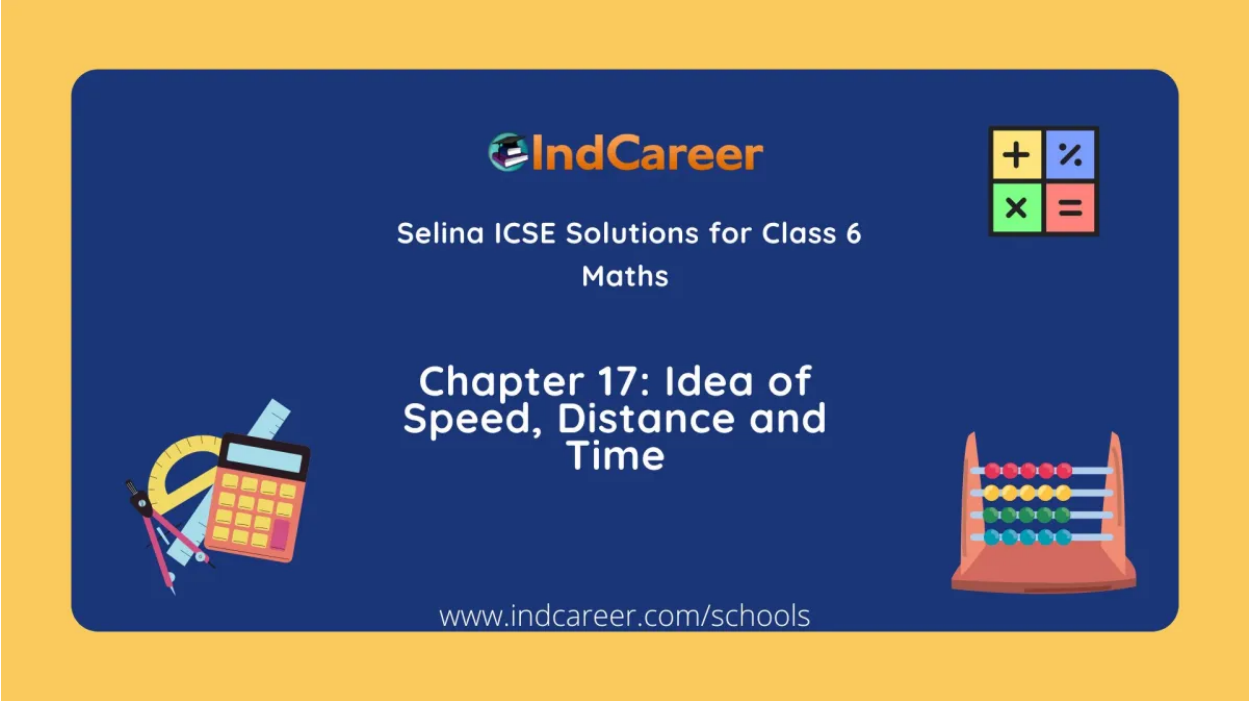
Selina Class 6 ICSE Solutions Mathematics : Chapter 17- Idea of Speed, Distance and Time



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Exercise 17(A)

1. A train covers 51 km in 3 hours. Calculate its speed. How far does the train go in 30 minutes?

Solution:

Given

A train covers 51 km in 3 hours

So, distance = 51 km

Time = 3 hours

Hence,

Speed = 51 km/ 3 hours

We get,

= 17 km/h

Now for 30 minutes

Speed = 17 km/h

Time = 0.5 hours

Hence,

Distance = 17 × 0.5

We get,

= 8.5 km

Therefore, train covered 8.5 km in 30 minutes

2. A motorist travelled the distance between two towns, which is 65 km, in 2 hours and 10 minutes. Find his speed in metre per minute.

