TIME, SPEED AND DISTANCE

1. A certain distance is covered by a train with a certain speed. If half the distance is covered in double time, then the ratio of this speed to that of the original one is

(a) 1 : 4 (b) 4 : 1
(c) 1 : 2 (d) 2 : 1

2. A man makes his upward journey at 16 km/h and downward journey at 28 km/h. What is his average speed ?

(a) 32 km/h (b) 56 km/h
(c) 20.36 km/h (d) 22 km/h

3. 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?

(a) 2197 ft (b) 2420 ft
(c) 2500 ft (d) 2629 ft

4. 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?

(a) 10 (b) 20
(c) 30 (d) None of these

5. Two persons *A* and *B* started from two different places towards each other. If the ratio of their speed be 3 : 5, then what is the ratio of distance covered by *A* and *B* respectively till the point of meeting?

(a) 1 : 2 (b) 3 : 4
(c) 3 : 5 (d) 5 : 3

6. If a man travels at 30 km/h, he reaches his destination late by 10 minutes but if he travels at 42 km/h then he reaches 10 minutes earlier. The distance travelled by him is

(a) 30 km (b) 35 km
(c) 45 km (d) 36 km

7. Two trains each of 120 m in length, run in opposite directions with a velocity of 40 m/s and 20 m/s respectively. How long will it take for the tail ends of the two trains to meet each other during the course of their journey?

(a) 20 s (b) 3 s
(c) 4 s (d) 5 s

8. 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 them. What is the ratio of their speeds?

(a) 11 : 20 (b) 9 : 20
(c) 11 : 9 (d) 19 : 20

9. Two runner start running together for a certain distance, one at 8 km/h and another at 5 km/h. The former arrives one and half an hour, before the latter. The distance (in km) is:

(a) 12 (b) 20
(c) 25 (d) 36

10. 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

11. A train is moving at a speed of 132 km/h. If the length of the train is 110 metres, how long will it take to cross a railway platform, 165 metres long ?

(a) 5 s (b) 7.5 s
(c) 10 s (d) 15 s

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

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

13. *A* and *B* travel the same distance at 9 km/h and 10 km/h respectively. If *A* takes 20 minutes longer than *B*, the distance travelled by each is:

(a) 16 (b) 20
(c) 30 (d) None of these

14. A passenger train takes two hours less for a journey of 300 km if its speed is increased by 5 km/h from its normal speed. The normal speed of the train is

(a) 35 km/h (b) 50 km/h
(c) 25 km/h (d) 30 km/h

15. A gun is fired at a distance of 3.32 km from Chauhan. He hears its sound 10 seconds later. Find the speed of the sound.

(a) 301 m/s (b) 302 m/s
(c) 332 m/s (d) 340 m/s

16. 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.

17. A car driver travels from the plains to a hill station, which are 200 km apart at an average speed of 40 km/h. In the return trip he covers the same distance at an average speed of 20 km/h. The average speed of the car over the entire distance of 400 km is
(a) 16.56 km/h (b) 17.89 km/h
(c) 26.67 km/h (d) 35 km/h

18. Two trains of equal lengths are running on parallel tracks in the same direction at 46 km/h and 36 km/h, respectively. The faster train passes the slower train in 36 sec. The length of each train is
(a) 50 m (b) 80 m
(c) 72 m (d) 82 m

19. In a 800 m race around a stadium having the circumference of 200 m, the top runner meets the last runner on the 5th minute of the race. If the top runner runs at twice the speed of the last runner, what is the time taken by the top runner to finish the race ?
(a) 20 min (b) 15 min
(c) 10 min (d) 5 min

20. Excluding stoppages, the speed of a train is 45 km/h and including stoppages, it is 36 km/h. For how many minutes does the train stop per hour ?
(a) 10 min. (b) 12 min.
(c) 15 min. (d) 18 min.

21. The driving wheel of a locomotive engine, 2.1 m in radius, makes 75 revolutions in one minute. Find the speed of the train in km/h.
(a) 60 km/h (b) 59.4 km/h
(c) 61.5 km/h (d) None of these

22. A train covers 180 km distance in 4 hours. Another train covers the same distance in 1 hour less. What is the difference in the distances covered by these trains in one hour ?
(a) 45 km (b) 9 km
(c) 40 km (d) None of these

23. Speed of a speed-boat when moving in the direction parallel to the direction of the current is 16 km/hr. Speed of the current is 3 km/hr. So the speed of the boat against the current will be (in km/hr)
(a) 22 (b) 9.5
(c) 10 (d) None of these

24. A plane left 30 minutes later than the scheduled time and in order to reach the destination 1500 km away in time, it had to increase the speed by 250 km/h from the usual speed. Find its usual speed.
(a) 720 km/h (b) 740 km/h
(c) 730 km/h (d) 750 km/h

25. Two trains are 2 km apart and their lengths are 200 m and 300 m. They are approaching towards each other with a speed of 20 m/s and 30 m/s, respectively. After how much time will they cross each other?
(a) 50 s (b) 100 s
(c) 25/3 s (d) 150 s

26. A train 300 m long is running at a speed of 90 km/hr. How many seconds will it take to cross a 200 m long train running in the opposite direction at a speed of 60 km/hr?
(a) $7\frac{1}{5}$ (b) 60
(c) 12 (d) 20

27. A boat travels upstream from B to A and downsteam from A to B in 3 hours. If the speed of the boat in still water is 9 km/hr and the speed of the current is 3 km/hr, the distance between A and B is
(a) 4 km (b) 8 km
(c) 6 km (d) 12 km

28. A motor boat can travel at 10 km/h in still water. It traveled 91 km downstream in a river and then returned, taking altogether 20 hours. Find the rate of flow of the river.
(a) 6 km/hr (b) 5 km/hr
(c) 8 km/hr (d) 3 km/hr

29. Two men starting from the same place walk at the rate of 5 km/h and 5.5 km/h respectively. What time will they take to be 8.5 km apart, if they walk in the same direction?
(a) 16 h (b) 8 h 30 min
(c) 4h / 5min (d) 17 h

30. Speed of a boat in standing water is 9 km/h and the speed of the stream is 1.5 kmIh. A man rows to a place at a distance of 105 km and comes back to the starting point. The total time taken by him is
(a) 20 h (b) 18 h
(c) 16 h (d) 24 h

31. An aeroplane travels distances 2500 km, 1200km and 500km at the rate of 500 km/hr, 400 km/hr, and 250 km/hr, respectively. The average speed is
(a) 420 km/hr (b) 405 km/hr
(c) 410 km/hr (d) 575 km/hr

32. There are 20 poles with a constant distance between each pole. A car takes 24 seconds to reach the 12th pole . How much time will it take to reach the last pole?
(a) 25.25 s (b) 17.45 s
(c) 35.75 s (d) 41.45 s

33. A man walks half of the journey at 4 km/h by cycle does one third of journey at 12 km/h and rides the remainder journey in a horse cart at 9 km/h, thus completing the whole journey in 6 hours and 12 minutes. The length of the journey is

(a) 36 km (b) $\frac{1332}{67}$ km

(c) 40 km (d) 28 km

34. A train covers 180 km distance in 4 hours. Another train covers the same distance in 1 hour less. What is the difference in the distances covered by these trains in one hour ?

(a) 45 km (b) 9 km

(c) 40 km (d) None of these

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

(a) 5.5 min (b) 6.0 min

(c) 5.28 min (d) 4.9 min

36. A boat goes 24 km upstream and 28 km downstream in 6 hours. It goes 30km upstream and 21 km downstream in 6 hours and 30 minutes. The speed of the boat in still water is :

(a) 10 km/h (b) 4 km/h

(c) 14 km/h (d) 6km/h

37. Two trains for Mumbai leave Delhi at 6 a.m. and 6 : 45 am and travel at 100 kmph and 136 kmph respectively. How many kilometres from Delhi will the two trains be together

(a) 262.4 km (b) 260 km

(c) 283.33 km (d) 275 km

38. Two points A and B are located 48 km apart on the riverfront. A motorboat must go from A to B and return to A as soon as possible. The river flows at 6 km/h. What must be the least speed of the motorboat in still water for the trip from A to B and back again to be completed in not more than six hours (assume that the motorboat does not stop at B)?

(a) 18 km/h (b) 16 km/h

(c) 25 km/h (d) 46 km/h

39. A 200 m-long train passes a 350 m long platform in 5 s. If a man is walking at a speed of 4 m/s along the track and the train is 100 m away from him, how much time will it take to reach the man?

(a) Less than 1 s (b) 1.04 s

(c) More than 2s (d) Data insufficient

40. A clock gains 15 minutes per day. It is set right at 12 noon. What time will it show at 4.00 am, the next day?

(a) 4 : 10 am (b) 4 : 45 am

(c) 4 : 20 am (d) 5 : 00 am

41. During a journey of 80 km a train covers first 60km with a speed of 40 km/h and completes the remaining distance with a speed of 20 km/h. What is the average speed of the train during the whole journey?

(a) 30 km/h (b) 32 km/h

(c) 36 km/h (d) 40 km/h

42. *A* travels from *B* to *C*, a distance of 250 miles, in 5.5 hours. He returns to *B* in 4 hours 40 minutes. His average speed is

(a) 44 (b) 46

(c) 48 (d) 50

43. A race course is 400 metres long. *A* and *B* run a race and *A* wins by 5 metres. *B* and *C* run over the same course and *B* wins by 4 metres. *C* and *D* run over it and *D* wins by 16 metres. If *A* and *D* run over it, then who would win and by how much ?

(a) *A* by 8.4 metres (b) *D* by 8.4 metres

(c) *D* by 7.3 metres (d) *A* by 7.3 metres

44. A circular running path is 726 metres in circumference. Two men start from the same point and walk in opposite directions at 3.75 km/h and 4.5 km/h, respectively. When will they meet for the first time ?

(a) After 5.5 min (b) After 6.0 min

(c) After 5.28 min (d) After 4.9 min

45. *R* and *S* start walking each other at 10 AM at the speeds of 3 km/hr and 4 km/hr respectively. They were initially 17.5 km apart. At what time do they meet?

(a) 2 : 30 PM (b) 11 : 30 AM

(c) 1 : 30 PM (d) 12 : 30 PM

46. 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?

(a) 36 kmph (b) 45 kmph

(c) 48 kmph (d) 50 kmph

47. A car travels first half distance between two places with a speed of 40 km/h and the rest of the half distance with a speed of 60 km/h. The average speed of the car is

(a) 48 km/h (b) 37 km/h

(c) 44 km/h (d) None of these

48. 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 ?

(a) 100 sec (b) 20 sec

(c) 300 sec (d) 200 sec

49. If a trian 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.

50. A man while returning from his factory, travels 2/3 of the distance by bus and $\frac{3}{4}$ of the rest by car, and the remaining by foot. If he travels 2 km on foot, find the distance covered by him.

(a) 24 km (b) 22 km

(c) 28 km (d) 26 km

51. A car driver, driving in a fog, passes a pedestrian who was walking at the rate of 2 km/hr in the same direction. The pedestrian could see the car for 6 minutes and it was visible to him up to a distance of 0.6 km. What was the speed of the car?
(a) 15 km/hr (b) 30 km/hr
(c) 20 km/hr (d) 8 km/hr

52. A plane left 30 min later than its scheduled time to reach its destination 1500 km away. In order to reach in time it increases its speed by 250 km/h. What is its original speed?
(a) 1000 km/h (b) 750 km/h
(c) 600 km/h (d) 800 km/h

53. Bombay Express left Delhi for Bombay at 14.30 hrs, travelling at a speed of 60 kmph and Rajdhani Express left Delhi for Bombay 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?
(a) 120 km (b) 360 km
(c) 480 km (d) 500 km

54. A person can swim at a speed of 9 km per hour in still water. If the speed of the stream is 6 km per hour, then how long does he take to swim up to a distance of 9 km and return at the starting point?
(a) 2 hours (b) $2\frac{1}{2}$ hours
(c) $3\frac{3}{5}$ hours (d) $3\frac{3}{4}$ hours

55. A thief goes away with a Maruti car at a speed of 40 km/h. The theft has been discovered after half an hour and the owner sets off in another car at 50 km/h. When will the owner overtake the thief from the start.
(a) $2\frac{1}{2}$ hours (b) 2 hr 20 min
(c) 1 hr 45 min (d) cannot be determined

56. A man is walking at a speed of 10 km per hour. After every kilometre, he takes rest for 5 minutes. How much time will he take to cover a distance of 5 kilometres?
(a) 48 min. (b) 50 min.
(c) 45 min. (d) 55 min.

57. One-fourth of a certain journey is covered at the rate of 25 km/h, one-third at the rate of 30 km/h and the rest at 50 km/h. Find the average speed for the whole journey.
(a) 600/53 km/h (b) 1200/53 km/h
(c) 1800/53 km/h (d) 1600/53 km/h

58. A railway passenger counts the telegraph poles on the rail road as he passes them. The telegraph poles are at a distance of 50 meters. What will be his count in 4 hours if the speed of the train is 45 km per hour?
(a) 2500 (b) 600

(c) 3600 (d) 5000

59. A long distance runner runs 9 laps of a 400 metres track everyday. His timings (in minutes) for four consecutive days are 88, 96, 89 and 87 resplectively. On an average, how many metres/minute does the runner cover ?
(a) 40 m/min (b) 45 m/min
(c) 38 m/min (d) 49 m/min

60. A dog starts chasing to a cat 2 hours later. It takes 2 hours to dog to catch the cat. If the speed of the dog is 30 km/h, what is the speed of cat?
(a) 10 km/h (b) 15 km/h
(c) 20 km/h (d) Can't be determined

1. *A* and *B* can run 200 m in 22 seconds and 25 seconds, respectively. How far is *B* from the finishing line when *A* reaches in ?
(a) 8 m (b) 12 m
(c) 16 m (d) 24 m

2. If a man walks at the rate of 5 kmph, he misses a train by 7 minutes. However, if he walks at the rate of 6 kmph, he reaches the station 5 minutes before the arrival of the train. Find the distance covered by him to reach the station.
(a) 4 km (b) 6 km
(c) 5 km (d) 7 km

3. 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) None of these

4. It takes eight hours for a 600 km journey, if 120 km is done by train and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the speed of the car is
(a) 4 : 3 (b) 3 : 4
(c) 3 : 2 (d) 2 : 3

5. Wheels of diameters 7 cm and 14 cm start rolling simultaneously from *X* and *Y* which are 1980 cm apart towards each other in opposite directions. Both of them make the same number of revolutions per second. If both of them meet after 10 seconds, the speed of the smaller wheel is
(a) 22 cm/s (b) 44 cm/s
(c) 66 cm/s (d) 132 cm/s

6. 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

7. An aeroplane first flew with a speed of 440 km/h 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 km/h. The average speed for the entire flight was 500 km/h. Find the total distance covered.
(a) 3250 km (b) 2750 km
(c) 4400 km (d) 1375 km

8. 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

9. A train starts from Delhi at 6 : 00 AM and reaches Ambala Cantt at 10 AM. The other train starts from Ambala Cantt at 8 AM and reaches Delhi at 11:30 PM. If the distance between Delhi and Ambala Cantt. is 200 km, then at what time did the two trains meet each other ?
(a) 8 : 56 AM (b) 8 : 46 AM
(c) 7 : 56 AM (d) 8 : 30 AM

10. Rahul can row a certain distance downstream in 6 hours and return the same distance in 9 hours. If the speed of Rahul in still water is 12 km/hr, find the speed of the stream.
(a) 2 km/hr (b) 2.4 km/hr
(c) 3 km/hr (d) Data inadequate

11. A man can row 4.5 km/hr in still water and he finds that it takes him twice as long to row up as to row down the river. Find the rate of the stream.
(a) 1.5 km/hr (b) 2 km/hr
(c) 2.5 km/hr (d) 1.75 km/hr

12. A man sitting in a train travelling at the rate of 50 km/hr observes that it takes 9 sec for a goods train travelling in the opposite direction to pass him. If the goods train is 187.5 m long, find its speed.
(a) 40 km/hr (b) 25 km/hr
(c) 35 km/hr (d) 36 km/hr

13. Two trains are moving in opposite directions at speeds of 60 km/hour and 90 km/hour. Their lengths are 1.10 km and 0.9 km respectively. The time taken by the slower train to cross the faster train in seconds is
(a) 36 (b) 49
(c) 45 (d) 48

14. It takes eight hours for a 600 km journey, if 120 km is done by tain and the rest by car. It takes 20 minutes more, if 200 km is done by train and the rest by car. The ratio of the speed of the train to that of the car is

(a) 2 : 3 (b) 3 : 2
(c) 3 : 4 (d) 4 : 3

15. The distance between two cities *A* and *B* is 330 km. *A* tain starts from *A* at 8 a.m. and travels towards *B* at 60 km/hr. Another train starts from *B* at 9 a.m. and travels towards *A* at 75 km/hr. At what time do they meet?

