Time, Speed & Distance

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

Basic formula we used here for calculation of time taken or Distance is:

Time taken = Distance/Speed

Distance = Speed x Time

Unit Conversion

Y km/h = (Y x 5/18)m/s

Ex:

72 km/h = 72 x 5/18

= 20 m/s

Y m/s = (Y x 18/5) km/h

Ex:

10 m/s = 10 x 18/5

= 36 km/h

Some Important Tricks:

- If the ratio of two speeds for same distance is $x : y$ then the ratio of time taken to over the distance is $y : x$

- If a person covers certain distance with speed x km/h and return back with speed y km/h then his average speed throughout the journey is

Average speed = 2xy/(x+y) km/h

- If a certain distance is covered with 3 different speed x km/h, y km/h and z km/h then average speed throughout the journey is

Average speed = 3xyz/(xy+yz+zx) km/h

• If 2 different distances covered with speed x km/h and y km/h respectively but required same time the then average speed throughout the journey is

Average speed = (x+y)/2 km/h

• If 2 trains start at the same time from different points suppose A and B respectively toward each other and after crossing if they take a and b seconds time respectively to reach at B and A point then

(A‘s speed) : (B‘s speed) = √b : √a

Relative Speed:

- If two objects are moving in same direction with speeds of “x” and “y” then their relative speed is

R.S = (x – y)

- If two objects are moving is opposite direction with speeds of “x” and “y” then their relative speed is

R.S = (x + y)

Q 1 : A man covers 30 km distance with speed of 10 km/h and return with 15 km/h. Find average speed.

A.6 km/h

B.12 km/h

C.12.5 km/h

D.12.25 km/h

Q 2 : A man covers 60 km distance with speed of 10, 12 and 15 km/h on three successive days. Find average speed.

A.6km/h

B.12 km/h

C.12.5 km/h

D.12.25 km/h

Q 3 : A boy goes to school with speed of 3 kmph and return with 2 kmph. If he takes 5 hrs in all. Find distance between home and school.

A.5 km

B.6 km

C.10 km

D.12 km

Q 4 : A boy goes to school with speed of 6 kmph and return with 3 kmph. If he takes 5 hrs in all. Find distance between home and school.

A.5 km

B.6 km

C.10 km

D.12 km

Q 5 : A boy walk at 5 kmph and reaches his school 10 min late. If speed has been 6 kmph, he will reach 15 min early. Find distance between home and school.

A.6.25 km

B.12 km

C.12.5 km

D.25 km

Q 6 : If train runs at 40 kmph, it reaches its destination late by 11 min but if it runs at 50 kmph, it is late by 5 min. Find the correct time for train to complete the journey.

A.11 min

B.19 min

C.24 min

D.30 min

Q 7 : Walking 5/6 of usual speed a man is late by 10 min. Find the usual time taken by him to cover the distance.

A.50 min

B. 60 min

C.40 min

D.30 min

Q 8 : Krishna covers a certain distance by train at 25 kmph and same distance by foot at 4 kmph. If the total journey is of 5 hr 48 min. Find total distance covered by him

A.20 km

B.40 km

C.80 km

D.120 km

Q 9 : Walking at 4 km/h a clerk reaches his office 5 min late. If he walk at 5 km/h he reaches 2 and half min earlier. What's the distance?

A.15 km

B.10 km

C.25 km

D.2.5 km

Q 10 : A train is running at 36 km/h. If it crosses a pole in 25 s, its length is

A. 248 m

B. 250 m

C. 255 m

D. 260 m

Q 11 : A train 50 m long passes a platform 100 m long in 10 sec. The speed of the train is

A.10 km/h

B.54 km/h

C.15 km/h

D.36 km/h

Q 12 : How many seconds will a 500 meter long train take to cross a man walking with a speed of 3 km/hr in the direction of the moving train if the speed of the train is 63 km/hr?

A. 25 sec

B. 30 sec

C. 40 sec

D. 45 sec

Q 13 : Two trains are running in opposite direction with the same speed. If the length of each train is 120 meters and they cross each other in 12 seconds. The speed of each train is

A. 72 kmph

B. 10 kmph

C. 36 kmph

D. 18 kmph

Q 14 : Two trains of equal length take 10 seconds and 15 seconds respectively to cross a telegraph post. If the length of each train be 120 meters, in what time will trains cross each other travelling in opposite direction?

