QUICK LAB ⬛⬛⬛ **Inquiry**

Create a Distance-Time Graph

In this lab, you will create a distance-time graph to show the speed of an object, or its distance traveled over time. Your teacher will give you an index card with a written scenario; you'll turn that scenario into a distance-time graph. When you finish, you'll swap your graph with a classmate, and analyze the graph they created.

PROCEDURE

1 Your teacher will give you an index card with a scenario on it. Read the card carefully.

2 Use the graph paper to create a distance-time graph to show how the object(s) in your scenario move(s) over time. Remember that the y-axis represents the distance traveled by an object, and the x-axis represents time. Include the appropriate units on your graph.

3 When you have finished your graph, find a partner who graphed a different scenario. Swap distance-time graphs with your partner.

4 Study your partner's distance-time graph. Use a pencil of one color to circle the point on the graph where the object had the greatest speed. Use a pencil of a different color to circle a point on the graph where the object had the least speed.

5 Answer the following questions while looking at your partner's distance-time graph. At what point in the graph did the object have the most speed? What was the speed?

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OBJECTIVES

- Create a distance-time graph.
- Understand that the slope of the line on a distance-time graph directly relates to speed.

MATERIALS

For each student
- index card (with pre-prepared distance-time scenario)
- paper, graphing
- pencils, colored (2)

Quick Lab continued

6 At what point in the graph did the object have the least speed? What was the speed?

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7 What does a steep slope on a distance-time graph indicate?

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8 How would you describe the motion of an object when there is a flat line on the distance-time graph?

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Sample Scenario #1: A runner is racing in a 10-kilometer (km) race. The runner travels the first 2 km in 12 minutes (min). Then the runner stops for 2 min to have a drink of water. He begins running again, and covers the next kilometer in 5 min. The following 3 km have the same pace: 6 minutes per kilometer (min/km). The runner again pauses to tie his shoe; he is paused for 1.5 min. He has 4 remaining km to go. When he starts running again, he runs 1 km in 5 min, but the remaining 3 km are each 1 min slower than the one before (6 min, 7 min, and 8 min, respectively). Create a distance-time graph to show the runner's speed.

Sample Scenario #2: A bus driver is driving his bus on its typical morning route, which is 12 km long. The bus driver leaves the station and travels 2 km to his first stop; it takes him 3 min to get there, and he has to stop halfway to his first stop to pause for 30 seconds at a stoplight. He pauses at his first stop for 1 min to let people on the bus. He then drives 3 km in 3 min, with no stops. He stops at the second bus stop for 1.5 min to let people on and off, then drives 2 km in 2 min, before stopping at a red light for 30 seconds. The bus driver then drives 1 km in 2 min, and stops at the third stop. It takes 2 min for people to get on and off the bus. The driver then takes the interstate straight to the fourth stop, 4 km away. He travels the 4 km in 2 min, with no pauses. Finally, he stops at the fourth bus stop and everybody gets off the bus. Create a distance-time graph to show the speed of the bus.

Sample Scenario #3: A child is riding her bike to school. It's a 4 km journey, and it takes her a total of 18 min. She leaves the house and rides 1 km in 3 min, with no stops. She then pauses at a red light for 1 min. When it turns green, she resumes riding her bike. The road slopes downhill for a bit, and she covers 1 km in 2 min. She stops at the bottom of the hill for 4 min to visit with a friend who is walking to school. For a while, she rides her bike at the same speed as her walking friend. Together, they cover 1 km in 7 min. The last kilometer is also downhill, so she rides ahead of her friend and zips down the hill to school. She covers the last kilometer in 1 min, and arrives at the school. Create a distance-time graph to show her speed.

Sample Scenario #4: A mother goes on a walk with her young child. They leave the house and walk 25 meters (m) in 2 min until the child is distracted by a flower and they stop for 1 min. They resume walking for 3 min and cover another 25 m in this time. Then, they start running. They run 50 m in 1 min. They stop at the neighborhood playground for 10 min before they start walking back home. They walk 50 m in 4 min, then stop for 3 min because the child falls down. They then walk quickly back home, covering 50 m in 2 min, stopping only once they have reached their house. Create a distance-time graph to show the speed of the mother and child.