Solution:

Given

A motorist travelled the distance 65 km in 2 hours and 10 minutes

So, distance = 65 km

Time = 2 hours 10 minutes

Hence,

Speed = 65 km / (2 hours + 10 minutes)

We know that,

1 km = 1000 m

1 hour = 60 min

= 65 (1000 m) / [2 (60 min) + 10 min]

= 65000 m/130 min

We get,

= 500 m/min

Therefore, the speed of a motorist in meter per minute is 500 m/min

3. A train travels 700 metres in 35 seconds. What is its speed in km/h?

Solution:

Given

A train travels 700 metres in 35 seconds

So, distance = 700 m

Time = 35 sec

Hence,

Speed = 700 m / 35 sec

1000 m = 1 km

1 m = 0.001 km

700 m = 0.001 × 700

= 0.7 km

3600 seconds = 1 hour

1 sec = 1 / 3600 hour

35 sec = 35 / 3600

Now,

Speed = Distance / Time

= [0.7 / (35/ 3600)**]**

We get,

= (0.7 × 3600) / 35

= 2520 / 35

= 72 km/h

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Therefore, the speed of train is 72 km/h

4. A racing car covered 600 km in 3 hours 20 minutes. Find its speed in metre per second. How much distance will the car cover in 50 sec?

Solution:

Given

A racing car covered 600 km in 3 hours and 20 minutes

So, distance = 600 km

Time = 3 hours 20 minutes

Hence,

Speed = 600 km / (3 hours + 20 minutes)

= 600 (1000m) / [3(60 min) + 20 min]

We get,

= 600000m / 200 min

= 600000m / 200 (60 sec)

We get,

= 600000 / 12000 sec

= 50 m / sec

Thus, speed in meter per second is 50 m / sec

Now, the distance covered by car in 50 sec is calculated as below

Speed = 50 m / sec

Time = 50 sec

Hence,

Distance = 50 × 50

= 2500 m

= 2.5 km

Therefore, the distance covered by car in 50 seconds is 2.5 km

5. Rohit goes 350 km in 5 hours. Find:

(i) his speed

(ii) the distance covered by Rohit in 6.2 hours

(iii) the time taken by him to cover 210 km

Solution:

(i) his speed

Given

Rohit goes 350 km in 5 hours

So, distance = 350 km

Time = 5 hours

Hence,

Speed = 350 km / 5 hours

We get,

= 70 km/h

Hence, Rohit speed is 70 km/h

(ii) the distance covered by Rohit in 6.2 hours

Given

Rohit goes 350 km in 5 hours

So, distance = 350 km

Time = 5 hours

Hence,

Speed = 350 km / 5 hours

We get,

= 70 km/h

Now, the distance covered by Rohit in 6.2 hours is calculated as below

Speed = 70 km/h

Time = 6.2 hours

Hence,

Distance = 70 × 6.2

= 434 km

Therefore, Rohit covers 434 km in 6.2 hours

(iii) the time taken by him to cover 210 km

Given

Rohit goes 350 km in 5 hours

So, distance = 350 km

Time = 5 hours

Hence,

Speed = 350 km / 5 hours

We get,

= 70 km/h

Now, the time taken by Rohit to cover 210 km is calculated as below

Distance = 210 km

Speed = 70 km/h

Hence,

Time = 210 km / 70 km/h

= 3 hours

Therefore, the time taken by Rohit to cover 210 km is 3 hours

6. A boy drives his scooter with a uniform speed of 45 km/h. Find:

(i) the distance covered by him in 1 hour 20 min

(ii) the time taken by him to cover 108 km

(iii) the time taken to cover 900 m

(i) the distance covered by him in 1 hour 20 min

Given

Speed of scooter is 45 km/h

Speed = 45 km/h

Time = 1 hours 20 minutes

Hence,

Distance = 45 × (1 + 20 / 60)

= 45 × (1 + 1 / 3)

