



1st Grade Science

**for Utah SEEd Standards
2020-2021**

1st Grade

for Utah SEEd Standards

Utah State Board of Education OER
2020-2021

Say Thanks to the Authors

Click <http://www.ck12.org/saythanks>

(No sign in required)



CK-12 Foundation is a non-profit organization with a mission to reduce the cost of textbook materials for the K-12 market both in the U.S. and worldwide. Using an open-source, collaborative, and web-based compilation model, CK-12 pioneers and promotes the creation and distribution of high-quality, adaptive online textbooks that can be mixed, modified and printed (i.e., the FlexBook® textbooks).

Copyright © 2020 CK-12 Foundation, www.ck12.org

The names “CK-12” and “CK12” and associated logos and the terms “FlexBook®” and “FlexBook Platform®” (collectively “CK-12 Marks”) are trademarks and service marks of CK-12 Foundation and are protected by federal, state, and international laws.

Any form of reproduction of this book in any format or medium, in whole or in sections must include the referral attribution link <http://www.ck12.org/saythanks>

(placed in a visible location) in addition to the following terms.

Except as otherwise noted, all CK-12 Content (including CK-12 Curriculum Material) is made available to Users in accordance with the Creative Commons Attribution-Noncommercial 3.0 Unported (CC BY-NC 3.0) License (<http://creativecommons.org/licenses/by-nc/3.0/>), as amended and updated by Creative Commons from time to time (the “CC License”), which is incorporated herein by this reference.

Complete terms can be found at <http://www.ck12.org/about/terms-of-use>.

Printed: May, 2020



For online attribution



©CK-12 Foundation

Licensed under  • [Terms of Use](#) • [Attribution](#)

Credits and Copyright

Credits Copyright, Utah State Board of Education, 2020.



Unless otherwise noted, the contents of this book are licensed under the Creative Commons Attribution NonCommercial ShareAlike license. Detailed information about the license is available online at <http://creativecommons.org/licenses/by-nc-sa/3.0/legalcode>

Unless otherwise attributed, photos were taken from the ck-12 website and Pixabay.

Prior to making this book publicly available, we have reviewed its contents extensively to determine the correct ownership of the material and obtain the appropriate licenses to make the material available. We will promptly remove any material that is determined to be infringing on the rights of others. If you believe that a portion of this book infringes another's copyright, contact Ricky Scott at the Utah State Board of Education: richard.scott@schools.utah.gov .

If you do not include an electronic signature with your claim, you may be asked to send or fax a follow-up copy with a signature. To file the notification, you must be either the copyright owner of the work or an individual authorized to act on behalf of the copyright owner. Your notification must include:

- Identification of the copyrighted work, or, in the case of multiple works at the same location, a representative list of such works at that site.
- Identification of the material that is claimed to be infringing or to be the subject of infringing activity. You must include sufficient information, such as a specific page number or other specific identification, for us to locate the material.
- Information for us to be able to contact the claimant (e.g., email address, phone number).
- A statement that the claimant believes that the use of the material has not been authorized by the copyright owner or an authorized agent.
- A statement that the information in the notification is accurate and that the claimant is, or is authorized to act on behalf of, the copyright owner.

This book is adapted primarily from the excellent materials created by the CK-12 Foundation - <http://ck12.org/> - which are licensed under the Creative Commons Attribution Non Commercial Share Alike license. We express our gratitude to the CK-12 Foundation for their pioneering work on secondary science textbooks, without which the current book would not be possible. We especially wish to thank the amazing Utah science teachers whose collaborative efforts made the book possible. Thank you for your commitment to science education and Utah students!



Students as Scientists

What does science look and feel like?

If you're reading this book, either as a student or a teacher, you're going to be digging into the "practice" of science. Probably, someone, somewhere, has made you think about this before, and so you've probably already had a chance to imagine the possibilities. Who do you picture doing science? What do they look like? What are they doing?

Often when we ask people to imagine this, they draw or describe people with lab coats, people with crazy hair, beakers and flasks of weird looking liquids that are bubbling and frothing. Maybe there's even an explosion. Let's be honest: Some scientists do look like this, or they look like other stereotypes: people readied with their pocket protectors and calculators, figuring out how to launch a rocket into orbit. Or maybe what comes to mind is a list of steps that you might have to check off for your science fair project to be judged; or, maybe a graph or data table with lots of numbers comes to mind.

