = 45 mph.

Speed of the aeroplane = (2 × 45) mph = 90 mph.

Distance covered by the aeroplane in 60 min = 90 miles.

Distance covered by the aeroplane in 20 min

$= \left(\frac{90}{60}\times 20\right)\text{miles} = 30 \text{ miles}.$

**26.** Speed = $\frac{\text{Distance}}{\text{Time}} \Rightarrow p - q = \frac{1}{r}$.

**27.** Let the required number of days be $x$.

More distance, More days required **(Direct Proportion)**

More speed, Less days required **(Indirect Proportion)**

More resting hours, More days required **(Direct Proportion)**

$$\left.\begin{array}{ll}\text{Distance} & 1:2\\ \text{Speed} & 2:1\\ \text{Resting hours} & 9:18\end{array}\right\}::40:x$$

$\therefore \quad 1\times 2\times 9\times x =$

$2\times 1\times 18\times 40 \Leftrightarrow x = \frac{2\times 18\times 40}{2\times 9} = 80.$

**28.** Time taken to cover 150 km = (1 hr 30 min + 10 min)

= 1 hr 40 min = $1\frac{2}{3}\text{hr} = \frac{5}{3}\text{hr}.$

Time taken to cover (150 × 6) *i.e.*, 900 km

$= \left(\frac{5}{3}\times 6\right)\text{hrs.} = 10 \text{ hrs.}$

Remaining 100 km is covered in 1 hour.

Total time taken = (10 + 1) hrs = 11 hrs.

**29.** Distance = Speed x Time = $\left(6\times\frac{50}{60}\right)\text{km} = 5 \text{ km}.$

$\therefore$ Required time = $\frac{\text{Distance}}{\text{Speed}} = \left(\frac{5}{10}\right)\text{hrs} = \frac{1}{2}\text{hr} = 30 \text{ min}.$

**30.** Ratio of speeds = $\left(\frac{550}{60}\times\frac{18}{5}\right):\left(\frac{33}{45}\times 60\right) = 33:44 = 3:4.$

**31.** Let the speeds of two trains be $7x$ and $8x$ km/hr.

Then, $8x = \frac{400}{4} = 100 \Rightarrow x = \left(\frac{100}{8}\right) = 12.5.$

$\therefore$ Speed of first train = (7 × 12.5) km/hr = 87.5 km/hr.

**32.** Total distance travelled $= \left[\left(50\times 2\frac{1}{2}\right)+\left(70\times 1\frac{1}{2}\right)\right]$

miles = (125 + 105) miles = 230 miles.

**33.** Number of gaps between 21 telephone posts = 20.

Distance travelled in 1 minute = (50 × 20) m = 1000 m = 1 km.

$\therefore$ Speed = 60 km/hr.

**34.** Distance $= \left(1100\times\frac{11}{5}\right)$ feet = 2420 feet.

**35.** Time taken to cover 600 km $= \left(\frac{600}{100}\right)$ hrs = 6 hrs.

Number of stoppages = $\frac{600}{75} - 1 = 7.$

Total time of stoppage = (3 × 7) min = 21 min.

Hence, total time taken = 6 hrs 21 min.

**36.** Let the distance covered by the cyclist be $x$ and the time taken be $y$. Then,

Required ratio = $\frac{\frac{1}{2}x}{2y} : \frac{x}{y} = \frac{1}{4} : 1 = 1 : 4.$

**37.** Distance covered in first 2 hours = (70 × 2) km = 140 km.

Distance covered in next 2 hours = (80 × 2) km = 160 km.

Remaining distance = 345 – (140 + 160) = 45 km.

Speed in the fifth hour = 90 km/hr.

Time taken to cover 45 km = $\left(\frac{45}{90}\right)\text{hr} = \frac{1}{2}\text{hr}.$

$\therefore$ Total time taken = $\left(2+2+\frac{1}{2}\right) = 4\frac{1}{2}\text{hrs}.$

**38.** This is a question on uniform retardation (as it is given that the car slows down at a fixed rate)

If $v$ is the final velocity, $u$ is the initial velocity, $a$ is the uniform acceleration (or retardation), $t$ is the time and $s$ is the distance covered, we have :

$v = u + at$ and $s = ut + \frac{1}{2}at^2$

Here, $v = 0$, $u = 24$ m/s, $a = -3$ m/s$^2$

$\therefore \quad 0 = 24 - 3t \Rightarrow 3t = 24 \Rightarrow t = 8.$

And, $s = \left[24\times 8 + \frac{1}{2}\times(-3)\times 8^2\right]\text{m} = (192 - 96)\text{ m} = 96 \text{ m}.$

**39.** Total time taken

$= \left[\frac{x}{y} + \frac{x}{\left(\frac{3y}{5}\right)} + \frac{x}{\left(\frac{2y}{5}\right)}\right]\text{hours}$

$= \left(\frac{x}{y} + \frac{5x}{3y} + \frac{5x}{2y}\right)\text{hours} = \left(\frac{6x+10x+15x}{6y}\right)\text{hours}$

$= \left(\frac{31x}{6y}\right)\text{hours}.$

$\therefore \quad \frac{31x}{6y} = 1 \Leftrightarrow \frac{x}{y} = \frac{6}{31}.$

**40.** Average speed = $\frac{\text{Total distance covered}}{\text{Total time taken}}$

$= \left(\frac{4\times 9\times 400}{88+96+89+87}\right)\text{m/min} = \left(\frac{14400}{360}\right)\text{m/min}$

= 40 m/min.

**41.** Time taken by the express train to cover 600 km

$= \left(\frac{600}{100}\right)\text{hrs} = 6 \text{ hrs}.$

Number of stoppages = (600 ÷ 75) – 1 = 7.

Duration of stoppage = (3 × 7) min = 21 min.

Total time taken = 6 hrs 21 min.

Total time taken by local train to cover 50 km (with stoppages) = 1 hr 2 min.

So, the local train covers (50 × 6) = 300 km in 6 hr 12 min.

In remaining 9 min, it covers $\left(\frac{50}{60}\times 9\right)\text{km} = 7.5 \text{ km}.$

$\therefore$ Required distance = (300 + 7.5) km = 307.5 km.

**42.** Let the required number of hours be $n$.

Clearly, the car covers 40 km in first hour, 45 km in the second hour, 50 km in the third hour, and so on.

Thus, we have :

40 + 45 + 50 + ..... upto $n$ terms = 385.

This is an A.P. with first term $a = 40$, common difference $d = 5$.

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

So, $\frac{n}{2}[80 + 5(n-1)] = 385 \Leftrightarrow 80n + 5n^2 - 5n = 770 \Leftrightarrow$

$5n^2 + 75n - 770 = 0$

$\Leftrightarrow n^2 + 15n - 154 = 0 \Leftrightarrow n^2 + 22n - 7n - 154 = 0$

$\Leftrightarrow n(n + 22) - 7(n + 22) = 0 \Leftrightarrow (n + 22)(n - 7) = 0 \Leftrightarrow n = 7.$

Hence, required number of hours = 7.

**43.** Total distance travelled in 12 hours = (35 + 37 + 39 + .... upto 12 terms).

This is an A.P. with first term, $a = 35$, number of terms, $n = 12$, common difference, $d = 2$.

$\therefore$ Required distance

$$= \frac{12}{2}[2\times 35 + (12-1)\times 2] = 6(70 + 22) = 552 \text{ km}.$$

**44.** Time taken to cover a distance is inversely proportional to the speed.

Let the required time be $x$ min.

Then, $50 : 55 :: x : 44 \Leftrightarrow 55x = 50 \times 44$

$\Leftrightarrow x = \left(\frac{50\times 44}{55}\right)\text{min} = 40 \text{ min}.$

**45.** Ratio of speeds = 2 : 3 : 4.

$\therefore$ Ratio of times taken = $\frac{1}{2}:\frac{1}{3}:\frac{1}{4} = 6:4:3.$

**46.** Ratio of speeds = 3 : 4.

Ratio of times taken = $\frac{1}{3}:\frac{1}{4} = 4:3.$

Let $A$ and $B$ take $4x$ and $3x$ minutes respectively to reach a destination.

Then, $4x - 3x = 20 \Leftrightarrow x = 20.$

$\therefore$ Time taken by $A = 4x = (4 \times 20)$ min = 80 min = $1\frac{1}{3}$ hr.

**47.** Let the speed of steam engine train be $x$.

Then, speed of electric train = 125% of $x = \frac{5x}{4}$.

Time taken by steam engine = 4 hr 25 min = $4\frac{25}{60}\text{ hr} = 4\frac{5}{12}\text{ hr}$

Let the time taken by electric train be $t$ hours.

Then, $x : \frac{5x}{4} :: t : 4\frac{5}{12} \Leftrightarrow 1 : \frac{5}{4} :: t : \frac{53}{12}$

$\Leftrightarrow \frac{5}{4}t = \frac{53}{12} \Leftrightarrow t = \left(\frac{53}{12}\times\frac{4}{5}\right) = \frac{53}{15} = 3\frac{8}{15}\text{ hr}.$

**48.** Suppose $B$ takes $x$ hours to walk $d$ km.

Then, $A$ takes $(x + 2)$ hours to walk $d$ km.

A's speed = $\left(\frac{d}{x+2}\right)\text{km/hr}$ and B's speed = $\left(\frac{d}{x}\right)\text{km/hr}.$

A's new speed = $\left(\frac{2d}{x+2}\right)\text{km/hr}.$

$\therefore \frac{d}{\left(\frac{d}{x}\right)} - \frac{d}{\left(\frac{2d}{x+2}\right)} = 1 \Leftrightarrow x - \left(\frac{x+2}{2}\right) = 1$

$\Leftrightarrow x - 2 = 2 \Leftrightarrow x = 4.$

**49.** Speed = $\left(10\times\frac{60}{12}\right)\text{km/hr} = 50 \text{ km/hr}.$

New speed = (50 − 5) km/hr = 45 km/hr.

$\therefore$ Time taken = $\left(\frac{10}{45}\right)\text{hr} = \left(\frac{2}{9}\times 60\right)\text{min} = 13\frac{1}{3}\text{ min}$

= 13 min 20 sec.

**50.** Distance covered in 2 hrs 15 min, i.e.,

$2\frac{1}{4}\text{ hrs} = \left(80\times\frac{9}{4}\right)\text{hrs} = 180 \text{ hrs}.$

Time taken to cover remaining distance

$= \left(\frac{350-180}{60}\right)\text{hrs} = \frac{17}{6}\text{ hrs} = 2\frac{5}{6}\text{ hrs} = 2 \text{ hrs } 50 \text{ min}.$

Total time taken = (2 hrs 15 min + 2 hrs 50 min) = 5 hrs 5 min.

So, Anna reached city A at 10.25 a.m.

**51.** Distance = (240 × 5) km = 1200 km.

$\therefore$ Required speed = $\left(1200\times\frac{3}{5}\right)\text{km/hr} = 720 \text{ km/hr}.$

**52.** Time required = (2 hrs 30 min − 50 min)

= 1 hr 40 min = $1\frac{2}{3}$ hrs.

$\therefore$ Required speed = $\left(50\times\frac{3}{5}\right)\text{km/hr} = 30 \text{ km/hr}.$

Original speed = $\left(50\times\frac{2}{5}\right)\text{km/hr} = 20 \text{ km/hr}.$

$\therefore$ Difference in speed = (30 − 20) km/hr = 10 km/hr.

