

NATIONAL SCIENCE EDUCATION STANDARDS

A. Science as Inquiry

Abilities necessary to do scientific inquiry
Understanding about scientific inquiry

D. Science and Technology

K–4

Understanding about science and technology

- o People have always had questions about their world. Science is one way of answering questions and explaining the natural world.
- o People have always had problems and invented tools and techniques to solve problems.
- o Women and men of all ages, backgrounds, and groups engage in a variety of scientific and technical work.
- o Tools help scientists make better observations, measurements, and equipment for investigations. They help scientists see, measure, and do things that they could not otherwise see, measure, and do.

5–8

Understanding about science and technology

- o Science and technology are reciprocal. Science helps drive technology as it addresses questions that demand more sophisticated instruments and provides principles for better instrumentation and technique. Technology is essential to science because it provides instruments and techniques that enable observations of objects and phenomena that are otherwise unobservable due to factors such as quantity, distance, location, size, and speed.

G. History and Nature of Science

K–4

Science as a human endeavor

- o Science and technology have been practiced by people for a long time.

© 2009 Creative Teaching Press Inc.

Written by Julia Wall

Publishing services by South Pacific Press

Designed by ThinkSpace Design

Art Director: Moonhee Pak

Editorial Director: Stacey Faulkner

Published in the United States of America by

Creative Teaching Press Inc.

P.O. Box 2723

Huntington Beach, CA 92647-0723

www.creativeteaching.com

All rights reserved. No part of this book may be reproduced in any form without the written permission of Creative Teaching Press Inc.

ISBN 978-1-59198-716-1

CTP 5745

Printed in the United States of America.