A. 16 sec

B. 15 sec

C. 12 sec

D. 10 sec

Q 15 : A train passes two persons walking in the same direction at a speed of 3 km/hr and 5 km/hr respectively in 10 seconds and 11 seconds respectively. The speed of the train is

A. 28 kmph

B. 27 kmph

C. 25 kmph

D. 24 kmph

Q 16 : The distance between two cities A and B is 330 km. A train 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 trains meet?

A. 10 : 00 AM

B. 10 : 30 AM

C. 11 : 00 AM

D. 11 : 30 AM

Q 17 : A train leaves Delhi at 6 AM and reaches Agra at 10 AM. Another train leaves Agra at 8 AM and reaches Delhi at 11:30 AM. At what time the trains will cross each other ?

A.8 : 32 AM

B.8 : 48 AM

C.8 : 52 AM

D.8 : 56 AM

Q 18 : Two trains A and B start from Howrah and Patna towards Patna and Howrah respectively at the same time. After passing each other they take 4 h 48 min and 3 h 20 min to reach Patna and Howrah respectively. If the train from Howrah is moving at 45 km/h, then the speed of the other train is

A. 60 km/h

B. 45 km/h

C. 35 km/h

D. 54 km/h

Q 19 : A train travelling with 25km/h leaves Delhi at 9 am and another train travelling with 35km/h leaves Delhi at 2 pm in the same direction. How far from Delhi will these together?

A.275.5 km

B. 334.5 km

C.347.5 km

D.437.5 km

Q 20 : Without any stoppage a person travels a certain distance at an average speed of 80 km/h and with stoppage he covers the same distance at an average speed of 60 km/h. How many minutes per hour does he stops ?

A. 45 min

B. 30 min

C. 20 min

D. 15 min

Q 21 : Two bikes starts from A and B towards each other with 16 km/h and 21 km/h resp. When they meet it is found that second bike has travelled 60 km more. Find distance between A and B.

A. 111 km

B. 222 km

C. 444 km

D. 666 km

Q 22 : Distance between two stations A and B is 208 km. A train starts from station A at 10 AM with 30 km/h and another starts from B at 1:20 noon with 24 km/h. When the train will meet and how far from station A ?

A. 2:20 PM, 120 km

B. 3:20 PM, 160 km

C. 2:20 PM, 160 km

D. 3:20 PM, 120 km

Q 23 : A police chases a thief. Their respective speeds are 8 and 6 km/hr. If the police started 10 min late, at what distance he will catch the thief ?

A.2 km

B.4 km

C.8 km

D.16 km

Q 24 : A thief is noticed by a policeman from a distance of 200 m. the thief starts running and the policeman chases him. The thief and the policeman run at the rate of 10 km/hr and 11 km/hr respectively. What is the distance between them after 6 minutes?

A. 100 m

B. 190 m

C. 200 m

D. 150 m

Q 25 : A monkey climbs 8 m and slip down 2 m on alternate min. If the height of pole is 58 m, how soon monkey will be on top?

A.12 min 54 sec

B. 9 min 30 sec

C.20 min 40 sec

D.18 min 30 sec

Q 26 : A train after running 100 km meet with an accident and then run at 3/5 th of its former speed and reaches the destination late by 48 min. If the accident had happened 30 km further it will be late by 24 min. Find speed of train.

A.125 km/hr

B. 150 km/hr

C.100 km/hr

D.50 km/hr

Race Based Questions

Q 27 : Kunal gives Ramesh a start of 5 sec. in 1000 m race, but both finish the race at same time. Find the time taken by A to finish the race if speed of B is 5 m/sec.

Q 28 : In a 1000m race,A gives a start of 100m to B & 150m to C. How much start B can give to C in a race of 1000m?

Q 29 : Naman can finish a race in 3 min. 10 sec. while Rajat can finish in 3 min. 20 sec. In 1000 m race, by what distance Naman will defeat Rajat?

Q 30 : In 100 m race Neelam runs at a speed of 9 km/h. She gives a start of 10 m to Sheetal and still defeats her by 10 sec. Find speed of Sheetal.

Advance Questions

Q 31 : Speed of Engine is 24 km/h without any wagon. The decrease in speed of engine is directly proportional to square root of number of wagons attached. If 4 wagons are attached with engine, speed becomes 20 km/h. Find the maximum number of wagons which are attached with engine so that engine can carry.

Q 32 : Kishan travel 120 km by bike, 450 km by taxi and 60 km by train. The total journey took 13 hour 30 minutes. If speed of taxi is 3 times of train and 1.5 times of bike. Find speed of taxi.