**53.** Remaining distance = 3 km

and Remaining time = $\left(\frac{1}{3}\times 45\right)\text{min} = 15 \text{ min} = \frac{1}{4}\text{ hour}.$

$\therefore$ Required speed = (3 × 4) km/hr = 12 km/hr.

**54.** Let the total journey be $x$ km.

Then, $\frac{3x}{5} + \frac{7x}{20} + 6.5 = x \Leftrightarrow 12x + 7x + 20\times 6.5$

$= 20x \Leftrightarrow x = 130 \text{ km}.$

**55.** Time taken to travel 45 km = $\left(\frac{45}{20}\right)\text{hr} = \frac{9}{4}\text{ hr} = 2\frac{1}{4}\text{ hr}$

= 2 hr 15 min.

Remaining time = (3 hr – 2 hr 15 min) = 45 min.

Hence, required speed = $\left(\frac{45}{45}\right)$km/min = 1 km/min.

**56.** Time taken to travel 25 km = $\left(\frac{25}{40}\right)$hr = $\frac{5}{8}$ hr.

Remaining time = $\left(1-\frac{5}{8}\right)$hr = $\frac{3}{8}$ hr.

$\therefore$ Required speed = $\left(21\times\frac{8}{3}\right)$km/hr = 56 km/hr.

**57.** Total distance = (70 + 50) miles = 120 miles.

Average speed = 50 miles/hour.

Required time of journey = $\left(\frac{120}{50}\right)$hr = $\frac{12}{5}$ = hr $2\frac{2}{5}$ hr

= 2 hr 24 min.

Time taken to cover 50 miles

= $1\frac{1}{2}$ hr = 1 hr 30 min.

$\therefore$ Remaining time = (2 hr 24 min – 1 hr 30 min) = 54 min.

**58.** Let the total distance be $x$ km. Then,

$$\frac{\frac{1}{2}x}{21}+\frac{\frac{1}{2}x}{24}=10\Rightarrow\frac{x}{21}+\frac{x}{24}=20$$

$$\Rightarrow\quad 15x=168\times20\Rightarrow x=\left(\frac{168\times20}{15}\right)=224\text{ km.}$$

**59.** Let the length of the journey be $x$ km. Then,

$$\frac{\frac{1}{3}x}{60}+\frac{\frac{2}{3}x}{80}=5\Rightarrow\frac{x}{180}+\frac{x}{120}=5\Rightarrow\frac{5x}{360}=5\Rightarrow x=360.$$

**60.** Let the total distance be $3x$ km.

Then, $\frac{x}{3}+\frac{x}{4}+\frac{x}{5}=\frac{47}{60}\Leftrightarrow\frac{47x}{60}=\frac{47}{60}\Leftrightarrow x=1.$

$\therefore$ Total distance = (3 × 1) km = 3 km.

**61.** Let the distance travelled by the train be $x$ km.

Then, distance travelled by bus = $(285-x)$ km.

$$\therefore\quad\left(\frac{285-x}{40}\right)+\frac{x}{55}=6\Leftrightarrow\frac{(285-x)}{8}+\frac{x}{11}=30$$

$$\Leftrightarrow\quad\frac{11(285-x)+8x}{88}=30$$

$\Leftrightarrow$ $3135 - 11x + 8x = 2640 \Leftrightarrow 3x = 495 \Leftrightarrow x = 165.$

Hence, distance travelled by train = 165 km.

**62.** Let A's speed = $x$ km/hr. Then, B's speed = $(7 - x)$ km/hr.

So, $\frac{24}{x}+\frac{24}{(7-x)}=14\Leftrightarrow 24(7-x)+24x=14x(7-x)$

$\Leftrightarrow$ $14x^2 - 98x + 168 = 0$

$\Leftrightarrow$ $x^2 - 7x + 12 = 0$

$\Leftrightarrow$ $(x - 3)(x - 4) = 0$

$\Leftrightarrow$ $x = 3$ or $x = 4$.

Since $A$ is faster than $B$, so A's speed = 4 km/hr and B's speed = 3 km/hr.

**63.** Speed on return trip = 150% of 40 = 60 kmph.

$\therefore$ Average speed

= $\left(\frac{2\times40\times60}{40+60}\right)$km/hr = $\left(\frac{4800}{100}\right)$km/hr = 48 km/hr.

**64.** Average speed = $\left(\frac{2\times500\times700}{500+700}\right)$km/hr = $\left(\frac{1750}{3}\right)$km/hr

= $583\frac{1}{3}$ km/hr.

**65.** Average speed = $\left(\frac{2\times56\times53}{56+53}\right)$km/hr = $\left(\frac{5936}{109}\right)$km/hr

= 54.45 km/hr $\approx$ 54.5 km/hr.

**66.** Average speed

= $\frac{\left(2\times\frac{5}{2}\times\frac{13}{4}\right)}{\left(\frac{5}{2}+\frac{13}{4}\right)}$km/hr = $\left(\frac{65}{4}\times\frac{4}{23}\right)$km/hr = $\left(\frac{65}{23}\right)$km/hr.

Total time taken = 4 hr 36 min = $4\frac{36}{60}$ hr = $4\frac{3}{5}$ hr = $\frac{23}{5}$ hr.

Total distance covered uphill and downhill

= $\left(\frac{65}{23}\times\frac{23}{5}\right)$km = 13 km.

$\therefore$ Distance walked uphill = $\left(\frac{13}{2}\right)$km = $6\frac{1}{2}$ km.

**67.** Time taken to cover 150 km in going trip

= 3 hr 20 min = $3\frac{20}{60}$ hr = $3\frac{1}{3}$ hr = $\frac{10}{3}$ hr.

Speed in going trip = $\left(150\times\frac{3}{10}\right)$km/hr = 45 km/hr.

Time taken to cover 150 km in return trip = 4 hr 10 min.

= $4\frac{1}{6}$ hr = $\frac{25}{6}$ hr.

Speed in return trip = $\left(150\times\frac{6}{25}\right)$km/hr = 36 km/hr.

$\therefore$ Average speed

= $\left(\frac{2\times45\times36}{45+36}\right)$km/hr = $\left(\frac{2\times45\times36}{81}\right)$km/hr = 40 km/hr.

Required difference = (45 – 40) km/hr = 5 km/hr.

**68.** Let the speed in return journey be $x$ km/hr.

Then, speed in onward journey = $\frac{125}{100}x=\left(\frac{5}{4}x\right)$ km/hr.

Average speed = $\left(\frac{2\times\frac{5}{4}x\times x}{\frac{5}{4}x+x}\right)$km/hr = $\left(\frac{10x}{9}\right)$km/hr.

$\therefore$ $\left(800\times\frac{9}{10x}\right)=16\Leftrightarrow x=\left(\frac{800\times9}{16\times10}\right)=45.$

So, speed in onward journey

= $\left(\frac{5}{4}\times45\right)$km/hr = 56.25 km/hr.

**69.** Time taken = 5 hrs 25 min = $\frac{65}{12}$ hrs.

Let the required distance be $x$ km.

Then, $\frac{x}{10}+\frac{x}{1}=\frac{65}{12} \Leftrightarrow 11x=\frac{650}{12} \Leftrightarrow x=\frac{325}{66}=4\frac{61}{66}$ km.

**70.** Total distance travelled = (50 × 1 + 48 × 2 + 52 × 3) km
= 302 km.

Total time taken = 6 hrs.

$\therefore$ Mean speed = $\left(\frac{302}{6}\right)$ km/hr = $50\frac{1}{3}$ km/hr.

**71.** Total distance travelled = (39 + 25) km = 64 km.

Total time taken = (45 + 35) min = 80 min = $\frac{4}{3}$ hr.

$\therefore$ Average speed = $\left(64\times\frac{3}{4}\right)$ km/hr = 48 km/hr.

**72.** Total distance travelled = $\left(30\times\frac{12}{60}+45\times\frac{8}{60}\right)$ km = 12 km.

Total time taken = (12 + 8) min = 20 min = $\frac{1}{3}$ hr.

$\therefore$ Average speed = (12 × 3) km/hr = 36 km/hr.

**73.** Total time taken = $\left(\frac{160}{64}+\frac{160}{80}\right)$ hrs = $\frac{9}{2}$ hrs.

$\therefore$ Average speed = $\left(320\times\frac{2}{9}\right)$ km/hr = 71.11 km/hr.

**74.** Total distance travelled = (10 + 12) km/hr = 22 km/hr.

Total time taken = $\left(\frac{10}{12}+\frac{12}{10}\right)$ hrs = $\frac{61}{30}$ hrs.

$\therefore$ Average speed = $\left(22\times\frac{30}{61}\right)$ km/hr = 10.8 km/hr.

**75.** Total distance travelled = (600 + 800 + 500 + 100) km
= 2000 km.

Total time taken = $\left(\frac{600}{80}+\frac{800}{40}+\frac{500}{400}+\frac{100}{50}\right)$ hrs = $\frac{123}{4}$ hrs.

$\therefore$ Average speed = $\left(2000\times\frac{4}{123}\right)$ km/hr = $\left(\frac{8000}{123}\right)$ km/hr

$=65\frac{5}{123}$ km/hr.

**76.** Total distance travelled = (24 + 36) km = 60 km.

Total time taken = $\left(\frac{24}{16}+\frac{36}{15}\right)$hr = $\left(\frac{3}{2}+\frac{12}{5}\right)$hr = $\frac{39}{10}$ hrs.

$\therefore$ Average speed = $\left(60\times\frac{10}{39}\right)$km/hr = $\left(\frac{200}{13}\right)$km/hr

= 15.38 km/hr.

**77.** Let each distance be equal to $d$. Then,
Total distance travelled = $3d$.

Total time taken = $\left(\frac{d}{x}+\frac{d}{y}+\frac{d}{z}\right)$hr = $\frac{d(xy+yz+zx)}{xyz}$ hr.

$\therefore$ Average speed = $\left[3d\times\frac{xyz}{d(xy+yz+zx)}\right]$km/hr

$=\frac{3xyz}{(xy+yz+zx)}$ km/hr.

**78.** Let the whole distance travelled be $x$ km and the average speed of the car for the whole journey be $y$ km/hr.

Then, $\frac{(x/3)}{10}+\frac{(x/3)}{20}+\frac{(x/3)}{60}=\frac{x}{y}$

$\Leftrightarrow \frac{x}{30}+\frac{x}{60}+\frac{x}{180}=\frac{x}{y} \Leftrightarrow \frac{1}{18}y=1 \Leftrightarrow y=18$ km/hr.

**79.** $x\times\frac{15}{60}+2x\times\frac{20}{60}+x\times\frac{10}{60}=39$

$\Rightarrow \frac{x}{4}+\frac{2x}{3}+\frac{x}{6}=39 \Rightarrow 3x+8x+2x=468 \Rightarrow x=36.$

**80.** Let speed of jogging be $x$ km/hr.

Total time taken = $\left(\frac{9}{6}\text{ hrs}+1.5\text{ hrs}\right)$ = 3 hrs.

Total distance covered = (9 + 1.5$x$) km.

