Question 1.
A train covers 51 km in 3 hours. Calculate its speed. How far does the train go in 30 minutes?
Solution:
Given: Distance = 51 km
Time = 3 hours
\[
\text{Speed} = \frac{\text{Distance}}{\text{Time}}
\]
\[
= \frac{51}{3} = 17 \text{ km/h}
\]
Now,
\[
\text{Time} = 30 \text{ minutes} = \frac{30}{60} \text{ h} = \frac{1}{2} \text{ h}
\]
Speed = 17 km/h
\[
\therefore \text{Distance travelled} = \text{Speed} \times \text{Time}
\]
\[
= 17 \times \frac{1}{2} = 8.5 \text{ km}
\]

Question 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:
Distance between two towns = 65 km
Time taken = 2 hr 10 min
\[
= 2 \frac{10}{60} = 2 \frac{1}{6} = \frac{13}{6} \text{ hrs}
\]
\[
\therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{65}{\frac{13}{6}}
\]
\[
= \frac{65 \times 6}{13} \text{ km/h} = 30 \text{ km/h}
\]
and speed in m/minute = \[
\frac{30 \times 1000}{60}
\]
\[
= 500 \text{ m/minute}
\]

Question 3.
A train travels 700 metres in 35 seconds. What is its speed in km/h?
Solution:
Distance = 700 m
Time taken = 35 sec

\[
\text{Speed in m/sec} = \frac{\text{Distance}}{\text{Time}} = \frac{700}{35} = 20 \text{ m/sec}
\]

and Speed in km/h = \[
\frac{20 \times 60 \times 60}{1000} = 72 \text{ km/h}
\]

Question 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:
Distance covered = 600 km
Time taken = 3 hr 20 min

\[
= \frac{3 \frac{20}{60}}{3} = \frac{10}{3} \text{ hrs}
\]

\[
\therefore \text{ Speed in km/h} = \frac{\text{Distance}}{\text{Time}} = \frac{600}{\frac{10}{3}}
\]

\[
= \frac{600 \times 3}{10} \text{ km/h} = 180 \text{ km/h}
\]

and Speed in m/sec = \[
\frac{180 \times 1000}{60 \times 60} = 50 \text{ m/sec}
\]

and Distance covered in 50 seconds
= Speed x Time
= 50 \times 50 \text{ m} = 2500 \text{ m} or 2.50 \text{ km}

Question 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:
Distance covered = 350 km
Question 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.

Solution:
Speed of the scooter = 45 km/h

\[
\text{Time taken} = \frac{20}{60} = \frac{1}{3} = \frac{4}{3} \text{ hours}
\]

(i) Distance covered in 1 hour 20 minutes

\[
= 45 \times \frac{4}{3} \text{ km} = 60 \text{ km}
\]

(ii) Time taken to cover 108 km

\[
= \frac{108}{45} \text{ hrs}
\]

\[
= \frac{12}{5} = 2 \frac{2}{5} \text{ hours}
\]

\[= 2 \text{ hours } 24 \text{ minutes}\]

(iii) Time taken to cover 900 m

\[
= \frac{900}{1000} \times \frac{1}{45} = \frac{1}{50} \text{ hr}
\]

\[
= \frac{60}{50} = \frac{6}{5} = 1 \frac{1}{5} \text{ minutes}
\]

\[= 1:2 \text{ minute or } 1 \text{ minute } 12 \text{ seconds}\]
Question 7.
I travel a distance of 10 km and come back in $2\frac{1}{2}$ hours. What is my speed?

**Solution:**
Total distance covered = 10 km + 10 km = 20 km

\[
\text{Time taken} = 2\frac{1}{2} = \frac{5}{2} \text{ hours}
\]

\[
\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{20}{\frac{5}{2}} = \frac{20 \times 2}{5} \text{ km/h} = 8 \text{ km/hr}
\]

Question 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 $\frac{1}{2}$ hour. What was his average speed during the whole journey?