(a) 10 a.m. (b) 10.30 a.m.
(c) 11 a.m. (d) 11.30 a.m.

16. *A* and *B* run a 5 km race on a round course of 400 m. If their speeds be in the ratio 5 : 4, how often does the winner pass the other?

(a) $4\frac{1}{2}$ times (b) $2\frac{3}{4}$ times
(c) $3\frac{1}{2}$ times (d) $2\frac{1}{2}$ times

17. A motorcyclist covered two thirds of a total journey at his usual speed. He covered the remaining distance at three fourth of his usual speed. As a result, he arrived 30 minutes later than the time he would have taken at usual speed. If the total journey was 180 km, the what is his usual speed?

(a) 40 kmph (b) 36 kmph
(c) 30 kmph (d) 32 kmph

18. A man can row a certain distance against the stream in six hours. However, he would take two hours less to cover the same distance with the current. If the speed of the current is 2 kmph, then what is the rowing speed in still water?

(a) 10 kmph (b) 12 kmph
(c) 14 kmph (d) 8 kmph

19. If I walk at 4 km/h, I miss the bus by 10 minutes. If I walk at 5 km/h, I reach 5 minutes before the arrival of the bus. How far I walk to reach the bus stand ?

(a) 5 km (b) 4.5 km
(c) $5\frac{1}{4}$ km / h (d) Cannot be determined

20. A man covers a certain distance on a toy train. If the train moved 4 km/h faster, it would take 30 minutes less. If it moved 2 km/h slower, it would have taken 20 minutes more. Find the distance.

(a) 60 km (b) 58 km
(c) 55 km (d) 50 km

21. An aeroplane flies along the four sides of a square at the speeds of 200, 400, 600 and 800 km/h. Find the average speed of the plane around the field.

(a) 384 km/h (b) 370 km/h
(c) 368 km/h (d) None of these

22. 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.

23. Points A and B are 70 km apart on a highway. One car starts form A and the another one from B at the same time. If they travel in the same direction, they meet in 7 hours. But if they travel towards each other, they meet in one hour. The speeds of the two cars are, respectively.

(a) 45 and 25 km/h (b) 70 and 10 km/h
(c) 40 and 30 km/h (d) 60 and 40 km/h

24. A river 3 m deep and 40 m wide is flowing at the rate of 2 km per hour. How much water (in litres) will fall into the sea in a minute?

(a) 4,00,000 (b) 40,00,000
(c) 40,000 (d) 4,000

25. Vinay fires two bullets from the same place at an interval of 12 minutes but Raju sitting in a train approaching the place hears the second report 11 minutes 30 seconds after the first. What is the approximate speed of train (if sound travels at the speed of 330 metre per second)?

(a) 660/23 m/s (b) 220/7 m/s
(c) 330/23 m/s (d) 110/23 m/s

26. A dog sees a cat. It estimates that the cat is 25 leaps away. The cat sees the dog and starts running with the dog in hot pursuit. If in every minute, the dog makes 5 leaps and the cat makes 6 leaps and one leap of the dog is equal to 2 leaps of the cat. Find the time in which the cat is caught by the dog (assume an open field with no trees)

(a) 12 minutes (b) 15 minutes
(c) 12.5 minutes (d) None of these

27. A train of 300 m is travelling with the speed of 45 km/h when it passes point A completely. At the same time, a motorbike starts from point A with the speed of 70 km/h. When it exactly reaches the middle point of the train, the train increases its speed to 60 km/h and motorbike reduces its speed to 65 km/h. How much distance will the motorbike travel while passing the train completely?

(a) 2.52 km (b) 2.37 km
(c) 2 km (d) None of these

28. A group of soldiers are marching with a speed of 5 m/s. The distance between the first and the last row of soldiers is 100 m. A dog starts running from the last row and moves towards the first row, turns and comes back to the last row. If the dog has travelled 400 m, the speed of the dog is

(a) $5\sqrt{2}$ m/s (b) $3\sqrt{5}$ m/s

(c) $6\sqrt{5}$ m/s (d) $6\sqrt{2}$ m/s

29. Ram runs 7/4 times as fast as Sham, If Ram gives Sham a start of 300 m, how far must the winning post be if both Ram and Sham have to end the race at the same time?

(a) 1400 m (b) 700 m

(c) 350 m (d) 210 m

30. A watch, which gains time uniformly, was 5 minutes behind the correct time when it showed 11:55 AM on Monday. It was 10 minutes ahead of the correct time when it showed 06:10 PM on the next day. When did the watch show the correct time?

(a) 6 AM, Tuesday (b) 6 PM, Monday

(c) 2 PM, Tuesday (d) 10 PM, Monday

31. Pankaj went to the post-office at the speed of 60 km/hr while returning for his home he covered the half of the distance at the speed of 10 km/hr, but suddenly he realized that he was getting late so he increased the speed and reached the home by covering rest half of the distance at the speed of 30 km/hr. The average speed of the Pankaj in the whole length of journey is:

(a) 5.67 km/hr (b) 24 km/hr

(c) 22.88 km/hr (d) 5.45 km/hr

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

(a) 40 km (b) 70 km

(c) 30 km (d) 80 km

33. A student rides on a bicycle at 8 km/h and reaches his school 2.5 minutes late. The next day he increases his speed to 10 km/h and reaches the school 5 minutes early. How far is the school from his house?

(a) 1.25 km (b) 8 km

(c) 5 km (d) 10 km

34. Two rockets approach each other, one at 42000 mph and the other at 18000 mph. They start 3256 miles apart. How far are they apart (in miles) 1 minute before impact ?

(a) 1628 (b) 1000

(c) 826 (d) 1200

35. Two guns were fired form the same place at an interval of 10 minutes and 30 seconds, but a person in the train approaching the place hears the second shot 10 minutes after the first. The speed of the train (in km/hr), supposing that speed travels at 330 metres per second, is

(a) 19.8 (b) 58.6

(c) 59.4 (d) 111.80

36. Train A running at 60 km/h leaves Mumbai for Delhi at 6 p.m. Train B running at 90 km/h also leaves 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 distance between Delhi and Mumbai is 1260 km ?

(a) 60 km/h (b) 90 km/h

(c) 120 km/h (d) 135 km/h

37. A boat, while going downstream in a river covered a distance of 50 mile at an average speed of 60 miles per hour. While returning, because of the water resistance, it took one hour fifteen minutes to cover the same distance . What was the average speed of the boat during the whole journey?

(a) 40 mph (b) 48 mph

(c) 50 mph (d) 55 mph

38. A man takes 5 hour 45 min. in walking to a certian place and riding back. He would have gained 2 hours by riding both ways. The time he would take to walk both ways, is

(a) 3 hrs 45 min (b) 7 hrs 30 min

(c) 7 hrs 45 min (d) 11 hrs 45 min

39. A boatman rows to a place 45 km distant and back in 20 hours. He finds that he can row 12 km with the stream in same time as 4 km against the stream . Find the speed of the stream.

(a) 3 km/hr (b) 2.5 km/hr

(c) 4 km/hr (d) Cannot be determined

40. A man goes 15 metres due west and then 8 metres due north. How far is he from the starting point?

(a) 19 metres (b) 16 metres

(c) 17 metres (d) 15 metres

41. Two trains, 130 m and 110 m long, are going in the same direction. The faster train takes one minute to pass the other completely. If they are moving in opposite directions, they pass each other completely in 3 seconds. Find the speed of each train.

(a) 38 m/sec, 36 m/sec (b) 42 m/sec, 38 m/sec

(c) 36 m/sec, 42 m/sec (d) None of these

42. A man who can swim 48 m/min in still water swims 200 m against the current and 200 m with the current. If the difference between those two times is 10 minutes, find the speed of the current.

(a) 30 m/min (b) 29 m/min

(c) 31 m/min (d) 32 m/min

43. A train after travelling 150 km meets with an accident and then proceeds with 3/5 of its former speed and arrives at its destination 8 h late. Had the accident occurred 360 km further, it would have reached the destination 4 h late. What is the total distance travelled by the train?

(a) 840 km (b) 960 km
(c) 870 km (d) 1100 km

44. A man who can swim 48 m/min in still water swims 200 m against the current and 200 m with the current. If the difference between those two times is 10 min, what is the speed of the current?

(a) 30 m/min (b) 31 m/min
(c) 29 m/min (d) 32 m/min

45. A man walks a certain distance and rides back in $6\frac{1}{4}$h. He can walk both ways in $7\frac{3}{4}$h. How long it would take to ride both ways ?

(a) 5 hours (b) $4\frac{1}{2}$ hours
(c) $4\frac{3}{4}$ hours (d) 6 hours

46. An accurate clock shows 8 o'clock in the morning. Through how many degrees will the hour hand rotate when the clock shows 2 o'clock in the afternoon?

(a) 144° (b) 150°
(c) 168° (d) 180°

47. Shyam's house, his office and his gym are all equidistant from each other. The distance between any 2 of them is 4 km. Shyam starts walking from his gym in a direction parallel to the road connecting his office and his house and stops when he reaches a point directly east of his office. He then reverses direction and walks till he reaches a point directly south of his office. The total distance walked by Shyam is

(a) 6 km (b) 9 km
(c) 16 km (d) 12 km

48. A dog after travelling 50 km meets a swami who counsels him to go slower. He then proceeds at 3/4 of his former speed and arrives at his destination 35 minutes late. Had the meeting occurred 24 km further the dog would have reached its destination 25 minutes late. The speed of the dog is

(a) 48 km/h (b) 36 km/h
(c) 54 km/h (d) 58 km/h

49. Ramesh and Somesh are competing in a 100 m race. Initially, Ramesh runs at twice the speed of Somesh for the first fifty m. After the 50 m mark, Ramesh runs at 1/4th his initial speed while Somesh continues to run at his original speed. If Somesh catches up with Ramesh at a distance of 'N' m from the finish line, then N is equal to

(a) 35 (b) 10
(c) 45 (d) None of these

50. *A*, *B*, and *C* are three participants in a kilometer race. If *A* can give *B* a start of 40 metres and *B* can give *C* a start of 25 metres, how many metres of a start can *A* give to *C*?

(a) 60 m (b) 64 m
(c) 62 m (d) 66 m

51. A monkey ascends a greased pole 12 metres high. He ascends 2 metres in first minute and slips down 1 metre in the alternate minute. In which minute, he reaches the top ?

(a) 21st (b) 22nd
(c) 23rd (d) 24th

52. Mallah can row 40 km upstream and 55 km downstream in 13 h and 30 km upstream and 44 km downstrean in 10 hours. What is the speed of Mallah in still water?

(a) 6 km/h (b) 12 km/h
(c) 3 km/h (d) 8 km/h

53. A passenger sitting in a train of length 100 m, which is running with speed of 60 km/h passing through two bridges, notices that he crosses the first bridge and the second bridge in time intervals which are in the ratio of 7 : 4 respectively. If the length of first bridge be 280 m, then the length of second bridge is:

(a) 490 m (b) 220 m
(c) 160 m (d) Can't be determined

54. A man can cross a downstream river by steamer in 40 minutes and same by boat in 1 hour. If the time of crossing the river in upstream direction by steamer is 50% more than downstream time by the steamer and the time required by boat to cross the same river by boat in upsteam is 50% more than the time required in downstream by boat. What is the time taken for the man to cross the river downstream by steamer and then return to same place by boat half the way and by steamer the rest of the way?

(a) 85 min (b) 115 min
(c) 120 min (d) 125 min

55. A tiger is 50 of its own leaps behind a deer. The tiger takes 5 leaps per minute to the deer's 4. If the tiger and the deer cover 8 m and 5 m per leap respectively, what distance will the tiger have to run before it catches the deer?

(a) 600 m (b) 700 m
(c) 800 m (d) 1000 m

56. A candle of 6 cm long burns at the rate of 5 cm in 5 h and another candle of 8 cm long burns at the rate of 6 cm in 4h. What is the time required by each candle to remain of equal lengths after burning for some hours, when they start to burn simultaneously with uniform rate of burning?

(a) 1 h (b) 1.5 h
(c) 2 h (d) None of these

57. Two persons start from the opposite ends of a 90 km straight track and run to and fro between the two ends. The speed of first person is 30 m/s and the speed of other is 125/6 m/s. They continue their motion for 10 hours. How many times they pass each other?

(a) 10 (b) 9
(c) 12 (d) None of these

58. At what time after 3:10 am, the acute angle made by the minute and hour-hand is double to that of a 3:10 am, for the first time?

(a) 4 h 43 min (b) 3 h 48 min
(c) $3\text{h}\frac{320}{11}\text{min}$ (d) None of these

59. A swiss watch is being shown in a museum which has a very peculiar property. It gains as much in the day as it loses during night between 8 pm to 8 am. In a week how many times will the clock show the correct time?

(a) 6 times (b) 14 times
(c) 7 times (d) 8 times

60. The metro service has a train going from Mumbai to Pune and Pune to Mumbai every hour, the first one at 6 a.m. The trip from one city to other takes 4½ hours, and all trains travel at the same speed. How many trains will you pass while going from Mumbai to Pune if you start at 12 noon?

(a) 8 (b) 10
(c) 9 (d) 13

61. A wall clock gains 2 minutes in 12 hours, while a table clock loses 2 minutes in 36 hours; both are set right at noon on Tuesday. The correct time when they both show the same time next would be

(a) 12 : 30 night (b) 12 noon
(c) 1 : 30 night (d) 12 night

62. Two ants start simultaneously from two ant holes towards

Expert Level

each other. The first ant covers 8% of the distance between the two ant holes in 3 hours, the second ant covered $\frac{7}{120}$ of the distance in 2 hours 30 minutes. Find the speed (feet/h) of the second ant if the first ant travelled 800 feet to the meeting point.
(a) 15 feet/h (b) 25 feet/h
(c) 45 feet/h (d) 35 feet/h

63. A watch loses 2/3% time during the 1st week and gains 1/3% time during the next week. If on a Sunday noon, it showed the right time, what time will it show at noon on the Saturday after the next.
(a) 11 : 26 : 24 a.m. (b) 10 : 52 : 18 a.m.
(c) 10 : 52 : 48 a.m. (d) 11 : 36 : 24 a.m.

