

Distance and Time at the Finish Line!

When we talk about speed, we often use words like “really fast” or “kind of slow”. But many times we need to be able to measure the actual speed of a moving object – we need to figure out the speed using real numbers for distance and time. Let’s try it!

Materials:

Meter stick or metric tape measure
Masking tape or sidewalk chalk
Clock or watch with a second hand
Calculator

Procedures:

You might want to do this set of activities outside.

1. On a piece of paper, make a chart like the one shown. Use your masking tape or chalk to mark a starting line. Then use your meter stick or measuring tape to measure 10 meters and mark a finish line. This is your “Speedway”.
2. Get ready to time your partner going at a slow speed, a medium speed, and a fast speed.
3. Have your partner walk slowly from the starting line to the finish line while you time how long it takes them to go the full 10 meters.
4. Record the number of seconds it took your partner to go the 10 meters in the chart next to “Time” and under “Slow”. Use your calculator to figure out your partner’s speed in meters per second. You will need to divide the distance traveled (10 meters) by the time your partner took to go that distance.

EXAMPLE: $\text{SPEED} = \text{DISTANCE} \div \text{TIME}$

Suppose your partner traveled 10 meters in 5 seconds. The speed would be $10 \text{ meters} \div 5 \text{ seconds} = 2 \text{ meters per second}$.

5. Repeat steps 2 and 3 but have your partner move at a medium speed. Time your partner and record the time and then calculate and record the speed in the chart. Then have your partner go at a fast speed. Again, time your partner and calculate and record the speed in the chart.
6. Now you do the slow, medium, and fast walking and let your partner record the time and calculate and record your walking speeds.

Think about this ...

In the beginning of a race, it always takes some time to really get going. If you could run 100 meters in 10 seconds (which, for men, would be almost a world record), your average speed over the whole race is 10 meters per second because $100 \text{ meters} \div 10 \text{ seconds} = 10 \text{ meters/second}$. But in the beginning of the race, you were just getting started so you probably were running slower than 10 meters per second. Near the end of the race, when you were running your fastest, you may have been going even faster than 10 meters per second. Why do you think they call 10 meters per second your “average” speed during the race?

Where's the Chemistry?

Let’s say you wanted to go a long distance like eight miles and you wanted to get there faster than if you just walked the whole way. You might decide to walk part of the way and run part of the way. If you timed how long it took to go the whole 8 miles and it took 2 hours, your speed would be 4 miles per hour ($8 \text{ miles} \div 2 \text{ hours} = 4 \text{ miles/hour}$). But you know that when you were running your speed was faster than when you were walking. You might wonder why your speed is said to be just one thing: 4 miles per hour. This is really your average speed over the entire distance for the entire time. Although you went a bit faster or slower at different times along the way, your overall speed for the trip as a whole averaged out to be 4 miles per hour.



The American Chemical Society develops materials for elementary school age children to spark their interest in science and teach developmentally appropriate chemistry concepts. The *Activities for Children* collection includes hands-on activities, articles, puzzles, and games on topics related to children's everyday experiences.

The collection can be used to supplement the science curriculum, celebrate National Chemistry Week, develop Chemists Celebrate Earth Day events, invite children to give science a try at a large event, or to explore just for fun at home.

Find more activities, articles, puzzles and games at www.acs.org/kids.

Safety Tips

This activity is intended for elementary school children under the direct supervision of an adult. The American Chemical Society cannot be responsible for any accidents or injuries that may result from conducting the activities without proper supervision, from not specifically following directions, or from ignoring the cautions contained in the text.

Always:

- Work with an adult.
- Read and follow all directions for the activity.
- Read all warning labels on all materials being used.
- Wear eye protection.
- Follow safety warnings or precautions, such as wearing gloves or tying back long hair.
- Use all materials carefully, following the directions given.
- Be sure to clean up and dispose of materials properly when you are finished with an activity.
- Wash your hands well after every activity.

Never eat or drink while conducting an experiment, and be careful to keep all of the materials used away from your mouth, nose, and eyes!

Never experiment on your own!

For more detailed information on safety go to www.acs.org/education and click on "Safety Guidelines".

