

Rover Motion Trace

Use measured data to build and interpret a distance-time graph.

7.7.C “measure, record, and interpret an object's motion using distance-time graphs; and”

NAME _____ DATE _____

1 READ AND MARK _____ Read it twice

YOUR JOB Underline phrases that tell what belongs on a distance-time graph. Circle statements that explain what a line shape can show about an object's motion.

A Rover's Test Run

① Scientists measure how far an object is from its starting point at regular times. A rover moved along a straight hallway, and its distance was recorded every two seconds. The table shows its measurements. To model its motion, assume it moved steadily toward or away from the start, or stayed still, between each pair of measurements. The graph uses this assumption; measurements alone could miss a trip out and back.

ROVER DISTANCE MEASUREMENTS

Time (seconds)	Distance from starting point (meters)
0	0
2	4
4	12
6	12
8	20

② On a distance-time graph, time goes on the horizontal axis and distance from the starting point goes on the vertical axis. Label each axis with units, such as seconds and meters. Plot each time and distance pair as one point. Connect points in time order. A rising line shows increasing distance. A flat line shows no change in distance.

- ③ Line steepness shows how quickly distance changes. With the same axes, a steeper line means greater speed in this model. For each straight segment, divide the size of the distance change by elapsed time. Speed is never negative. A downward line shows a return toward the start: from 10 m to 6 m in 2 s, speed is $(10 - 6) / 2 = 2$ m/s. Read the scales before comparing slopes.

2 ANSWER WITH EVIDENCE _____ Use the passage

1 What point would you plot for the rover's measurement at 4 seconds? Write the time first, then the distance.

2 During which time interval did the rover's distance from its starting point stay the same?

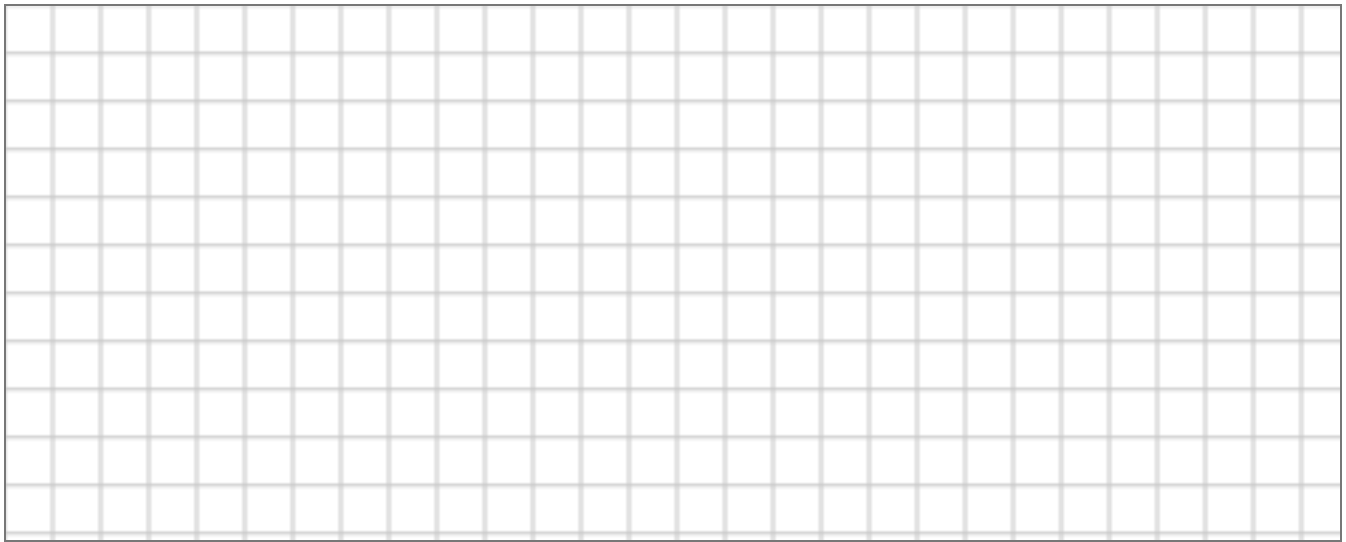
3 How far did the rover move from 2 seconds to 4 seconds? Show the change in distance.

4 If you graph the rover's data, what kind of line segment connects the points at 4 seconds and 6 seconds? What does it mean?

3 YOUR TURN

Your own words

Measure and graph real motion first. Teacher supplies a toy car, timer, meter tape and a clear straight 2 m tabletop or floor route; move the car slowly by hand, never run or ride it. Work with a mover, timer and recorder (teacher may take a role). Mark the start as 0 m. At the 0 s cue start moving away; at 2 s stop and hold. Measure and record the actual distance from the start in m. Remain there through the 4 s cue, record the same observed position, then move farther away. At 6 s stop, measure and record that position. Stay within the marked route. On extra paper record the four time/distance pairs (0, 2, 4, 6 s). Use the grid to label time in s horizontally and distance in m vertically, choose equal scale intervals, plot your measured points and connect in time order. Explain the flat segment using your recorded values and actual pause. Reading positions while held avoids trying to read a moving car. Then on extra paper complete this separate hypothetical model task: Create your own distance-time graph for an object that moves, pauses, and then moves again. Label both axes with units, plot and connect at least four points, include one flat segment, and write one sentence explaining what the flat segment shows.



PART 1 • READ AND MARK

Underline phrases that tell what belongs on a distance-time graph. Circle statements that explain what a line shape can show about an object's motion. Accept any marking that follows this job and points at the right text.

PART 2 • ANSWERS

#	QUESTION	ANSWER
1	What point would you plot for the rover's measurement at 4 seconds? Write the time first, then the distance.	(4 seconds, 12 meters)
2	During which time interval did the rover's distance from its starting point stay the same?	From 4 seconds to 6 seconds.
3	How far did the rover move from 2 seconds to 4 seconds? Show the change in distance.	12 m – 4 m = 8 m
4	If you graph the rover's data, what kind of line segment connects the points at 4 seconds and 6 seconds? What does it mean?	A flat, horizontal segment. It represents a stop in our model: the rover stays 12 m from the start. The two measurements alone cannot rule out motion away and back between them.

PART 3 • YOUR TURN (SAMPLE ANSWER)

Hypothetical model sample (not claimed experimental data): Label the horizontal axis Time (seconds) and vertical axis Distance from start (meters). Plot (0, 0), (2, 4), (4, 4), (6, 10); the 2–4 s flat segment models a pause. Actual tabletop values will be different and must come from measurement.

Accept equivalent coordinate notation and clear explanations based on the table. For Your Turn, accept any correctly labeled distance-time graph with at least four connected points, a flat segment, and a matching explanation. For the real task, observe supported timed movement and distance measurement; check all four actual records, appropriate scales, units and plotted pairs matching those records. Positions at 2 and 4 s should match because the car is held still; if it moved accidentally, record that honestly and repeat the protocol. A 6 s distance farther from start gives the second rising segment. Do not substitute the hypothetical sample for measured data. Joined straight segments model motion between measurements, not proof of a perfectly constant speed; the observed hold separately confirms this pause. Teacher assigns accessible roles and checks a clear route and slow hand movement.