Sports Science

40 Goal-Scoring, High-Flying, Medal-Winning Experiments for Kids

Jim Wiese

Illustrations by Ed Shems

John Wiley & Sons, Inc.

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For Barbara

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Published by John Wiley & Sons, Inc., New York
Published simultaneously in Canada

Design and Production by Navta Associates, Inc.

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Library of Congress Cataloging-in-Publication Data:

Wiese, Jim, date.
Sports science : 40 goal-scoring, high-flying, medal-winning experiments for kids / by Jim Wiese.
p. cm.
Includes index.
ISBN 0-471-44258-5 (pbk. : acid-free paper)
1. Physics—Experiments. 2. Sports—Experiments. I. Title.
QC26 .W54 2002
530'.078—dc21 2002003461

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

Acknowledgments

I have always been interested in sports. I was not born a natural athlete but found that through hard work and practice I could improve in the sports I loved best—basketball, golf, and running. When I later entered college, I took several classes about the science of sports and learned that by applying scientific principles to my training, I could improve my skills even more. I even pursued graduate degrees in exercise physiology, wanting to do research for myself. Much of what you'll find in this book began in my own life, either as something I learned in one of my classes or in an article I read, or as something I wanted to study for myself. I hope that the activities in this book will get others to think about sports in a different way.

A lot of people have shared their interest in sports and sports science with me. I would especially like to thank Charley Sarver at Biola University, Dr. Ford Hess at Humboldt State Univerity, and Dr. Peter Lindsay at the University of Alberta for their dedication to sports and sports science, and for their ability to inspire others.

Again, I would like to thank the team of people at John Wiley who worked to make this book a reality. I would especially like to acknowledge the work of my editor, Kate Bradford. Her professionalism in every aspect of the publishing process always brings out the best in my writing.

Contents

Introduction

Have you ever watched a baseball game and asked yourself how the pitcher was able to make the ball curve? Or have you wondered how a figure skater can spin on one foot in such a way that she turns faster and faster? Or have you ever tried to figure out how to make your skateboard jump up off the ground? If you've ever thought about these and other questions, *Sports Science* is the place to find the answers. *Sports Science* lets you investigate the science behind many different sports, from baseball to biking to snowboarding to throwing a Frisbee. So get ready for over 40 exciting activities that will let you learn more about yourself and the sports you love.

How to Use This Book

This book starts with a chapter called Getting in the Zone, which talks about the most important part of your body in sports (your brain!). Then the rest of the chapters describe the science behind sports that use balls, blades, skis, and boards, rackets, wheels, and other things. In each chapter there are several projects on that topic. Each project includes a list of materials, a step-by-step procedure to follow, and an explanation of why the project turned out the way it did. Words in **bold** type are defined in the glossary at the back of the book. You'll be able to find most of the materials you need for these projects around the house or at your neighborhood hardware or grocery store. Some of the projects have a section called More Fun Stuff to Do that lets you try different variations on the original activity. Sections called Sports Science in Action give examples of how science is used by some well-known and some not-so-well-known sports figures.

Being a Good Scientist

- Read through the instructions once completely before you start the activity or experiment.
- Collect all the equipment you'll need before you start the activity or experiment.
- Keep a notebook in which you write down what you do in your experiment or project and what happens.

- Follow the instructions carefully. *Do not attempt to do by yourself any steps that require the help of an adult.*
- If your experiment or project does not work properly the first time, try again or try doing it in a slightly different way. In real life, experiments don't always work out perfectly the first time.
- Always have an open mind that asks questions and looks for answers. The basis of good science is asking good questions and finding the best answers.

Increasing Your Understanding

- Make small changes in the design of the equipment or project to see if the results stay the same. Change only one thing at a time so you can tell which change caused a particular result.
- Make up an experiment or activity to test your own ideas about how things work.
- Look at the things around you for examples of the scientific principles that you have learned.
- Don't worry if at first you don't understand the things around you. There are always new things to discover. Remember that many of the most famous discoveries were made by accident.

Using This Book to Do a Science Fair Project

Many of the activities in this book can serve as the starting point for a science fair project. After doing the experiment as it is written in the book, what questions come to mind? Some possible projects are suggested in the section of the activities called More Fun Stuff to Do.

To do a science fair project, you will have to follow the **scientific method.** When following the scientific method, you begin with a **hypothesis** (an educated guess about the results of an experiment you are going to perform), test it with an experiment, analyze the results, and draw a conclusion. For example, if you enjoyed the Think Fast activity, you may want to find out if boys or girls have a faster reaction time. A hypothesis for this experiment could be that girls have a faster reaction time than boys. Next you will have to devise an experiment to test your hypothesis. In the Think Fast example, you might test the reaction time for several of your friends. Make sure you test at least 5

other boys and 5 other girls. The more people you test, the more reliable your data is and the more accurate your conclusion. Next you will analyze the data you recorded. In the Think Fast example, you could create a table showing the sex of each person and his or her reaction time. You could also find the average reaction time for each group and compare those results. To find the average reaction time, add the reaction times in each group, then divide by the number of people in that group. Finally, you should come up with a conclusion that shows how your results prove or disprove your hypothesis.

A Word of Warning

Some science experiments can be dangerous. *Ask an adult to help you with experiments that call for adult help, such as those that involve matches, knives, or other sharp instruments.* Don't forget to ask your parents' permission to use household items, and put away your equipment and clean up your work area when you have finished experimenting. Good scientists are careful and avoid accidents.

1 Getting in the Zone

Starting Right