$\therefore \frac{9+1.5x}{3}=9 \Leftrightarrow 9+1.5x=27 \Leftrightarrow \frac{3}{2}x=18$

$\Leftrightarrow x=\left(18\times\frac{2}{3}\right)=12$ kmph.

**81.** Ratio of speeds while going and returning = 40 : 30 = 4 : 3.
Ratio of times taken while going and returning = 3 : 4.

Time taken while going = $\left(\frac{3}{7}\times 8\right)$hr = $\frac{24}{7}$ hr.

Time taken while returning = $\left(\frac{4}{7}\times 8\right)$hr = $\frac{32}{7}$ hr.

$\therefore$ Required distance = $\left(40\times\frac{24}{7}\right)$miles = $\frac{960}{7}$ miles

= 137.14 miles.

**82.** Time taken = 1 hr 40 min 48 sec

= 1 hr $40\frac{4}{5}$ min = $1\frac{51}{75}$ hrs = $\frac{126}{75}$ hrs.

Let the actual speed be $x$ km/hr.

Then, $\frac{5}{7}x\times\frac{126}{75}=42$ or $x=\left(\frac{42\times7\times75}{5\times126}\right)=35$ km/hr.

**83.** New speed = $\frac{7}{11}$ of usual speed.

$\therefore$ New time = $\frac{11}{7}$ of usual time.

So, $\frac{11}{7}$ of usual time = 22 hrs

$\Rightarrow$ usual time = $\left(\frac{22\times7}{11}\right)=14$ hrs.

Hence, time saved = (22 − 14) = 8 hrs.

**84.** Let the speed be $x$ km/hr.

Then, $30x-30\times\frac{14}{15}x=10 \Leftrightarrow 2x=10 \Leftrightarrow x=5$ km/hr.

**85.** New speed = $\frac{6}{7}$ of usual speed.

New time = $\frac{7}{6}$ of usual time

$\therefore \quad \left(\frac{7}{6}\text{ of usual time}\right) - (\text{usual time}) = \frac{1}{5}\text{ hr.}$

$\Rightarrow \quad \frac{1}{6}\text{ of usual time} = \frac{1}{5}\text{ hr}$

$\Rightarrow \quad \text{usual time} = \frac{6}{5}\text{ hr} = 1\text{ hr }12\text{ min.}$

**86.** Let the average speed on the onward journey be $x$ km/hr.
Then, average speed on return journey

$= (80\%\text{ of } x)\text{ km/hr} = \left(\frac{4x}{5}\right)\text{km/hr.}$

$\therefore \quad \frac{500}{x} + \frac{500}{\left(\frac{4x}{5}\right)} + \frac{1}{2} = 23 \Rightarrow \frac{500}{x} + \frac{625}{x} = \frac{45}{2}$

$\Rightarrow \quad \frac{1125}{x} = \frac{45}{2} \Rightarrow x = \frac{1125 \times 2}{45} = 50.$

Hence, speed on return journey

$= \left(\frac{4x}{5}\right) = \left(\frac{4 \times 50}{5}\right)\text{km/hr} = 40\text{ km/hr.}$

**87.** Let the normal speed of the train be $x$ km/hr.

Then, new speed $= \left(112\frac{1}{2}\%\text{ of } x\right)\text{km/hr}$

$= \left(\frac{225}{2} \times \frac{1}{100} \times x\right)\text{km/hr} = \left(\frac{9}{8}x\right)\text{km/hr.}$

Let the distance covered be $d$ km.

Then, $\frac{d}{x} - \frac{d}{\left(\frac{9x}{8}\right)} = \frac{20}{60} = \frac{1}{3} \Rightarrow \frac{d}{x} - \frac{8d}{9x} = \frac{1}{3}$

$\Rightarrow \quad \frac{d}{9x} = \frac{1}{3} \Rightarrow d = 3x.$

$\therefore$ Actual time taken $= \frac{d}{x} = \frac{3x}{x} = 3\text{ hours} = 180\text{ min.}$

**88.** Let the distance be $x$ km.

Difference in timings = 12 min $= \frac{12}{60}\text{ hr} = \frac{1}{5}\text{ hr.}$

$\therefore \quad \frac{x}{\left(\frac{5}{2}\right)} - \frac{x}{\left(\frac{7}{2}\right)} = \frac{1}{5} \Leftrightarrow \frac{2x}{5} - \frac{2x}{7} = \frac{1}{5}$

$\Leftrightarrow 14x - 10x = 7 \Leftrightarrow x = 1\frac{3}{4}\text{ km.}$

**89.** Difference between timings $= 24\text{ min} = \frac{24}{60}\text{ hr} = \frac{2}{5}\text{ hr.}$

Let the length of the journey be $x$ km.

Then, $\frac{x}{40} - \frac{x}{50} = \frac{2}{5} \Leftrightarrow \frac{x}{200} = \frac{2}{5} \Leftrightarrow x = \left(\frac{2}{5} \times 200\right) = 80\text{ km.}$

**90.** Let the correct time to complete the journey be $x$ min.
Distance covered in $(x + 11)$ min. at 40 kmph

= Distance covered in $(x + 5)$ min. at 50 kmph

$\therefore \quad \frac{(x+11)}{60} \times 40 = \frac{(x+5)}{60} \times 50 \Leftrightarrow x = 19\text{ min.}$

**91.** Let the distance travelled be $x$ km.

Then, $\frac{x}{10} - \frac{x}{15} = 2 \Leftrightarrow 3x - 2x = 60 \Leftrightarrow x = 60\text{ km.}$

Time taken to travel 60 km at 10 km/hr $= \left(\frac{60}{10}\right)\text{hrs} = 6\text{ hrs.}$

So, Robert started 6 hours before 2 P.M. *i.e.*, at 8 A.M.

$\therefore$ Required speed $= \left(\frac{60}{5}\right)\text{kmph} = 12\text{ kmph.}$

**92.** Let the to and fro distance to the mall be $x$ km.

Then, $\frac{x}{10} - \frac{x}{15} = \frac{30}{60} = \frac{1}{2} \Rightarrow \frac{x}{30} = \frac{1}{2} \Rightarrow x = 15.$

Time taken to travel 15 km at 10 km/hr

$= \left(\frac{15}{10}\right)\text{hr} = \frac{3}{2}\text{ hrs} = 1\frac{1}{2}\text{ hrs.}$

Since 30 minutes were spent in shopping, so Ravi started for the mall 2 hours before 19.00 hrs *i.e.*, at 17.00 hrs.

Now, required time for to and fro journey

$= (18.15\text{ hrs} - 17.00\text{ hrs}) - 30\text{ min} = 45\text{ min} = \frac{3}{4}\text{ hrs.}$

Hence, required speed $= \left(15 \times \frac{4}{3}\right)\text{km/hr} = 20\text{ km/hr.}$

**93.** Let the distance travelled by bus be $x$ km.
Then, distance travelled by train $= (285 - x)$ km.

$\therefore \quad \frac{x}{40} + \frac{(285-x)}{55} = 6 \Rightarrow \frac{11x + 8(285-x)}{440} = 6$

$\Rightarrow \quad 11x - 8x + 2280 = 2640 \Rightarrow 3x = 360 \Rightarrow x = 120.$

Hence, distance travelled by train $= (285 - 120)$ km $= 165$ km.

**94.** Let distance $= x$ km and usual rate $= y$ kmph.

$$\frac{x}{y} - \frac{x}{y+3} = \frac{40}{60} \quad \text{or} \quad 2y(y+3) = 9x \qquad ...(i)$$

And, $\frac{x}{y-2} - \frac{x}{y} = \frac{40}{60}\text{ or } y(y-2) = 3x \qquad ...(ii)$

On dividing $(i)$ by $(ii)$, we get :

$2(y + 3) = 3(y - 2) \Rightarrow y = 12.$

$\therefore$ Distance $= x = \frac{2y(y+3)}{9} = \left(\frac{2 \times 12 \times 15}{9}\right)\text{km} = 40\text{ km.}$

**95.** Let distance $= x$ km and usual speed $= y$ kmph.

$$\frac{x}{y} - \frac{x}{y+6} = 4 \Rightarrow 6x = 4y(y+6) \qquad ...(i)$$

And, $\frac{x}{y-6} - \frac{x}{y} = 6 \Rightarrow 6x = 6y(y-6) \qquad ...(ii)$

From (i) and (ii), we get :

$4y(y + 6) = 6y(y - 6) \Rightarrow 2(y + 6) = 3(y - 6) \Rightarrow y = 30.$

$\therefore$ Length of the journey $= x = \frac{4y(y+6)}{6} = \left(\frac{4 \times 30 \times 36}{6}\right)\text{km}$

**96.** Let distance $= x$ km and usual rate $= y$ kmph.

Then, $\frac{x}{y} - \frac{x}{y+10} = 1\text{ or } y(y+10) = 10x \qquad ...(i)$

And $\frac{x}{y} - \frac{x}{y+20} = \frac{7}{4}\text{ or } y(y+20) = \frac{80x}{7} \qquad ...(ii)$

On dividing $(i)$ by $(ii)$, we get : $y = 60.$

Substituting $y = 60$ in $(i)$, we get : $x = 420$ km.

**97.** Let speed of the car be $x$ kmph.

Then, speed of the train $= \frac{150}{100}x = \left(\frac{3}{2}x\right)$ kmph.

$\therefore \frac{75}{x} - \frac{75}{\frac{3}{2}x} = \frac{125}{10\times 60} \Leftrightarrow \frac{75}{x} - \frac{50}{x}$

$= \frac{5}{24} \Leftrightarrow x = \left(\frac{25\times 24}{5}\right) = 120$ kmph.

**98.** Due to stoppages, it covers 9 km less.

Time taken to cover 9 km $= \left(\frac{9}{54}\times 60\right)\text{min} = 10$ min.

**99.** Due to stoppage, Kingfisher flight covers (700 – 560) = 140 km less per hour.

Time taken to cover 140 km $= \left(\frac{140}{700}\times 60\right)\text{min} = 12$ min.

Hence, stoppage time per hour = 12 min.

**100.** Let the distance between village $A$ and $B$ be $x$ km.

Then, $\frac{x}{40} - \frac{x}{60} = 2 \Rightarrow x = 240.$

**101.** Let the distance between the stations $A$ and $B$ be $x$ km.

Time taken = 45 min $= \frac{3}{4}$ hr.

$\therefore$ Original speed $= \left(x\times\frac{4}{3}\right)$km/hr $= \frac{4x}{3}$ km/hr.

New speed $= \left(\frac{4x}{3} - 5\right)$km/hr $= \left(\frac{4x-15}{3}\right)$km/hr.

$\therefore \quad \frac{x}{\left(\frac{4x-15}{3}\right)} = \frac{48}{60} \Rightarrow \frac{3x}{4x-15} = \frac{4}{5}$

$\Rightarrow 15x = 16x - 60 \Rightarrow x = 60.$

**102.** Let the speed of the train be $x$ km/hr.

Then, $\frac{600}{x} - \frac{600}{x+5} = 4 \Leftrightarrow 4x(x+5) = 3000$

$\Leftrightarrow 4x^2 + 20x - 3000 = 0 \Leftrightarrow x^2 + 5x - 750 = 0$

$\Leftrightarrow (x + 30)(x - 25) = 0 \Leftrightarrow x = 25.$

$\therefore$ Speed of the train = 25 km/hr.