**Solution:**
Distance of 5 km travelled on foot in 2 hours
Distance of 40 km travelled by bus in 2 hours
Distance of 5 km travelled by Rickshaw in $\frac{1}{2}$ hour
Total distance covered = 5 + 40 + 5 = 50 km

\[
\text{Time taken} = 2 + 2 + \frac{1}{2} = 4 \frac{1}{2} = \frac{9}{2} \text{ hours}
\]

\[
\therefore \text{Average speed} = \frac{\text{Distance}}{\text{Time}} = \frac{50}{\frac{9}{2}} = \frac{50 \times 2}{9} \text{ km/h}
\]

\[
= \frac{100}{9} \text{ km/h}
\]

\[
= 11 \frac{1}{9} \text{ km/h}
\]

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

**Solution:**
Distance covered 240 km by car with speed 60 km/h
Distance covered 80 km by train with speed 100 km/h
and rest distance covered 200 km by bus with speed 50 km/h
Total distance covered = \((240 + 80 + 200) \text{ km} = 520 \text{ km}\)

Now time taken by car \(= \frac{240}{60} = 4 \text{ hours}\)

Time taken by train \(= \frac{80}{100} = \frac{4}{5} \text{ hours}\)

and time taken by bus \(= \frac{200}{50} = 4 \text{ hours}\)

\(:= \text{ Total time taken} \)
\(= 4 + \frac{4}{5} + 4 = 8 \frac{4}{5} = \frac{44}{5} \text{ hours}\)

\(:= \text{ Average speed} \)
\(= \frac{\text{Distance}}{\text{Time}} = \frac{520}{\frac{44}{5}} = \frac{520 \times 5}{44} \text{ km/h}\)

\(= \frac{650}{11} = 59 \frac{1}{11} \text{ km/h}\)

**Question 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:**
Speed of sound in air \(= 330 \text{ m/sec}\)

\(\therefore \text{ Speed in km/h} = \frac{330 \times 60 \times 60}{1000} \)

\(= 1118 \text{ km/h} \).

Time taken by sound to cover 99 km
\(= \frac{99}{1188} = \frac{1}{12} \text{ hours} \)

\(= \frac{1}{12} \times 60 = 5 \text{ minutes} \)

or \(5 \times 60 = 300 \text{ seconds} \)

**EXERCISE 17(B)**

**Question 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:
Distance = 180 m
Speed = 90 km/h

\[ \therefore \text{Time taken} = \frac{180}{90 \times 1000} \times \frac{1}{500} \text{ hrs} \]

\[ = \frac{1 \times 60 \times 60}{500} = \frac{36}{5} = 7.2 \text{ seconds} \]

Question 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:
Distance = 150 m
Time taken = 10 sec

\[ \therefore \text{Speed} = \frac{150}{10} = 15 \text{ m/s} \]

\[ = \frac{15 \times 60 \times 60}{1000} \text{ km/h} = 54 \text{ km/h} \]

Question 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:
Distance covered = 120 m + 160 m = 280 m
Time taken = 14 seconds

\[ \therefore \text{Speed} = \frac{\text{Distance}}{\text{Time}} \]

\[ = \frac{280}{14} = 20 \text{ m/s} \]

In seconds case, distance

\[ = 120 + 100 = 220 \text{ m} \]

\[ \therefore \text{Time taken} = \frac{220}{20} \text{ sec} = 11 \text{ sec} \]

Question 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:**
Amit walks 8 km in 1 hour 20 min

\[ \text{or } 1 \frac{1}{3} = \frac{4}{3} \text{ hours} \]

\[ \therefore \text{ Speed } = \frac{\text{Distance}}{\text{Time}} \]

\[ = \frac{8}{\frac{4}{3}} = \frac{8 \times 3}{4} = 6 \text{ km/h} \]

(a) (i) Distance covered in 10 minutes

\[ = \frac{6 \times 1000 \times 10}{60} = 1000 \text{ m} = 1 \text{ km} \]

