

Motion Rate Mission

Use distance and time to find average speed.

GRADE 7 • TEKS 7.7

7.7 "Force, motion, and energy. The student describes the cause-and-effect relationship between force and motion. The student is expected to: calculate average speed using distance and time measurements from investigations..."

NAME _____

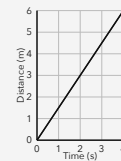
DATE _____

FIND AVERAGE SPEED

Average speed tells how much total distance an object travels in each unit of time. Divide total distance by total time, and make sure the units match. A distance-time graph shows distance on the vertical axis and time on the horizontal axis.

WORKED EXAMPLE

The graph shows a cart's motion. Calculate its average speed.



1. Read the total distance: 6 m.
2. Read the total time: 4 s.
3. Divide distance by time: $6 / 4 = 1.5$.
4. Write the speed in meters per second.

Answer: 1.5 m/s

PRACTICE 6 problems

- 1** A robot travels 45 meters in 9 seconds. What is its average speed?

ANSWER _____

- 2** A runner travels 120 meters in 30 seconds. What is the runner's average speed?

ANSWER _____

- 3** A cyclist travels $\frac{2}{3}$ kilometer in $\frac{1}{3}$ hour. What is the cyclist's average speed?

ANSWER _____

- 4** A remote-control car travels 84 meters in 12 seconds. What is its average speed?

ANSWER _____

- 5** A toy car travels 15 meters east, then 15 meters west, in 10 seconds. What total distance does it travel, and what is its average speed?

ANSWER _____

- 6** Cart A travels 36 meters in 9 seconds. Cart B travels 35 meters in 5 seconds. Which cart has the greater average speed? Show both speeds.

ANSWER _____

APPLY IT Show your work

- 1** A robotics club tests the same robot on three short runs. Use the table to find the robot's average speed for all three runs together.

ROBOT TEST RUNS

Run	Distance (m)	Time (s)
1	14	2
2	21	3
3	35	5

ANSWER _____

- 2** At a skate park, Jay records a 140-meter lap in 20 seconds for a video. What is Jay's average speed? At that same speed, how long would 3 laps take?

WORK SPACE

ANSWER _____

CHALLENGE One step up

The table records a delivery bot's motion. Find its average speed for the whole trip. Then explain how the table shows that the bot stopped for part of the trip.

DELIVERY BOT MOTION

Time (s)	Distance from Start (m)
0	0
2	2
5	2
9	8

WORK SPACE AND ANSWER

PART 1 • PRACTICE

#	PROBLEM	ANSWER
1	A robot travels 45 meters in 9 seconds. What is its average speed?	5 m/s
2	A runner travels 120 meters in 30 seconds. What is the runner's average speed?	4 m/s
3	A cyclist travels $\frac{2}{3}$ kilometer in $\frac{1}{3}$ hour. What is the cyclist's average speed?	2 km/h
4	A remote-control car travels 84 meters in 12 seconds. What is its average speed?	7 m/s
5	A toy car travels 15 meters east, then 15 meters west, in 10 seconds. What total distance does it travel, and what is its average speed?	30 m; 3 m/s
6	Cart A travels 36 meters in 9 seconds. Cart B travels 35 meters in 5 seconds. Which cart has the greater average speed? Show both speeds.	Cart B; Cart A = 4 m/s and Cart B = 7 m/s

PART 2 • APPLY IT

- 7 m/s** Add the distances: $14 + 21 + 35 = 70$ m. Add the times: $2 + 3 + 5 = 10$ s, then divide 70 by 10.
- 7 m/s; 60 s** Divide 140 m by 20 s to get 7 m/s. Three laps are 420 m, and $420 / 7 = 60$ s.

CHALLENGE

8/9 m/s; The distance stays at 2 m from 2 s to 5 s, so the bot was stopped during that time.

Accept equivalent forms of 1.5 m/s, such as $\frac{3}{2}$ m/s. For the challenge, accept a correct explanation that identifies no change in distance from 2 seconds to 5 seconds.