**103.** Let the usual speed be $x$ km/hr.

Then, $\frac{75}{x} - \frac{75}{x+10} = \frac{15}{60} \Leftrightarrow x(x+10) = 3000$

$\Leftrightarrow x^2 + 10x - 3000 = 0 \Leftrightarrow (x + 60)(x - 50) = 0 \Leftrightarrow x = 50.$

$\therefore$ Required time $= \left(\frac{300}{60}\right)$hrs $= 5$ hrs.

**104.** Let the distance be $x$ km.

Then, $\frac{x}{7\frac{1}{2}} - \frac{x}{8} = 4 \Leftrightarrow \frac{2x}{15} - \frac{x}{8} = 4 \Leftrightarrow x = 480$ km.

**105.** Let the distance be $x$ km.

Then, $\frac{x}{3} - \frac{x}{3.75} = \frac{1}{2} \Leftrightarrow 2.5x - 2x = 3.75$

$\Leftrightarrow \quad x = \frac{3.75}{0.50} = \frac{15}{2} = 7.5$ km.

**106.** Let the actual distance travelled be $x$ km.

Then, $\frac{x}{10} = \frac{x+20}{14} \Leftrightarrow 14x = 10x + 200$

$\Leftrightarrow \quad 4x = 200 \Leftrightarrow x = 50$ km.

**107.** Ratio of speeds = 3 : 4. Ratio of times taken = 4 : 3.

Suppose $A$ takes $4x$ hrs and $B$ takes $3x$ hrs to reach the destination. Then,

$4x - 3x = \frac{30}{60} = \frac{1}{2}$ or $x = \frac{1}{2}$.

$\therefore$ Time taken by $A = 4x$ hrs $= \left(4\times\frac{1}{2}\right)$ hrs = 2 hrs.

**108.** Let Abhay's speed be $x$ km/hr.

Then, $\frac{30}{x} - \frac{30}{2x} = 3 \Leftrightarrow 6x = 30 \Leftrightarrow x = 5$ km/hr.

**109.** Ratio of speeds = 4 : 3 : 5.

$\therefore$ Ratio of times taken $= \frac{1}{4} : \frac{1}{3} : \frac{1}{5} = 15 : 20 : 12.$

**110.** Let the speed of the fast train be $x$ km/hr.

Then, speed of the slow train = $(x - 16)$ km/hr.

$\therefore \frac{192}{x-16} - \frac{192}{x} = 2 \Rightarrow \frac{1}{x-16} - \frac{1}{x} = \frac{1}{96}$

$\Leftrightarrow \quad x^2 - 16x - 1536 = 0 \Leftrightarrow (x - 48)(x + 32) = 0 \Leftrightarrow x = 48.$

**111.** Let the original planned duration of the flight be $x$ hours.

Then, $\frac{6000}{x} - \frac{6000}{\left(x+\frac{1}{2}\right)} = 400 \Leftrightarrow \frac{6000}{x} - \frac{12000}{(2x+1)} = 400$

$\Leftrightarrow \quad \frac{15}{x} - \frac{30}{(2x+1)} = 1 \Leftrightarrow 2x^2 + x - 15 = 0$

$\Leftrightarrow \quad (x + 3)(2x - 5) = 0 \Leftrightarrow x = \frac{5}{2} = 2\frac{1}{2}.$

**112.** Let the distance covered at 440 kmph be $x$ km.

Then, distance covered at 660 kmph = $(x - 770)$ km.

Total distance covered = $(x + x - 770)$ km

$= (2x - 770)$ km.

$\therefore \quad \frac{2x-770}{500} = \frac{x}{440} + \frac{x-770}{660} \Leftrightarrow \frac{2x-770}{25} = \frac{x}{22} + \frac{(x-770)}{33}$

$\Leftrightarrow \quad 66(2x - 770) = 25(5x - 1540)$

$\Leftrightarrow \quad 7x = 12320 \Leftrightarrow x = 1760.$

Hence, total distance covered = $(2x - 770)$

$= (2 \times 1760 - 770)$ km $= 2750$ km.

**113.** Let A's speed = $x$ km/hr.

Then, B's speed = $(x + 4)$ km/hr.

Clearly, time taken by B to cover (60 + 12) *i.e.*, 72 km

= Time taken by $A$ to cover (60 – 12) *i.e.*, 48 km

$\therefore \quad \frac{72}{x+4} = \frac{48}{x} \Rightarrow 72x = 48x + 192 \Rightarrow 24x = 192 \Rightarrow x = 8.$

Hence, A's speed = 8 km/hr.

**114.** Let the cyclist's speed without wind be $x$ km/hr and the speed of the wind be $y$ km/hr.

Then, $\frac{1}{x+y}=\frac{3}{60}\Rightarrow x+y=20$ ...(*i*)

And, $\frac{1}{x-y}=\frac{4}{60}\Rightarrow x-y=15$ ...(*ii*)

Adding (*i*) and (*ii*), we get : $2x = 35$ or $x = 17.5$.
Putting $x = 17.5$ in (*i*), we get : $y = 2.5$.
Time taken to drive 17.5 km without wind = 1 hr.
Time taken to drive 1 km without wind

$=\left(\frac{1}{17.5}\right)\text{hr}=\left(\frac{1}{17.5}\times 60\right)\text{min}=3\frac{3}{7}\text{ min}.$

**115.** Let the speeds of the train and the car be $x$ km/hr and $y$ km/hr respectively.

Then, $\frac{160}{x}+\frac{600}{y}=8\Rightarrow\frac{20}{x}+\frac{75}{y}=1$ ...(*i*)

And, $\frac{240}{x}+\frac{520}{y}=8\frac{1}{5}\Rightarrow\frac{240}{x}+\frac{520}{y}=\frac{41}{5}$ ...(*ii*)

Multiplying (*i*) by 12 and subtracting (*ii*) from it, we get :

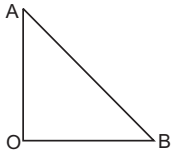
$\frac{380}{y}=12-\frac{41}{5}=\frac{19}{5}\Rightarrow y=\left(380\times\frac{5}{19}\right)=100.$

Putting $y = 100$ in (*i*), we get : $\frac{20}{x}+\frac{3}{4}=1\Rightarrow\frac{20}{x}=\frac{1}{4}\Rightarrow x=80.$

Hence, speed of car = 100 km/hr, speed of train = 80 km/hr

**116.** Suppose the two trawlers start from a point $O$ and move in the directions $OA$ and $OB$ respectively.
Let the speeds of the two sea trawlers be $x$ km/hr and $y$ km/hr. respectively.

Then, $\left(x\times\frac{1}{2}\right)^2+\left(y\times\frac{1}{2}\right)^2=(17)^2$




$\Rightarrow\frac{x^2}{4}+\frac{y^2}{4}=289\Rightarrow x^2+y^2=1156$ ...(*i*)

And, $\left(x\times\frac{3}{4}\right)-\left(y\times\frac{3}{4}\right)=10.5\Rightarrow x-y=10.5\times\frac{4}{3}=14$ ...(*ii*)

Now, $(x + y)^2 + (x - y)^2 = 2(x^2 + y^2)$
$\Rightarrow (x + y)^2 = 2 \times 1156 - (14)^2 = 2312 - 196 = 2116$
$\Rightarrow x + y = \sqrt{2116} = 46$ ...(*iii*)

Adding (*ii*) and (*iii*), we get : $2x = 60$ or $x = 30$.
Putting $x = 30$ in (*ii*), we get : $y = 16$.
Hence, the speeds of the two sea-trawlers are 30 km/hr and 16 km/hr.

**117.** Let $C$'s speed = $x$ km/hr. Then, $B$'s speed = $3x$ km/hr and $A$'s speed = $6x$ km/hr.
$\therefore$ Ratio of speeds of $A$, $B$, $C = 6x : 3x : x = 6 : 3 : 1$.

Ratio of times taken = $\frac{1}{6}:\frac{1}{3}:1=1:2:6.$

If $C$ takes 6 min, then $A$ takes 1 min.

If $C$ takes 72 min, then $A$ takes $\left(\frac{1}{6}\times 72\right)\text{min}=12\text{ min}.$

**118.** Qua]ntity of water let in by the leak in 1 min

$=\left(\frac{3\frac{3}{4}}{12}\right)\text{tonnes}=\left(\frac{15}{4}\times\frac{1}{12}\right)\text{tonnes}=\frac{15}{48}\text{ tonnes}.$

Quantity of water thrown out by the pumps in 1 min

$=\left(\frac{12}{60}\right)\text{tonnes}=\frac{1}{5}\text{ tonnes}.$

Net quantity of water filled in the ship in 1 min

$=\left(\frac{15}{48}-\frac{1}{5}\right)\text{tonnes}=\frac{27}{240}\text{ tonnes}.$

$\frac{27}{240}$ tonnes water is filled in 1 min.

60 tonnes water is filled in $\left(\frac{240}{27}\times 60\right)\text{min}$

$=\frac{1600}{3}\text{ min}=\frac{80}{9}\text{ hrs}.$

Hence, required speed = $\frac{40}{(80/9)}\text{ km/hr}$

$=\left(40\times\frac{9}{80}\right)\text{km/hr}=\frac{9}{2}\text{ km/hr}=4\frac{1}{2}\text{ km/hr}.$

**119.** Quantity of petrol consumed in 1 hour

$=\left(\frac{40}{10}+\frac{1}{2}\right)\text{litres}=4\frac{1}{2}\text{ litres}.$

Time for which the fuel lasted = $\left[\frac{18}{\left(4\frac{1}{2}\right)}\right]\text{hrs}$

$=\left(18\times\frac{2}{9}\right)\text{hrs}=4\text{ hrs}.$

$\therefore$ Required distance = (40 × 4) km = 160 km.

**120.** To be 0.5 km apart, they take 1 hour.

To be 8.5 km apart, they take $\left(\frac{1}{0.5}\times 8.5\right)\text{hrs}=17\text{ hrs}.$

**121.** Since $A$ and $B$ move in the same direction along the circle, so they will first meet each other when there is a difference of one round between the two.
Relative speed of $A$ and $B$ = (6 – 1) = 5 rounds per hour.
Time taken to complete one round at this speed

$=\frac{1}{5}\text{ hr}=12\text{ min}.$

**122.** Perimeter of the field = 2(400 + 300) m = 1400 m = 1.4 km.
Since A and B move in the same direction, so they will first meet each other when there is a difference of one round *i.e.*, 1.4 km between the two.
Relative speed of $A$ and $B$ = (3 – 2.5) km/hr = 0.5 km/hr.

Time take to cover 1.4 km at this speed = $\left(\frac{1.4}{0.5}\right)\text{hr}$

$=2\frac{4}{5}\text{ hr}=2\text{ hr }48\text{ min}.$

So they shall first cross each other at 9 : 48 a.m. and again, 2 hr 48 min after 9 : 48 a.m. *i.e.*, 12 : 36 p.m.
Thus, till 12 : 30 p.m. they will cross each other once.

**123.** Distance covered by first person in time $t$

$=\left(\frac{2}{8}\right)\text{rounds}=\frac{1}{4}\text{ round}.$

Distance covered by second person in time $t = \frac{3}{8}$ round.

Speed of first person $= \frac{1}{4t}$;

Speed of second person $= \frac{3}{8t}$.

