
PATHWAYS · IN · SCIENCE · III
A COURSE FOR ELEMENTARY SCHOOLS

Our Wide, Wide World

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Preface

Pathways in Science is designed to meet the demands of the modern tendency to introduce science as an essential part of the elementary-school curriculum by presenting a course of carefully graded problems in science for Grades I to VI. It presents a well-balanced program, which develops elementary meanings derived from the major scientific fields — astronomy, biology, chemistry, geology, and physics.

The content of this series is the result of a study of science in all grades of the elementary school, including extensive try-outs. Based originally upon the "Horace Mann Course of Study in Elementary Science"¹ and upon "Certain Techniques Used in Developing a Course of Study in Science,"² it has involved searching analyses of several thousand children's questions, of educated laymen's needs in science, of courses of study, and of worth-while scientific concepts.

¹ Horace Mann Course of Study in Elementary Science, Bureau of Publications, Teachers College, Columbia University, New York City, 1927.

² Certain Techniques Used in Developing a Course of Study in Science for the Horace Mann Elementary School, Bureau of Publications, Teachers College, Columbia University, New York City, 1927.

The volumes are organized about those principles and concepts of science which have received a high evaluation in these research studies by developing the meanings which are commonly found in the challenging problems of life. In this way the child comes to an understanding of those principles which are so essential to the interpretation of the natural phenomena of his environment. It is hoped that by the use of these books the cultural values of science will be realized more widely.

The series definitely conforms to the recommendations and the spirit of the Thirty-first Yearbook, Part I of the National Society for the Study of Education, and the requirements of recent state and city courses of study in elementary science.

Each volume of the series has been organized about a number of units. These units present a series of problems, each of which offers a real challenge to children. Sufficient information is given in the text to lead to a satisfactory solution of the problem and to an understanding of the essential meanings that are involved in the presentation.

Each unit has a page of motivating material which gives the preview to the unit and serves also to tie up unit with unit. Exercises in the form of

Things to Think About or *Things to Do* form a basis of essential activities.

The units have been so arranged that the essential meanings developed in "Our Wide, Wide World" will be utilized in later volumes of the series. Thus proper sequence is developed with an avoidance of duplication and overlapping.

A manual for the teacher accompanies "Our Wide, Wide World," giving additional information and activities. The manual will prove to be especially helpful to those teachers who are giving instruction in science for the first time. By making use of the manual, which includes a carefully prepared bibliography for teachers, it is possible for classroom teachers to secure considerable training for the teaching of elementary science while conducting the course.

Teachers should not expect the children to remember all the details given treatment in this volume. A considerable part of the information in this text is designed as context material which presents and develops an understanding of the essential meanings in terms of the child's own experiences and vocabulary. The accompanying teacher's manual lists the essential meanings and important concepts in a convenient and easily accessible way.

The vocabulary has been checked throughout by the use of the Buckingham-Dolch Word List. Whenever over-grade words are needed for the enrichment of the science vocabulary of the children, they are carefully explained in the text.

Striking features of this volume are photographs of children in the process of scientific discovery and full-color inserts by Sears Gallagher, Schuyler Mathews, Forrest Orr, and Gunmar Widforss. In this book there are also many wash drawings of plants and animals and many photographs which serve to illustrate the meaning developed in the text.

Another feature is the simple index, which permits the children to use this volume as a source book of scientific information in connection with their activities.

The authors are indebted especially to Dr. B. R. Buckingham for the encouragement and advice that he has given in this undertaking.

G. S. C.

S. E. B.

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OUR WIDE, WIDE WORLD

Did you ever think that you should like to be an animal or a plant instead of a boy or a girl?

If you were an animal, do you think that you should know how to keep warm in the winter time or how to find your food? Should you be able to keep yourself safe from animal enemies? Should you know how to care for your animal babies?

If you were a plant, could you make your own food? Do you think that you should like to live for hundreds of years as some plants do?

Or would you rather be a boy or a girl who can look, listen, and find out about these things? A boy or a girl can find out many other interesting things which are happening in this wide, wide world.

Why is the earth warm in summer and cold in winter?

Why is the earth light in the daytime and dark at night?

Where is the sun?

What are the stars?

Is air everywhere?

Can anyone live without water?

The stories in this book tell about all these things. The pictures tell some things which the stories do not tell. What a lot of things a boy or a girl can learn about our wide, wide world!

UNIT I

The Story of the Sky

THE STORY OF THE SKY

Did you ever wonder what the earth would be like without the sun?

Would the moon and the stars give us enough light to live by?

Could we possibly get along without the sun?

Tell all the things you can think of which show that we need the sun every minute of every day.



A. THE SUN, THE STARS, AND THE MOON

How far away is the sun?

How large is the sun?

What is the sun made of?

What are the stars?

What is the moon like?

These are questions which children have asked ever since they have asked about anything. Have you ever found out the answers to them? Grown-ups asked these questions for thousands of years before they found answers which came very near the truth.

Every day men who know a great deal about the sun and the moon and the stars are learning wonderful things in answer to these questions. Many of these things are found in "The Story of the Sky."

1. How Far Away is the Sun?

The earth is ninety-three millions of miles away from the sun. Miles, miles, miles, miles, miles, and miles are between the earth and the sun! Can you imagine how far such a great number of miles must be?