We get,

= 45 × 4 / 3

= 15 × 4

= 60

Hence, the distance covered by a boy in 1 hour 20 minutes is 60 km

(ii) the time taken by him to cover 108 km

Given

Speed of scooter is 45 km/h

So, speed = 45 km/h

Distance = 108 km

Hence,

Time = 108 km / 45 km/h

We get,

= 12 / 5 h

= $2\frac{2}{5}$h

This is equal to,

= 2 hours (2 / 5) × 60 min

= 2 hours (2 × 12) min

= 2 hours 24 min

Hence, the time taken by a boy to cover 108 km distance is 2 hours 24 min

(iii) the time taken to cover 900 m

Given

Speed of scooter is 45 km/h

So, speed = 45 km/h

Distance = 900 m

Hence,

Time = 900 m / 45 km/h

= (900 / 1000) × 1 / 45

We get,

= (9 / 10) × (1 / 45)

= 1 / 50 h

= (1 / 50) × 60 min

= 6 / 5 min

This can be written as,

= 1 and 1 / 5 min

= 1 min (1 / 5 × 60) sec

We get,

= 1 min 12 sec

Hence, the time taken by a boy to cover 900 m is 1 min 12 sec

7. I travel a distance of 10 km and come back in 2 ½ hours. What is my speed?

Solution:

Given

10 km distance travelled twice in 2 ½ hours

So, distance = 10 km + 10 km

= 20 km

Time = 2 ½ hours

This can be written as,

Time = 5 / 2 hours

Hence,

Speed = [20 km / (5 / 2 hours)]

= (20 × 2) / 5

We get,

= 40 / 5

= 8 km/h

Hence, the speed of a person to cover a distance of 10 km twice is 8 km/h

8. A man walks a distance of 5 km in 2 hours. Then he goes in a bus to a nearby town, which is 40 km, in further 2 hours. From there, he goes to his office in an autorickshaw, a distance of 5 km, in ½ hour. What was his average speed during the whole journey?

Solution:

Given

A man walks a distance of 5 km in 2 hours

40 km distance is covered by bus in 2 hours

5 km distance is covered by autorickshaw in ½ hour

Hence,

Total distance covered by a man during whole journey is calculated as below

Total distance = 5 km + 40 km + 5 km

= 50 km

Total time taken by a man during whole journey

Total time = 2 + 2 + 1/2

= (4 + 4 + 1) / 2

We get,

= 9 / 2 hours

Hence,

Average speed = 50 km / (9 / 2) hours

= (50 × 2) / 9 km/h

= 100 / 9 km/h

= $11\frac{1}{9}$ km/h

Therefore, the average speed taken by a man during whole journey is $11\frac{1}{9}$ km/h

9. Jagan went to another town such that he covered 240 km by a car going at 60 kmh^{-1}. Then he covered 80 km by a train, going at 100 kmh^{-1} and the rest 200 km, he covered by a bus, going at 50 kmh^{-1}. What was his average speed during the whole journey?

Solution:

Given

Jagan covered 240 km distance by a car at 60 km/h

He travelled 80 km distance by train at 100 km/h

He travelled 200 km distance by a bus at 50 km/h

Hence,

Total distance travelled by Jagan = 240 km + 80 km + 200 km

= 520 km

Now, total time taken by Jagan during whole journey is shown below

Time taken by car = 240 km / 60 km/h

= 4 hours

Time taken by a train = 80 km / 100 km/h

= 4 / 5 hours

Time taken by bus = 200 km / 50 km/h

= 4 hours

So, total time taken = 4 + 4 / 5 + 4

= (20 + 4 + 20) / 5

We get,

= 44 / 5 hours

Hence,

Average speed = total distance / total time

= 520 km / (44 / 5) hours

= [(520 × 5) / 44] km/h

= (130 × 5) / 11 km/h

= 650 / 11 km/h

= $59\frac{1}{11}$ km/h

Hence, the average speed during the whole journey is $59\frac{1}{11}$ km/h

10. The speed of sound in air is about 330 ms^{-1}. Express this speed in kmh^{-1}. How long will the sound take to travel 99 km?

