TIME, SPEED AND DISTANCE

DRILL 1 – Average Speed

For same distance,

Average speed = 2xy / x +y

For different distance,

Average speed = Total distance / Total time taken

- A car travels 600 km in 11 hours and another 800 km in 17 hours. Find the average speed of the entire journey.
  a.50 km/hr b.55 km/hr c.58 km/hr d.60 km/hr

- A truck travels 300 km at a speed of 45 km per hour and for the next 600 km it increases its speed to 60 km per hour. Find the average speed of the truck.
  a.9 km/hr b.9.18 km/hr c.8.57 km/hr d.8.75 km/hr

- A person takes 40 minutes to walk from his home to his office where as only 30 minutes from office to home. What is his average speed if the distance between his office and home is 6 km?
  a.10.3 km/hr b.11.5 km/hr c.12.7 km/ hr d.13.5 km/hr

- A train travels from Chennai to Bangalore at a speed of 15 m/s and returns at a speed of 12 m/s. What is its average speed?
  a.12.35 m/s b.13.3 m/s c.14.4 m/s d.NOTA

DRILL 2 – Distance covered is same

By rule of componendo and dividendo

Distance/Product of time = Product of speed/Distance = Difference of speed / Difference of time

- An increase in the speed of a car by 10 km per hour saves 30 minutes in a journey of 100 km. Find the initial speed of the car.
  a.35 kmph b.40 kmph c.45 kmph d.50 kmph

- A car covers a distance of 420 km at a constant speed if it travels with a speed of 10kmph less, than the usual speed, it would have taken 1 hour more to travel the same distance. Find the speed of the car.
  a. 50kmph b. 75kmph c. 60kmph d. 70kmph

- The speed of the train whose length is 360 metres, when increased by 20 m/s will save 3 seconds to cross a signal post. What is the usual speed of the train?
  a.30 m/s b.40 m/s c.45 m/s d.60 m/s

DRILL – 3 – Distance covered is same but no values for time and speed

When speed is increased by 'x', time reduces by 'a' to cover the same distance 'd' and when speed is decreased by 'y', the time increases by 'b', then

$d = (x + y)\ (a + b.\ (xyab.\ /\ (xb – ya.^2$

- A man covered a certain distance at some speed.Had he moved 3kmph faster, he would have take 40 minutes less. If he had moved 2kmph slower he would have taken 40 mins more. Find the distance in km
  a.20 b.35 c.40 d.55

- A man covers a certain distance in his toy train. If the train moved 4 km/hr faster, it would take 30 minutes less. If it moved 2 km/hr slower, it would take 20 minutes more. Find the distance.
  a.60 km b.71.8 km c.80 km d.81.2 km

DRILL 4 – Distance covered is different

Use of

Distance reference / time reference / speed reference

According to the data given.

- A car travels for 11 hours. Out of this, it travels 100 km at a certain speed and then it increases its speed by 15 km/hr to cover the remaining 280 km. Find the time it takes to travel the span of 280 km.
  a.5 hours b.6 hours c.7 hours d.8 hours

- A car travels a distance of 170 km in 2 hours partly at a speed of 100 km/hr and partly at 50 km/hr. Find the distance travelled at speed of 100 km/hr.
  a.50 km b.60 km c.70 km/hr d.NOTA

- If a truck travels a distance of 240 km in 6 hours, partly at a speed of 60 km/hr and partly at 30 km/hr, then find the time for which it travels at 60 km/hr.

a.1 hour b.1.5 hours c.2 hours d.2.5 hours

- Thief is spotted by policeman from a distance of 120m.when the policeman start the chase, the thief also running. If the speed of the thief be 8km/hr and that policeman is 12km/hr, how far the thief will have run before he is overtaken
  a. 300m b. 280m c. 240m d. 243.3m

- A toy train travels equal distance with 3 different speeds of 3,4 and 5 km/hr taking rest for two times in between of one and a half minute. It takes a total time of 50 mins for the whole journey. The total distance(in km) is:
  a.1 km b.2 km c.3 km d.NOTA

DRILL 5 – Speeds and Ratios

- A cat takes 5 leaps for every 6 leaps of a dog but 2 leaps of a cat is equal to 3 leaps of a dog. Compare their speeds.
  a.3:2 b.2:3 c.5:4 d.4:5

- The speeds of two trains are in the ratio of 4:3. If the first train takes 15 seconds less to cover a distance, what is the time taken by the second train to cover the same distance? (in seconds)
  a.45 b.50 c.55 d.60
- Amar covers a distance in ½ hr whereas Ajay covers the same distance in 1 hr 15 minutes. Find the ratio of their speed.
  a.2:5 b.5:2 c.10:23 d.23:10

- Two cars travel 180 km and 270 km in 4 hours and 5 hours respectively. Find the ratio between their speeds.
  a.5:6 b.6:5 c.4:5 d.5:4

- The ratio of the speeds of Amar and Akbar is 8:5. If Akbar takes 15 minutes more than Amar to cover a distance, find the time taken by Akbar to cover the same distance.
  a.20 minutes b.30 minutes c.40 minutes d.NOTA

DRILL 6 – Concepts on trains

A train 110 meters long travels at 60km/h. How long does it take to cross:-

a) A telegraph post
b) A man running at 6km/h in the Same direction
c) A man running at 6km/h in the opposite direction
d) A platform 240metres long
e) Another train 170 metres long standing on another parallel track
f) Another train 170m long, running at 54km/h in same direction
g) Another train 170m long, running at 80km/h in opposite direction

DRILL 7 – Stoppage time per hour for a train.