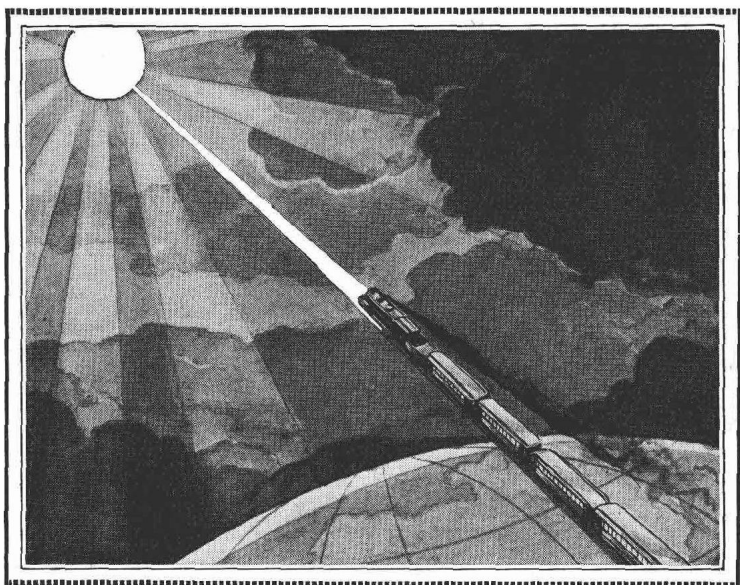
Is it farther than from your house to the North Pole? Is it farther than from your house across the ocean? Is it farther than a trip around the earth?

We can answer all these questions at once. The sun is many times farther away from us than the North Pole and the other side of the ocean and a trip around the earth put together.

Imagine flying to the sun! Tell all the reasons you can why a person could not really and truly fly to the sun.

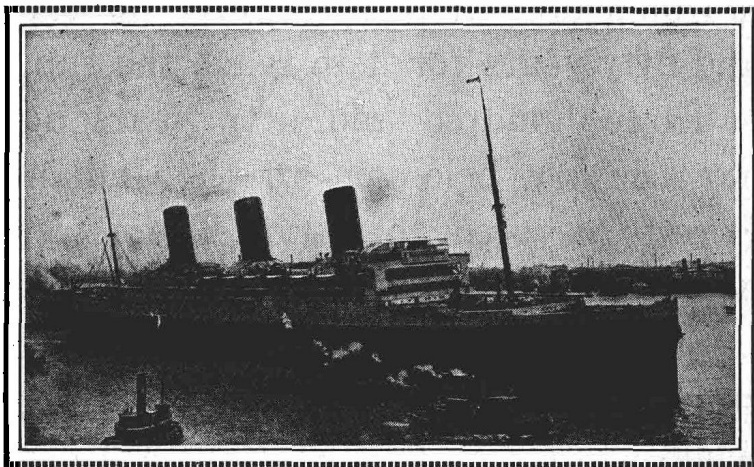
Perhaps each boy and girl said, "You can't fly to the sun because it is too far away." That is one very important reason.

Pretend that a make-believe aviator is making a trip to the sun in a make-believe airplane. Pretend that he travels at the speed at which most aviators travel on long non-stop flights.



How long do you think it would take this train to reach the sun?

He could make no stops for rest nor for gas and oil, because there would be no place for him to stop. At that racing speed it would take him eighty years to fly to the sun. Do you know anyone who is eighty years old? How does he look? How does he walk? Our make-believe aviator would be older



Do boats travel as fast as trains? How long do you think it would take this big boat to reach the sun? Read and find out

than that by the time he reached the sun. What a long, long ride!

If tracks could be laid on a sunbeam, it would take our very fastest trains nearly two hundred years to reach the sun. Your grandmother's grandmother had not been born two hundred years ago.

This is one of our fastest ocean liners. If this boat could travel through space,

it would take more than three hundred and fifty years for it to reach the sun.

Three hundred and fifty years ago our country belonged to the Indians. Forests covered the land. There were no cities, no railroads, not even farms.

Suppose that someone could have started to go to the sun on this boat when white men first came to America. After traveling for all those years he would still have many miles to go.

What a long, long journey! Did you think that the sun was so far away from us as that?



Things to Think About



1. Alice Smith went to visit her grandmother, who lives ninety-three miles from Alice's home. Alice was on the train nearly two hours. If she had taken a million trips to her grandmother's, she would have traveled as far as from the earth to the sun. It is a long, long way to the sun.

2. Marie Bracco has just come to our school from Italy. She traveled nearly four thousand miles to get to this country. It took her more than a week to get here. But just think of this! The sunbeams which come into your window have traveled more than twenty thousand times as far as Marie traveled, yet it took them less than ten minutes to get here!

2. How Large is the Sun?

How large do you think the sun is? Is it as small as it looks? Is it bigger than a house?

If you look at the sun through a dark glass, you see that it looks like a big ball of bright light. Some people say that it looks about the size of a man's head. Other people say that it seems about the size of a pumpkin. Let us find out how big it really is.

We all know that the sun looks so small because it is millions and millions



This picture shows only a tiny part of our earth.
The sun is larger than thousands of earths

of miles away. How large do you suppose the sun really is? Is it larger than your town? Do you think it is larger than our whole country?

This big bright light which we call the sun is much larger than the whole earth. It is many, many, many times larger than the earth.

The earth is a tiny ball beside the sun. If some strong giant could roll together