



*Let's Do*

# SCIENCE

Primary 2

Textbook

**B**





## The 5E Model – Guided Inquiry

The Let's Do Science series is based on the Biological Sciences Curriculum Study (BSCS) 5E teaching and learning instructional model. The 5E model is centered on the idea that students understand science concepts best by using prior knowledge to pose questions and find answers through guided inquiry.

This hands-on approach, integrated with engineering and design skills, has students learn science by doing science. Teachers guide the learning process and are able to assess student performance by evaluating student explanations and the application of newly acquired knowledge and skills.

### Engage

The Engage phase of the 5E model provides students with the opportunity to demonstrate their prior knowledge and understanding of the topic or concept. Students are presented with an activity or question which serves to motivate and engage students as they begin the lesson. Teachers identify and correct any misconceptions and gather data from students which will guide informed teaching and learning.

Essential to stimulating and engaging students is the use of mixed media such as colorful photos, illustrations and diagrams found throughout the textbooks and activity books. Let's Do Science also includes extensive digital resources such as narrated videos, interactive lessons, virtual labs, slideshows and more.





## Explore

This phase encourages exploration of concepts and skills through hands-on activities and investigations. Students are encouraged to work together and apply various process skills while gaining concrete, shared learning experiences. These experiences provide a foundation for which students can refer to while building their knowledge of new concepts. This student-centered phase comes before formal explanations and definitions of the concept which are presented by the teacher.

## Explain

This phase follows the exploration phase and is more teacher-directed. Students are initially encouraged to draw on their learning experiences and demonstrate their understanding of the concept through explanations and discussion. After the students have had the opportunity to demonstrate their understanding of the concept, the teacher then introduces formal definitions and scientific explanations. The teacher also clarifies any misconceptions that may have emerged during the Explore phase.

## Elaborate

In the Elaborate phase, students refine and consolidate their acquired knowledge and skills. Opportunities are provided for students to further apply their knowledge and skills to new situations in order to broaden and deepen their understanding of the concept. Students may conduct additional investigations, share information and ideas, or apply their knowledge and skills to other disciplines.

## Evaluate

This final phase includes both formal and informal assessments. These can include concept maps, physical models, journals as well as more traditional forms of summative assessment such as quizzes or writing assessments. Students are encouraged to review and reflect on their own learning, and on their newly acquired knowledge, understanding and skills.

# Let's Do Science

Let's Do Science is based on the United States Next Generation Science Standards (NGSS). The series consists of full-color textbooks and full-color activity books for Grades K to 6.

Let's Do Science engages students with a highly visual presentation of the disciplinary core ideas in the textbooks and places an emphasis on applying scientific knowledge using NGSS practices through numerous scientific investigations. Let's Do Science sees engineering as an essential element of science education and as such is tightly integrated into both the textbooks and activity books.

The Let's Do Science textbooks include the following features:

## Think Deeply

Topic-related questions for group discussion aimed at deepening students' understanding of the topic.

## Engineer It!

Goes beyond inquiry by encouraging students to design, model and build to engineer solutions to defined problems.

## In the Field

Inspirational science-related professions to stir interest in science-related careers.

**In the Field**

If you love plants of all shapes and sizes, you might want to be a horticulturist. A **horticulturist** is a scientist that specializes in growing plants for people to use.

Horticulturists use their knowledge of plants to help farmers improve the fruits, flowers and vegetables they grow.

Horticulturists can also use their knowledge of plants and soil to help manage and protect natural areas like parklands or nature reserves.



## A Closer Look

Invokes enthusiasm in science by presenting interesting topics beyond the syllabus.

**Birds**

Birds are animals covered in feathers, legs and two wings to fly.

Birds have different shapes and sizes to get the shape of their wings to fly.



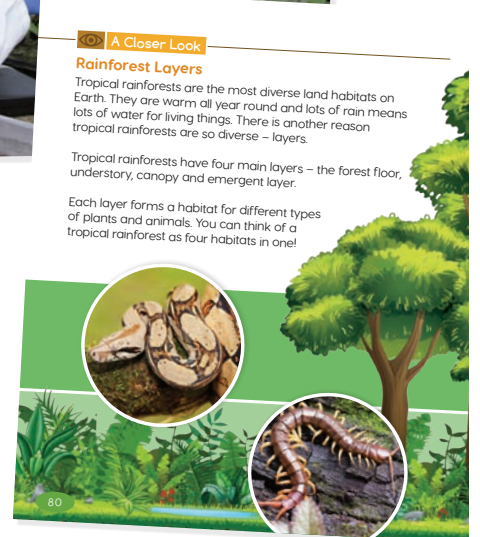
**A Closer Look**

**Rainforest Layers**

Tropical rainforests are the most diverse land habitats on Earth. They are warm all year round and lots of rain means lots of water for living things. There is another reason tropical rainforests are so diverse – layers.

