

Measuring Constant Velocity

Teacher's Notes

Main Topic	Motion
Subtopic	Velocity
Learning Level	Middle/High
Technology Level	Low
Activity Type	Student

Description: Students mark the distance traveled by a car during set time intervals and then calculate its velocity.
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Required Equipment	Constant Velocity Car, Measuring Tape, Stopwatch, Chalk, Graph paper
Optional Equipment	Long roll of paper

Educational Objectives

- Graph a moving car's position vs. time. Determine the car's velocity from the slope of the line.

Key Question

- What characterizes constant velocity?

Concept Overview

A moving object experiences a change in its position in a certain time. For constant velocity, the change in position over each equivalent time period is constant.

Students will graph the position vs. time of a moving car. The graph will be a straight line whose slope is the car's velocity.

Lab Tips

Lab groups should consist of a Car Operator, a Marker, and a Timer. Instruct the Car Operator to start the car a short distance before the group's starting point. The Timer should begin timing when the car crosses the starting line, and clearly shout "Mark" every two seconds.

Because of the difficulty in making absolutely accurate marks, groups should make as many marks as space allows.

This is an ideal outdoor lab.

Measuring Constant Velocity

Name: _____

Class: _____

Pre-Lab Questions:

1. Define *velocity* using words.
2. Define *velocity* using an equation.
3. Describe how to find the *slope* of a line.

Goal:

To analyze the motion of the car using a position vs. time graph.

Materials:

Battery-operated Car
Measuring Tape
Stopwatch
Chalk
Graph paper

Procedure:

1. Within your group, appoint a Car Operator, a Timer, and a Marker.
2. Use chalk to mark a starting point on the ground.
3. Turn the car on and place it on the ground a few feet ahead of the starting line.
4. When the car crosses the starting line, the Timer starts the stopwatch.
5. Every 2 seconds, the Timer shouts "Mark!" to the Marker.
6. The Marker makes a chalk mark at the position of the car.
7. Make as many marks as you can, up to 10, in the space you have.
8. Turn off the car.
9. Measure and record (on the next page) the distances between the marks.

Measuring Constant Velocity

Name: _____

Class: _____

Mark	Time (s)	Distance between marks (cm)	Position (distance from Start) (cm)
Start	0	0	0
1	2		
2	4		
3	6		
4	8		
5	10		
6	12		
7	14		
8	16		
9	18		
10	20		

10. Plot each data point on a graph, with time as the independent variable (on the x-axis) and position as the dependent variable (on the y-axis).

11. Do the data points seem to fall in a straight line? _____

12. Draw a best-fit straight line through the data points.

13. Calculate the slope of the line. Be sure to include units in your calculation.

14. What physical quantity is represented by the slope of this line? _____

15. Is the velocity of the car constant or not constant? _____

16. How would you recognize a graph of constant velocity?

17. Attach your graph to this page.