Q 33 : Gopal travel 360 Km in 4 hrs. partly by air & partly by train. If he had travelled all the way by air then he would have arrived 2 hrs.earlier at his destination and save 4/5 of the time he was in the train. Find the distance travelled by air & train separately.

BOATS & STREAMS

Boats and Streams

Speed =
Speed of Boat +
Speed of Stream

Speed =
Speed of Boat -
Speed of Stream

Downstream

Upstream

Direction of Stream →

Direction of Boat →

← Direction of Boat

formulae,

$$D = B + W$$

$$U = B - C$$

$$B = (D + U)/2$$

$$C = (D - U)/2$$

Example:

A boatman goes 2 km against the current of the stream in 1 hour and goes 1 km along the current in 10 minutes. How long will it take to go 5 km in stationary water?

Solution:

Rate downstream = 1/10 × 60 km/h = 6 km/h

Rate upstream = 2 km/h

Speed in still water = 1/2(6 + 2) km/h = 4 km/h

Therefore, the required time for 5 km = 5/4hrs = 1 ¼ hrs = 75 min.

Practice Questions:

1. A boat takes a circular route to travel a total distance of 24 km to reach its initial position. The speed of the boat in still water is 5 km/hr and the speed of the stream is 3 km/h. How much time (in hrs) does the boat travel upstream and downstream respectively?

a) 12, 3

b) 3, 12

c) 5, 3

d) 3, 5

2. Boat goes downstream from P to Q in 2hrs, upstream in 6hrs and if speed of stream is 6km/h, then find the distance PQ

a) 6 km

b) 4 km

c) 10 km

d) 36 km

3. A river runs at 4 km/hr. if the time taken by a man to row is boat upstream is thrice as the time taken by him to row it downstream then find the speed of the boat in still water.

a) 16 km/hr
b) 8 km/hr
c) 6 km/hr
d) 12 km/hr

4. A motorboat whose speed is 15 km/h in still water goes 30 km downstream and comes back in a total of 4hrs 30min. What is the speed of the stream?

a) 5 km/h

b) 6 km/h

c) 10 km/h

d) 12 km/h

5. A boat sails 15 km of a river towards upstream in 5 hours. How long will it take to cover the same distance downstream, if the speed of current is one-fourth the speed of the boat in still water:

a) 1.8 h

b) 3 h

c) 4 h

d) 5 h

6. 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 Km/h, then what is the speed of the man in still water.

a) 10 km/h

b) 12 km/h

c) 16 km/h

d) 8 km/h

7. A man can row downstream at 12 Km/h and upstream at 8 Km/h. Find the ratio of the speed of the current to the speed of the man in still water?

a) 1 : 5

b) 5 : 4

c) 25 : 16

d) 16 : 25

8. In a stream running at 2 km/h, a motorboat goes 10 km upstream and returns to the starting point in 55 minutes. Find the speed (all in km/h) of the motorboat in still water.

a) 2

b) 11

c) 22

d) None of these

9. The ratio of the speed of the boat in still water to the speed of the current is 4:1. What is the ratio of the downstream speed of the boat to the upstream speed?

a) 2:1

b) 1:1

c) 5:3

d) None of these

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

a) 3 km/h

b) 2.5 km/h

c) 4 km/h

d) 3.5 km/h

11. Two boats, travelling at 5 km/h and 10 km/h respectively, head directly towards each other. They begin at a distance of 20 km from each other. How far apart are they (in km) one minute before they collide?

a) 1/12

b) 1/6

c) 1/4

d) 1/3

12. A man takes twice as long to row a distance against the stream as to row the same distance along the stream. The ratio of the speed of the boat (in still water) and the stream is

a) 2:1

b) 3:1

c) 3:2

d) 4:3

13. A man takes a total time of 2hours to cover a distance of 6 km while doing upstream and downstream. If the speed of stream is 4 km/h find speed of boat in still water?

a) 2 km/h

b) 6 km/h

c) 3 km/h

d) 8 km/h

14. While going A to B against the stream and coming back from B to A with stream it takes a total time of 3 hours. If the distance from B to A is 4 km and speed of stream is 1 km/h. Find speed of boat in still water?

a) 2 km/h

b) 4 km/h

c) 3 km/h

d) 1 km/h

Advance Questions

15. Ratio of Speed of boat to the speed of current of water is 36:5. The boat goes along with the current in 5 hours 10 minutes. It will come back in ?

16. A boat covers 25 km upstream and 39 km downstream in 8 hours. While it covers 35 km upstream and 52 km downstream in 11 hours. Find speed of current. ?