1. My Scooty gives an average of 40 kmpl of petrol. But after recent filling at the new petrol pump, its average dropped to 38 kmpl. I investigated and found out that it was due to adulterated petrol. Petrol pumps add kerosene, which is 2/3 cheaper than petrol, to increase their profits. Kerosene generates excessive smoke and knocking and gives an average of 18 km per 900 ml. If I paid Rs. 30 for a litre of petrol, what was the additional amount the pump-owner was making ?
(a) ` 1.75 (b) ` 1.80
(c) ` 2.30 (d) ` 2

2. I have to reach a certain place at a certain time and I find that I shall be 15 min too late, if I walk at 4 km an hour, and 10 min too soon, if I walk at 6 km an hour. How far have I to walk?
(a) 25 km (b) 5 km
(c) 10 km (d) None of these

3. On a journey across Bombay, a tourist bus averages 10 km/h for 20% of the distance, 30 km/h for 60% of it and 20 km/h for the remainder. The average speed for the whole journey was
(a) 10 km/h (b) 30 km/h
(c) 5 km/h (d) 20 km/h

4. 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

5. Pankaj walked at 5 km/h for certain part of the journey and then he took an auto for the remaining part of the journey travelling at 25 km/h. If he took 10 hours for the entire journey. What part of journey did he travelled by auto if the average speed of the entire journey be 17 km/h:
(a) 750 km (b) 100 km
(c) 150 km (d) 200 km

6. Train X starts from point A for point B at the same time that train Y starts from B to A. Point A and B are 300 km apart. The trains are moving at a constant speed atleast at 25 km/h. The trains meet each other 3 hours after they start. If the faster train takes atleast 2 more hours to reach the destination. By which time will the slower train have definitely reached its destination? (Ignoring the length of trains in crossing).
(a) 4 hours after the start
(b) 7.5 hours after the start
(c) 6 hours after the start
(d) None of the above

7. A boat takes 7 hours to go from P to R, through a midpoint Q, but it takes 8 hours to go from P to Q, and then return from Q to P. How long it would take to go from R to P?
(a) 7 h (b) 8 h
(c) 9 h (d) None of these

8. A beats B by 100 m in a race of 1200 m and B beats C by 200 m in a race of 1600 m. Approximately by how many metres can A beat C in a race of 9600 m?
(a) 1600 m (b) 1800 m
(c) 1900 m (d) 2400 m

9. A gives both B and C a start of 60 m in a 1500 m race. However, while B finishes with him, C is 15 m behind them when A and B cross the finishing line. How much start can B give C for the 1500 m race course?
(a) $7\frac{6}{23}$ m (b) $15\frac{5}{8}$ m
(c) $7\frac{11}{16}$ m (d) $5\frac{5}{24}$ m

10. Due to the technical snag in the signal system two trains start approaching each other on the same rail track from two different stations, 240 km away from each other. When the two trains at 60 km/h touching each time each train. The bird is initially sitting on the top of the engine of one of the trains and it moves so till these trains collide. If these trains collide one and a half hour after the start, then how many kilometers bird travels till the time of collision of trains?
(a) 90 km (b) 130 km
(c) 120 km (d) None of these

11. A surveillance plane is moving between two fixed places

Pukhwara and Kargil at 120 km/hr. The distance between two places is 600 km. After 18 hour what will be the distance between the Kargil and its position if it is starts moving from Pukhwara?

(a) 360 km (b) 300 km
(c) 240 km (d) None of these

12. There are three runners Tom, Dick and Harry with their respective speeds of 10 km/h, 20 km/h and 30 km/h. They are initially at P and they have to run between the two points P and Q which are 10 km apart from each other. They start their race at 6 am and end at 6 pm on the same day. If they run between P and Q without any break, then how many times they will be together either at P and Q during the given time period?

(a) 5 (b) 7
(c) 4 (d) 12

13. A soldier fired two bullets at an interval of 335 seconds moving at a uniform speed v_1. A terrorist who was running ahead of the soldier in the same direction, hears the two shots at an interval of 330 seconds? If the speed of sound is 1188 km/h, then who is the faster and by how much?

(a) Soldier, 22 km/h (b) Terrorist, 25 km/h
(c) Soldier, 18 km/h (d) Terrorist, 20 km/h

14. A man goes to the fair in Funcity with his son and faithful dog. Unfortunately man misses his son which he realises 20 minutes later. The son comes back towards his home at the speed of 20 m/min and man follows him at 40 m/min. The dog runs to the son(child) and comes back to the man (father) to show him the direction of his son. It keeps moving to and fro at 60 m/min between son and father, till the man meets the son. What is the distance travelled by the dog in direction of the son?

(a) 800 m (b) 1675 m
(c) 848 m (d) 1000 m

15. A thief sees a jeep at a distance of 250 m, coming towards him at 36 km/h. Thief takes 5 seconds to realise that there is nothing but the police is approaching him by the jeep and start running away from police at 54 km/hr. But police realise after 10 seconds, when the thief starts running away, that he is actually a thief and gives chase at 72 km/h. How long after thief saw police and catchup with him and what is the distance police had to travel to do so?

(a) 50 s, 1000 m (b) 65s, 1150 m
(c) 65 s, 1300 m (d) 45 s, 1050 m

16. In a circus there was a leopard and a tiger walking in the two different rings of same radii. There I observed that when leopard moved 3 steps, tiger moved 5 steps in the same time, but the distance traversed by leopard in 5 steps is equal to the distance traversed by tiger in 4 steps. What is the number of rounds that a leopard made when tiger completed 100 rounds

(a) 120 (b) 48
(c) 75 (d) None of these

17. Arti and Barkha start swimming towards each other from the deep end and shallow end respectively of a swimming pool in Funcity. They start their swimming simultaneously in the length of 300 m pool. The ratio of their speeds is 1 : 2 respectively. Each swimmer rests for 6 seconds once she reaches the other end and starts swimming back. Where will they meet for the second time in the still water of swimming pool?

(a) 30 m from the shallow end
(b) at the shallow end
(c) at the depend
(d) can't be determined

18. If the two incorrect watches are set at 12:00 noon at correct time, when will both the watches show the correct time for the first time given that the first watch gains 1 min in 1 hour and second watch loses 4 min in 2 hours:

(a) 6 pm, 25 days later
(b) 12:00 noon, 30 days later
(c) 12 noon, 15 days later
(d) 6 am 45 days later

19. Ramu purchased a second hand swiss watch which is very costly. In this watch the minute-hand and hour hand coincide after every $65\frac{3}{11}$ minutes. How much time does the watch lose or gain per day?

(a) 4 min (b) 5 min
(c) 4 min, 20 sec (b) None of these

20. Kumbhakarna starts sleeping between 1 am and 2 am and he wakes up when his watch shows such a time that the two hands (i.e., hour-hand and minute-hand) interchanging the respective places. He wakes up between 2 am and 3 am on the same night. How long does he sleep?

(a) $55\frac{5}{13}$ min (b) $110\frac{10}{13}$ min
(c) $54\frac{6}{13}$ min (d) None of these

21. A faulty clock gains 10 minutes every hour. If the time is set correctly at 12 Noon on 1st Jan 2010, then how many times will its minute-hand and hour-hand meet in the next 24 hours ?

(a) 22 (b) 26
(c) 24 (d) 25

22. Progressive express left for New Delhi, increasing its speed in each hour. It started its journey from Lucknow, but after four hours of its journey it met with accident. Its speed in the fourth hour was $\frac{7}{5}$ times that of the third hour and the speed in the third hour was $\frac{10}{7}$ times that of the second hour and in the second hour it was $\frac{7}{5}$ times that of the first hour. If it would have been travelled with the half of the speed that of the third hour, then it would have gone 160 km less in the same time (i.e., in four hours). The

average speed of the train during the journey of 4 hours was:
(a) 50 km/hr (b) 90 km/hr
(c) 80 km/hr (d) can't be determined

23. Two rifles are fired from the same place at a difference of 11 minutes 45 seconds. But a man who is coming towards the place in a train hears the second sound after 11 minutes. Find the speed of train.
(a) 72 km/h (b) 36 km/h
(c) 81 km/h (d) 108 km/h

24. Two people A and B start from P and Q (distance = D) at the same time towards each other. They meet at a point R, which is at a distance 0.4 D from P. They continue to move to and fro between the two points. Find the distance from point P at which the fourth meeting takes place.
(a) 0.8 D (b) 0.6 D
(c) 0.3 D (d) 0.4 D

25. Two riders on the horseback with a gun and a bullet proof shield were moving towards each other at a constant speed of 20 km/h and 5 km/h respectively. When they were 100 km apart, they started firing bullets at each other at the speed of 10 km/h. When a bullet of rider 1 hits the shield of rider 2, rider 2 fires a bullet and the process continues vice versa. Neglecting the time lag at the instant when the bullet hits the shield and the rider fires the shot, find the total distance covered by all the bullets shot by both the riders.
(a) 50 km (b) 40 km
(c) 25 km (d) None of these

26. A passenger train departs from Ahmedabad at 6 pm for Bombay. At 9 p.m. an express train, whose average speed exceeds that of the passenger train by 15 km/h, leaves Bombay for Ahmedabad. Two trains meet each other mid-route. At what time do they meet, given that the distance between the cities is 1080 km?
(a) 4 pm (b) 2 pm
(c) 12 midnight (d) 6 am

27. A car covers a distance of 715 km at a constant speed. If the speed of the car had been 10 km/h more, then it would have taken 2 h less to cover the same distance. What is the original speed of the car?
(a) 55 km/h (b) 50 km/h
(c) 45 km/h (d) 65 km/h

28. A train leaves station *X* at 5 a.m. and reaches station *Y* at 9 a.m. Another train 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 ?
(a) 7 : 36 am (b) 7 : 56 am
(c) 8 : 36 am (d) 8 : 56 am

29. A train covered a certain distance at a uniform speed. If the train had been 6 km/h faster, then it would have taken 4 hours less than the scheduled time. And, if the train were slower by 6 km/h, then the train would have taken 6 hours more than the scheduled time. The length of the journey is
(a) 700 km (b) 740 km
(c) 720 km (d) 760 km

30. A man swimming in a steam which flows $1\frac{1}{2}$ km/hr., finds that in a given time he can swim twice as far with the stream as he can against it. At what rate does he swim?
(a) $5\frac{1}{2}$ km/hr (b) $4\frac{1}{2}$ km/hr
(c) $7\frac{1}{2}$ km/hr (d) None of these

31. In a 400 metres race, *A* gives *B* a start of 5 seconds and beats him by 15 metres. In another race of 400 metres, *A* beats *B* by $7\frac{1}{7}$ seconds. Find their speeds.
(a) 8 m/sec, 7m/sec (b) 7 m/sec, 6 m/sec
(c) 6 m/sec, 5 m/sec (d) 5 m/sec, 4 m/sec

32. The speeds of three cars are in the ratio 2 : 3: 4. The ratio between the times taken by these cars to travel the same distance is
(a) 4: 3: 2 (b) 2: 3: 4
(c) 4: 3: 6 (d) 6: 4: 3

33. Anand travelled 300 km by train and 200 km by taxi. It took him 5 h and 30 min. However, if he travels 260 km by train and 240 km by taxi, he takes 6 min more. The speed of the train is
(a) 100 km/h (b) 120 km/h
(c) 80 km/h (d) 110 km/h

34. A boat takes 19 h for travelling downstream from point *A* to point *B* and coming back to a point *C* midway between *A* and *B*. If the velocity of the stream is 4 km/h and the speed of the boat in still water is 14 km/h, what is the distance between *A* and *B*?
(a) 200 km (b) 180 km
(c) 160 km (d) 220 km

35. A car travels 25 km/h faster than a bus for a journey of 500 km. If the bus takes 10 h more than the car, then the speeds of the car and the bus are
(a) 25 km/h and 40 km/h (b) 50 km/h and 25 km/h
(c) 25 km/h and 60 km/h (d) None of these

36. Speed of a speed-boat when moving in the direction perpendicular to the direction of the current is 16 km/h. Speed of the current is 3 km/h. So the speed of the boat against the current will be (in km/h)
(a) 22 (b) 9.5
(c) 10 (d) None of these

37. Two ants start simultaneously from two ant holes towards each other. The first ant coveres 8% of the distance between the two ant holes in 3 hours, the second ant covered $\frac{7}{120}$ of the distance in 2 hours 30 minutes. Find the speed (feet/h) of the second ant if the first ant travelled 800 feet to the meeting point.
(a) 15 feet/h (b) 25 feet/h
(c) 45 feet/h (d) 35 feet/h

38. Two Indian tourists in the US cycled towards each other, one from point *A* and the other from point *B*. The first tourist left point *A* 6 hrs later than the second left point *B*, and it turned out on their meeting that he had travelled 12 km less than the second tourist. After their meeting, they kept cycling with the same speed, and the first tourist arrived at *B* 8 hours later and the second arrived at *A* 9 hours later. Find the speed of the faster tourist.

(a) 4 km/h (b) 6 km/h
(c) 9 km/h (d) 2 km/h

39. A motorcyclist left point A for point B. Two hours later, another motorcyclist left A for B and arrived at B at the same time as the first motorcyclist. Had both motorcyclists started simultaneously from A and B travelling towards each other, they would have met in 80 minutes. How much time did it take the faster motorcyclist to travel from A to B?

(a) 6 hours (b) 3 hours
(c) 2 hours (d) 4 hours

40. Shaurya and Arjit take a straight route to the same terminal point and travel with constant speeds. At the initial moment, the positions of the two and the terminal point form an equilateral triangle. When Arjit covered a distance of 80 km, the triangle become right-angled. When Arjit was at a distance of 120 km from the terminal point, the Shaurya arrived at the point. Find the distance between them at the initial moment assuming that there are integral distances throughout the movements described.

(a) 300 km (b) 240 km
(c) 200 km (d) 225 km

41. Three cars started simultaneously from Ajmer to Benaras along the same highway. The second car travelled with a speed that was 10 km/h higher than the first car's speed and arrived at Benaras 1 hour earlier than the first car. The third car arrived at Benaras 33.33 minutes earlier than the first car, travelling half the time at the speed of the first car and the other half at the speed of the second car. Find the total distance covered by these three cars during their journey between Ajmer and Benaras.

(a) 360 km (b) 600 km
(c) 540 km (d) 840 km

42. Two towns are at a distance of 240 km from each other. A motorist takes 8 hours to cover the distance if he travels at a speed of V_0 km/h from town A to an intermediate town C, and then continues on his way with an acceleration of x km/hr^2. He needs the same time to cover the whole distance if he travels from A to C at V_0 km/h and from C to B at V_1 km/h or from A to C at V_1 km/h from C to B at V_0 km/h. Find V_0 if the acceleration 'x' is double V_0 in magnitude and $V_0 \neq V_1$.