Tropical rainforests have four main layers – the forest floor, understory, canopy and emergent layer.

Each layer forms a habitat for different types of plants and animals. You can think of a tropical rainforest as four habitats in one!







Animals with a body covered in feathers. They have two pairs of wings. Many birds use their wings to fly.

Birds have beaks of all shapes and sizes. The shape of the beak helps the bird to get the food it needs.

Birds reproduce by laying eggs. Parents often care for their young when they hatch from the eggs.




**AB Activity 2.3**

What are the characteristics of birds?



**Did You Know?**  
All birds have feathers and wings, but not all can fly. Flightless birds include penguins, emus, ostriches and cassowaries.



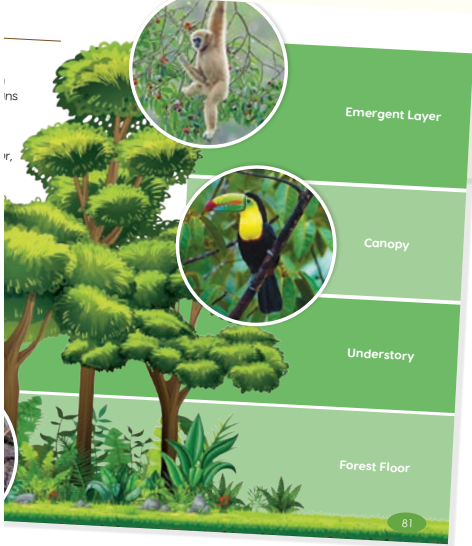
**Science Words**

volcano	flood	tornado
erupt	landslide	weathering
magma	thunderstorm	erosion
lava	wildfire	deposition
earthquake	hurricane	land reclamation
tsunami		

**Review**

- Which best describes the process when soil and rocks fall from mountains and hills.  
(a) Tsunami  
(b) Wildfire  
(c) Landslide
- Which best describes the process when hot molten rock flows onto the Earth's surface?  
(a) Earthquake  
(b) Volcanic eruption
4. What process is shown in the picture?  
  
(a) Erosion  
(b) Weathering  
(c) Deposition
5. Describe the difference between erosion and weathering.
6. Use the words in the box to label the picture.  
**erosion    deposition**  

7. Describe the difference between a landslide and weathering.
8. List three processes that change the shape of the land rapidly.
9. List three process that change the shape of the land slowly.
10. Describe two ways people can slow or prevent changes to the shape of the land.

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Emergent Layer

Canopy

Understory

Forest Floor

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**Review**

Topical questions at the end of each chapter for formative assessment.

**Amazing Fact!**

Interesting facts to build interest and enthusiasm.

**Did You Know?**

Extra information to build students' knowledge base of the current topic.

**Try This!**

Optional hands-on activities to be conducted in groups or at home.

**AB Activity**

Links students to the Let's Do Science Activity Book at the appropriate juncture.

**Discussion**

Topic-related questions and situations for class discussion to build a deeper understanding of topics.

**Science Words**

Lists the essential science vocabulary covered in each chapter.



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**Changing Matter**

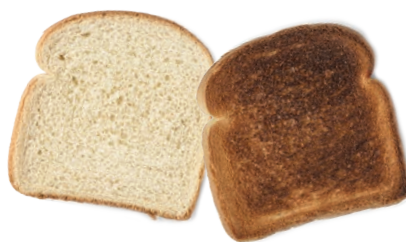
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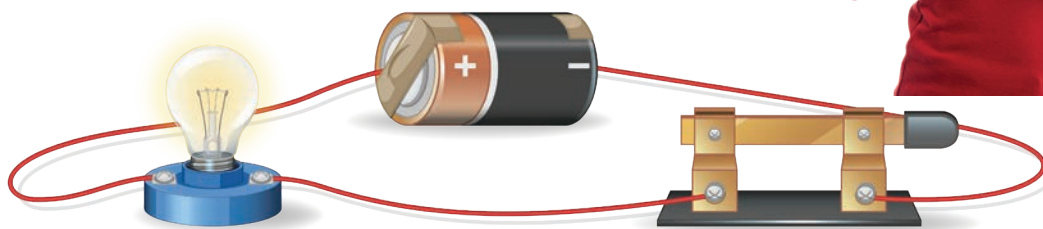
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**Review**

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# 5

## Earth's Land and Water



In this chapter you will ...