Since the two persons start from $A$ and $B$ respectively, so they shall meet each other when there is a difference of $\frac{7}{8}$ round between the two.

Relative speed of $A$ and $B = \left(\frac{3}{8t} - \frac{1}{4t}\right) = \frac{1}{8t}$.

Time taken to cover $\frac{7}{8}$ round at this speed $= \left(\frac{7}{8} \times 8t\right) = 7t$.

**124.** Suppose after $x$ km from the start $B$ catches up with $A$. Then, the difference in the time taken by $A$ to cover $x$ km and that taken by $B$ to cover $x$ km is 4 hours.

$\therefore \frac{x}{4} - \frac{x}{10} = 4$ or $x = 26.7$ km.

**125.** Suppose the two trains meet $x$ km from Delhi.

Then, $\frac{x}{60} - \frac{x}{80} = 2 \Leftrightarrow x = 480$.

**126.** Relative speed of the thief and policeman
$= (11 - 10)$ km/hr $= 1$ km/hr.

Distance covered in 6 minutes $= \left(\frac{1}{60} \times 6\right)$ km
$= \frac{1}{10}$ km $= 100$ m.

$\therefore$ Distance between the thief and policeman
$= (200 - 100)$ m $= 100$ m.

**127.** Relative speed of the car w.r.t. bus $= (50 - 30)$ km/hr
$= 20$ km/hr.

Required distance = Distance covered in 15 min at relative speed $= \left(20 \times \frac{1}{4}\right)$km $= 5$ km.

**128.** Relative speed $= (10 - 8)$ km/hr $= 2$ km/hr.

Required time = Time taken to cover 100 m at relative speed

$= \left(\frac{100}{2000}\right)$hr $= \frac{1}{20}$ hr $= \left(\frac{1}{20} \times 60\right)$min $= 3$ min.

**129.** Suppose the thief is overtaken $x$ hrs after 2.30 p.m.

Then, Distance covered by the thief in $x$ hrs = Distance covered by the owner in $\left(x - \frac{1}{2}\right)$hrs.

$\therefore 60x = 75\left(x - \frac{1}{2}\right) \Leftrightarrow 15x = \frac{75}{2} \Leftrightarrow x = \frac{5}{2}$ hrs.

So, the thief is overtaken at 5 p.m.

**130.** Distance covered by Aryan in 5 min $= (40 \times 5)$ m $= 200$ m.

Relative speed of Rahul w.r.t. Aryan $= (50 - 40)$ m/min
$= 10$ m/min.

Time taken to cover 200 m at relative speed
$= \left(\frac{200}{10}\right)$min $= 20$ min.

Distance covered by the dog in 20 min $= (60 \times 20)$ m
$= 1200$ m.

**131.** Let the thief be caught $x$ metres from the place where the policeman started running.

Let the speed of the policeman and the thief be $5y$ m/s and $4y$ m/s respectively.

Then, time taken by the policeman to cover $x$ metres = time taken by the thief to cover $(x - 100)$ m

$\Rightarrow \frac{x}{5y} = \frac{(x - 100)}{4y} \Rightarrow 4x = 5(x - 100) \Rightarrow x = 500$.

So, the thief ran $(500 - 100)$ i.e. 400 m before being caught.

**132.** Distance covered by $A$ in 4 hrs $= (4 \times 4)$ km $= 16$ km.

Relative speed of $B$ w.r.t. A $= (10 - 4)$ km/hr $= 6$ km/hr.

Time taken to cover 16 km at relative speed
$= \left(\frac{16}{6}\right)$hrs $= \frac{8}{3}$ hrs.

Distance covered by B in $\frac{8}{3}$ hrs $= \left(10 \times \frac{8}{3}\right)$km $= \left(\frac{80}{3}\right)$km
$= 26.7$ km.

**133.** Let the speed of the goods train be $x$ km/hr. Then, relative speed $= (80 - x)$ km/hr.

Distance covered by goods train in 6 hrs at $x$ km/hr = Distance covered by passenger train in 4 hrs at $(80 - x)$ km/hr

$\Rightarrow 6x = 4(80 - x) \Rightarrow 10x = 320 \Rightarrow x = 32$ km/hr.

**134.** Error = Time taken to cover 10 m at 300 m/sec

$= \left(\frac{10}{300}\right)$sec $= \frac{1}{30}$ sec $\approx 0.03$ sec.

**135.** Clearly, the two persons would be maximum distance apart when they stand in opposite directions to the point at which sound is produced, and minimum distance apart when they stand in the same direction.

$\therefore$ Maximum distance between the two persons
= Distance covered by sound in $(6 + 5)$ seconds, i.e. 11 sec
$= (300 \times 11)$ m $= 3300$ m $= 3.3$ km.

And, minimum distance between the two persons
= Distance covered by sound in $(6 - 5)$ sec., i.e. 1 sec
$= 300$ m $= 0.3$ km.

**136.** Let the speed of the man be $x$ m/sec.

Then, Distance travelled by the man in 5 min 52 sec = Distance travelled by sound in 8 sec

$\Leftrightarrow x \times 352 = 330 \times 8$

$\Leftrightarrow x = \left(\frac{330 \times 8}{352}\right)$m/sec.

$= \left(\frac{330 \times 8}{352} \times \frac{18}{5}\right)$km/hr $= 27$ km/hr.

**137.** To be $(18 + 20)$ km apart, they take 1 hour.

To be 47.5 km apart, they take $\left(\frac{1}{38} \times 47.5\right)$hrs $= 1\frac{1}{4}$ hrs.

**138.** Suppose they meet after $x$ hours. Then,

Distance travelled by $P$ in $x$ hrs + Distance travelled by $Q$ in $x$ hrs = 10 km

$\Leftrightarrow 3x + 2x = 10 \Rightarrow 5x = 10 \Rightarrow x = 2$ hrs.

Distance travelled by $P$ in 2 hrs = $(3 \times 2)$ km = 6 km.

**139.** Suppose they meet $x$ hrs after 9 a.m. Then,

Distance travelled by car $X$ in $(x - 1)$ hrs + Distance travelled by car $Y$ in $x$ hrs = 700 km

$\Rightarrow 60(x - 1) + 60x = 700 \Rightarrow 120x = 760$

$\Rightarrow x = \frac{760}{120} = \frac{19}{3}$ hrs = 6 hr 20 min.

So, they cross each other 6 hr 20 min after 9 a.m. *i.e.*, at 3 : 20 p.m.

**140.** Suppose the trains meet after $x$ hrs. Then,

Distance covered by 1st train in $x$ hrs

+ Distance covered by 2nd train in $\left(x - \frac{3}{4}\right)$ hrs = 232 km

$\Rightarrow 48x + 50\left(x - \frac{3}{4}\right) = 232$

$\Rightarrow 98x = 232 + \frac{75}{2} = \frac{539}{2} \Rightarrow x = \frac{539}{196}$ hrs.

Required distance

= Distance travelled by 1st train in $\left(\frac{539}{196}\right)$ hrs.

$= \left(48 \times \frac{539}{196}\right)$ km = 132 km.

**141.** Clearly, the two will meet when they are 726 m apart.

To be (4.5 + 3.75) = 8.25 km apart, they take 1 hour.

To be 726 m apart, they take $\left(\frac{100}{825} \times \frac{726}{1000}\right)$ hrs

$= \left(\frac{242}{2750} \times 60\right)$ min = 5.28 min.

**142.** Relative speed = (2 + 3) = 5 rounds per hour.

So, they cross each other 5 times in an hour and 2 times in half an hour.

Hence, they cross each other 7 times before 9.30 a.m.

**143.** Time taken by the two cyclists to cover one round of the track is $\frac{300}{7}$ sec and $\frac{300}{8}$ sec respectively.

$\therefore$ Required time = L.C.M. of $\frac{300}{7}$ and $\frac{300}{8}$ = 300 sec.

**144.** Relative speed = (200 + 200) km/hr = 400 km/hr.

Distance covered in 1 hr 30 min

$= \left(400 \times \frac{1}{2} + 200 \times \frac{1}{2} + 100 \times \frac{1}{2}\right)$ km

= (200 + 100 + 50) km = 350 km.

[$\because$ speed reduces by half every half an hour]

Hence, distance between the trains

= (425 – 350) km = 75 km.

**Questions 145 to 147**

Let $B$'s speed = $x$ km/hr.

Then, $A$'s speed = (150% of $x$) km/hr = $\left(\frac{3x}{2}\right)$ km/hr.

Clearly, $A$ and $B$ cross each other when A has travelled for 14 hours and B for 9 hours.

So, distance travelled by $A$ in 14 hrs + distance travelled by $B$ in 9 hrs = 120 km

$\Rightarrow \left(\frac{3x}{2} \times 14\right) + 9x = 120 \Rightarrow 30x = 120 \Rightarrow x = 4.$

$\therefore$ $A$'s speed = $\left(\frac{3 \times 4}{2}\right)$ km/hr

= 6 km/hr & B's speed = 4 km/hr.

**145.** Time taken by $A$ to cover 120 km = $\left(\frac{120}{6}\right)$ hrs = 20 hrs.

So, $A$ will reach his destination 20 hrs after 6 a.m., i.e., at 2 a.m. the next day.

**146.** Required difference = $\left(\frac{120}{4} - \frac{120}{6}\right)$ hrs

= (30 – 20) hrs = 10 hrs.

**147.** $A$'s speed = 6 km/hr.

**148.** Let the speed of train $Z$ be $z$ mph.

Distance travelled by train $X$ in 1 hr = $x$ miles.

Relative speed of train Z w.r.t. train $X$ = $(z - x)$ mph.

To catch train $X$ at 5 : 30 A.M., train $Z$ will have to cover $x$ miles at relative speed in 3 hr 30 min, i.e. $\frac{7}{2}$ hrs.

$\therefore \quad (z - x) \times \frac{7}{2} = x \Rightarrow \frac{7}{2}z = \frac{9}{2}x \Rightarrow z = \left(\frac{9}{2} \times \frac{2}{7}\right)x = \frac{9}{7}x.$

**149.** Let the speed of the second lady be $x$ km/hr.

Then, speed of first lady = $(x + 2)$ km/hr.

$\therefore \quad \frac{24}{x} - \frac{24}{(x+2)} = 1 \Rightarrow x(x+2) = 48$

$\Rightarrow \quad x^2 + 2x - 48 = 0 \Rightarrow x^2 + 8x - 6x - 48 = 0$

$\Rightarrow \quad x(x + 8) - 6(x + 8) = 0 \Rightarrow (x + 8)(x - 6) = 0$

$\Rightarrow \quad x = 6.$

Hence, speed of first lady = 8 km/hr; speed of second lady = 6 km/hr.

**150.** Let the speed of the man be $x$ km/hr.

Then, Distance covered by the bus in 2 min

= Distance covered by the man in 8 min

$\Rightarrow 20 \times \frac{2}{60} = x \times \frac{8}{60} \Rightarrow x = \left(\frac{2}{3} \times \frac{60}{8}\right) = 5$ km/hr.

**151.** Suppose the two men meet in $n$ hours.

Then Sum of distances covered by two men in $n$ hours = 76

$\Rightarrow 4\frac{1}{2}n + \left(3\frac{1}{4} + 3\frac{3}{4} + \text{..... upto } n \text{ terms}\right) = 76$

$\Rightarrow \frac{9}{2}n + \frac{n}{2}\left[2 \times \frac{13}{4} + (n-1) \times \frac{1}{2}\right] = 76$

[Sum to $n$ terms of an A.P.]