(a) 15 km/h (b) 10 km/h
(c) 20 km/h (d) 8 km/h

43. A pedestrian and a cyclist left Nagpur for Buti Bori at the same time. Having reached Buti Bori, the cyclist turned back and met the pedestrian an hour after the start. After their meeting, the pedestrian continued his trip to Buti Bori and cyclist turned back and also headed for Buti Bori. Having reached Buti Bori, the cyclist turned back again and met the pedestrian 30 mins after their first meeting. Determine what time it takes the pedestrian 30 mins after their first meeting. Determine what time it takes the pedestrian to cover the distance between Nagpur and Buti Bori.

(a) 1 hour (b) 2 hours
(c) 2.5 hours (d) 3 hours

44. Two people started simultaneously form points *A* and *B* towards each other. At the moment the person who started from *A* had covered two-thirds of the way, the other person had covered 2 km less than half the total distance. If it is known that when the person who started from *B* had covered 1/4 of the way, the other person was 3 km short of the mid point. Find the distance between *A* and *B*. The speeds of the two people were constant.

(a) $(15 - 3\sqrt{17})$ km (b) $(15 + 3\sqrt{17})$ km
(c) Both (a and b) (d) $3\sqrt{17} - 5$km

Test Yourself

1. A racetrack is in the form of a right triangle. The longer of the legs of the track is 2 km more than the shorter of the legs (both these legs being on a highway). The start and end points are also connected to each other through a side road. The escort vehicle for the race took the side road and rode with a speed of 30 km/h and then covered the two intervals along the highway during the same time with a speed of 42 km/h. Find the length of the racetrack.

(a) 14 km (b) 10 km
(c) 24 km (d) 36 km

2. Two trains 137 metres and 163 metres in length are running towards each other on parallel lines, one at the rate of 42 kmph and another at 48 kmph. In what time will they be clear of each other from the moment they meet?

(a) 10 sec (b) 12 sec
(c) 14 sec (d) cannot be determined

3. Two planes move along a circle of circumference 1.2 km 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. Find the speed of the slower plane.

(a) 0.04 km/s (b) 0.03 km/s
(c) 0.05 km/s (d) 0.02 km/s

4. An ant moved for several seconds and covered 3 mm in the first second and 4 mm more in each successive second than in its predecessor. If the ant had covered 1 mm in the first second and 8 mm more in each successive second, then the difference between the path it would cover during the same time and the actual path would be more than 6 mm but less than 30 mm. Find the time for which the ant moved (in seconds)

(a) 5 s (b) 4 s
(c) 6 s (d) 2 s

5. A train leaves station *X* at 5 a.m. and reaches station *Y* at 9 a.m. Another train 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 ?

(a) 7 : 36 am (b) 7 : 56 am
(c) 8 : 36 am (d) 8 : 56 am

6. Rahim sets out to cross a forest. On the first day, he completes 1/10th of the journey. On the second day, he covers 2/3rd of the distance travelled the first day. He continues in this manner, alternating the days in which he travels 1/10th of the distance still to be covered, with days on which he travels 2/3 of the total distance already covered. At the end of seventh day, he finds that 22½ km more will see the end of his journey. How wide is the forest?

(a) $66\frac{2}{3}$ km (b) 100 km
(c) 120 km (d) 150 km

7. Two ducks move along the circumference of a circular pond in the same direction and come alongside each other every 54 minutes. If they moved with the same speeds in the opposite directions, they would meet every 9 minutes. It is known that when the ducks moved along the circumference in opposite directions, the distance between them decreased from 54 to 14 feet every 48 seconds. What is the speed of the slower duck?

(a) 20 feet/min (b) 15 feet/min
(c) 30 feet/min (d) 20.83 feet/min

8. An athlete runs to and fro between points A and B at a speed of 10 km/h. A second athlete simultaneously runs from point B to A and back at a speed of 15 km/h. If they cross each other 12 min after the start, after how much time will they cross each other?

(a) 18 min (b) 24 min
(c) 36 min (d) 48 min

9. A train's journey is disrupted due to an accident on its track after it has travelled 30 km. Its speed then comes down to 4/5th of its original and consequently it runs 45 min late. Had the accident taken place 18 km farther away, it would have been 36min late. Find the original speed of the train.

(a) 25 km/h (b) 36 km/h
(c) 30 km/h (d) 20 km/h

10. A tank of 4800 m^3 capacity is full of water. The discharging capacity of the pump is 10 m^3/min higher than its filling capacity. As a result the pump needs 16 min less to discharge the fuel than to fill up the tank. Find the filling capacity of the pump.

(a) 50 m^3/min (b) 25 m^3/min
(c) 55 m^3/min (d) 24 m^3/min

11. Karan and Arjun run a 100-metre race, where Karan beats Arjun by 10 metres. To do a favour to Arjun, Karan starts 10 metres behind the starting line in a second 100-metre race. They both run at their earlier speeds. Which of the following is true in connection with the second race?

(a) Karan and Arjun reach the following line simultaneously
(b) Arjun beats Karan by 1 metre
(c) Arjun beats Karan by 11 metre
(d) Karan beats Arjun by 1 metre

12. *A* train *X* departs from station *A* at 11.00 am for station *B*, which is 180 km away. Another train *Y* departs from station *B* at 11.00 am for station *A*. Train *X* travels at an average speed of 70 kms/hr and does not stop any where until it arrives at station B. Train Y travels at an average speed of 50 kms/hr, but has to stop for 15 minutes at station C, which is 60 kms away from station B enroute to station A. Ignoring the lengths the train , what is the distance , to the nearest km, from station A to the point where the trains cross each other?

(a) 112 (b) 118
(c) 120 (d) None of these

13. The vehicle of Mr. Ghosh needs 30% more fuel at the speed of 75 kmph than it needs at the speed of 50 kmph. At a speed of 50 kmph, Mr. Ghosh can go to a distance of 195 kms. At the speed of 75 kmph, he will able to travel a distance of

(a) 120 kms (b) 150 kms
(c) 160 kms (d) 140 kms

14. I started climbing up the hill at 6 am and reached the temple at the top at 6 pm. Next day I started coming down at 6 am and reached the foothill at 6 pm. I walked on the same road. The road is so short that only one person can walk on it. Although I varied my pace on my way, I never stopped on my way. Then which of the following must be true

(a) My average speed downhill was greater than that uphill
(b) At noon, I was at the same spot on both the days.
(c) There must be a point where I reached at the same time on both the days.
(d) There cannot be a spot where I reached at the same time on both the days.

15. In a watch, the minute hand crosses the hour hand for the third time exactly after every 3 hrs., 18 min., 15 seconds of watch time. What is the time gained or lost by this watch in one day?

(a) 14 min. 10 seconds lost
(b) 13 min. 44 seconds lost
(c) 13min. 20 seconds gained
(d) 14 min. 40 seconds gained

Hints & Solutions

Foundation Level

1. **(a)** Let a distance x be covered in time t.

Required ratio = $\dfrac{\frac{x/2}{2t}}{\frac{x}{t}} = \dfrac{1}{4} = 1:4$

2. **(c)** Let the distance travelled during both upward and downward journey be x km.

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

$= \dfrac{x+x}{\frac{x}{16}+\frac{x}{28}} = \dfrac{2}{\frac{28+16}{28\times 16}}$

$= \dfrac{2\times 28\times 16}{44} = 20.36 \text{ km/h}$

3. **(b)** Distance = $\left(1100\times\dfrac{11}{5}\right)$ feet = 2420 feet.

4. **(a)** Time required = (2 hrs 30 min – 50 min) = 1hr 40 min

$= 1\dfrac{2}{3}$ hrs

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

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

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

5. **(c)** When time is constant the distance covered by A and B will be in the ratio of their speeds, respectively.

6. **(b)** Let the distance travelled be x km.
Then, the correct time at a speed of 30 km/h

$= \dfrac{x}{30} - \dfrac{10}{60}$ and

the correct time at a speed of 42 km/h = $\dfrac{x}{42} + \dfrac{10}{60}$

Now, $\dfrac{x}{30} - \dfrac{10}{60} = \dfrac{x}{42} + \dfrac{10}{60}$

or $\dfrac{x}{30} - \dfrac{x}{42} = \dfrac{2}{6}$ or $\dfrac{12x}{1260} = \dfrac{2}{6}$ or x = 35 km

7. **(c)** Relative speed of the trains = (40 + 20) = 60 m/s
Distance = (120 + 120) = 240 m

Time taken by trains to cross each other completely

$= \dfrac{240}{60} = 4$ s

$\therefore$ Larger the no. of cogs (tooth of wheel) of wheel, lesser will be that no. of revolution made by it.

8. **(c)** Let the speed of trains be x km/h and y km/h, respectively.
When the trains cross each other, time taken by both the trains will be equal.

i.e. $\dfrac{110}{x} = \dfrac{90}{y} \Rightarrow \dfrac{x}{y} = \dfrac{110}{90} \Rightarrow x:y = 11:9$

9. **(b)** Required distance = $\dfrac{S_1S_2}{(S_1 \sim S_2)} \times$ Time difference

$= \dfrac{8\times 5}{3}\times\dfrac{3}{2} = 20$km

10. **(b)** Let the total distance be x km. Then,

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

$\Rightarrow 15x = 168 \times 20 \Rightarrow x = \left(\dfrac{168\times 20}{15}\right) = 224$ km.

11. **(b)** Speed of the train = 132 km/h = $\dfrac{132\times 5}{18}$ m/s

Distance = (110 + 165) = 275 m
Time required to cross the railway platform

$= \dfrac{275\times 18}{132\times 5} = 7.5$s

12. **(b)** Let the total distance be $3x$ km.

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

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

13. **(c)** $\dfrac{x}{9} - \dfrac{x}{10} = \dfrac{20}{60}$

or, $\dfrac{10x - 9x}{90} = \dfrac{20}{60}$

$\therefore x$ = 30 km

14. **(c)** Let the normal speed = x km/h
Then, the new speed = (x + 5) km/h.

Now, $\dfrac{300}{x} - 2 = \dfrac{300}{(x+5)}$ or $\dfrac{300}{x} - \dfrac{300}{(x+5)} = 2$

Checking with options, we see that x = 25 km/h.

15. **(c)** Distance between Chauhan and the gun

$= 3.32 \times 1000 = 3320$ m

Time taken = 10 s

$\Rightarrow$ Speed $= \frac{3320}{10} = 332\,\text{m/s}$

16. **(a)** 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 = $\frac{1}{5}$ hr = 12 min.

$\therefore$ They meet at 7:42 a.m.

17. **(c)** Average speed = $\frac{\text{Total distance covered}}{\text{Total time taken}}$

$$= \frac{2 \times 200}{\frac{200}{40} + \frac{200}{20}} = \frac{2 \times 40 \times 20}{40 + 20}$$

$$= \frac{2 \times 40 \times 20}{60} = \frac{80}{3} = 26.67 \text{ km/h.}$$

18. **(a)** Let the length of each train be x metres.

Then, the total distance covered = $(x + x) = 2x$ m

Relative speed = (46 – 36) = 10 km/h $= \frac{10 \times 5}{18}\,\text{m/s}$

Now, $36 = \frac{2x \times 18}{50}$

or $x = 50$ m

19. **(c)** After 5 minutes (before meeting), the top runner covers 2 rounds i.e., 400 m and the last runner covers 1 round *i.e.*, 200 m.

$\therefore$ Top runner covers 800 m race in 10 minutes.

20. **(b)** Due to stoppges the train travels (45 – 36) = 9 km less in an hour than it could have travelled without stoppages.

Thus train stops per hour for $\frac{9}{45} \times 60 = 12$ min.

21. **(b)** Distance travelled by the train in 1 hour

$= 2 \times \frac{22}{7} \times 2.1 \times 75 \times 60\,\text{m.} = \frac{132 \times 450}{1000} = 59.4$ km

i.e. speed of the train = 59.4 km/h.

22. **(d)** First train’s speed is 45km/hr.

$\left(\text{Using speed} = \frac{\text{Distance}}{\text{Time}}\right)$

Second train’s speed is 60km/hr.

Difference in the distance covered by these trains in 1 hr. is 15 km.

23. **(c)** Speed of speed-boat = 16 – 3 = 13 km/hr.

$\therefore$ Speed of boat against the current = 13 – 3 = 10 km/hr.

24. **(d)** Let the usual speed be x km/hr, then

$$\frac{1500}{x} - \frac{1500}{x + 250} = \frac{1}{2}$$

$\Rightarrow x = 750$ km/hr

25. **(a)** Relative velocity = 20 + 30 = 50 m/s.

Distance = 2.5 kms. = 2500 m.

t = 2500/50 = 50 s.

26. **(c)** Relative speed = 90 + 60 = 150 km/hr.

Total distance to be covered = 300 + 200 = 500 m

Time required $= \frac{500}{150 \times 1000} \times 3600 = 12$ sec.

27. **(d)** Required distance between A and B

$$= \frac{3\left((9)^2 - (3)^2\right)}{2(9)} = \frac{3(81 - 9)}{18} = \frac{72}{6} = 12\,\text{km.}$$

28. **(d)** Total distance covered = 2 × 91 km = 182 km

Time taken = 20 hours

$\therefore$ Average speed $= \frac{182}{20} = 9.1\,\text{km/h}$

Let the speed of flow of the river = x km/hr

then, $\frac{10^2 - x^2}{10} = 9.1 \Rightarrow 100 - 91 = x^2 \Rightarrow x = \pm 3$

Hence, rate of flow of the river = 3 km/h

29. **(d)** Relative speed = 5.5 – 5 = 0.5 km/h.

Required time $= \frac{8.5}{0.5} = 17$ h

30. **(d)** x (speed of boat in standing water) = 9 km/hr

speed of stream = 1.5 km.h

Total time taken by him $= \frac{105}{10.5} + \frac{105}{7.5}$

= 10 + 14 = 24 h

31. **(a)** Given, distances are 2500 km, 1200 km and 500 km. Given, speeds are 500 km/h, 400 km/h and 250 km/h

$$\therefore \quad \text{Total time} = \frac{2500}{500} + \frac{1200}{400} + \frac{500}{250}$$

$$= 5 + 3 + 2 = 10 \text{ hr.}$$

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

$$= \frac{2500 + 1200 + 500}{10} = \frac{4200}{10}$$

$$= 420 \text{ km/hr}$$

32. **(d)** Let the distance between each pole be x m. Then, the distance up to 12th pole = 11 x m

$$\text{Speed} = \frac{11x}{24} \text{ m/s}$$

Time taken to covers the total distance of 19x

$$= \frac{19x \times 24}{11x} = 41.45 \text{s}$$

33. **(a)** Let the length of the journey = x km.

$$\therefore \text{Journey rides by horse cart} = x\left(1 - \frac{1}{2} - \frac{1}{3}\right)$$

$$= \frac{1}{6}x \text{ km.}$$

Then, total time taken to complete journey $= \frac{31}{5}$ hr

$$\Rightarrow t_1 + t_2 + t_3 = \frac{31}{5}$$

$$\Rightarrow \frac{x}{2} \times \frac{1}{4} + \frac{x}{3} \times \frac{1}{12} + \frac{x}{6 \times 9} = \frac{31}{5}$$

$$\Rightarrow x = \frac{31}{5} \times \frac{216}{37} = 36.2 \text{km} \approx 36 \text{km}$$

34. **(d)** Required difference $= \frac{180}{3} - \frac{180}{4} = 15$ km

35. **(c)** Let the husband and the wife meet after x minutes. 4500 metres are covered by Pradeep in 60 minutes.