- list and describe different kinds of land and bodies of water.
- identify where water is found on Earth and whether it is solid or liquid.
- develop a model to represent the land and bodies of water in an area.



What are the Earth's different landforms and bodies of water?





### Go Online!



Access interactive content relating to this topic on the NGScience website.  
**ngscience.com**



What is a map?  
How are maps useful to people?





How can you describe the land around you?

## Earth's Landforms


The shape of the surface of the Earth can be different in many ways. In some areas the land is flat. In other areas the land may be hilly or surrounded by mountains.







The different shapes of the Earth's land are called **landforms**.



What are some landforms in your area?







Most of the water on Earth is in the ocean. The ocean contains salt water.

The fresh water and salt water on Earth can be found as liquid water or solid ice.





## Salt Water on Earth

### The Ocean and Seas

When viewed from space, the Earth looks like a big blue ball. The blue parts you see are the ocean. The **ocean** is a large body of salt water. It covers almost three-fourths of the surface of the Earth.

A great diversity of living things live in the ocean. The ocean is also very important to people for transportation and sources of food.





Salt water can also be found in seas. A **sea** is a smaller part of the ocean that is partly surrounded by land.

In some cold areas of the Earth, parts of the ocean can freeze into **sea ice**. Sea ice is solid salt water.





An aerial photograph of a lagoon, showing a large body of water with varying shades of blue and turquoise, surrounded by lush green vegetation and rocky terrain. A text box is overlaid on the right side of the image.

## Lagoons

A **lagoon** is a shallow body of salt water that is separated from the sea or the ocean by sand, rock or other natural barriers.








## Fresh Water on Earth

The water in the ocean is too salty for most living things on land to use. They need fresh water. The water we drink is fresh water. **Fresh water** contains very little salt.

On Earth, fresh water can be found in streams, rivers, lakes and ponds. In cold areas, fresh water can also be found as solid ice.





A photograph of a forest stream flowing over mossy rocks. The water is clear and reflects the surrounding greenery. The rocks are covered in vibrant green moss, and the forest floor is also lush with moss. The background shows tall trees and a dense canopy.

## Streams and Rivers

A **stream** is a flowing body of fresh water. A stream starts at a high point such as a mountain or hill. As it flows downstream, it may pick up more water from melting snow or rain. It may also join other streams and grow larger to form a river.

Like streams, **rivers** are fresh water and flow downstream. Rivers flow into lakes or the ocean.







## Ponds and Lakes

Rivers often flow into lakes. A **lake** is a large body of fresh water that is surrounded by land. Lakes are often used by people for recreation, transport and as a source of drinking water.

Much like a lake, a **pond** is a closed body of fresh water. Ponds are usually smaller than lakes.



How is a lagoon different from a lake or pond?



## Amazing Fact!

Lake Michigan in the United States of America is the largest lake located inside one country. It is almost 500 km (300 mi) long!

## Go Online!



Observe and compare the Earth's different bodies of fresh water on the NGScience website.  
*QuickCode:* **P6J2**





## Glaciers

A **glacier** is a large body of thick ice that forms from the build-up of snow over many years.

Glaciers form on land. They move very slowly down mountains.

When glaciers get lower down a mountain, they may melt into rivers and lakes. Some glaciers reach the ocean and form icebergs.



## Icebergs

An **iceberg** is a large body of freshwater ice floating in the ocean. Most icebergs form when chunks of ice break off a glacier or ice shelf.

A small iceberg is about the size of a bus. Some icebergs can be over 100 m (300 ft) in length.

Go Online!



Watch how glaciers form icebergs on the NGScience website.

QuickCode: **P7Z5**







Go Online!

Scientists have discovered that human activities are causing temperatures on Earth to rise. This is causing ice at the Earth's pole to melt faster than normal. Find out more about the effects of climate change on the NGScience website. *QuickCode: N7C4*

## Liquid and Solid Water

There are many places where water can be found on Earth. Salt water fills the ocean. Fresh water flows from streams to rivers and lakes.

In cold parts of the Earth, water is in a frozen state as solid ice. If the temperature gets warm enough, the ice will melt into water.





In some places, streams, rivers and lakes may have water in the warm months of the year and ice in the cold months of the year.

Each year, the pattern of changing from water to ice and back to water repeats.



**AB** Activities 5.3 – 5.4







# Mapping the Earth

## What Is a Map?



### Try This!

Look at a globe or map of the Earth with a classmate. Which parts are land? Which parts are water? What landforms can you see?

A map is a drawing or model of an area. Some show a large area. A globe is a map of the whole planet Earth. There are also maps of countries, cities and towns.

