MATHS FIELD GUIDE · GRADE 5

Speed connects distance and time

OPENING PROBLEM

How far in ten minutes at this steady pace?

Minutes	1	2	5
Metres	120	240	600

02 Read the same journey three ways
03 Rules and worked cases
04 Compare two cycle rides
05 Compare the models
06 Read the units on a rate
07 Check your reasoning

ILLUSTRATED PROBLEM SHEET

Read the same journey three ways

Distance = speed × time for travel at constant speed.

1

Minutes	1	2	5
Metres	120	240	600

How far in ten minutes at this steady pace?

Double the five-minute distance to get 1200 m.

2

Distance 36 km
↓
Time 3 h
↓
36 ÷ 3 = 12 km/h

What does twelve mean here?

Twelve kilometres in each hour at this speed.

3

Distance 30 km
↓
Speed 15 km/h
↓
30 ÷ 15 = 2 h

Why does dividing give hours?

Count the number of 15-kilometre hourly portions in 30 kilometres.

4

Time (h)	0	1	2
Distance (km)	0	8	8

What happened during the second hour?

The total distance did not change. No additional distance was travelled in that hour.

6 km in 2 h
3 km/h.

6 km/h for 2 h
12 km.

CHAPTER PROBLEM

At a constant 12 km/h, how far in thirty minutes?

6 km. Thirty minutes is half an hour.

MATHS REFERENCE · GRADE 5

Speed connects distance and time

Speed tells us distance travelled per unit of time.

Average speed is total distance divided by total elapsed time. It does not mean the speed was constant throughout.

Cases to recognise

Situation	What to do and why
18 km in half an hour	Two equal half hours make 36 km in an hour at that speed.
3 km in 20 minutes	Three such intervals fit in an hour. Average speed is 9 km/h.

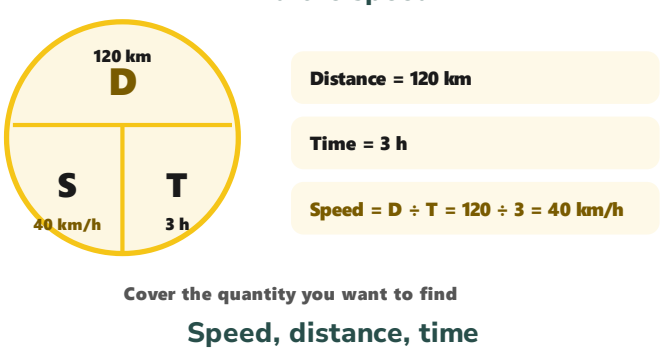
Read the model

Find distance per hour

A traveller covers 120 km in three hours.

120 ÷ 3 = 40, so the average speed is 40 km/h. “Per hour” names the reference unit.

Find the speed



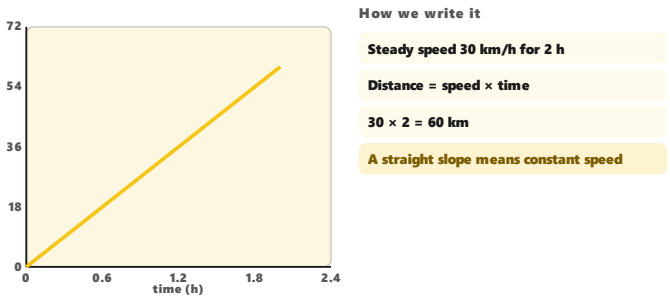
Speed, distance, time

Use a constant-speed model

At a constant speed of 30 km/h for two hours, distance is 30 × 2 = 60 km.

A straight distance–time line shows equal distances in equal time intervals.

Distance-time graph



Slope of a distance-time graph is speed

speed Distance travelled per unit of time.
elapsed time The whole time from start to finish.
average speed Total distance divided by total elapsed time.
constant speed The same distance in each equal time interval.



The mix is two parts A to three parts B. How many parts in all?

Five. A is two fifths of the whole mixture.

WORKED INVESTIGATION

Compare two cycle rides

Mira cycles 12 km in 40 minutes. Divide by four to find the distance in ten minutes, then scale to one hour. Assume steady speed.