$\Rightarrow \frac{9n}{2} + \frac{n}{2}\left[\frac{13}{2} + \frac{1}{2}n - \frac{1}{2}\right] = 76$

$\Rightarrow \frac{9n}{2} + \frac{n}{2}\left(6 + \frac{n}{2}\right) = 76$

$\Rightarrow \frac{9n}{2}+\frac{6n}{2}+\frac{n^2}{4}=76 \Rightarrow \frac{15n}{2}+\frac{n^2}{4}=76$

$\Rightarrow 30n + n^2 = 304 \Rightarrow n^2 + 30n - 304 = 0$

$\Rightarrow (n + 38)(n - 8) = 0 \Rightarrow n = 8.$

Distance travelled by first man in 8 hours

$= \left(\frac{9}{2}\times 8\right)\text{km} = 36 \text{ km}.$

Distance travelled by second man = (76 – 36) km = 40 km.

Thus, the meeting point is 36 km from $R$ and 40 km from $S$, i.e. (40 – 36) = 4 km nearer to $R$ than $S$.

Hence, $x = 4$.

**152.** Let their speeds be $x$ m/sec and $y$ m/sec respectively.

Then, $\frac{1200}{x+y}=15 \Rightarrow x+y=80$ ...(*i*)

And, $\frac{1200}{x-y}=60 \Rightarrow x-y=20$ ..(*ii*)

Adding (*i*) and (*ii*), we get : $2x = 100$ or $x = 50$.

Putting $x = 50$ in (*i*), we get : $y = 30$.

Hence, speed of slower plane = 30m/s = 0.03 km/s.

**153.** Let the speed of the faster and slower cyclists be $x$ km/hr and $y$ km/hr respectively,

Then, $\frac{k}{x-y}=r \Rightarrow (x-y)\,r=k$ ...(*i*)

And, $\frac{k}{x+y}=t \Rightarrow (x+y)\,t=k$ ...(*ii*)

From (*i*) and (*ii*), we have :

$(x - y)r = (x + y)t \Rightarrow xr - yr = xt + yt \Rightarrow xr - xt = yr + yt$

$\Rightarrow x(r - t) = y(r + t) \Rightarrow \frac{x}{y}=\frac{r+t}{r-t}.$

**154.** Let the distance between points $X$ and $Y$ be $d$ km.

Suppose the bus takes $x$ hours to travel from $X$ to $Y$.

Then, speed of bus = $\frac{d}{x}$ and speed of car = $\frac{d}{x-2}$.

Now, sum of distances travelled by car and bus in $1\frac{1}{3}$ hrs *i.e.* $\frac{4}{3}$ hrs $= d$

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

$\Rightarrow \frac{4}{3x}+\frac{4}{3(x-2)}=1$

$\Rightarrow 4(x - 2) + 4x = 3x(x - 2)$

$\Rightarrow 3x^2 - 14x + 8 = 0$

$\Rightarrow 3x^2 - 12x - 2x + 8 = 0 \Rightarrow 3x(x - 4) - 2(x - 4) = 0$

$\Rightarrow (x - 4)(3x - 2) = 0 \Rightarrow x = 4 \quad \left[\because x \neq \frac{2}{3}\right]$

$\therefore$ Required time = 4 hours.

**155.** In the same time, they cover 110 km and 90 km respectively.

$\therefore$ Ratio of their speeds = 110 : 90 = 11 : 9.

**156.** At the time of meeting, let the distance travelled by the first train be $x$ km.

Then, distance covered by the second train = $(x + 120)$ km.

$\therefore \frac{x}{50}=\frac{x+120}{60} \Leftrightarrow 60x = 50x + 6000$

$\Leftrightarrow 10x = 6000 \Leftrightarrow x = 600.$

So, distance between $A$ and $B$ = $(x + x + 120)$ km = 1320 km.

**157.** Distance covered by train A from 11 a.m. to 2 p.m. *i.e.*, in 3 hrs = (60 × 3) = 180 km.

Relative speed = (72 – 60) km/hr = 12 km/hr.

Time taken to cover 180 km at relative speed

$= \left(\frac{180}{12}\right)\text{hrs} = 15 \text{ hrs}.$

So, the two trains will meet 15 hrs after 2 p.m. *i.e.*, at 5 a.m. on the next day.

**158.** Let the distance between stations $X$ and $Y$ be $x$ km and let the trains meet $y$ hours after 7 a.m.

Clearly, M covers $x$ km in 4 hrs and $N$ covers $x$ km in (7/2) hrs.

$\therefore$ Speed of $M=\frac{x}{4}\text{kmph}$, Speed of $N=\frac{2x}{7}\text{kmph}.$

Distance covered by $M$ in $(y + 2)$ hrs + Distance covered by $N$ in $y$ hrs = $x$.

$\therefore \frac{x}{4}(y+2)+\frac{2x}{7}\times y = x \Leftrightarrow \frac{(y+2)}{4}+\frac{2y}{7}=1$

$\Leftrightarrow y=\frac{14}{15}\text{ hrs}=\left(\frac{14}{15}\times 60\right)\text{min.} = 56 \text{ min}.$

Hence, the trains meet at 7.56 a.m.

**159.** Suppose the three trains meet $x$ hours after 9 p.m.

Let the speed of train $C$ be $y$ km/hr.

Distance travelled by Train $A$ in $(x + 3)$ hrs = Distance travelled by Train $B$ in $x$ hrs

$\Rightarrow 60(x + 3) = 90x \Rightarrow 30x = 180 \Rightarrow x = 6.$

Also, dist. travelled by Train $B$ in $x$ hrs + Dist. travelled by train $C$ in $x$ hrs = 1260 km

$\Rightarrow 90x + yx = 1260 \Rightarrow 540 + 6y = 1260 \Rightarrow 6y = 720 \Rightarrow y = 120.$

Hence, speed of Train $C$ = 120 km/hr.

**160.** Let the distance be $x$ km. Then,

(Time taken to walk $x$ km) + (Time taken to drive $x$ km)

$= \frac{27}{4}\text{ hrs}$

$\Rightarrow$ (Time taken to walk $2x$ km) + (Time taken to drive $2x$ km)

$= \frac{27}{2}\text{ hrs}.$

But time taken to drive $2x$ km = $\frac{19}{4}\text{ hrs}.$

$\therefore$ Time taken to walk $2x$ km = $\left(\frac{27}{2}-\frac{19}{4}\right)\text{hrs}$

$= \frac{35}{4}\text{ hrs} = 8 \text{ hrs } 45 \text{ min}.$

**161.** Since 10 minutes are saved, it means that Reena's father drives from the meeting point to the station and back to the meeting point in 10 min *i.e.* he can drive from the meeting point to the station in $\left(\frac{10}{2}\right)=5 \text{ min}.$

But he reaches the station daily at 7 p.m. So Reena and her father meet on the way at 6 : 55 p.m. Thus, Reena walked for 25 min before her father picked her up.

**162.** Clearly, the coachman needed 2 hours to reach the station from Mr X's house or 4 hours for the entire round trip.

But now he took (4 – 1) = 3 hours for the round trip.

Thus he went one way in $1\frac{1}{2}$ hrs *i.e.*,

Mr *X* walked for $1\frac{1}{2}$ hrs.

Distance covered in $1\frac{1}{2}$ hrs while walking

$= \left(4 \times \frac{3}{2}\right)\text{miles} = 6 \text{ miles}.$

But this distance would have been covered by the coachman in $\left(2 - 1\frac{1}{2}\right)\text{hr} = \frac{1}{2}\text{hr}.$

Speed of the coachman $= \left(6 \div \frac{1}{2}\right)\text{mph} = 12 \text{ mph}.$

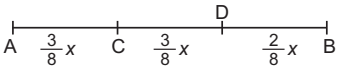
$\therefore$ Distance between the house and the station

= Distance covered by coachman in 2 hrs

= (12 × 2) miles = 24 miles.

**163.** Let length $AB = x$.

Then, if *C* is the position of the




cat, we have $AC = \frac{3}{8}x$.

When the cat runs towards the entrance, the train catches it at the entrance. This means that when the train reaches the entrance, the cat has travelled a distance of $\frac{3}{8}x$.

Let us now consider the case when the cat runs towards the exit.

So, when the train reaches *A*, the cat reaches a point *D* such that CD = $\frac{3}{8}x$.

Then, $BD = \left[x - \left(\frac{3}{8}x + \frac{3}{8}x\right)\right] = \frac{x}{4}.$

Since the train catches the cat at the exit, so the train covers distance *x* (= *AB*) in the same time in which the cat covers distance $\frac{x}{4}(= BD)$.

$\therefore$ Required ratio = $x : \frac{x}{4} = 4 : 1.$

**164.** On attaching 9 compartments to the engine, we have :

reduction in speed = $k\sqrt{9}$, = 3 *k* where *k* is a constant.

$\therefore$ 42 – 3*k* = 24 or 3*k* = 18 or *k* = 6.

For the speed of the engine to be zero, let the number of compartments attached be *x*.

Then, $42 - 6\sqrt{x} = 0 \Rightarrow 6\sqrt{x} = 42 \Rightarrow \sqrt{x} = 7 \Rightarrow x = 49.$

Hence, maximum number of compartments that the engine can pull = (49 – 1) = 48.

**165.** Since *A* and *B* are 5 km apart and Ram's speed is 5 km/hr, so Ram reaches *B* in 1 hour *i.e.*, at 10 a.m.

Thus, when Ram reaches B, Shyam has travelled from 9 : 45 a.m. to 10 a.m. *i.e.* 15 min.

So, distance covered by Shyam when Ram reaches

$B = \left(10 \times \frac{15}{60}\right)\text{km} = \frac{5}{2}\text{km}.$

Now, Ram starts travelling from *B* to *A*.

So, relative speed = (10 + 5) km/hr = 15 km/hr.

Distance between Ram and Shyam = $\left(5 - \frac{5}{2}\right)\text{km} = \frac{5}{2}\text{km}.$

Time taken to cover $\frac{5}{2}$ km at relative speed

$= \left(\frac{5}{2} \times \frac{1}{15}\right)\text{hr} = \frac{1}{6}\text{hr} = 10 \text{ min}.$

Hence, Ram and Shyam meet each other 10 minutes after 10 a.m. *i.e.*, at 10 : 10 a.m.

**166.** Time taken by Shyam to reach *B* from *A*

$= \left(\frac{5}{10}\right)\text{hr} = \frac{1}{2}\text{hr} = 30 \text{ min}.$

So, Shyam reaches *B* at 10 : 15 a.m.

Now, Shyam starts travelling from *B* to *A*.

Distance between Ram and Shyam

= Distance travelled by Ram in 15 min

$= \left(5 \times \frac{1}{4}\right)\text{km} = \frac{5}{4}\text{km}.$

Relative speed = (10 – 5) km/hr = 5 km/hr.

$\therefore$ Time taken to cover $\frac{5}{4}$ km at 5 km/hr

$= \left(\frac{5}{4} \times \frac{1}{5}\right)\text{hr} = \frac{1}{4}\text{hr} = 15 \text{ min}.$

Hence, Shyam overtakes Ram at 15 min past 10 : 15 a.m. *i.e.*, at 10 : 30 a.m.