Solution:

Given

Speed of sound in air = 330 m/sec

So, speed = 330 m/sec

Distance = 99 km

= 99 × 1000

We get,

= 99000 m

Hence,

Time = [(99000 m) / (330 m/sec)]

= 9900 / 33 sec

We get,

= 300 sec

= 5 min

Hence, the time taken by the sound to travel 99 km is 5 min

Exercise 17(B)

1. A train 180 m long is running at a speed of 90 km/h. How long will it take to pass a railway signal?

Solution:

Given

A train 180 m long is running at a speed of 90 km/h

So, distance = 180 m

Speed = 90 km/h

Hence,

Time = Distance / Speed

= 180 m / 90 km/h

= 180 / (90 × 1000)

= 1 / 500 hours

We get,

= 1 / 500 × 60 × 60 sec

= 36 / 5 sec

We get,

= 7.2 sec

Hence, the train will take 7.2 sec to pass a railway signal

2. A train whose length is 150 m, passes a telegraph pole in 10 sec. Find the speed of the train in km/h.

Solution:

Given

A train whose length is 150 m, passes a telegraph pole in 10 sec

So, distance = 150 m

Time = 10 sec

Hence,

Speed = 150 m / 10 sec

= 15 m/sec

= (15 × 60 × 60) / 1000 km/h

= (15 × 6 × 6) / 10 km/h

= 3 × 3 × 6 km/h

We get,

= 54 km/h

Hence, the speed of train in kilometer per hour is 54 km/h

3. A train 120 m long passes a railway platform 160 m long in 14 sec. How long will it take to pass another platform which is 100 m long?

Solution:

Given

A train 120 m long passes a railway platform 160 m long in 14 seconds

Distance = 120 m + 160 m

= 280 m

Time = 14 sec

Hence,

Speed = Distance / time

= 280 / 14

= 20 m/sec

Hence, the speed of train is 20 m/sec

Now, time taken by the train to pass 100 m platform is as follows

Distance = 120 m + 100 m

= 220 m

Speed = 20 m/sec

Time = 220 m / 20 m/sec

We get,

= 11 sec

Hence, the time taken by the train to pass 100 m platform is 11 sec

4. Mr. Amit can walk 8 km in 1 hour 20 minutes.

(a) How far does he go in:

(i) 10 minutes?

(ii) 30 seconds?

(b) How long will it take him to walk:

(i) 2500 m?

(ii) 6.5 km?

Solution:

(a) (i)

Given

8 km is covered in 1 hour 20 minutes

Distance = 8 km

Time = 1 hour 20 minutes

= 1 + 20 / 60

= 1 + 1 / 3

We get,

= 4 / 3 hours

Hence,

Speed = 8 km / (4 / 3) hours

Speed = (8 × 3) / 4 km/h

Speed = 2 × 3 km/h

Speed = 6 km/h

Now, distance covered in 10 minutes is as follows

Speed = 6 km/h

Time = 10 min

= 10 / 60 hour

= 1 / 6 hour

Hence,

Distance = 6 × 1 / 6

We get,

= 1 km

Therefore, the distance covered by Mr. Amit in 10 min is 1 km

(ii) Given

8 km is covered in 1 hour 20 minutes

So,

Distance = 8 km

Time = 1 hour 20 minutes

= 1 + 20 / 60

= 1 + 1 / 3

We get,

= 4 / 3 hours

Hence,

Speed = 8 km / 4 / 3 hours

= (8 × 3) / 4 km/h

We get,

= 6 km/h

Now, the distance covered in 30 seconds is as follows

Speed = 6 km/h

Time = 30 sec

Hence,

Distance = 6 × [30 / (60 × 60)] km

On further calculation, we get

= 1 / (10 × 2) km

= 1 / 20 × 1000 m

= 1 / 2 × 100

= 50 m

Therefore, the distance covered by Mr. Amit in 30 seconds is 50 m

(b) (i)