In x minutes, he will cover $\frac{4500}{60}x$ metres.

Similarily,

In x minutes, his wife will cover $\frac{3750}{60}x$ m.

$$\text{Now, } \frac{4500}{60}x + \frac{3750}{60}x = 726$$

$$\Rightarrow \quad x = \frac{726 \times 60}{8250} = 5.28 \text{min}$$

36. **(a)** Let speed of the boat in still water be x km/h and speed of the current be y km/h.
Then, upstream speed = $(x - y)$ km/h
and downstream speed = $(x + y)$ km/h

$$\text{Now, } \frac{24}{(x - y)} + \frac{28}{(x + y)} = 6 \qquad \ldots(1)$$

$$\text{and } \frac{30}{(x - y)} + \frac{21}{(x + y)} = \frac{13}{2} \qquad \ldots(2)$$

Solving (1) and (2), we have
x = 10 km/h and y = 4 km/h

37. **(c)** The train that leaves at 6 am would be 75 km ahead of the other train when it starts. Also, the relative speed being 36 kmph, the distance from Mumbai would be (75/36) × 136 = 283.33 km

38. **(a)** Solve through options. At 18 kmph the motorboat would take exactly 6 hours.

39. **(a)** The train can cover (200 + 350) m distane in five seconds which means the speed of the train is 110 m/s. Relative speed of man and trian is 114 m/s. To cover the distance of 100 metre, it will take less than one second.

40. **(a)** The clock gains 15 min in 24 hours.
Therefore, in 16 hours, it will gain 10 minutes.
Hence, the time shown by the clock will be 4.10 am.

41. **(b)** Average speed $= \frac{\text{Total distance}}{\text{Total time}}$

$$= \frac{80}{\frac{60}{40} + \frac{20}{20}} = \frac{80}{2.5} = 32 \text{ km/h}$$

42. **(d)** Total distance = 250 × 2 = 500 km

$$\text{Total time} = 5\frac{1}{2}\text{hrs} + 4\frac{2}{3}\text{hrs} = 10\frac{1}{6}\text{hrs}$$

$$\text{Average speed} = \frac{\text{Total distance}}{\text{Total time}} = \frac{500}{10\frac{1}{6}} = \frac{3000}{61}\text{hrs}$$

$$= 49.18 \text{ hours} \approx 50 \text{ hours (approx.)}$$

43. **(c)** The statements in the question can be reformulated as follows:
If A covers 400 m, B covers 395 m.
If B covers 400 m, C covers 396 m.
If D covers 400 m, C covers 384 m.
Therefore, if B covers 395 m, then C will cover,

$$\frac{396}{400} \times 395 = 391.05 \text{m}$$

Again, If C covers 391.05 m, then D will cover

$$\frac{400}{384} \times 391.05 = 407.34 \text{ m.}$$

Thus, if A and D run over 400 m, then D wins by 7.3 m.

44. (c) Their relative speeds = (4.5 + 3.75) = 8.25 km/h

Distance = 726 metres = $\frac{726}{1000} = 0.726\,\text{km}$

Required time = $\frac{0.726}{8.25} \times 60 = 5.28$ min

45. (d) Since they are moving in opposite direction, therefore their relative speed will be 4 + 3 = 7 km/hr.

Time $= \frac{d}{s} = \frac{17.5}{7} = 2.5\text{hrs.}$

(where d is distance and s is speed).

∴ They should meet at 12.30 PM.

46. (c) Speed on return trip = 150% of 40 = 60 kmph.

∴ Average speed = $\left(\frac{2 \times 40 \times 60}{40 + 60}\right)$ km/hr

$= \left(\frac{4800}{100}\right)$ km/hr = 48 km/hr.

47. (a) Average speed = $\frac{2 \times V_1 \times V_2}{V_1 + V_2} = \frac{2 \times 40 \times 60}{40 + 60}$

= 48 km/h

48. (c) The speeds of the two cyclists are different Hence, when one of the cyclist has covered one round more than the other cyclist, only then they will meet at the starting point.

∴ Time when the two cyclists will meet

= 300 m × (difference in speeds)

= 300 × (8 – 7) sec = 300 seconds.

49. (c) 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

∴ $\frac{(x+11)}{60} \times 40 = \frac{(x+5)}{60} \times 50 \Leftrightarrow x = 19$ min.

50. (a) Let x be the total distance.

∴ According to the question,

Distance covered by him on foot = $\frac{1}{3} x \times \frac{1}{4} = \frac{x}{12}$

But given he travels on foot = 2 km

∴ $\frac{x}{12} = 2 \Rightarrow x = 24\,\text{km.}$

51. (d) Let speed of car = x km / hr

Let speed of pedestrian = y = 2km / hr

∴ Relative speed = (x – 2) km / hr

∴ According to the question,

$(x - 2) \times \frac{6}{60} = 0.6 \Rightarrow x - 2 = 6 \Rightarrow x = 8$ km / h

52. (b) Let the original time be T hours and original speed be x km/h

$\frac{1500}{x} = T$ …(1)

$\frac{1500}{x + 250} = T - \frac{30}{60}$ …(2)

Solving equations (1) and (2), we get

Speed of plane = x = 750 or – 1000 (not possible)

∴ x = 750 km/h

53. (c) Suppose they meet x hours after 14.30 hrs.

Then, 60x = 80 (x – 2) or x = 8.

∴ Required distance = (60 × 8) = 480 km.

54. (c) Total time taken

$= \left(\frac{9}{9+6} + \frac{9}{9-6}\right)$ hour

$= \left(\frac{3}{5} + 3\right)$ hours $= 3\frac{3}{5}$ hours

55. (a) Distance to be covered by the thief and by the owner is same.

Let after time 't', owner catches the thief.

$\therefore 40 \times t = 50\left(t - \frac{1}{2}\right)$

$\Rightarrow 10t = 25 \Rightarrow t = \frac{5}{2}\text{hr} = 2\frac{1}{2}\text{hr}$

56. (b) Rest time = Number of rest × Time for each rest

= 4 × 5 = 20 minutes

Total time to cover 5 km

$= \left(\frac{5}{10} \times 60\right)$ minutes + 20 minutes = 50 minutes.

57. (c) Assume that the distance is 120 km. Hence, 30 km is covered @ 25 kmph, 40@30 kmph and so on. Then average speed is 120/total time

58. (c) Time taken to cross a pole = $\frac{50}{1000} \times \frac{1}{45}$ hr

∴ No. of counts = $\frac{4 \times 1000 \times 45}{50}$ = 80 × 45 = 3600.

59. (a) Average speed $= \frac{\text{Total distance}}{\text{Total time}}$

$= \frac{400 \times 4 \times 9}{88 + 96 + 89 + 87} = \frac{400 \times 4 \times 9}{360}$

= 40 metres /minutes

60. (b) Time $= \frac{\text{Distance advanced}}{\text{Relative speed}}$

$2 = \frac{2 \times x}{(30 - x)}$

$\Rightarrow x$ = 15 km/h

Standard Level

1. **(d)** When A covers 200 metres, B covers

$$200 \times \frac{22}{25} = 176\,\text{m}$$

So, B is (200 – 176) = 24 m far away from the end point when A reaches in.

2. **(b)** Let the required distance be x km.
Difference in the times taken at two speeds

$= 12 \text{ min} = \frac{1}{5}\text{hr}.$

$\therefore \frac{x}{5} - \frac{x}{6} = \frac{1}{5} \Leftrightarrow 6x - 5x = 6 \Leftrightarrow x = 6$

Hence, the required distance is 6 km.

3. **(c)** 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 km.

4. **(b)** Let the speed of the train and the car be x km/h and y km/h, respectively.

Now, $\frac{120}{x} + \frac{480}{y} = 8$ …(1)

and $\frac{200}{x} + \frac{400}{y} = \frac{25}{3}$ …(2)

From (1), $120y + 480x = 8xy$ and …(3)

From (2), $200y + 400x = \frac{25}{3}xy$ …(4)

From (3) and (4),

$$\frac{120y + 480x}{8} = \frac{3(200y + 400x)}{25}$$

or $15y + 60x = 24y + 48x$

or $12x = 9y$ or $\frac{x}{y} = \frac{3}{4}$ or $x : y = 3 : 4$

5. **(c)** Circumference of the wheel starting from

$X = 2 \times \frac{22}{7} \times 3.5 = 22$ cm

Circumference of the wheel starting from

$Y = 2 \times \frac{22}{7} \times 7 = 44$ cm

Let both the wheels make n revolutions in one second.
Distance covered by both the wheels in 1 sec
$= 22\,n + 44\,n = 66$ n cm

$\Rightarrow$ Distance covered by both the wheels in 10 sec = 660 n cm

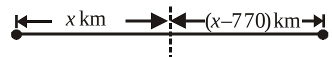
Now, 660 n = 1980 $\Rightarrow$ $n = 3$
Speed of the smaller wheel = 22 n cm/s = 66 cm/s

6. **(c)** Remaining distance = 3 km and Remaining time

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

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

7. **(b)** Let the aeroplane covers x km at a speed of 440 km/h and $(x - 770)$ km at a speed of 660 km/h.
Hence, it covers a total distance of $(2x - 770)$ km at a speed of 500 km/h.



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

$$\Rightarrow \quad 500 = \frac{2x - 770}{\frac{x}{440} + \frac{x - 770}{660}}$$

or $\frac{2x - 770}{500} = \frac{x}{440} + \frac{x - 770}{660}$

or $x = 1760$

Therefore, the total distance covered = $2x - 770$
= 2 × 1760 – 770 = 2750 km

8. **(a)** Let the whole distance travelled be x km and the average speed of the car for the whole journey be y km/hr.

Then, $\frac{(x/3)}{40} + \frac{(x/3)}{20} + \frac{(x/3)}{60} = \frac{x}{y}$

$\Leftrightarrow \frac{x}{30} + \frac{x}{60} + \frac{x}{180} = \frac{x}{y}$

$\Leftrightarrow \frac{1}{18}y = 1$

$\Leftrightarrow y = 18$ km/hr.

9. **(a)** Speed of first train = 50 km/hr.

Speed of second train $= \frac{400}{7}$ km/hr.

At 8:00 AM distance between two trains is 100 kms.
Relative velocity

$$= 50 + \frac{400}{7} = \frac{350 + 400}{7} = \frac{750}{7}\text{km / h}$$

Time taken $= \frac{100 \times 7}{750} \times 60 = 56\,\text{min}$. Hence, the two trains meet each other at 8:56 AM.

10. **(b)** Let the speed of the stream be x km/hr and distance travelled be S km. Then,

$\frac{S}{12 + x} = 6$ and $\frac{S}{12 - x} = 9$

$\Rightarrow \frac{12 - x}{12 + x} = \frac{6}{9} \Rightarrow 108 - 9x = 72 + 6x$

$\Rightarrow 15x = 36 \Rightarrow x = \frac{36}{15} = 2.4$ km/hr.

11. **(a)** If the rate of the stream is x, then $2(4.5 - x) = 4.5 + x$

$\Rightarrow\ 9 - 2x = 4.5 + x \Rightarrow\ 3x = 4.5 \Rightarrow\ x = 1.5$ km/hr

12. **(b)** Distance covered = 187.5m, Time = 9 secs

Relative speed $= \dfrac{187.5}{9} \times \dfrac{3600}{1000} = 75$ km/hr

As the trains are travelling in opposite directions, speed of goods train = 75 – 50 = 25 km/hr.

13. **(d)** Relative speed of both trains = 60 + 90 = 150 km / h

Total distance = 1.10 + 0.9 = 2 km

$\therefore$ Required time $= \dfrac{2 \times 60 \times 60}{150} = 48$ seconds.

14. **(c)** Let the speed of the train be x km/hr and that of the car be y km/hr.

Then, $\dfrac{120}{x} + \dfrac{480}{y} = 8$ or $\dfrac{1}{x} + \dfrac{4}{y} = \dfrac{1}{15}$ ...(1)

And, $\dfrac{200}{x} + \dfrac{400}{y} = \dfrac{25}{3}$ or $\dfrac{1}{x} + \dfrac{2}{y} = \dfrac{1}{24}$ ...(2)

Solving (1) and (2), we get $x = 60$ and $y = 80$.

$\therefore$ Ratio of speeds = 60 : 80 = 3 : 4.

15. **(c)** Suppose they meet x hrs after 8 a.m. Then,

(Distance moved by first in x hrs) + [Distance moved by second in $(x - 1)$ hrs] = 330

$\therefore 60x + 75(x - 1) = 330$

$\Rightarrow\ x = 3$

So, they meet at (8 + 3), i.e. 11 a.m.

16. **(d)** Given, ratio of speeds of A and B is 5 : 4.

$\therefore$ B makes 4 rounds when A makes 5 rounds.

Now, distance covered by A in 5 rounds

$= \left(5 \times \dfrac{400}{1000}\right) = 2$km

and distance covered by B in 4 rounds

$= \left(4 \times \dfrac{400}{1000}\right)$km = 1.6 km

It is clear that in 5 hours, A passes

B only once. (*i.e.*, 1 time).

In other words, in covering 2 km, A pases B 1 time.

$\therefore$ In covering 5 km, A passes B in $\left(\dfrac{1}{2} \times 5\right)$ times

i.e., $2\dfrac{1}{2}$ times.

17. **(a)** Total journey = 180 km

$\dfrac{1}{3}$rd of journey $= \dfrac{180}{3} = 60$ km.

If usual speed be x kmph, then

$$\frac{60}{\frac{3x}{4}} - \frac{60}{x} = \frac{1}{2}$$

$$\Rightarrow \frac{80}{x} - \frac{60}{x} = \frac{1}{2}$$

$$\Rightarrow \frac{80}{x} - \frac{60}{x} = \frac{1}{2}$$

$\Rightarrow\ x = 40$ kmph

18. **(a)** If the rowing speed in still water be x kmph, and the distance by y km, then

$\dfrac{y}{x - 2} = 6$

$\Rightarrow\ y = 6(x - 2)$ ...(1)

and, $\dfrac{y}{x + 2} = 4$

$\Rightarrow\ y = 4(x + 2)$ ...(2)

$\Rightarrow\ 6(x - 2) = 4(x + 2)$

$\Rightarrow\ x = 10$ kmph

19. **(a)** $d = \text{product of speed}\left[\dfrac{\text{difference of time}}{\text{difference of speed}}\right]$

$d = \dfrac{4 \times 5}{60}\left[\dfrac{10 - (-5)}{5 - 4}\right]$ [Here, –ve sign indicates before the schedule time]

$\Rightarrow\ d = 5$ km

20. **(a)** Let the distance be x km. Let speed of train be y km/h. Then by question, we have

$\dfrac{x}{y + 4} = \dfrac{x}{y} - \dfrac{30}{60}$ ...(1)

and $\dfrac{x}{y - 2} = \dfrac{x}{y} + \dfrac{20}{60}$ ...(2)

On solving (1) and (2), we get $x = 3y$

Put $x = 3y$ in (1) we get

$\dfrac{3y}{y + 4} = 3 - \dfrac{1}{2} \Rightarrow y = 20$

Hence, distance = 20 × 3 = 60 km.

