Time and Distance: 8 Shortcuts & Tricks explained with solved examples

The terms time and distance are related to the speed of a moving object.
Speed: Speed is defined as the distance covered by an object in unit time.

Speed = Distance/Time

Some Important Facts:

* Distance travelled is proportional to the speed of the object if the time is kept constant.
* Distance travelled is proportional to the time taken if speed of object is kept constant.
* Speed is inversely proportional to the time taken if the distance covered is kept constant.
* If the ratio of two speeds for same distance is a:b then the ratio of time taken to cover the distance is b:a

Relative Speed:

i. If two objects are moving in same direction with speeds of x and y then their relative speed is (x - y)
ii. If two objects are moving in opposite direction with speeds of x and y then their relative speed is (x + y)

Unit Conversion:

i. To convert 'X' Km/hr into m/s
   - Multiply X with 5/18

ii. To convert 'x' m/s into Km/hr
   - Multiply x with 18/5

Some Important Shortcut Formulas

Trick-1:

If some distance is travelled at x km/hr and the same distance is travelled at y km/hr then the average speed during the whole journey is given by
Average speed = (2*x*y)/(x+y)

Ex: A peson travelled a distance with 8 km/hr and return the journey with 4 km/hr.then,the average speed during the journey ?

a. 5 km/hr b. 16/3 km/hr
c. 6 km/hr d. 12 km/hr

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Trick-2:

If a person travels a certain distance at x km/hr and returns at y km/hr, if the time taken to the whole journey is T hours then the one way distance is given by

D=[T*x*y]/(x+y)

Ex: If a person travels certain distance at 6 Km/hr and returns at 8 Km/hr, if the time taken to the whole journey in 7 hours.then,the one way distance ?

a. 16 b. 24 c. 8 d. 32

Sol: D= (7*8*6)/(8+6)= 24 km

Trick-3:

If a car does a journey in 'T' hrs, the first half at 'x' km/hr and the second half at 'y' km/hr. The total distance covered by the car is :

(2 * Time * x * y)/ (x + y).

Ex: A motorcar does a journey in 10 hrs, the first half at 21 kmph and the second half at 24 kmph. Find the distance?

a. 124 b. 224 c. 225 d. 125

Sol: Distance = (2 x 10 x 21 x 24) / (21+24) = 10080 / 45 = 224 km.

Trick-4:

If the same distance is covered at two different speeds S1 and S2 and the time taken to cover the distance are T1 and T2 ,then the distance is given by

D = [(s1*s2)/(s1-s2)]*(t2-t1)

Ex: A person travelled a distance with two different speeds 5 Km/hr and 6 km/hr and time taken to cover distance are 3 hrs and 4 hrs.the distance travelled by person ?

a. 30 km b. 20 km c. 15 km d. 38 km

Sol: D= [(5*6)/(5-6)]*(4-3) =30km

Trick-5:

A distance covers in some time with S1 speed.if it takes T hr more to cover same distance with S2 speed. So, the distance is

D = (T*S1*S2)/(S1-S2)

Ex: A person covers a distance with 5 km/hr in some time.if he moves with 3 km/hr speed he covers the distance in 2 hr more.the distance travelled by person ?

a. 10 km b. 15 km c. 18 km d. 21 km

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Sol: D= (2*5*3)/(5-3) = 15 km

Trick-6:

If a distance traveled with S1.then,it takes T hrs late.same distance traveled with S2.then, it takes T hrs earlier.so,the distance is

D = (2*S1*S2*T)/(S2-S1)

Ex: A person travelled a distance with 5 km/hr then, he will take 2 hrs more.if he travels with 7.5 km/hr then,he will reach 2 hrs earlier.the distance traveled by person ?

a. 55 km b. 60 km c. 65 km d. 70 km

Sol: D = (2*5*7.5*2)/(7.5-5) = 60 km

Trick-7:

If a body covers part of the journey at speed p km/hr and the remaining part of the journey at a speed q km/hr and the distances of the two parts of the journey are in the ratio m : n, then the average speed for the entire journey is

= (m+n) pq / (mq+np).

Ex: If a Manish covers part of the journey at speed 2 km/hr and the remaining part of the journey at a speed 4 km/hr and the distances of the two parts of the journey are in the ratio 3 : 2, then the average speed for the entire journey ?

a. 5 b. 2.5 c. 10 d. 7.5

Sol: = [(3+2)*2*4] / [(3*4)+(2*2)]

= 2.5 km/hr

Trick-8:

A train travelling at a speed of 'S1' kmph leaves A at 't1' hrs. and another train travelling at speed 'S2' kmph leaves A at 't2' hrs in the same direction. Then the meeting point's distance from starting is given by = (S1 xS2 X Difference in time) /Difference in speed.

Ex: A train travelling 25 kmph leaves Delhi at 9 a.m. and another train travelling 35 kmph starts at 2 p.m. in the same direction. How many km from will they be together ?

a. 437.5 b. 137.5 c. 237.5 d. 337.5

Sol : Meeting point's distance from the starting point = [25 x35 x(2p.m. - 9 a.m)] / (35 -25) = (25 x35x 5) / 10 = 4375 / 10 = 437.5 km .

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