Given

8 km is covered in 1 hour 20 minutes

So,

Distance = 8 km

Time = 1 hour 20 minutes

= 1 + 20 / 60

We get,

= 1 + 1 / 3

= 4 / 3 hours

Hence,

Speed = 8 km / 4 / 3 hours

= (8 × 3) / 4 km/h

= (2 × 3) km/h

= 6 km/h

Now, time taken by Mr. Amit to walk 2500 m is as follows

Speed = 6 km/h

Distance = 2500 m

= 2.5 km

Hence,

Time = 2.5 / 6 hour

= 25 / (6 × 10) hour

On further calculation, we get

= 5 / 12 hour

= 5 / 12 × 60 min

= 5 × 5 min

= 25 min

Therefore, the time taken by Mr. Amit to walk 2500 m is 25 minutes

(ii)

Given

8 km is covered in 1 hour 20 minutes

So,

Distance = 8 km

Time = 1 hour 20 minutes

= 1 + 20 / 60

= 1 + 1 / 3

We get,

= 4 / 3 hours

Hence,

Speed = 8 km / 4 / 3 hours

= (8 × 3) / 4 km/h

= (2 × 3) km/h

= 6 km/h

Now, time taken by Mr. Amit to walk 6.5 km is as follows

Speed = 6 km/h

Distance = 6.5 km

Hence,

Time = 6.5 / 6 hour

= 65 / 60 hour

= 1 hour 5 minutes

Therefore, the time taken by Mr. Amit to walk 6.5 km is 1 hour 5 min

5. Which is greater: a speed of 45 km/h or a speed of 12.25 m/sec?

How much is the distance travelled by each in 2 seconds?

Solution:

Given

First speed = 45 km/h

Second speed = 12.25 m/sec

= [(1225 × 60 × 60) / (100 × 1000)] km/h

= (1225 × 6 × 6) / 1000 km/h

On further calculation, we get

= (49 × 6 × 6) / 40 km/h

= (49 × 3 × 3) / 10 km/h

We get,

= 441 / 10 km/h

= 44.1 km/h

Hence, it is clear that the first speed 45 km/h is greater than the second speed 12.25 m/sec

Now, the distance travelled in 2 seconds at 45 km/h is shown below

Speed = 45 km/h

= (45 × 1000) / (60 × 60) m/sec

We get,

= 450 / 36 m/sec

Time = 2 sec

Hence,

Distance = 450 / 36 m/sec × 2 sec

= 450 / 18 m

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= 25 m

Now, the distance travelled in 2 seconds at 12.25 m/sec is shown below

Speed = 12.25 m/sec

Time = 2 sec

Hence,

Distance = 12.25 m/sec × 2 sec

= 24.50 m

Therefore, the distance travelled by each in 2 seconds is 25 m and 24.50 m

6. A and B start from the same point and at the same time with speeds 15 km/h and 12 km/h respectively, find the distance between A and B after 6 hours if both move in:

(i) same direction

(ii) the opposite directions.

Solution:

(i) Same direction

Given

Speed of A = 15 km/h

Speed of B = 12 km/h

Time = 6 hours

Hence,

Distance covered by A = 15 × 6

= 90 km

Distance covered by B = 12 × 6

= 72 km

Now, the distance between A and B after 6 hours if both move in same direction is calculated as follows

Distance covered by A – Distance covered by B = 90 km – 72 km

= 18 km

Hence, the distance between A and B after 6 hours if both move in same direction is 18 km

(ii) the opposite direction

Given

Speed of A = 15 km/h

Speed of B = 12 km/h

Time = 6 hours

Hence,

Distance covered by A = 15 × 6

= 90 km

Distance covered by B = 12 × 6

= 72 km

Now, the distance between A and B after 6 hours if both move in the opposite directions can be calculated as shown below

Distance covered by A + Distance covered by B = 90 km + 72 km

= 162 km

Hence, the distance between A and B after 6 hours if both move in the opposite directions is 162 km

7. A and B start from the same place, in the same direction and at the same time with speeds 6 km/h and 2 m/sec respectively. After 5 hours who will be ahead and by how much?