21. **(a)** Let each side of the square be x km and let the average speed of the plane around the field be y km/h. Then,

$$\frac{x}{200} + \frac{x}{400} + \frac{x}{600} + \frac{x}{800} = \frac{4x}{y}$$

$$\Rightarrow \frac{25x}{2400} = \frac{4x}{y} \Rightarrow y = \left(\frac{2400 \times 4}{25}\right) = 384.$$

$\therefore$ Average speed = 384 km/h.

22. **(c)** Here, distance to be covered by the thief and by the owner is same.

Let after 2 : 30 p. m., owner catches the thief in t hrs.

Then, $60 \times t = 75\left(t - \dfrac{1}{2}\right) \Rightarrow t = \dfrac{5}{2}$ hrs

So, the thief is overtaken at 5 p.m.

23. **(c)** Let the speed of the cars be x km/h and y km/h, respectively.

Their relative speeds when they are moving in same direction = $(x - y)$ km/h.

Their relative speeds when they are in opposite directions = $(x + y)$ km/h.

Now, $\frac{70}{x+y} = 1$ or $x + y = 70$ …(1)

and $\frac{70}{(x-y)} = 7$ or $x - y = 10$ …(2)

Solving (1) and (2), we have

$x = 40$ km/h and $y = 30$ km/h.

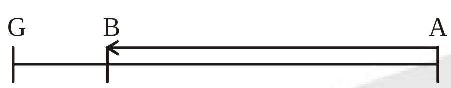
24. **(b)** Volume of water flowed in an hour

= 2000 × 40 × 3 cubic metre = 240000 cubic metre

∴ volume of water flowed in 1 minute

$= \frac{240000}{60} = 4000$ cubic metre = 40,00,000 litre

25. **(c)**



In the above figure, the train travels from A to B in 11 : 30 minutes.

Suppose, you denote the time at which the first gunshot is heard as $t = 0$. Also, if you consider the travel of the sound of the second the gunshot is heard at point B at $t = 11 : 30$ minutes. Also, the second gunshot should reach point B at $t = 12$ minutes. Hence, the sound of the 2nd gunshot would take 30 seconds to travel from B to A.

Thus, $\frac{S_{train}}{S_{sound}} = \frac{t_{sound}}{t_{train}}$

$S_{train} = 330 \times \frac{30}{690} = \frac{330}{23}$ m/s.

26. **(c)** Initial distance = 25 dog leaps.

Per minute → dog makes 5 dog leaps

Per minute → Cat makes 6 cat leaps = 3 dog leaps.

Relative speed = 2 dog leaps/minutes.

An initial distance of 25 dog leaps would get covered in 12.5 minutes.

27. **(b)** Speed of train while passing point

A = 70 × (5/18) m/s = V_1

Speed of bike initially = 70 × (5/18) m/s = V_2

Time taken by the bike to reach at the mid-point of the train = $150/(V_2 - V_1)$

Again find out the new speeds of train and bike, and calculate the time taken by the bike to cover the rest 150 m distance relative to the train.

28. **(a)** Form the equations first and then use the options.

29. **(b)**

	Ram	:	Sham
Speed	7	:	4
Time	4	:	7
Distance	4	:	7

Now, $7x - 4x = 300$

Means $x = 100$

Therefore, the winning post is 7 × 100 = 700 m away from the starting point

30. **(d)** The watch gains (5 + 10) = 15 min in 30 hours (12 Noon to 6 PM next day). This means that it will show the correct time when it gains 5 min in 10 hours or at 10 PM on Monday.

31. **(b)** Average speed when Pankaj was returning

$= \frac{2 \times 10 \times 30}{40} = 15$ km/hr

Now the average speed of the whole journey

$= \frac{2 \times 15 \times 60}{75} = 24$ km/hr

32. **(b)** The train needs to travel 15 minutes extra @35 kmph. Hence, it is behind by 8.75 kms. The rate of losing distance is 5 kmph. Hence, the train must have travelled for 8.75/5 = 1 hour 45 minutes. @40 kmph → 70 km.

Alternatively, you can also see that 12.5% drop in speed results in 14.28% increase in time. Hence, total time required is 105 minutes @ 40 kmph → 70 kilometers.

Alterntively, solve through options.

33. **(c)** Let the distance between the school and the home be x km.

Then, $\frac{x}{8} - \frac{2.5}{60} = \frac{x}{10} + \frac{5}{60}$ or $\frac{x}{8} - \frac{x}{10} = \frac{5}{60} + \frac{2.5}{60}$

or $\frac{2x}{80} = \frac{7.5}{60}$ or $x = \frac{7.5 \times 80}{2 \times 60} = 5$ km

34. **(b)** Relative speed of rockets

= (42000 + 18000) = 60000 mile/h

It means both of them together cover a distance of 60000 miles between themselves in 60 minutes or 1000 miles in 1 minute.

Hence, they should be 1000 miles apart, 1 minute before impact.

35. **(c)** Let the speed of the train be x m/sec. Then,

Distance travelled by the train in 10 min. = Distance travelled by sound in 30 sec.

$\Leftrightarrow x \times 10 \times 60 = 330 \times 30$

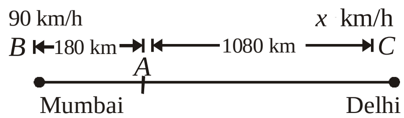
$\Leftrightarrow x = 16.5$.

∴ Speed of the train = 16.5 m/sec = $\left(16.5 \times \frac{18}{5}\right)$ km/hr

= 59.4 km/hr

36. (c) Let the speed of train C be x km/h.
At 9 p.m. the train A will have covered a distance of 180 km.
For trains A and B relative speed = (90 – 60) = 30 km/h
Distance between them = 180 km

Time after which they meet = $\frac{180}{30} = 6$ hrs



For trains A and C relative speeds = $(60 + x)$ km/h
Distance between them = 1080 km.

Time after which they meet = $\frac{1080}{(60+x)}$ hrs

As the time of meeting of all the three trains is the same, we have $\frac{1080}{(60+x)} = 6$

or $x = 120$ km/h

37. (b) Time taken by the boat during downstream journey = $\frac{50}{60} = \frac{5}{6}$h

Time taken by the boat in upstream journey = $\frac{5}{4}$h

Average speed = $\frac{2 \times 50}{\frac{5}{6} + \frac{5}{4}} = \frac{100 \times 24}{50} = 48$ mph

38. (c) Let the distance be x km. Then,
(Time taken to walk x km) + (Time taken to ride x km)
$= \frac{23}{4}$ hrs.
⇒ (Time taken to walk $2x$ km) + (Time taken to ride $2x$ km) = $\frac{23}{2}$ hrs.

But, time taken to ride $2x$ km = $\frac{15}{4}$ hrs.

∴ Time taken to walk $2x$ km = $\left(\frac{23}{2} - \frac{15}{4}\right)$ hrs = $\frac{31}{4}$ hrs
= 7 hrs 45 min.

39. (a) Let the speed of the boatman be x km/hr and that of stream by y km/hr. Then

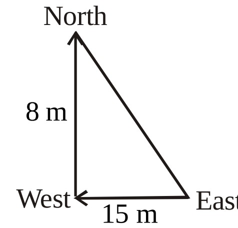
$$\frac{12}{x+y} = \frac{4}{x-y}$$

$\Rightarrow$ $12x - 12y = 4x + 4y$
$\Rightarrow$ $8x = 16y \Rightarrow x = 2y$

Now $\frac{45}{x+y} + \frac{45}{x-y} = 20$

$\Rightarrow$ $45 + 135 = 60y \Rightarrow 180 = 60y \Rightarrow y = 3$km/hr.

40. (c) Required distance



$= \sqrt{8^2 + 15^2}$

$= \sqrt{64 + 225}$

$= \sqrt{289} = 17$ m

41. (b) Let the Speed of faster train be x and speed of slower train be y.
Now, when both the train move in same direction their relative speed = $x - y$
Now, total distance covered = 130 + 110 = 240
Now, distance = speed × time
∴ $240 = (x - y) \times 60$ (∵ 1 min = 60 sec)
$\Rightarrow x - y = 4$ …(1)
When the trains move in opposite direction then their relative speed = $x + y$
∴ $240 = (x + y) \times 3$
$\Rightarrow 80 = x + y$ …(2)
on solving eqs (1) and (2), we get $x = 42$ m/sec and $y = 38$ m/sec

42. (d) Let v_m = velocity of man = 48 m/min
Let v_c = velocity of current
then t_1 = time taken to travel 200 m against the current.

i.e., $t_1 = \frac{200}{v_m - v_c}$ ....(1)

and t_2 time taken to travel 200 m with the current

i.e., $t_2 = \frac{200}{v_m + v_c}$ ....(2)

Given : $t_1 - t_2 = 10$ min

$$\therefore \frac{200}{v_m - v_c} - \frac{200}{v_m + v_c} = 10$$

$$\Rightarrow v_m^2 - v_c^2 = 40v_c \Rightarrow v_c^2 + 40v_c - (48)^2 = 0$$

$$\Rightarrow v_c = 32, -72$$

Hence, speed of the current = 32 (∵ $v_c \neq -72$).

43. (c) Let the total distance to be travelled = x km
Speed of train = v km/h
and time taken = t hr.

$\frac{150}{v} + \frac{x - 150}{\left(\frac{3v}{5}\right)} = (t + 8)$ .....(1)

$\frac{510}{v} + \frac{x - 510}{\frac{3}{5}v} = (t + 4)$ .....(2)

Eq (2) – Eq (1)

$$\frac{510}{v} - \frac{150}{v} + \frac{x - 510}{\frac{3}{5}v} - \frac{x - 150}{\frac{3v}{5}} = -4$$

$$\frac{360}{v} - \frac{360 \times 5}{3v} = -4 \Rightarrow v = 60 \text{ km/hr.}$$

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

Put in eqn (1)

$$\frac{150}{60} + \frac{x - 150}{\frac{3 \times 60}{5}} = \left(\frac{x}{60} + 8\right)$$

$$\frac{5}{2} + \frac{x - 150}{36} = \frac{x}{60} + 8$$

$$\frac{x - 150}{36} - \frac{x}{60} = 8 - \frac{5}{2} = \frac{11}{2}$$

$$\frac{10x - 1500 - 6x}{360} = \frac{11}{2}$$

$$\Rightarrow 4x - 1500 = \frac{360 \times 11}{2} = 1980 \Rightarrow 4x = 3480$$

$$x = \frac{3480}{4} \text{ km} = 870 \text{ km}$$

44. **(d)** Let speed of current = v.m/min

$$\frac{200}{48 - v} - \frac{200}{48 + v} = 10$$

$20(48 + v) - 20(48 - v) = 48^2 - v^2$

$40v = 48^2 - v^2$

$v^2 + 40v - 2304 = 0$

$v = 32$ m/min.

45. **(c)** We know that, the relation in time taken with two different modes of transport is

$t_{\text{walk both}} + t_{\text{ride both}} = 2\,(t_{\text{walk}} + t_{\text{ride}})$

$$\frac{31}{4} + t_{\text{ride both}} = 2 \times \frac{25}{4}$$

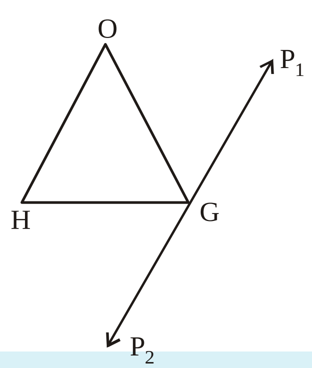
$$\Rightarrow t_{\text{ride both}} = \frac{25}{2} - \frac{31}{4} = \frac{19}{4} = 4\frac{3}{4} \text{ hrs}$$

46. **(d)** Time difference between 8 am and 2 pm = 6 hrs.

Angle traced by the hour hand in 6 hours

$$= \left(\frac{360}{12} \times 6\right)^{\circ} = 180^{\circ}$$

47. **(d)**



From the figure above we see that Shyam would have walked a distance of 4 + 4 + 4 = 12 km. (G to P_1, P_1 to G and G to P_2).

48. **(a)** The dog loses 1/3rd of his normal time from the meeting point. (Thus normal time = 35 × 3 = 105 minutes)

If the meeting occurred 24 km further, the dog loses 25 minutes.

This means that the normal time for the new distance would be 75 minutes. Thus, normally the dog would cover this distance of 24 km in 30 minutes.

Thus, normal speed = 48 km/hr.

49. **(d)** This question gives us the freedom to assume any value of speeds of Ramesh and Somesh. Let us assume the initial speed of Somesh = 20 m/s, then the initial speed of Ramesh = 40 m/s.

Till 50 m they are running with this speed only. Time taken by Ramesh in covering 50m = 1.25sec.

In the same time Somesh is covering 25m. After this stages, speed of Somesh is 20m/s, whereas speed of Rasmesh = 10 m/s. Now relative speed = 10m/s and distance = 25m. At 75m from the starting, both of them will be meeting.

50. **(b)** When *A* covers 1000 m, *B* covers 960 m.

Similarly, when *B* covers 1000 m, *C* covers 975 m.

$\therefore$ When *B* covers 960 m, *C* covers $\frac{975}{1000} \times 960 = 936$ m.

Thus, *A* can give a start to *C* by a distance

= (1000 – 936) m = 64 m.

51. **(a)** In 2 minutes, he ascends = 1 metre

$\therefore$ 10 metres, he ascends in 20 minutes.

$\therefore$ He reaches the top in 21st minute.

52. **(d)**

$$\frac{40}{(B - S)} + \frac{55}{(B + S)} = 13$$

$$\frac{30}{(B - S)} + \frac{44}{(B + S)} = 10$$

On solving these, we get *B* = 8 km/h, *S* = 5 km/h

$\therefore$ speed of Mallah in still water = 8 km/h

53. **(c)** Note here the length of the train in which passenger is travelling is not considered since we are concerned with the passenger instead of train. So, the length of the bridge will be directly proportional to the time taken by the passenger respectively.

t $\rightarrow$ Time

l $\rightarrow$ Length of bridge

Therefore. $\frac{t_1}{t_2} = \frac{l_1}{l_2}$

$$\frac{7}{4} = \frac{280}{2}$$

$\Rightarrow$ $x = 160$ m

54. **(b)** Downstream (Steamer) = 40 min
Downstream (Boat) = 60 min
Upstream (Steamer) = 60 min
Upstreamer (Boat) = 90 min
Required time = 40 + 30 + 45 = 115 min.

55. **(c)** Speed of tiger = 40 m/min
Speed of deer = 20 m/min
Relative speed = 40 – 20 = 20 m/min
Difference in distances = 50 × 8 = 400 m

$\therefore$ Time taken in overtaking (or catching) $= \dfrac{400}{20} = 20$ min

$\therefore$ Distance travelled in 20 min = 20 × 40 = 800 m

56. **(d)** $(6 - x) = (8 - 1.5x)$
$\Rightarrow \quad x = 4$ cm
So, it will take 4 hours to burn in such a way that they remain equal in length.

57. **(c)** The speeds of two persons is 108 km/h and 75 km/h. The first person covers 1080 km in 10 hours and thus he makes 12 rounds. Thus, he will pass over another person 12 times in any one of the direction.

58. **(c)** Angle between two hands at 3 : 10 am
= (90 + 5) – 60 = 35°
So, the required angle = 70°, after 3:10 am
Total time required to make 70° angle when minute-hand is ahead of hour-hand.

$$= \frac{90+70}{11/2} = \frac{320}{11} \text{ min}$$

So at 3h $\dfrac{320}{11}$ min the required angle will be formed.