Look at this part	What it tells you
10 minutes	3 km
20 minutes	6 km
60 minutes	18 km

Work it through

A second cyclist covers 8 km in 30 minutes, or 16 km in an hour. Comparing equal times shows that Mira is faster.

Catch the mistake

Dividing 12 by 40 gives kilometres per minute. Label the unit before comparing the answer with a speed in kilometres per hour.

Compare the cases

Find time from a known speed

At a constant 20 km/h, a 60 km journey takes 60 ÷ 20 = 3 hours.

Distance divided by distance per hour leaves a time in hours.

Keep time units consistent

Thirty minutes is half an hour, not 0.30 hours.

Travelling 10 km in half an hour gives an average speed of 20 km/h.

Change one condition

At Mira’s steady speed, 45 km takes 2.5 hours: 36 km in two hours and 9 km in another half hour.

A	B
2	3
4	6
6	9

What changes across batches?

The totals change, while the amount of B for each unit of A stays at 3/2.

SPEED CONNECTS DISTANCE AND TIME

Compare the models

Stops belong in elapsed journey time

A journey covers 60 km in two hours, including a stop.

Its overall average speed is 30 km/h. The moving speed may be higher.

Do not average unequal-duration speeds casually

Adding two speeds and halving them is not generally the journey's average speed.

Use the total distance and total elapsed time. Different time intervals contribute different amounts.

Check what the model assumes

Distance = speed × time uses a constant speed, or a stated average for that time interval.

Use compatible distance and time units, and make the assumption clear.

Explain your reasoning

A journey covers 90 km in three hours. Find its average speed.

30 km/h.

Two more worked cases

Situation	Reasoning
30 km at 12 km/h	Time = 30 ÷ 12 = 2.5 hours.
10 km in one hour, then 20 km in three hours	Total 30 km in four hours gives 7.5 km/h. Combine distances and times first.

Total 35 g
↓
35 ÷ 5 = 7 g
↓
A = 14 g

How much A is in 35 g of this mix?

One part is 7 g. Two parts give 14 g and the remaining 21 g is B.

ILLUSTRATED PROBLEM SHEET

Read the units on a rate

A rate compares two quantities with different units.

1

Time (h)	Distance (km)
1	18
2	36
2.5	45

At steady speed, how far in 2½ hours?

Two hours give 36 km and half an hour adds 9 km. Total 45 km.

2

600 m in 5 min
↓
120 m per min
↓
7.2 km per hour

Why divide before multiplying?

Find distance in one minute, then scale to sixty minutes and convert metres to kilometres.

3

Pack	Price
250 g	₹40
400 g	₹60

Which pack costs less per 100 g?

₹16 versus ₹15. The 400 g pack costs less per 100 g.

4

Time (min)	Water (L)
0	3
1	5
2	7

Is water volume proportional to time?

It grows by 2 L each minute but starts at 3 L. Doubling time need not double the amount.

₹45 for three equal packs
₹15 per pack.

Three packs per hour
one pack every 20 minutes at a steady rate.

CHAPTER PROBLEM

A 40 km journey takes two hours including a stop. May you ignore the stop when finding overall average speed?

No. Use both hours: the overall average is 20 km/h.

QUESTION BANK · FOLD OR COVER THE RIGHT COLUMN

Check your reasoning

Try the problem	Solution and reasoning
01 A walker travels at 4 km/h for half an hour. How far?	Half an hour is half of one hourly stretch: 2 km.
02 A cyclist rides one hour at 10 km/h and two hours at 16 km/h. Average speed?	42 km over 3 hours gives 14 km/h.
03 A runner covers 3 km in 15 minutes. At that steady speed, how far in 50 minutes?	Each five minutes covers one kilometre. Ten such intervals cover 10 km.
04 A cyclist rides 45 km at 15 km/h and stops for half an hour. Total elapsed time?	Riding takes three hours; the stop raises elapsed time to 3.5 hours.
05 A walker covers 600 m in five minutes. At the same speed, how many kilometres in one hour?	Twelve intervals give 7,200 m, or 7.2 km.

A	B
2	3
3	4

Does adding one to both counts preserve this recipe?

No. Cross-products 2 × 4 and 3 × 3 differ.

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