Solution:

Given

Speed of A = 6 km/h

Speed of B = 2 m/sec

Time = 5 hours

Hence,

Distance covered by A = 6 km/h × 5 hours

We get,

= 30 km

Distance covered by B = 2 m/sec × 5 hours

= 2 × 5 × 60 × 60

We get,

= 36000 m

= 36 km

Hence, it is clear that B will be ahead of A

Now, the distance between B and A after 5 hours if both moving in the same direction is calculated as below

Distance covered by B – Distance covered by A = 36 km – 30 km

= 6 km

Hence, B will be ahead of 6 km from A

8. Mohit covers a certain distance in 6 hours by his scooter at a speed of 40 kmh^{-1}.

(i) Find the time taken by Manjoor to cover the same distance by his car at the speed of 60 kmh^{-1}.

(ii) Find the speed of Joseph, if he takes 8 hrs to complete the same distance

Solution:

(i)

Given

Mohit covers a distance at a speed of 40 km/h in 6 hours by his scooter

So,

Speed of scooter = 40 km/h

Time taken by scooter = 6 hours

Hence,

Distance = 40 × 6

We get,

= 240 km

Now, the time taken by Manjoor to cover 240 km by his car at the speed of 60 km/h is calculated as below

Time = 240 / 60

We get,

= 4 hours

Hence, the time taken by Manjoor to cover 240 km by his car at the speed of 60 km/h is 4 hours

(ii)

Given

Mohit covers a distance at a speed of 40 km/h in 6 hours by his scooter

So,

Speed of scooter = 40 km/h

Time taken by scooter = 6 hours

Hence,

Distance = 40 × 6

= 240 km

Now, the speed of Joseph to cover 240 km in 8 hours can be calculated as below

Speed = 240 / 8

= 30 km/h

Hence, the speed of Joseph to cover 240 km in 8 hours is 30 km/h

9. A boy swims 200 m in still water and then returns back to the point of start in total 10 minutes. Find the speed of his swim in

(i) ms^{-1}

(ii) kmh^{-1}

Solution:

(i) m/sec

Given

A boy swims 200 m in still water and then returns back to the starting point in total 10 minutes

So,

Distance = 200 m + 200 m

= 400 m

Time = 10 minutes

Hence,

Speed = 400 /10

We get,

= 40 m/min

Converting into seconds, we get

= 40 / 60 m/sec

= 2 / 3 m/sec

Therefore, the speed of the boy swim in meter per second is 2 / 3 m/sec

(ii) km/h

Given

A boy swims 200 m in still water and then returns back to the starting point in total 10 minutes

So,

Distance = 200 m + 200 m

= 400 m

Time = 10 minutes

Hence,

Speed = 400 / 10

= 40 m/min

Now, converting into km/h, we get

= (40 × 60) / 1000 km/h

We get,

= 24 / 10 km/h

= 2.4 km/h

Therefore, the speed of the boy swim in kilometer per hour is 2.4 km/h

10. A distance of 14.4 km is covered in 2 hours 40 minutes. Find the speed in ms^{-1}. With this speed Sakshi goes to her school, 240 m away from her house and then returns back. How much time, in all, will Sakshi take?

Solution:

Given

A distance of 14.4 km is covered in 2 hours 40 minutes

So,

Distance = 14.4 km

Converting into metre, we get

= 14.4 × 1000 m

= 14400 m

Time = 2 hours 40 minutes

Converting into seconds, we get

= 160 minutes

= 160 × 60 seconds

We get,

= 9600 seconds

Hence,

Speed = (14400 / 9600) m/sec

= 144 / 96 m/sec

We get,

= 3 / 2 m/sec

= 1.5 m/sec

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Hence, the speed in meter per second is 1.5 m/sec

Now, time taken by Sakshi to cover the distance to go to her school, 240 m away from her house and then return back is calculated as below

Distance = 240 m + 240 m

= 480 m

Speed = 1.5 m/sec

Hence,

Time = 480 / 1.5 sec

= 4800 / 15 sec

We get,

= 320 sec

= 5 min 20 sec

Hence, Sakshi will take 5 minutes 20 seconds to go to her school and then return back

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