So let's start over. When you imagine graphs and tables, lab coats and calculators, is that what you love? If this describes you, that's great. But if it doesn't, and that's probably true for many of us, then go ahead and dump that image of science. It's useless because it isn't you. Instead, picture yourself as a maker and doer of science. The fact is, we need scientists and citizens like you, whoever you are, because we need all of the ideas, perspectives, and creative thinkers. This includes you.

Scientists wander in the woods. They dig in the dirt and chip at rocks. They peer through microscopes. They read. They play with tubes and pipes in the aisles of a hardware store to see what kinds of sounds they can make with them. They daydream and imagine. They count and measure and predict. They stare at the rock faces in the mountains and imagine how those came to be. They dance. They draw and write and write and write some more.

Scientists — and this includes all of us who do, use, apply, or think about science — don't fit a certain stereotype. What really sets us apart as humans is not just that we know and do things, but that we wonder and make sense of our world. We do this in many ways, through painting, religion, music, culture, poetry, and, most especially, science. Science isn't just a method or a collection of things we know. It's a uniquely human practice of wondering about and creating explanations for the natural world around us. This ranges from the most fundamental building blocks of all matter to the widest expanse of space that contains it all. If you've ever wondered "When did time start?", or "What is the smallest thing?", or even just "What is color?", or so many other

endless questions then you're already thinking with a scientific mind. Of course you are; you're human, after all.

But here is where we really have to be clear. Science isn't just questions and explanations. Science is about a sense of wondering and the sense-making itself. We have to wonder and then really dig into the details of our surroundings. We have to get our hands dirty. Here's a good example: two young scientists under the presence of the Courthouse Towers in Arches National Park. We can be sure that they spent some amount of time in awe of the giant sandstone walls, but here in this photo they're enthralled with the sand that's just been re-washed by recent rain. There's this giant formation of sandstone looming above these kids in the desert, and they're happily playing in the sand. This is ridiculous. Or is it?



How did that sand get there? Where did it come from? Did the sand come from the rock or does the rock come from sand? And how would you know? How do you tell this story?

Look. There's a puddle. How often is there a puddle in the desert? The sand is wet and fine; and it makes swirling, layered patterns on the solid stone. There are pits and pockets in the rock, like the one that these two scientists are sitting in, and the gritty sand and the cold water accumulate there. And then you might start to wonder: Does the sand fill in the hole to form more rock, or is the hole worn away because it became sand? And then you might wonder more about the giant formation in the background: It has the same colors as the sand, so has this been built up or is it being worn down? And if it's being built up by sand, how does it all get put together; and if it's being worn away then why does it make the patterns that we see in the rock? Why? How long? What next?

Just as there is science to be found in a puddle or a pit or a simple rock formation, there's science in a soap bubble, in a worm, in the spin of a dancer and in the structure of a bridge. But this thing we call "science" is only there if you're paying attention, asking questions, and imagining possibilities. You have to make the science by being the person who gathers information and evidence, who organizes and reasons with this, and who communicates it to others. Most of all, you get to wonder. Throughout all of the rest of this book and all of the rest of the science that you will ever do, wonder should be at the heart of it all. Whether you're a student or a teacher, this wonder is what will bring the sense-making of science to life and make it your own.

