Investigate the Possibilities

Elementary Physical Science

Forces & Motion

From High-speed Jets to Wind-up Toys

Student Journal

Tom DeRosa
Carolyn Reeves

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Student's Manual

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First Printing: February 2009

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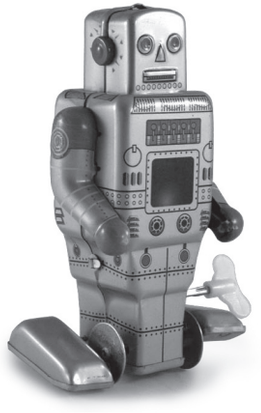

Master Books
P.O. Box 726
Green Forest, AR 72638

Printed in the United States of America

Cover Design by Diana Bogardus and Terry White
Interior Design by Terry White

ISBN 10: 0-89051-540-9
ISBN 13: 978-0-89051-540-2
Library of Congress number: 2008943697

All Scripture references are New International Version unless otherwise noted.

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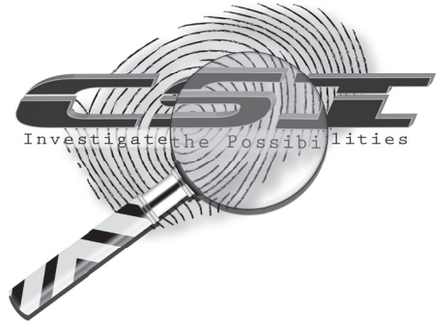


Table of Contents

Note to the Student

The Student Manual provides a place for you to record information about your ideas, the investigations, the projects, and answers to the questions. Record the dates you complete each activity and each "Dig Deeper" project or other project. Use the space to the right of the titles of the investigations or projects in the Table of Contents to keep up with when you complete your work. There is a possibility of 61 points in all. Try to earn at least one point each week. The more stars, the more difficult the project.

Write a little about each project you choose from Dig Deeper, but you will probably need more space to complete many of these projects. When you need to, put the projects in an additional folder. Your teacher will tell you how many projects you are required to do, but feel free to do more if you find an area that you find especially interesting to you. The reason for the large number of projects is to give you choices. This allows you to dig deeper about those areas you are most interested in pursuing, as well as to find projects that best fit your individual learning styles.

For each investigation, begin with "Thinking About." After you read this section, try to recall any experiences you have had related to the topic. Make a brief note about your experiences or just write something you would like to know.

Use the Student Manual to record all observations and data obtained from each activity. Record the answers to "What Have You Learned."

"The Stumpers Corner" is your time to ask the questions. Write two questions related to each lesson that are hard enough to stump someone. Write your questions along with the correct answer. Or you may prefer to write two questions that you don't know and would like to know more about.

Activity 1

Investigation #1

Wind-up Walking Toys
Speed, Time, and Distance

Thinking About

Date:

The Activity: Procedure and Observations

1. Measure the line to the right by putting the 0 mark of the ruler at the beginning of the line. The correct answer is found by writing the last whole number, a decimal, and the number of short marks following the number. The abbreviation cm is written after these numbers. Draw two or three lines for your partner to measure. Check these answers with your ruler.

2. Lay the ruler out in front of you. Wind up the walking toy next to the ruler and measure how far it walks in 10 seconds. Record. Calculate its average speed by dividing the total distance it walked in centimeters by 10 seconds. Show your calculations. Write your number answer followed by cm/sec. This is read "centimeters per second."

   Distance_____ Time 10 seconds

   Average speed _____

3. Measure how long it takes for the wind-up toy to walk 1 meter. Record. If it doesn't make it that far, record how far it walked and the time it walked.

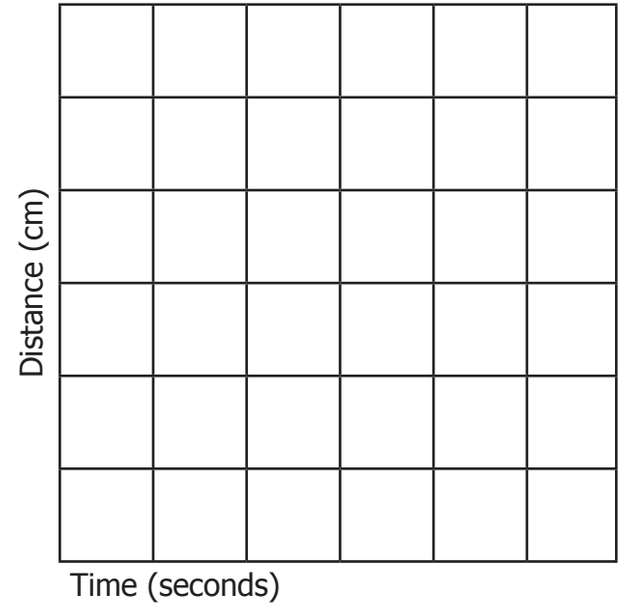
   Distance _____

   Time_____

   Calculate its average speed by dividing the distance it walked by the time. Show your calculations. The speed will be in m/s if it walks as far as a meter. If you measure the distance in cm, your answer will be in cm/s. Average speed_____

4. Record the distance the toy walked in five-second intervals. Use these numbers to make the graph.

GRAPH OF DISTANCE VERSUS TIME FOR THE WIND-UP TOY



5 seconds	=	_____ centimeters
10 seconds	=	_____ centimeters
15 seconds	=	_____ centimeters
20 seconds	=	_____ centimeters
25 seconds	=	_____ centimeters
30 seconds	=	_____ centimeters

5. Graph the results of distance versus time.

   Does your graph make a straight line or a curved line?

   Try to think of a reason for this.

6. Did your walking toy start out fast and then get slower until it stopped, or did it keep walking at the same speed all the way?

_____

7. Race your walking toy with someone else's.
Which one was the fastest?

_____

Dig Deeper

What Did You Learn ?

1. What two things do you need to know in order to calculate speed?
_____ and _____

2. What is the formula for calculating speed?

3. How would a line graph of the speed of a runner look when the runner goes slower and slower? _____ Or faster and faster? _____ Or maintains the same speed? _____

4. What are three ways in which motion can be described?
_____, _____, and _____

5. If you are riding in a car that is traveling at 60 miles per hour and you travel for three hours, how far have you traveled? _____

6. Suppose an object is traveling at a supersonic speed of 800 m/s. Write this speed using all words and no symbols.

7. Calculate the speed of an animal that ran 50 meters in 10 seconds. Write the number answer with the correct unit symbols.
Speed_____

8. What is the source of energy for the walking toys you used for this activity?

Stumper's Corner

1. _____
_____

2. _____
_____