CONTENTS

How Big Are You? 3

Focusing Light 4

Microscopes 5

Telescopes 8

Measuring Big and Small
Objects 13

Communicating with
Aliens 22

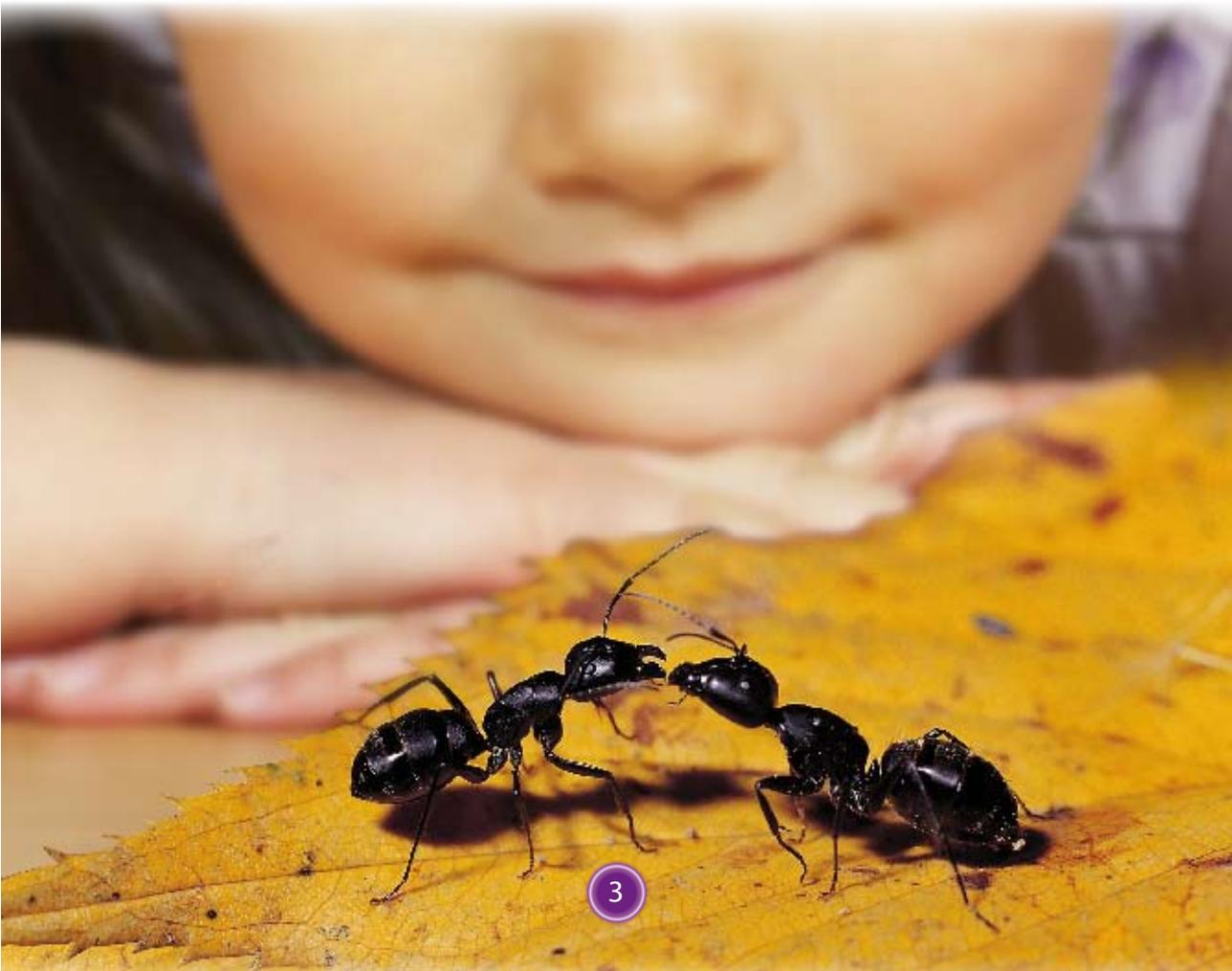
Glossary 24



HOW BIG ARE YOU?

Have you ever wondered how big you must look to an ant? What about how small you might look to a blue whale?

People have always been curious about things that are very small and very big. Scientists study **objects** and **structures** that are extremely small or big. With the help of technology, they measure things as tiny as atoms and as large as galaxies.



FOCUSING LIGHT



A lens in a telescope

Around two thousand years ago, people were learning how to make glass from different materials. At first, they used glass to make bottles and jars, but soon they were making windows, mirrors, and many other

things. About a thousand years ago, people discovered how to grind glass to make a lens. Lenses are pieces of curved glass that can be used to make things look bigger and closer. By the 1600s, scientists had worked out how to put several lenses into a tube to make a microscope or a telescope.

Microscopes are one way technology helps us to study things that are very small. They enable you see extremely small things. Telescopes allow you see big things that are very far away. They both work by **focusing** light.



Did you know that when lenses were first invented, people thought they looked like lentil beans? That's why they're called lenses!



Lentils

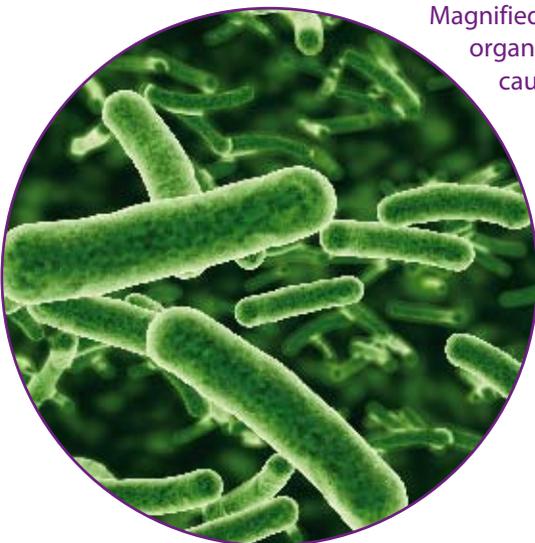
MICROSCOPES



When they were invented, microscopes let people look at common objects in a new way. Scientists looked through microscopes and saw objects **magnified** many times—they made small things look bigger.

A snowflake, as seen through a microscope

They also used microscopes to study things that no one had ever seen before. When scientists looked through microscopes, they discovered tiny things like bacteria. At first, they didn't know what these tiny things were!



Magnified bacteria—tiny organisms that can cause disease



One of the first microscopes—
invented about 400 years ago

MEASURING BIG AND SMALL OBJECTS

Thanks to technology, we have lots of ways to measure large and small objects.

Measuring Objects in Space

You've probably stood back-to-back with a friend or family member to see who's taller. Scientists sometimes measure objects in space by comparing the objects to things that are behind them.



An artist's impression of the sun seen from Quaoar

When scientists found a new planet-like object in 2002, they named it Quaoar (pronounced *Kwaa-waar*). Scientists **estimate** the size of Quaoar from the

amount of light it reflects and from the size of the objects behind it. From this, they estimate that Quaoar has a **diameter** of about 745 miles (about 1,199 kilometers). By comparison, Texas is 790 miles (1,271.38 kilometers) from north to south.



Quaoar is even further away from the earth than Pluto is! Its orbit is 3.7 billion miles (6 billion kilometers) from the sun.