59. **(d)** $(n + 1)$ times in n days.

60. **(c)** If you start at 12 noon, you would reach at 4 : 30 PM. You would be able to meet the train which left Mumbai at 8 AM, 9 AM, 10 AM, 11 AM, 12 Noon, 1 PM, 2 PM, 3 PM and 4 PM – a total of 9 trains.

61. **(b)** In 36 hours, there would be a gap of 8 minutes. The two watches would show the same time when the gap would be exactly 12 hours or 720 minutes.
The no. of 36 hour time frames required to create this gap = 720/8 = 90.
Total time= 90 × 36 = 3240 hours. Since this is divisible by 24, the watches would show 12 noon.

62. **(d)** Assume the distance between the two ant holes is 600 feet. Then, the first ant's speed is 16 feet/hr while the second ant's speed is 14 feet/hr.
If the first ant covers 800 feet, the second will cover 700 feet (since, distance is proportional to speed).
Hence total distance is 1500 feet and required speed is 14 × 2.5 = 35 feet/hr.

63. **(c)** The net time loss is 1/3% of 168 hours.

Expert Level

1. **(d)** Average of Kerosene $= \dfrac{18}{900} \times 1000 = 20 \text{km/ltr.}$
Cost of petrol = ` 30 / ltr;

$\therefore$ Cost of Kerosene $= \dfrac{2}{3}$ of petrol = ` 10/ltr.

Let the quantity of Kerosene be x in 1 ltr. of mixture.
$\therefore$ 20 (x) + 40 $(1 - x)$ = 38
$\Rightarrow \quad x = 0.1$ ltr.
$\therefore$ Cost of mixture = 10 (0.1) + 30 (0.9) = 28/-
Hence the additional amount that pump owner was charging = 30 – 28 = ` 2.

2. **(b)** Distance (D) = Speed (S) × Time (T)

$$D = 4 \times \left(T + \frac{15}{60}\right)$$

$$D = 4T + 1 \qquad \ldots(1)$$

$$D = 6\left(T - \frac{10}{60}\right)$$

$$D = 6T - 1 \qquad \ldots(2)$$

Solving equations (1) and (2), we get
$T = 1$ h
$D = 4 \times 1 + 1 = 5$ km

3. **(d)** Let the average speed be x km/h.
and Total distance $= y$ km. Then,

$$\frac{0.2}{10}y + \frac{0.6}{30}y + \frac{0.2}{20}y = \frac{y}{x}$$

$$\Rightarrow x = \frac{1}{0.05} = 20 \text{km/h}$$

4. **(d)** Let the speed in return journey be x km/hr.

Then, speed in onward journey $= \dfrac{125}{100}x = \left(\dfrac{5}{4}x\right)$ km/hr.

Average speed $= \left(\dfrac{2 \times \frac{5}{4}x \times x}{\frac{5}{4}x + x}\right)$ km/hr $= \dfrac{10x}{9}$ km/hr.

$\therefore \left(800 \times \dfrac{9}{10x}\right) = 16 \Leftrightarrow x = \left(\dfrac{800 \times 9}{16 \times 10}\right) = 45.$

So, speed in onward journey $= \left(\dfrac{5}{4} \times 45\right)$ km/hr
= 56.25 km/hr

5. **(c)** Let he walked for x hours, then
$5x + 25(10 - x) = 17 \times 10$
$\Rightarrow \quad x = 4$
$\therefore \quad 10 - x = 6$ h
Hence, distance travelled by auto = 25 × 6 = 150 km.

6. (b) Let the speed of X and Y be the x km/h and y km/h respectively. Since they meet after 3 hours, so $x + y = 100$.
Since, the faster train takes atleast 3 + 2 = 5 hours to complete the 300 km journey. Hence, minimum possible speed for the slower train = 40 km/h at which speed it will take 7.5 h to complete the journey

$$\left(7.5 = \frac{300}{40}\right)$$

7. (c)

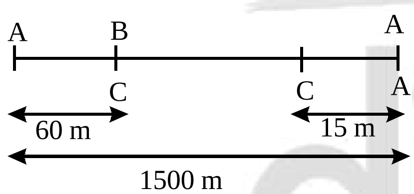
$PQ = QR$

$P \rightarrow Q \rightarrow R$ (7h)

It means $P \rightarrow Q$ (3.5 h)
Again {$P \rightarrow Q$ and $Q \rightarrow P$} (8 h)
It means $Q \rightarrow P$ (4.5 h)
Therefore $R \rightarrow Q$ (4.5 h)
Thus, from R to P boat will take 9 hours
Hint: $P \rightarrow R$ (Downstream)
$R \rightarrow P$ (Upstream)

8. (c) Ratio of speed of A : B = 12 : 11
and ratio of speeds of B : C = 8 : 7
Therefore ratio of speeds of A : B : C = 96 : 88 : 77
So in 9600 m race A will beat C by 1900 m

9. (b)



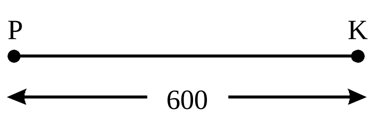
In the same time, when A covers 1500 m, B covers 1440 m and C covers 1425 m.
So, in 1440 m race B can give a start of 15 m.
$\therefore$ In 1500 m race B will give a start of

$$\frac{15}{1440} \times 1500 = 15\frac{5}{8} \text{ m}$$

10. (a) Time taken to collide the two trains = $\frac{3}{2}$h

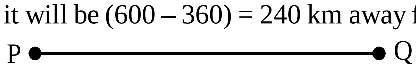
So, in $\frac{3}{2}$h bird travels $\frac{3}{2} \times 60 = 90$ km

11. (c)



In 18 h plane will cover 18 × 120 = 2160 km
Now, 2160 = (600 × 2) + 600 + 360
So, the plane will be 360 km away from Kargil it means it will be (600 – 360) = 240 km away from Pukhwara.

12. (b)



They will be together at every two hours. Therefore in 12h they will be (6 + 1) = 7 times together at P and they will never meet together at Q.

13. (c) $\dfrac{\text{Speed of wind (Sound)}}{\text{Relative speed of soldier and terrorist}} = \dfrac{\text{Time utilised}}{\text{Difference in time}}$

$$\frac{1188}{x} = \frac{330}{5}$$

$\Rightarrow x = 18$ km/h

14. (d) In 20 minutes the difference between man and his son = 20 × 20 = 400 m
Distance travelled by dog when he goes towards son

$$= \frac{400}{40} \times 60$$

= 600 m and time required is 10 minutes
In 10 minutes the remaining difference between man and son.
400 – (20 × 10) = 200 m
Total distance travelled by dog = 600 + 400 = 1000 m

15. (b) Initial speed of police = 10 m/s
Increased speed of police = 20 m/s
Speed of thief = 15 m/s
Initial difference between thief and police = 250 m
After 5 seconds difference between thief and police = 250 – (5 × 10) = 200 m
After 10 seconds more the difference between thief and police = 200 + (5 × 10) = 250 m.
Now, the time required by police to catch the thief

$$= \frac{250}{5} = 50\text{s}$$

Distance travelled = 50 × 20 = 1000 m
Total time = 50 + 15 = 65 s
Total distance = 1000 + (15 × 10) = 1150 m

16. (b) The ratio of speeds
= The ratio of distances, when time is constant.
$\therefore$ The ratio of distances covered by leopard to the tiger = 12 : 25
Again, ratio of rounds made by leopard to the tiger = 12 : 25
Hence, leopard makes 48 rounds, when tiger makes 100 rounds.

17. (b) Since both rest for 6 seconds so when B is just about to start the journey A reaches there at the shallow end so they meet at they shallow end.

18. (b) **For the first watch:** When a watch creates the difference of 12 hours, it shows correct time.
So to create the difference of 12 h required time

$$= \frac{60 \times 12}{24} = 30 \text{ days}$$

For the second watch: To create the difference of 12 h required time.

$$= \frac{30 \times 12}{24} = 15 \text{ days}$$

So, after 30 days at the same time both watches show the correct time.

19. (a) You must know that a correct watch coincide just after

$65\frac{5}{11}$ min.

Therefore in every $65\frac{5}{11}$ hours the watch gains $\frac{2}{11}$

Hence, in 24 hours it will gain $\frac{2}{11} \times \frac{11}{720} \times 24 \times 60 = 4$ min

20. (a) To exchange the position both hands to cover 360° together. In one minute, hour-hand moves $\frac{1^\circ}{2}$ and in one minute, minute-hand moves 6°. Let the required time be t min, then

$$6t + \frac{1}{2}t = 360$$

$$\Rightarrow \quad t = \frac{360}{13} \times 2 = \frac{720}{13} = 55\frac{5}{13}\text{min}$$

21. (d) The minute-hand of a normal clock covers $\frac{360}{60} = 6°$ per minute. The hour-hand of a normal clock covers $\frac{30}{60} = \frac{1°}{2}$ per minute. So once they are together, in every minute the minute hand gains $6 - \frac{1}{2} = \frac{11°}{2}$ over the hour hand.

So, time between two meetings $= \frac{360}{\frac{11}{2}} = \frac{720}{11}$ minutes.

So, in any clock the hour-hand and the minute-hand meet after every $\frac{720}{11}$ minutes.

If 60 minutes have passed in a normal clock then time passed in the faulty clock is 70 minutes.

If 24 hrs (or 24 × 60 minutes) have passed in a normal clock then time passed in the faulty clock must be 24 × 70 = 1680 minutes.

Number of times the hands meet –

$$\frac{1680}{\frac{720}{11}} = 25.67 = 25$$

22. (b) Let the speed for the first hour be x km/hr

then the speed for the second hour be $\frac{7}{5}x$ km/hr

then the speed for the third hour be

$$\frac{10}{7} \times \frac{7}{5}x = 2x \text{ km/hr}$$

then the speed for the fourth hour be

$$2x \times \frac{7}{5} = \frac{14x}{5} \text{ km/hr}$$

Therefore total distance in four hours

$$= x + \frac{7}{5}x + 2x + \frac{14x}{5} = \frac{36x}{5} \text{ km}$$

$$\therefore \text{ Average speed } = \frac{\text{Total Distance}}{\text{Total time}} = \frac{\left(\frac{36x}{5}\right)}{4}$$

$$= \frac{9x}{5} \text{ km/hr}$$

Again the distance in 4 hours @ speed of x km/hr which is half of the third hour's speed is $4x$ km

Hence $\frac{36x}{5} - 4x = 160$ km

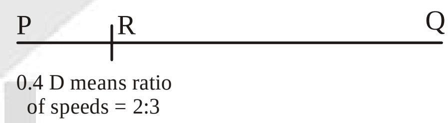
$\Rightarrow \quad x = 50$

Hence, the average speed $= \frac{9 \times 50}{5} = 90$ km/hr

23. (c) If we assume the speed of the sound as 330 m/s, we can see that the distance traveled by the sound in 45 seconds is the distance traveled by the train in 11 minutes.

330 × 45 = 660 × s $\rightarrow$ s = 22.5 m/s = 81 kmph

24. (a) The ratio of speeds of A to B would be 2 : 3.

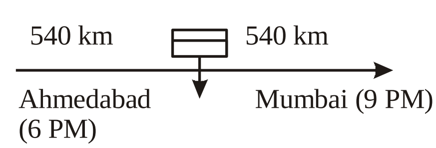


The 4th meeting would occur after a combined movement of $D + 6D = 7D$. 2/5th of this distance would be covered by A and 3/5th of this distance would be the distance covered by B. Thus, distance covered by A would be 2/5th of $7D$ __: distance covered by A = $2.8D$ – which means that the 4th meeting occurs at a distance of 0.8 D from P.

25. (b) We can see that it takes them 4 hours to reach each other. And this is the same time for which bullets will cover some distance.

So, the total distance covered by the bullet = 4×10 = 40 km

26. (d)



Now using options can get us the result.

Take the option 6 A.M. which means the train from Ahmedabad takes 12 hours to cover 540 km. In this way, the speed will be 45 km/h and train from Mumbai takes 9 hours to cover 540 km which means the speed is 60km/h: It is written in the question that the difference between the speed of the train from Ahmedabad and that from Mumbai is 15 km/h. Hence, this is the answer.

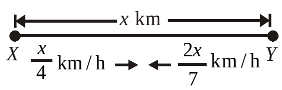
27. **(a)** Let the original speed of car = v km/hr.

$$\frac{715}{v}-\frac{715}{v+10}=2$$

$$\frac{v+10-v}{v(v+10)}=\frac{2}{715}$$

$v(v + 10) = 715 \times 5$
$v^2 + 10v - 3575 = 0$
$(v + 65)(v - 55) = 0$
$\therefore v = 55$ km/hr.

28. **(b)** Let the distance between X and Y be x km. Then, the speed of A is $\frac{x}{4}$ km/h and that of B is $\frac{2x}{7}$ km/h.



Relative speeds of the trains

$$=\left(\frac{x}{4}+\frac{2x}{7}\right)=\frac{15x}{28}\ \text{km/h}$$

Therefore the distance between the trains at 7 a.m.

$$=x-\frac{x}{2}=\frac{x}{2}\ \text{km}$$

Hence, time taken to cross each other

$$=\frac{\frac{x}{2}}{\frac{15x}{28}}\text{hr}=\frac{x}{2}\times\frac{28}{15x}\text{hr}=\frac{14}{15}\times 60\,\text{min}=56\,\text{min}$$

Thus, both of them meet at 7.56 a.m.

29. **(c)** Let the speed of train be x km/h and actual time taken is t hrs.
In first case, distance = $(x + 6)(t - 4)$ km …(1)
In second case, distance = $(x - 6)(t + 6)$ km …(2)
Also distance = xt from (1) and (2)
$(x + 6)(t - 4) = (x - 6)(t + 6)$ …(3)

$$\Rightarrow \frac{x+6}{x-6}=\frac{t+6}{t-4}\Rightarrow\frac{x}{6}=\frac{2t+2}{10}$$

$$\Rightarrow \frac{x}{6}=\frac{t+1}{5}$$

$\Rightarrow 5x = 6t + 6 \Rightarrow 5x - 6t = 6$

$$\Rightarrow t=\frac{5x-6}{6}$$

Putting the value of 't' in eqn. (3), we get
$x = 30$ km/hr
$\therefore t = 24$ hr
Thus, distance = $30 \times 24 = 720$

Alternatively :
The speed difference between slow-speed and fast-speed train is 12 km/hr. and the time difference is 10 hrs. Speed difference of 12km/hr. hints that the distance should be divisible by 12. Only option (c) is divisible by 12.
By conventional method following equation will help solve the problem.

$$\frac{d}{s}=\frac{d}{s+12}+10$$

Easier method is as follows. Speed difference of 12 km/hr hints that the distance should be divisible by 12. Only option (c) is divisible by 12.

$$\frac{720}{12}=60\text{hrs.},\ \frac{720}{24}=30\text{hrs.},\ \frac{720}{36}=20\text{hrs.}$$

So, fastest speed is 36km/hr. slowest speed is 24km/hr.