Stoppage time per hour = difference in speed / faster speed

- Without stoppage, a train travels certain distance with an average speed of 80 km/hr and with stoppages, it covers the same distance with the speed of 60 km/hr. How many minutes per hour the train stops?
  a.5 minutes b.10 minutes c.12 minutes d.15 minutes

- Excluding stoppages, the speed of the train is 45 km/hr and including stoppages the speed is 36 km/hr. For how many minutes does the train stop per hour?
  a.5 minutes b.10 minutes c.12 minutes d.15 minutes

DRILL 8 - Boats and Streams

Speed downstream = Speed of the stream + Speed of the boat in still water

Speed upstream = Speed of the boat in still water - Speed of the stream

Speed of the stream = (Speed downstream - Speed upstream) / 2

Speed of the boat in still water = (Speed downstream + Speed upstream) / 2

When upstream distance = downstream distance;

Total journey time ($T_{up} + T_{dn}$) =

(Rate in still water X Total distance) / (Rate Upstream X Rate Downstream)

- A boat running downstream covers a distance of 16km in 2 hours while for covering the same distance upstream, it takes 4 hours, what is the speed of the boat in still water?
  a. 6kmph b. 10kmph c. 5kmph d. 9kmph

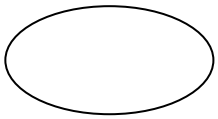
- A man rows 750m in 675 seconds against the stream and returns in 7½ minutes. What is the speed in still water?
  a.1.25 m/s b.1.38 m/s c.2.25 m/s d.2.38 m/s

- If a boat goes 7km upstream in 42 minutes and the speed of the stream is 3kmph, then the speed of the boat in still water is
  a.10 km/hr b.11 km/hr c.12 km/hr d.13 km/hr

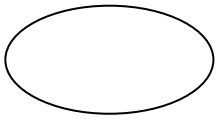
- A man can row 9 1/3 kmph in still water and finds that it takes him thrice as much time to row up than as to row down the same distance in the river. What is the speed of the current?
  a.3 ¾ km/hr b.4 2/3 km/hr c.3 2/3 km/hr d.4 ¾ km/hr

GOOGLY QUESTIONS

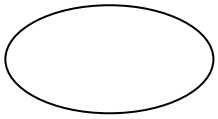
1. I started on my bicycle at 7 am to reach a place. After going a certain distance, my bicycle went out of order. Consequently I rested for 35 mins and came back to my house walking all the way. I reached my house at 1 pm. If my cycling speed is 10kmph and my walking speed is 1kmph, then on my bicycle I covered a distance of:
   Solution:
   6 hrs and 25 minutes = time (walk) + time (cycle)
   385 = D/10 + D/1
   D = 3850 / 11 = 350



2. If I walk at 4km/hr, I miss the bus by 10 minutes. If I walk at 5km/hr, I reach 5 minutes b4 the arrival of the bus. How far I walk to reach the bus stand?
   Solution:
   D = 4(t - 1/6) = 5(t + 1/12)
   Solving , t is negative.
   Therefore solution not possible



3. When 2 trains were running in the same direction at 90km/hr and 60km/h respectively, the faster train crossed a man in the slower train in 27 seconds. Find the length of the faster train.
   Solution:
   Time taken to cross = Length of the faster train / (90 + 60)(5/18) = 27
   = 1125 m



PRACTICE PROBLEMS

1. Two trains start from two different stations which are 435 km apart. One of the train starts at 12 noon, the other at 1.00 pm. The speeds of the trains are 35km/hr and 45 km/hr respectively. At what time do they meet?
   a. 3.00 pm b. 3.00 am c. 6.00 pm d. 6.00 am

2. A person saves 180 minutes in covering a certain distance when he increases his speed from 25 km/hr to 30 km/hr. Find the distance.

a. 250 km b. 420 km c. 500 km d. 450 km

3. Travelling at $4/5^{th}$ of his usual speed, a man is 15 minutes late. What is his usual time to cover the same distance?
   a. 60 minutes b. 75 minutes c. 15 minutes d. 45 minutes

4. Two cars are 120km apart, if they travelled in the same direction. They would take 2 hrs to meet. If they travelled in opposite direction they would take 3/2 hrs to meet. Find the speed in kmph of faster car
   a. 70 b. 80 c. 60 d. 50

5. 2 trains are travelling in opposite directions at uniform speeds of 50km/hr and 60km/hr respectively. They take 6 seconds to cross each other. If the 2 trains had travelled in the same direction, then a passenger sitting in the faster train would have overtaken the slower train in 27secs. The length of the faster train is more than the slower train by :
   a. 108.33 m b. 75 m c. 150 m d. 33.33 m

6. The poles on the road are 40m apart. How many poles will be passed by the car in 2hr 15mins if the speed of the car is 72kmph
   a. 4150 b. 450 c. 4050 d. 4250

7. A thief steals a car at 2.30pm and drives it at 60kmph. The theft is discovered at 3.00pm and the owner sets off in another car at 75kmph. When will he overtakes the thief?
   a. 6.30pm b. 6.00pm c. 5.00pm d. 6.10pm

8. Ram and Bharat travel the same distance at the rate of 6 km per hour and 10 km per hour respectively. If Ram takes 30 minutes longer than Bharat, the distance travelled by each is
   a. 8 km b. 9 km c. 10 km d. NOTA

9. A train takes 20sec to overtake the cyclist travelling 9kmph. It takes 30sec to overtake another cyclist travelling at 18kmph. Find the length of the train
   a. 75 b. 100 c. 125 d. 150

10. If a train 100m long is running at the speed of 30km/hr .Find the time taken by it to pass a man standing near the railway line
    a. 16sec b. 25sec c. 12sec d. 2sec