Adam Johnston Weber State University

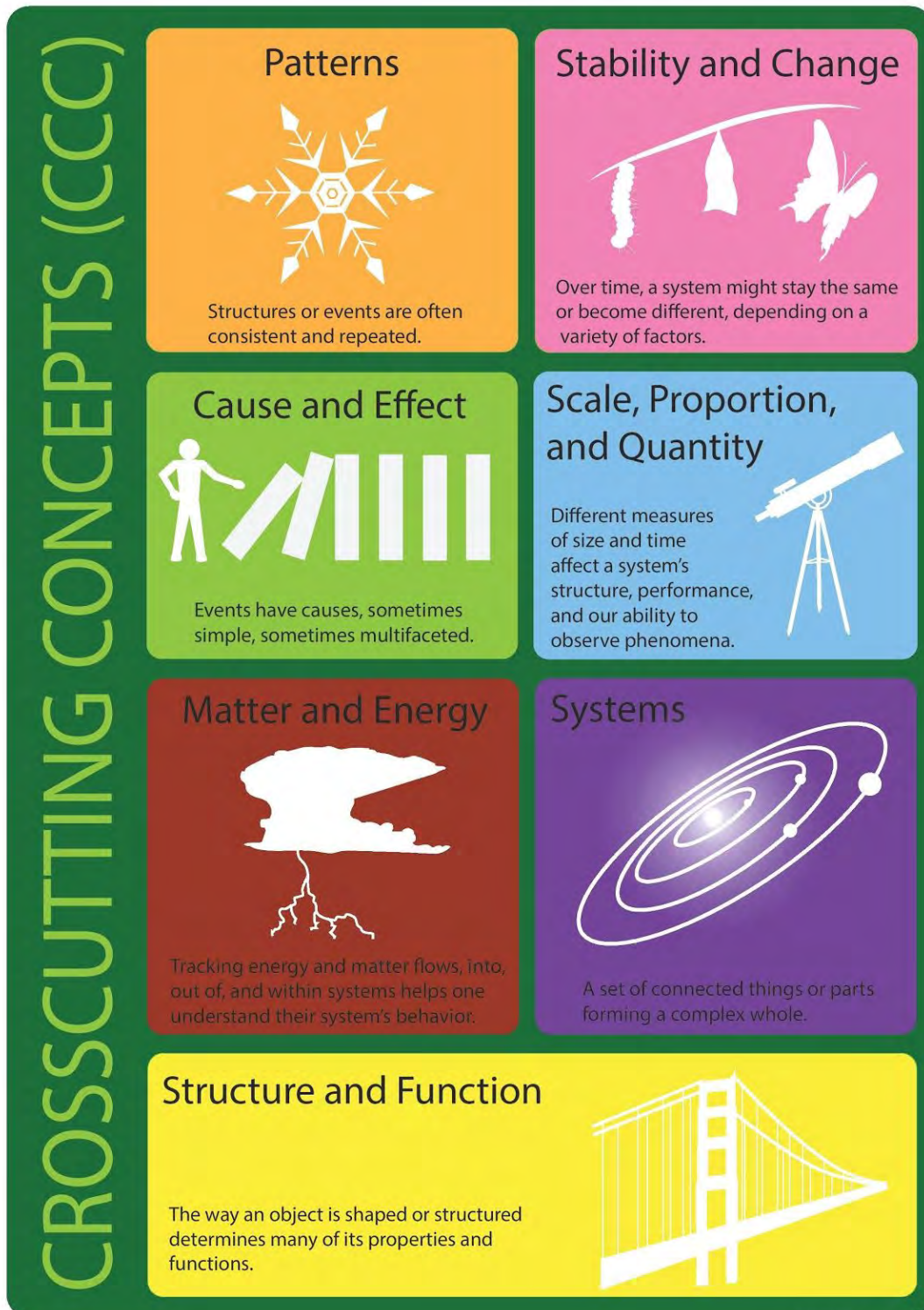
Science and Engineering Practices

Science and Engineering Practices are what scientists do to investigate and explore natural phenomena



Cross Cutting Concepts

Crosscutting Concepts are the tools that scientists use to make sense of natural phenomena.



Created by Susan Larson

A Note to Teachers

This Open Educational Resource (OER) textbook has been written specifically for students as a reputable source for them to obtain information aligned to the 1st Grade Science Standards. The hope is that as teachers use this resource with their students, they keep a record of their suggestions on how to improve the book. Every year, the book will be revised using teacher feedback and with new objectives to improve the book.

If there is feedback you would like to provide to support future writing teams please use the following online survey: <http://go.uen.org/bFi>

Table of Contents

CHAPTER 1- Seasons and Space Patterns	9
1.1 Movement (1.1.1)	10
1.2 Time of Year (1.1.2)	17
1.3 Daylight Patterns (1.1.3)	22
CHAPTER 2-Needs of Living Things	29
2.1 Sun and Water (1.2.1)	30
2.2 Surviving Locations (1.2.2)	38
2.3 Traits of Parents (1.2.3)	52
2.4 Survival Behaviors (1.2.4)	59
CHAPTER 3-Sound and Light	66
3.1 Sound Vibrations (1.3.1)	67
3.2 Effects of Light (1.3.2)	71
3.3 Light Pathways (1.3.3)	78
3.4 Communication (1.3.4)	86

CHAPTER 1

Strand 1: Seasons and Space Patterns

Chapter Outline

- 1.1 Movement (1.1.1)
- 1.2 Time of Year (1.1.2)
- 1.3 Daylight Patterns (1.1.3)