(ii) Distance covered in 30 seconds

\[ = \frac{6 \times 1000 \times 30}{60 \times 60} = 50 \text{ m} \]

(b) (i) Time taken in 2500 m = \[ \frac{2500}{1000 \times 6} \]

\[ = \frac{5}{12} \text{ hours} = \frac{5}{12} \times 60 = 25 \text{ minutes} \]

(ii) Time taken in 6.5 km

\[ = \frac{6.5}{6} = \frac{65}{60} \text{ hours} \]

\[ = 1 \text{ hour } 5 \text{ minutes} \]

**Question 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:**
First speed = 45 km/h
Second = 12.25 m/sec
\[
\text{Second} = \frac{12.25 \times 60 \times 60}{1000} \text{ km/h}
\]
\[
= \frac{1225 \times 60 \times 60}{100 \times 1000}
\]
\[
= \frac{441}{10} = 44.1 \text{ km/h}
\]
It is clear from above that 45 km/h is greater.
Distance covered in 2 seconds by 45 km/h
\[
\text{Speed} = \frac{45 \times 1000 \times 2}{60 \times 60} = 25 \text{ m}
\]
and distance covered in 2 seconds by
\[
12.25 \text{ m/sec} = 12.25 \times 2 = 24.50
\]

**Question 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:**

A's speed = 15 km/h
B's speed = 12 km/h
Distance covered by A in 6 hours = 15 \times 6 = 90 km
and Distance covered by B in 6 hours = 12 \times 6 = 72 km
(i) Distance between A and B when they move in the same direction = 90 - 72 = 18 km
(ii) Distance between A and B, when they move in the opposite directions = 90 + 72 = 162 km

**Question 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:**

A's speed = 6 km/h
B's speed = 2 m/sec
Distance covered by A in 5 hours = 6 \times 5 = 30 km
and distance covered by B in 5 hours = 5 \times 60 \times 60 \times 2 m = 36000 m = \frac{36000}{1000} = 36 km
B will be ahead and 36 - 30 = 6 km ahead.
Question 8.
Mohit covers a certain distance in 6 hrs 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:
Mohit's speed = 40 km/h or kmh\(^{-1}\)
Distance covered in = 6 hours
Distance = 40 \times 6 = 240 km
(i) Manjoor car's speed = 60 kmh\(^{-1}\)
He will cover the distance of 240 km in = \frac{240}{60} = 4 hours
(ii) Joseph covered that distance in 8 hours
His speed = \frac{240}{8} = 30 kmh\(^{-1}\)

Question 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:
Distance swimmend by a boys of 200 m + 200 m = 400 m
Time taken = 10 minutes

(i) \therefore \text{His speed in m s}^{-1} = \frac{400}{10 \times 60}

\frac{2}{3} \text{ m s}^{-1}

(ii) \text{Speed in km h}^{-1} = \frac{2}{3} \times \frac{3600}{1000} = \frac{24}{10}

= 2.4 \text{ km h}^{-1}

Question 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:
Distance = 14.4 km
Time taken to cover = 2 hrs 40 min
= \frac{22}{3} = \frac{5}{3} \text{ hrs}
(i) \[ \therefore \text{Speed in m/s} = \frac{\frac{14.4 \times 1000}{\frac{8}{3} \times 3600}}{} \]
\[ = \frac{144 \times 1000 \times 3}{10 \times 8 \times 3600} = \frac{3}{2} \text{ m s}^{-1} \]
\[ = 1.5 \text{ m s}^{-1} \]

(ii) Distance from house to school and back
\[ = 240 \times 2 = 480 \text{ m} \]
\[ \therefore \text{Time taken} = \frac{480}{1.5} \text{ second} \]
\[ = \frac{480 \times 10}{15} = 320 \text{ seconds} \]
\[ = \frac{320}{60} \text{ min} = 50 \text{ min 20 sec} \]