**167.** Suppose the escalator has *n* steps.

Let man's speed be *x* steps per sec. and the speed of the escalator be *y* steps per sec.

Then, $x + y = \frac{n}{30}$ and $x - y = \frac{n}{90}.$

Adding, we get : $2x = \frac{4n}{90} = \frac{2n}{45}$ or $x = \frac{n}{45}.$

$\therefore$ Required time = $\frac{n}{(n/45)} = 45 \text{ sec}.$

**168.** 60 leaps of the hare = $\left(60 \times 1\frac{3}{4}\right)\text{m} = 105 \text{ m}.$

So, the hound should gain 105 m over the hare.

When the hound travels $\left(3 \times 2\frac{3}{4}\right)\text{m} = \frac{33}{4}\text{m}$, the hare travels $\left(4 \times 1\frac{3}{4}\right)\text{m} = 7\text{m}.$

In 3 leaps of the hound, the hound gains $\left(\frac{33}{4} - 7\right)\text{m} = \frac{5}{4}\text{m}.$

$\therefore$ Number of leaps required = $\left(105\times\frac{4}{5}\times 3\right)=252.$

**169.** Let the total distance be $x$ km and time spent in riding be $y$ hours.

Then, distance covered by riding = $\left(\frac{x}{3}\right)$km.

Distance covered by walking = $\left(x-\frac{x}{3}\right)$km $=\frac{2x}{3}$ km.

Time spent in walking = (20 $y$) hrs.

Riding speed = $\left(\frac{\frac{x}{3}}{y}\right)$km/hr $=\left(\frac{x}{3y}\right)$km/hr.

Walking speed = $\frac{\left(\frac{2x}{3}\right)}{20\,y}$km/hr $=\left(\frac{x}{30\,y}\right)$km/hr.

$\therefore$ Required ratio = $\frac{x}{3y}:\frac{x}{30\,y}=1:\frac{1}{10}=10:1.$

**170.** Suppose after meeting the bus, the car travelled $x$ km to reach Jaipur.

Then, it travelled $x$ km in $1\frac{1}{2}$ hours.

Again, it travelled back to meet the bus again in $1\frac{1}{2}$ hours.

Now, distance travelled in $\frac{1}{2}$ hour $=\frac{x}{3}$ km.

The bus travelled $\left(x-\frac{x}{3}\right)=\frac{2x}{3}$ km in 3 hours.

So, it will travel $x$ km in $\left(3\times\frac{3}{2x}\times x\right)$hrs $=\frac{9}{2}$hrs $=4\frac{1}{2}$hrs.

Hence, the bus will reach Jaipur

$4\frac{1}{2}$ hours after 4 : 30 p.m. *i.e.* at 9 p.m.

**171.** Speed of Karan = 60kmph

Time = 9 hrs.

Distance = Speed × Time = 60 × 9 = 540 km.

$\therefore$ Time taken to cover 540 km at 90 km/ph

$=\frac{540}{90}=6$ hours.

**172.** Speed of bus = 72 km/ph $=\left(\frac{72\times 5}{18}\right)$m/sec. = 20 m/sec.

Let distance covered by bus in 5 sec be $x$

$\therefore$ Distance = Speed × Time

$\Rightarrow x$ = 20 × 5 = 100 meter

**173.** Let the distance covered be $2x$ km.

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

Time taken to covers the first half and second half of the journey in $t_1$ and $t_1$ hours

$\Rightarrow \frac{a}{60}=t_1$ ....(i)

$\Rightarrow \frac{a}{45}=t_2$ ....(ii)

Adding (i) and (ii) we get

$\frac{a}{60}+\frac{a}{45}=t_1+t_2$

$\frac{a}{60}+\frac{a}{45}=5\frac{15}{60}=5\frac{1}{4}$

$\Rightarrow\frac{3a+4a}{180}=\frac{21}{4}$

$\Rightarrow 7a=\frac{21}{4}\times 180$

$\Rightarrow a=\frac{21\times 180}{4\times 7}=135$ km.

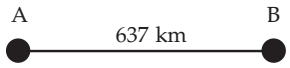
$\therefore$ Length of total journey.

= 2 × 135 = 270 km.

**174.** Speed of Ashok = 39 km/ph

Speed of Rahul = 47 km/ph

Distance between place A and B = 637 km




Ashok (8:00 am) Rahul (10:00 am)

Distance covered by Ashok (from 8 am to 10 am) in 2 hours = 2 × 39 = 78 km

$\therefore$ Remaining distance = 637 – 78 = 559

Relative speed = 39 + 47 = 86 km/ph

$\therefore$ Time taken to travel 559 km = $\frac{559}{86}$ = 6.5 hours

So, they meet at = (10 a.m.+ 6.5) hours = 4:30 pm

**175.** 1 m/sec = $\frac{18}{5}$ km/ph

Car cover 20 metres in a second

$\therefore$ 20 m/sec = $\frac{20\times 18}{5}$ = 72 km/ph

**176.** Distance between the Speed of P and Q

= $3\frac{1}{2}-3=\frac{7}{2}-3=\frac{1}{2}$ km/hr.

So, Distance = Speed × Time

Time = 4 hours

$\Rightarrow D=\frac{1}{2}\times 4=2$ km

**177.** Let the total distance be covered $3a$ km

$2a$ km distance covered in 2 hours 30 minutes at the rate of $k$ km/ph.

According to the question

Speed × Time = Distance

$x\times 2\frac{30}{60}=2a$

$\Rightarrow x\times 2\frac{1}{2}=2a$

$\therefore x\times\frac{5}{2}=2a$

$\Rightarrow 5x = 4a$ ....(*i*)

Then, '$a$' km distance covered in 50 minutes at the rate of ($x$ + 2 ) km/ph.

$(x+2)\times\frac{50}{60}=a$

$\Rightarrow (x + 2) \times 5 = 6a$ ....(ii)

On dividing equation (ii) by (i).

$$\frac{(x+2)\times 5}{5x} = \frac{6a}{4a}$$

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

$\Rightarrow 3x = 2x + 4$

$\Rightarrow x + 4$

From equation (i)

$5 \times 4 = 4a$

$\Rightarrow a = 5$

$\therefore$ Total distance $= 3a = 3 \times 5 = 15$ km.

**178.** Difference between time = 1 hour

Distance between point AB = $x$ km

According to the question

$$\frac{x}{18} - \frac{x}{24} = 1$$

LCM of 18 and 24 = 72

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

$\Rightarrow x = 72$ km

Time taken at 18 km/ph to cover 72 km

$$= \frac{72}{18} = 4 \text{ hours}$$

$\therefore$ Speed to cover 72 km in 2 hours

$$= \frac{72}{2} = 36 \text{ km/ph.}$$

**179.** Let the distance between school and home be = $D$

According to the given information

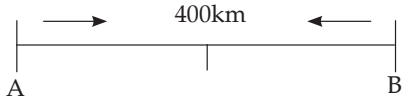
$$\frac{D}{2\frac{1}{2}} - \frac{D}{3} = 16 \text{ minutes}$$

$$\therefore \frac{2D}{5} - \frac{D}{3} = \frac{16}{60}$$

$$\Rightarrow \frac{6D-5D}{15} = \frac{16}{60}$$

$$\Rightarrow D = \frac{16}{60} \times 15 = 4 \text{ km}$$

**180.**




Let the speed of Kim be $a$ and that of Om be $b$.

Distance between point A and B = 400 $km$

Then, $\frac{400}{a} - \frac{400}{b} = 1$

Let, $\frac{1}{a} = x$ and $\frac{1}{b} = y$

$400x - 500y = 1$ ....(i)

Speed of km doubles and she will take lets time *i.e.* 1 hour 30 minutes than 0 meter

Again, $\frac{400}{b} - \frac{400}{2b} = \frac{3}{2}$

$$\therefore 400y - 200x = \frac{3}{2}$$

$800y - 400x = 3$

Solving (i) and (ii), we get

$400x - 400y = 1$

$$\frac{-400x + 800y = 3}{400y = 4}$$

$$\therefore y = \frac{4}{400} = \frac{1}{100} \text{ km}$$

$\therefore b = 100$ km

Now, $\frac{400}{a} - \frac{400}{100} = 4$

Or, $\frac{400}{a}$

$\therefore a = 80$ kmph.

**181.** Let distance covered be $x$ in 15 minutes

$$\text{Average speed} = \frac{\text{Time distance}}{\text{Time taken}}$$

$$= \left(\frac{650+850}{12+18}\right) \text{kmph}$$

$$= \left(\frac{1500}{30}\right) \text{kmph}$$

= 50 kmph

**182.** Speed of vehicle = 80 kmph

$$= \left(\frac{80\times 1000}{60}\right) \text{m/min.}$$

$$= \left(\frac{4000}{3}\right) \text{m/min.}$$

$$\therefore \text{Required distance } x = \frac{4000}{3} \times 15 = 20000 \text{ meter}$$

**183.** According to given information

$$\frac{\frac{2x}{3}}{4} + \frac{3}{5} = \frac{3}{2}$$

$$\Rightarrow \frac{2x}{12} + \frac{x}{15} = \frac{3}{2}$$

$$\Rightarrow \frac{x}{6} + \frac{x}{15} = \frac{3}{2}$$

$$\Rightarrow \frac{5x+2x}{30} = \frac{3}{2}$$

$$\Rightarrow \frac{7x}{30} = \frac{3}{2}$$

$\Rightarrow 14x = 90$

$$\Rightarrow x = \frac{90}{14} = 6.4 \text{ km.}$$

**184.** Rani goes to school from her house = 30 minutes

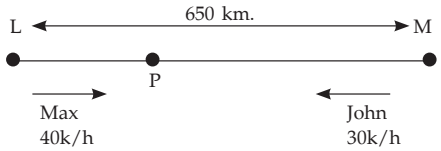
Raja goes to school from her house = 45 minutes

Required ratio = 30 : 45 = 2 : 3

**185.** Speed of John = 30 km/h

Speed of Max = 40 km/h

Distance between L and M = 650 km




Distance travelled by John in 3 hrs. = 30 × 3 = 90 kms
Time taken by Max and John to travel remaining (650 – 90 = 560)

$= \frac{560}{40+30} = 8$ hours.

Distance travelled by John to reach point
P = 8 × 30 = 240 kms
Distance between P and M = 240 + 90 = 330 kms

**186.** Let the distance travelled by a car be $x$ km.

First $\frac{x}{3}$ km distance cover at speed of 10 km/hr

Second $\frac{x}{3}$ km distance cover at speed = 20 km/hr

Third $\frac{x}{3}$ km distance cover at speed = 60 km/hr

According to given information

Total time $= \frac{x}{3\times10} + \frac{x}{3\times20} + \frac{x}{3\times60}$

$= \frac{x}{30} + \frac{x}{60} + \frac{x}{180}$

$= \frac{6x+3x+x}{180}$

$= \frac{10x}{180} = \frac{x}{18}$

Average speed = $\frac{x\times18}{x}$ km/hr. = 18 km/hr

**187.** Let the speed of car be $x$ km/hr
Distance = speed × time
Distance = $8x$ km
According to given information
$(x + 4) \times 7.5 = 8x$
$\Rightarrow 7.5x + 30 = 8x$
$\Rightarrow 8x - 7.5x = 30$
$30 = 0.5x$
$x = \frac{30}{0.5} = 60$ km/hr

Required distance = 8 × 60 = 480 km.