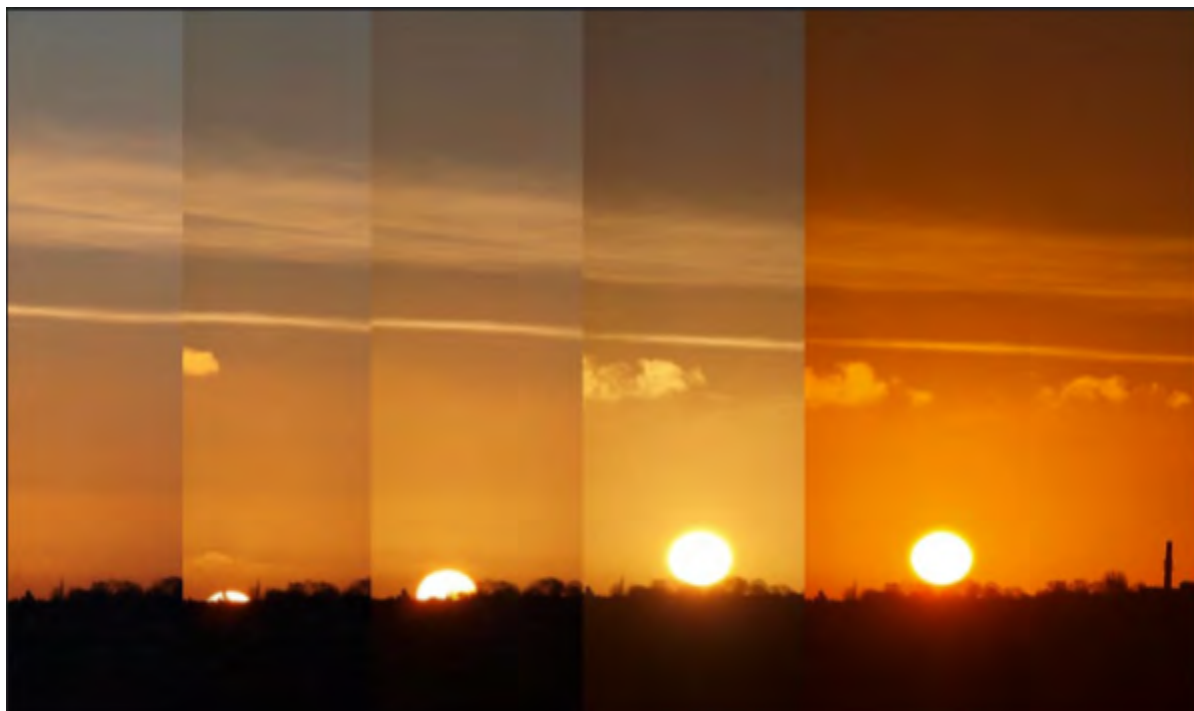


Four seasons in Japan by Masakazu Matsumoto,
<https://flic.kr/p/avmYzR>, CC-BY

Seasonal patterns of motion of the Sun, Moon, and stars can be observed, described, and predicted. These patterns may vary depending on the region, location, or time of year.

1.1 Movement (1.1.1)

Explore this Phenomenon



Movement of the Sun by Chloe Blanchfield, <https://flic.kr/p/9jhLrr>, CC-BY-NC-ND

The sun seems to be in a different place in the morning than it is in the afternoon. Is there a pattern that the sun follows?

Do the moon and stars follow a pattern too?

As you read the following section, think about how you could explain the patterns of the movement of the sun, moon, and stars.

1.1.1 Movement

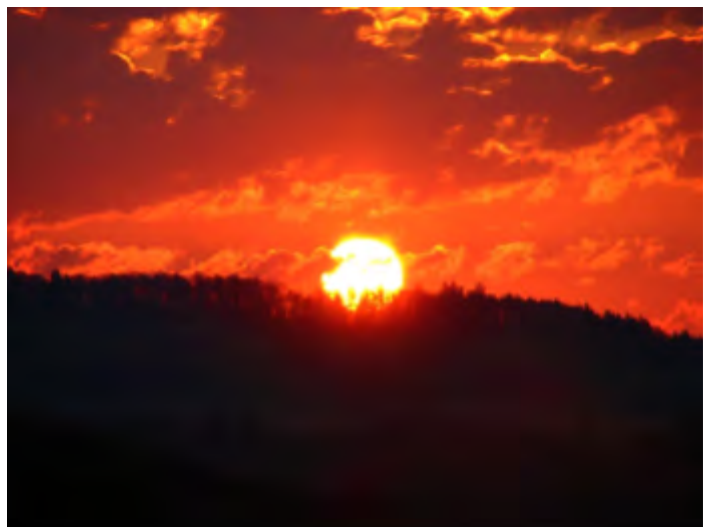
Obtain, evaluate, and communicate information about the movement of the Sun, Moon, and stars to describe predictable patterns. Examples of patterns could include how the Sun and Moon appear to rise in one part of the sky, move across the sky, and set; or how stars, other than the Sun, are visible at night but not during the day. **(ESS1.A)**



In this section, see if you can identify the patterns of the movement of the Sun, Moon, and stars. As you observe these patterns try to predict what will happen from day to day and month to month for each. Also, notice which ones are visible during the day and night. Explain why the sun is seen only during the day and stars are only seen during the night.