30. **(b)** Let the speed of swimmer be x km/hr
When he swim with the flow
then speed = $(x + 3/2)$ km/h.

$$\therefore S_1=\left(x+\frac{3}{2}\right)\times t$$

When he swim against the flow of stream

then speed $=\left(x-\frac{3}{2}\right)t$

$$\therefore S_2=\left(x-\frac{3}{2}\right)t$$

According to the ques
$S_1 = 2S_2$.

$$\left(x+\frac{3}{2}\right)t=2\left(x-\frac{3}{2}\right)t$$

$$\left(x+\frac{3}{2}\right)t=2t\left(\frac{2x-3}{2}\right)$$

$$\Rightarrow\left(\frac{2x+3}{2}\right)=2x-3$$

$$\Rightarrow 2x+3=4x-6\Rightarrow 9=2x\Rightarrow x=\frac{9}{2}=4\frac{1}{2}\ \text{km/hr}$$

31. **(a)** Let V_A and t_A be the speed and time of A respectively. and V_B, t_B be the speed and time of B respectively.
Now, total (length) distance = 400 m
Now, B beats A by 15 metres.
$\therefore$ Distance covered by B = 400 – 15 and $t_B = t_A + 5$

$$\therefore\quad V_B=\frac{400-15}{t_A+5}\quad\text{....(1)}$$

Similarly, $V_A=\frac{400}{t_A}$

In another race of 400 m, $V_B=\dfrac{400}{t_A+\frac{50}{7}}$ ....(2)

Equations (1) and (2), we get

$$\frac{400-15}{t_A+5}=\frac{400}{t_A+\frac{50}{7}}$$

$\Rightarrow \quad 385\left(t_A + \frac{50}{7}\right) = 400\,(t_A + 5)$

$\Rightarrow \quad 77\left(t_A + \frac{50}{7}\right) = 80\,(t_A + 5)$

$\Rightarrow \quad 150 = 3t_A \Rightarrow t_A = 50$ sec.

$\therefore \; V_A = \frac{400}{50} = 8\text{m / sec}$ and $V_B = \frac{385}{55} = 7\text{m / sec}.$

32. **(d)** Let the distance be x.
Ratio of speeds of 3 cars = 2 : 3 : 4

$\therefore \quad S_1 = \frac{2}{9},\, S_2 = \frac{3}{9},\, S_3 = \frac{4}{9}$

Now, as we know, distance = speed × time

$\therefore \quad x = \frac{2}{9}T_1,\; x = \frac{3}{9}T_2,\; x = \frac{4}{9}T_3$

$\Rightarrow \quad \frac{T_1}{x} = \frac{9}{2},\, \frac{T_2}{x} = \frac{9}{3},\, \frac{T_3}{x} = \frac{9}{4}$

$\therefore \quad \frac{T_1}{x} : \frac{T_2}{x} : \frac{T_3}{x} = \frac{9}{2} : \frac{9}{3} : \frac{9}{4} = 108 : 72 : 54 = 6 : 4 : 3$

$\therefore$ Required ratio = 6 : 4 : 3.

33. **(a)** Let the speed of train = v_1 km/h
and speed of taxi = v_2 km/h

$$\frac{300}{v_1} + \frac{200}{v_2} = \frac{11}{2} \Rightarrow \frac{3}{v_1} + \frac{2}{v_2} = \frac{11}{200} \qquad \ldots(1)$$

$$\frac{260}{v_1} + \frac{240}{v_2} = \frac{336}{60} \Rightarrow \frac{26}{v_1} + \frac{24}{v_2} = \frac{336}{600} \qquad \ldots(2)$$

From eqs (1) and (2)

$$\frac{36}{v_1} + \frac{24}{v_2} = \frac{11 \times 12}{200}$$

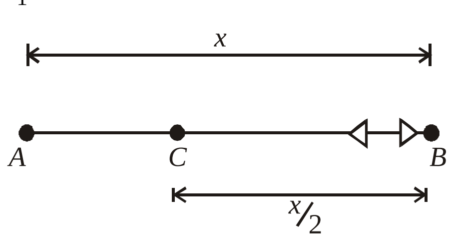
$$\frac{36}{v_1} + \frac{24}{v_2} = \frac{336}{600}$$

– – –

$$\Rightarrow \frac{10}{v_1} = \frac{132}{200} - \frac{336}{600} = \frac{396 - 336}{600} = \frac{1}{10}$$

$v_1 = 100$ km/h

34. **(b)**



Speed of boat in still water is 14 km/h.
Velocity of stream = 4 km/h.
Let the distance between point A and $B = x$ km.

$\frac{x}{18} + \frac{x}{2(10)} = 19$

$\frac{x}{18} + \frac{x}{20} = 19$

$\frac{20x + 18x}{360} = 19$

$38x = 19 \times 360$

$x = \frac{19 \times 360}{38}$

$\therefore x = 180$ km/h

35. **(b)** Let the speed of car = V km/h
then speed of bus = $V - 25$ km/h
Journey distance = 500 km

Now, $\frac{500}{V - 25} - \frac{500}{V} = 10$

$\Rightarrow \quad 500V - 500\,(V - 25) = V\,(V - 25) \times 10$

$\Rightarrow \quad 500V - 500V + 12500 = (V^2 - 25V)\,10$

$\Rightarrow \quad V^2 - 25V - 1250 = 0$

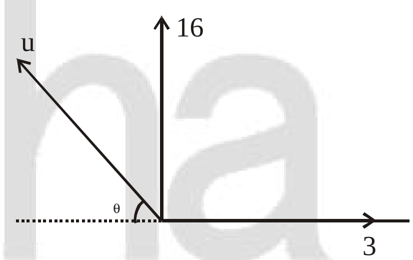
$\Rightarrow \quad V\,(V - 25) = 1250$

$\Rightarrow \quad V\,(V - 25) = 50 \times 25$

$\Rightarrow \quad V = 50$ km/h

Speed of car = 50 km/h
Speed of bus = 25 km/h

36. **(d)**



Let the speed of the boat be u km per hour.
$\therefore \; u \cos\theta = 3,\; u \sin\theta = 16$

$\Rightarrow \tan\theta = \frac{16}{3} \Rightarrow \sin\theta = \frac{16}{\sqrt{265}}$

Since, $u \sin\theta = 16$

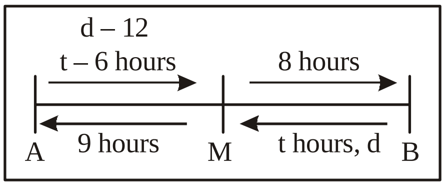
$\Rightarrow \; u.\frac{16}{\sqrt{265}} = 16$

$\Rightarrow \; u = \sqrt{265} = 16.28$ km per hour

$\therefore$ Speed of the boat against the current
$= u - 3 = 16.28 - 3 = 13.28$ km per hour.

37. **(d)** Since the second ant covers 7/120 of the distance in 2 hours 30 minutes, we can infer that is covers 8.4/120 = 7% of the distance in 3 hours. Thus, in 3 hours both ants together cover 15% of the distance $\rightarrow$ 5% per hour $\rightarrow$ they will meet in 20 hours.
Also, ratio of speeds = 8 : 7.
So, the second ant would cover 700 ft to the meeting profit in 20 hours and its speed would be 35 feet/hr.

38. **(b)** This is a complex trial and error based question and the way you would have to think in this is:

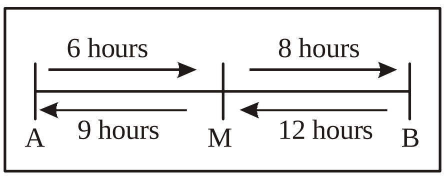


From the figure above, it is clear that *A* is faster as he takes only $t + 2$ hours while *B* has taken $t + 9$ hours to complete the journey.

Then, we get: $(t - 6)/9 = 8/t$

Solving for *t*, we get $t = -6$ (not possible)

Or $t = 12$. Putting this value of *t* in the figure it change to:



We also get ratio of speeds = 3 : 2 (inverse of ratio of times)

The next part of the puzzle is to think of the 12km less traveled by the first person till the meeting point.

If the speed of the faster person is 3s, that of the slower person = 2*s*.

Further

$12 \times 2s - 6 \times 3s = 12$ km

$s = 2$ kmph.

39. **(c)** Give that they meet in 80 minutes, when moving towards each other, the sum of their speeds should be such that they cover 1.25% of the distance per minute (i.e., 75% of the distance per hour).

40. **(b)** If the side of the initial equilateral triangle is S, then when Arjit covers (S – 120) kms, Shaurya covers S kilometres. Also, when Arjit covers a distance of 80 kilometers, Shaurya covers a distance such that the resultant triangle is right angled.

Check these conditions through options.

41. **(b)** If S_1 is the speed of the first car, then $(S_1 + 10)$ will be the second car's speed. If t_1 hours is the time required for the first car, then $(t_1 - 1)$ hours is the time required for the second car in covering the same distance, while that of the third car is $\left(t_1 - \frac{33.33}{60}\right)$ hours.

Check these conditions through options.

42. **(c)** Let the distance AC = d

Then, $\frac{d}{V_0} + \frac{240 - d}{V_1} = \frac{d}{V_1} + \frac{240 - d}{V_0}$

If $V_0 \neq V_1$, then the above condition will be satisfied only if d = 120 km.

43. **(b)** Suppose A and B are the points where the first and the second meeting took place.

The total distance covered by the pedestrian and the cyclist before the first meeting = Twice the distance between Nagpur and Buti Bori.

Total time taken is 1 hour.

Total distance cover by pedestrian and the cyclist between the two meetings = Twice the distance between A and Buti Bori.

and time taken is half an hour.

Hence, A is the mid-point. This will result in a GP.

44. **(c)** If 2*d* is the distance between A and B, then

$$\frac{\frac{2}{3} \times 2d}{d - 2} = \frac{d - 3}{2d \times \frac{1}{4}}$$

Explanation of Test Yourself

1. **(a)** The requisite conditions are met on a Pythagoras triplet 6, 8, 10. Since the racetrack only consists of the legs of the right triangle the length must be 6 + 8 = 14 km.

2. **(b)** Relative speed of the trains

$= (42 + 48)$ kmph $= 90$ kmph

$= \left(90 \times \frac{5}{18}\right)$ m/sec $= 25$ m/sec.

Time taken by the trains to pass each other

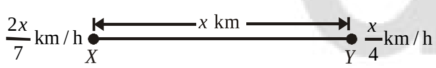
= Time taken to cover (137 + 163) m at 25 m/sec

$= \left(\frac{300}{25}\right)$ sec $= 12$ seconds.

3. **(b)** The sum of speeds would be 0.08 m/s (relative speed in opposite direction). Also if we go by option (b), the speeds will be 0.03 and 0.05 m/s respectively. At this speed the overlapping would occur every 60 seconds.

4. **(b)** The movement of the ant in the two cases would be 3, 7, 11, 15, 19, 23 and 1, 9, 17, 25, 33, 41. It can be seen that after 3 seconds the difference is 6 mm after 4 seconds, the difference is 16 mm and after 5 seconds the difference is 30 mm. Thus, it is clearly seen that the ant moved for 4 seconds.

5. **(b)** Let the distance between X and Y be x km. Then, the speed of A is $\frac{x}{4}$ km/h and that of B is $\frac{2x}{7}$ km/h.



Relative speeds of the trains

$$= \left(\frac{x}{4} + \frac{2x}{7}\right) = \frac{15x}{28} \text{ km / h}$$

Therefore the distance between the trains at 7 a.m.

$$= x - \frac{x}{2} = \frac{x}{2} \text{ km}$$

Hence, time taken to cross each other

$$= \frac{\frac{x}{2}}{\frac{15x}{28}} = \frac{x}{2} \times \frac{28}{15x} = \frac{14}{15} \times 60 = 56 \text{ min}$$

Thus, both of them meet at 7 : 56 a.m.

6. **(c)** The distances covered in percentage would be,
10% + 6.66% + 8.33% + 16.66% + 5.833% + 31.666 + 2.0833 = 81.25%
(22.5/18.75) × 100 = 120 km

7. **(d)** The sum of the speeds of the ducks is 50 feet/min. Hence circumference $= 9 \times 50 = 450$ feet and difference of speeds $= \frac{450}{54} = 8.33$.

$\therefore$ Speed of slower duck $= \frac{50 - 8.33}{2} = 20.83$ feet/min.

8. **(c)**

Both the athlete are crossing each other after 12 minutes which means the distance between them is 5 km. It will be easy to go through the ratio of the speed which is 2 : 3. The answer is 36 minutes.

9. **(c)** Let the original speed be X km/h
According to the question, $18/(4/5x) - 18/x = 9/60$ hr
$x = 30$ km/h

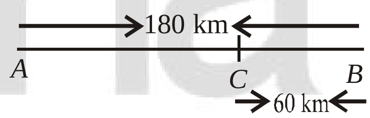
10. **(a)** Solve this through options as: For option (a)
4800/60 – 4800/50 = 16 minutes

11. **(d)** When Karan runs 100m, Arjun runs only 90m
So, in the new situation,
Karan has to run 110 m
Hence, distance covered by Arjun when Karan covers

$$110 \text{ m} = \frac{90}{100} \times 110 = 99 \text{ m}$$

Therefore, Karan beats Arjun by 1m

12. **(a)**



¬ 11.00 am Y

X 11.00 a.m. →

Time taken by Y for distance cover from B to C with stoppages

$$= \left(\frac{6}{5} + \frac{1}{4}\right) \text{hrs} = \frac{24 + 5}{20} = \frac{29}{20} \text{hrs.}$$

Say they cross each other at x distance from A

$$\therefore \frac{x}{70} = \frac{29}{20} + \frac{120 - x}{50}$$

$$\therefore \frac{x}{50} + \frac{x}{70} = \frac{29}{20} + \frac{12}{5}$$

$$\Rightarrow \frac{12x}{350} = \frac{29 + 48}{20} \Rightarrow \frac{12x}{35} = \frac{77}{2}$$

$$\therefore x = \frac{77}{2} \times \frac{35}{12} = 112.29 \approx 112 \text{ km}$$

13. (b) The only thing which matters in this problem is mileage or kms per litre of the fuel. At 50 kmph 195 kms can be covered. According to condition 1.3 times the fuel will be required at 75kmph.

Therefore, distance travelled will be 195/1.3 = 150 kms.

14. (c) 1st day he climbing up at 6.00 a.m. and reached at 6.00 p.m.

2nd day he coming down at 6.00 a.m. and reached the foothill 6.00 p.m.

Hence, average speed of both path is same.

At noon it is not necessary that he was at same spot.

There must be a point where he reached at the same time on both the days.

15. (b) When watch, runs correct the minute hand should cross the hour hand once in every $65+\frac{5}{11}$ minutes.

So, they should ideally cross 3 times once in

$3\times\left(\frac{720}{11}\right)=\frac{2160}{11}$ minutes = 196.36 minutes.

But in the watch under consideration, they meet after every 3 hour, 18 minutes and 15 seconds, i.e.,

$\left(3\times 60+18+\frac{15}{60}\right)=\frac{793}{4}$ minutes

In 24 hours a watch has 1440 minutes.

Thus, our watch is actually losing time (as it is slower than the normal watch). Hence, when our watch elapsed $\left(1440\times\frac{196.36}{198.25}\right)$ = 1426.27 minutes.

Hence, the amount of time lost by our watch in one day $=(1440-1426.27)=13.73$ *i.e.*, 13 minutes and 44 seconds (approx).