**188.** Speed of thief = 10 km/hr
Speed of policeman = 11 km/hr
Relative speed of policeman with respect to thief
= (11 – 10) km/hr = 1 km/hr
Thief is noticed by a policeman from a distance of 200m
Distance covered in 6 minutes $\frac{1000}{60}\times6 = 100$ m
Distance between them after 6 minutes
= 200 – 100 = 100 m

**189.** Let total distance covered by man be $x$ km
Journey covered by rail = $\frac{2x}{15}$
Journey covered by bus = $\frac{9x}{20}$
Remaining covered by Cycle = 10 km

$\therefore x\left(1-\frac{2}{15}-\frac{9}{20}\right)=10$

LCM of 15 and 20 = 60

$x\left(\frac{60-8-27}{60}\right)=10$

$\Rightarrow x\left(\frac{25}{60}\right)=10$

$x = \frac{10\times60}{25} = 24$ km.

**190.** Speed of Ramesh = 10 kmph
Ramesh will take rest four times during his journey
$\therefore$ Required time
$= \left(5\times\frac{1}{10}\times60\right)$minutes + (5 × 4) minutes
= (30 + 20) minutes
= 50 minutes
Ramesh takes time to cover a distance of 5 kms

**191.** According to the question,
$\therefore$ 50m = 20m
$\therefore$ 1m = $\frac{20}{50}$ m

$\therefore$ 1000m = $\left(\frac{20}{50}\times1000\right)$m ≡ 400 m

## EXERCISE

## (DATA SUFFICIENCY TYPE QUESTIONS)

**Directions** *(Questions 1 to 12): Each of the questions below consists of a statement and/or a question and two statements numbered I and II given below it. You have to decide whether the data provided in the statements is/are sufficient to answer the question. Read both the statements and*

*Give answer (a) if the data in Statement I alone are sufficient to answer the question, while the data in Statement II alone are not sufficient to answer the question;*

*Give answer (b) if the data in Statement II alone are sufficient to answer the question, while the data in Statement I alone are not sufficient to answer the question;*

*Give answer (c) if the data either in Statement I or in Statement II alone are sufficient to answer the question;*

***Give answer (d) if the data even in both Statements I and II together are not sufficient to answer the question; and***

***Give answer (e) if the data in both Statements I and II together are necessary to answer the question.***

**1.** How much time did *X* take to reach the destination?

**I.** The ratio between the speeds of X and Y is 3 : 4.

**II.** *Y* takes 36 minutes to reach the same destination.

**2.** Shweta walked from her home to the bus stop and back again. How long did it take her to make the entire trip?

**I.** She walked from home to the bus stop at the rate of 3 km/hr.

**II.** She walked back to home @ 5 km/hr.

**3.** What is the distance between City *A* and City *B*?

**I.** Bus starting from A reaches B at 6 : 15 p.m. at an average speed of 60 kmph.

**II.** Bus at an average speed of 40 kmph reaches *A* at 4 : 35 p.m. if it starts from *B* exactly at noon.

**(Bank P.O., 2009)**

**4.** What is the usual speed of the train? **(M.B.A., 2002)**

**I.** The speed of the train is increased by 25 km/hr to reach the destination 150 km away in time.

**II.** The train is late by 30 minutes.

**5.** Two towns are connected by railway. Can you find the distance between them?

**I.** The speed of mail train is 12 km/hr more than that of an express train.

**II.** A mail train takes 40 minutes less than an express train to cover the distance.

**6.** Sachin jogs at a constant rate for 80 minutes along the same route everyday. How long is the route? **(M.A.T., 2006)**

**I.** Yesterday, Sachin began jogging at 5 : 00 p.m.

**II.** Yesterday, Sachin had jogged 5 miles by 5 : 40 p.m. and 8 miles by 6 : 04 p.m.

**7.** The towns *A*, *B* and *C* are on a straight line. Town *C* is between *A* and *B*. The distance from *A* to *B* is 100 km. How far is *A* from *C*? **(M.B.A., 2003)**

**I.** The distance from *A* to *B* is 25% more than the distance from *C* to *B*.

**II.** The distance from *A* to *C* is $\frac{1}{4}$ of the distance from *C* to *B*.

**8.** What is the average speed of the car over the entire distance?

**I.** The car covers the whole distance in four equal stretches at speeds of 10 kmph, 20 kmph, 30 kmph and 60 kmph respectively.

**II.** The total time taken is 36 minutes.

**9.** How long will it take for a jeep to travel a distance of 250 km? **(M.B.A., 2005)**

**I.** The relative speed of the jeep with respect to the car moving in the same direction at 40 kmph is 50 kmph.

**II.** The car started at 3.00 a.m. in the morning.

**10.** A car and a bus start from city *A* at the same time. How far is the city *B* from city *A* ?

**I.** The car travelling at an average speed of 40 km/hr reaches city *B* at 4 : 35 p.m.

**II.** The bus reaches city *B* at 6 : 15 p.m. at an average speed of 60 km/hr.

**11.** Two cars pass each other in opposite directions. How long would they take to be 500 km apart?

**I.** The sum of their speeds is 135 km/hr.

**II.** The difference of their speeds is 25 km/hr.

**12.** Jacob's house is 60 miles from the town. On Sunday, he went to town and returned home. How long did the entire trip take?

**I.** He travelled at a uniform rate for the round trip of 30 miles per hour.

**II.** If Jacob travelled 10 miles per hour faster, it would have taken $\frac{3}{4}$ of the time for the round trip.

## ANSWERS

**1.** (*e*) **2.** (*d*) **3.** (*b*) **4.** (*e*) **5.** (*d*) **6.** (*b*) **7.** (*c*) **8.** (*a*) **9.** (*a*) **10.** (*e*)
**11.** (*a*) **12.** (*c*)

## SOLUTIONS

**1.** **I.** If *Y* takes 3 min, then *X* takes 4 min.

**II.** If Y takes 36 min, then *X* takes $\left(\frac{4}{3}\times 36\right)\text{min} = 48\text{ min}$.

Thus, I and II together give the answer.

∴ Correct answer is (*e*).

**2.** Since the distance between the house and the bus stop is not given, the duration of the trip cannot be calculated.

∴ Correct answer is (*d*).

**3.** **I.** Only the reaching time is given. So, the duration of the journey and hence the distance between City A and City B cannot be calculated.

**II.** Required distance = $\left(40\times 4\frac{35}{60}\right)\text{km} = 183\frac{1}{3}\text{ km}$.

$\therefore$ II alone gives the answer. $\therefore$ Correct answer is (*b*).

**4.** Let the usual speed of the train be $x$ kmph.

Time taken to cover 150 km at usual speed = $\frac{150}{x}$ hrs.

**I.** Time taken at increased speed = $\frac{150}{(x+25)}$ hrs.

**II.** $\frac{150}{x}-\frac{150}{(x+25)}=\frac{30}{60} \Leftrightarrow \frac{1}{x}-\frac{1}{(x+25)}=\frac{1}{300}$

$\Leftrightarrow$ $[(x + 25) - x] \times 300 = x(x + 25)$

$\Leftrightarrow$ $x^2 + 25x - 7500 = 0 \Leftrightarrow (x + 100)(x - 75) = 0$

$\Leftrightarrow$ $x = 75$.

Thus, I and II together give the answer.

$\therefore$ Correct answer is (*e*).

**5.** Let the distance between the two stations be $x$ km.

**I.** Let the speed of the express train be $y$ km/hr.

Then, speed of the mail train = $(y + 12)$ km/hr.

**II.** $\frac{x}{y}-\frac{x}{(y+12)}=\frac{40}{60}$.

Thus, even I and II together do not give $x$.

$\therefore$ Correct answer is (*d*).

**6.** From II, we have :

Distance covered by Sachin from 5 : 40 p.m. to 6 : 04 p.m *i.e.*, in 24 min = 3 miles.

$\therefore$ Length of the route = Distance covered in 80 min

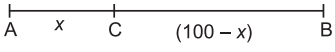
$= \left(\frac{3}{24}\times 80\right)\text{miles} = 10\text{ miles}$.

So, II alone gives the answer while I alone does not.

$\therefore$ Correct answer is (*b*).

**7.** Let AC = $x$ km.

Then, CB = $(100 - x)$km




**I.** AB = 125% of CB

$\Leftrightarrow 100=\frac{125}{100}\times(100-x) \Leftrightarrow 100-x$

$=\frac{100\times 100}{125}=80 \Leftrightarrow x=20\text{ km}$.

$\therefore$ $AC$ = 20 km.

Thus, I alone gives the answer.

**II.** $AC=\frac{1}{4}CB \Leftrightarrow x=\frac{1}{4}(100-x) \Leftrightarrow 5x=100 \Leftrightarrow x=20$.

$\therefore$ $AC$ = 20 km.

Thus, II alone gives the answer.

$\therefore$ Correct answer is (*c*).

**8.** Let the whole distance be $4x$ km.

**I.** Total time taken

$=\left(\frac{x}{10}+\frac{x}{20}+\frac{x}{30}+\frac{x}{60}\right)=\frac{(6x+3x+2x+x)}{60}=\frac{12x}{60}=\frac{x}{5}$.

$\therefore$ Speed = $\frac{\text{Distance}}{\text{Time}}=\frac{4x}{(x/5)}\text{ kmph} = 20\text{ km/hr}$.

$\therefore$ I alone is sufficient to answer the question.

**II.** alone does not give the answer.

$\therefore$ Correct answer is (*a*).

**9.** **I.** Speed of the jeep = (40 + 50) kmph = 90 kmph.

$\therefore$ Required time = $\left(\frac{250}{90}\right)\text{hrs}=\frac{25}{9}\text{ hrs}=2\frac{7}{9}\text{ hrs}$.

So, I alone gives the answer while II alone does not.

$\therefore$ Correct answer is (*a*).

**10.** Let $AB$ = $x$ km. From I and II, we get :

$\frac{x}{40}-\frac{x}{60}=1\frac{40}{60}$ [(6 : 15 p.m.) – (4 : 35 p.m.)

= 1 hr 40 min]

$\Leftrightarrow \frac{x}{40}-\frac{x}{60}=\frac{100}{60}$. This gives $x$.

$\therefore$ Correct answer is (*e*).

**11.** **I.** gives, relative speed = 135 km/hr.

$\therefore$ Time taken = $\frac{500}{135}$ hrs.

**II.** does not give the relative speed.

$\therefore$ I alone gives the answer and II is irrelevant.

$\therefore$ Correct answer is (*a*).

**12.** **I.** Time taken for the round trip = $\left(\frac{120}{30}\right)$ hrs = 4 hrs.

**II.** Let the time taken for the round trip be $x$ hours.

Then, $\frac{120}{\left(\frac{3}{4}x\right)}-\frac{120}{x}=10 \Leftrightarrow \frac{160}{x}-\frac{120}{x}=10$

$\Leftrightarrow 10x = 40 \Leftrightarrow x = 4$.

Thus, I alone or II alone gives the answer.

$\therefore$ Correct answer is (*c*).