Maps can show smaller areas such as a park, zoo or even your home.





# 8

## Changes to Matter



How can an object made of a small set of pieces be disassembled and made into a new object?



**In this chapter you will ...**

- describe ways in which matter can change.
- describe how an object made of a small set of pieces can be disassembled and made into a new object.
- observe, test and describe how heat can change matter.
- list some changes caused by heating or cooling that can be reversed and some changes that cannot be reversed.





Go Online! 

Access interactive content relating to this topic on the NGScience website.  
[ngscience.com](http://ngscience.com)



How does matter change when it is heated or cooled?





# Changing Matter

## How Can We Change Matter?

We can change matter in many ways. You can change a sheet of paper by folding or cutting it to make a new object.



What are some other ways we can change matter?





You can change matter by breaking it into smaller pieces, like cutting a loaf of bread.

You can also change matter by putting smaller pieces together to make a big object, like assembling the parts of a toy.



### Try This!

Does the mass of solid matter change when it is cut into pieces? Conduct an investigation to find out.



AB

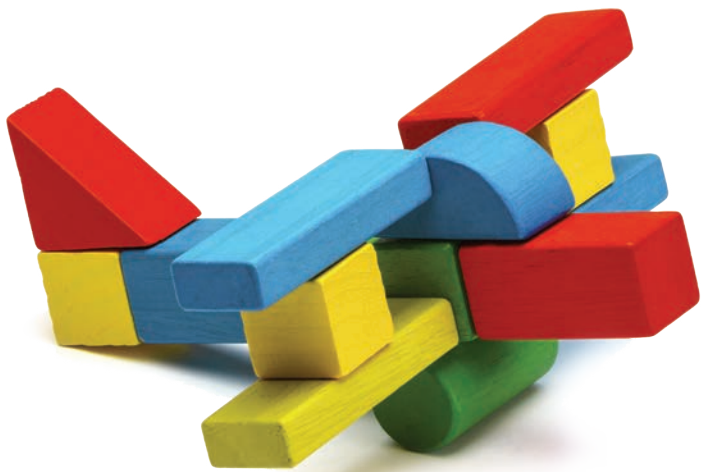
### Activity 8.1







Sometimes when we change matter, we can also change it back to its original form. You change matter when you assemble blocks to build a toy house. You can also take apart the toy house, leaving the blocks again.





Other times, matter that is changed cannot be changed back to its original form.

When you chop firewood, you cannot change it back into a log. When you make a fruit smoothie, you cannot change the smoothie back into the fruits used to make it.



 **AB** Activity 8.2



What are some other examples where matter is changed and cannot be changed back?



**Try This!**

Take a piece of scrap paper and change it in a way that it can be changed back. Change the paper again in a way that cannot be changed back.





## Putting Together and Taking Apart

Different objects can be made by putting smaller objects together. The new objects can have different characteristics, even though they were made of the same set of pieces.



### Think Deeply

Imagine you are a builder about to build a new house. Which part of the house would you build first? Why?







Many bricks can be put together to make the walls of a house.








## Think Deeply

Imagine you are a builder about to demolish an old house. Which part of the house would you take down first? Why?



An object such as a house is made of many small pieces. The pieces can be disassembled and made into new objects. The bricks used to build the walls of a house can be disassembled.





The disassembled bricks can be assembled again and made into new objects.

They could be used to make a garden path or to build a barbecue pit.

The new objects can have different characteristics, even though they were made of the same set of pieces.



### AB Activity 8.3





### Go Online!

Learn about different materials and their properties on the NGScience website.  
*QuickCode:* **E1X9**

## Heat and Matter

### Changing Temperature

**Temperature** is how hot or cold something is. When matter is heated, its temperature increases. When matter is cooled, its temperature decreases.

Heating and cooling matter can cause it to change from one state to another.



What change in state occurs when solid matter is heated?







▲ Butter melts when it is heated.



▲ When metal is heated, it changes into a liquid.

## Solid to Liquid

When matter is heated, its temperature increases. This can cause matter to change from solid to liquid. This process is called **melting**.

Some matter, like ice, will melt at room temperature. It changes from solid ice to liquid water. Other matter requires more heat to start melting.







### Try This!

Plan and conduct an investigation to observe how heating and cooling changes a block of chocolate. Describe the changes you observe.

## Liquid to Solid

When matter is cooled, its temperature decreases. This can cause matter to change from liquid to solid. This process is called **freezing**.

Placing water in a freezer decreases its temperature. It changes from liquid water to solid ice.



What causes a wax candle to melt and freeze?



AB

Activity 8.4