Movement in the Sun, Moon, and Stars

Every morning, the Sun rises.



Sunrise by jespahjoy, <https://lic.kr/p7VkwK1>, CC-BY



Snowing in March by Ashton Emanuel, <https://flic.kr/p/m3VXiR>, CC-BY-NC-ND

Even if there are clouds,
the Sun still rises.

When the Sun sets,
the day turns into
night.

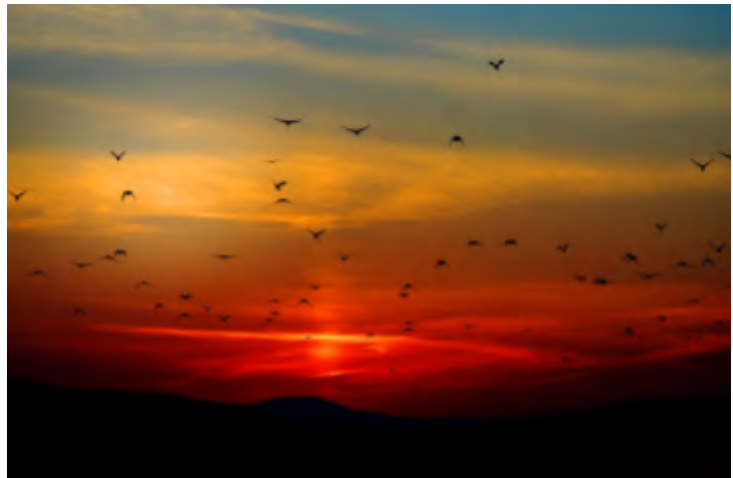


Image by Giania Pralea, Pixabay.com, CC0



New Year's Day 2015 by Daniel Zimmerman, <https://flic.kr/p/qnAwk2>, CC-BY

The movement of
the Sun has a
pattern. The sun
rises in the east.

It always goes
down in the west.

During the day, it seems to move across the sky.



Image by Myriam Zilles (Myriams-Fotos), Pixabay.com, CC0

At night, the stars appear.



Image by Free-Photos, Pixabay.com, CC0

Stars move across the sky too.



Camping by Tristan Schmurr, <https://flic.kr/p/dDazPv>, CC-BY

Stars move in the same pattern as the Sun.

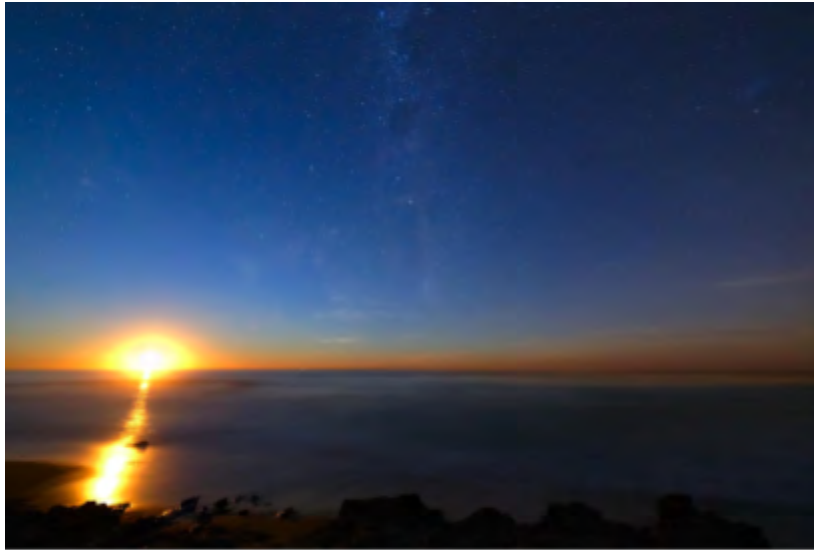
They move from east to west.



Image by jameswheeler, Pixabay.com, CC0

Stars are always there, even if you can't see them.

During the day we can't see the stars because the sun shines so bright.



Not a Sunrise by Luis Argerich, <https://flic.kr/p/ecbc73>, CC-BY-NC



Moon rise among the trees 24-01-2013 by PsJeremy, <https://flic.kr/p/dPayni>, CC-BY

Sometimes the Moon can be seen in the night sky and sometimes it can't.

Sometimes, the Moon can still be seen in the sky during the day.

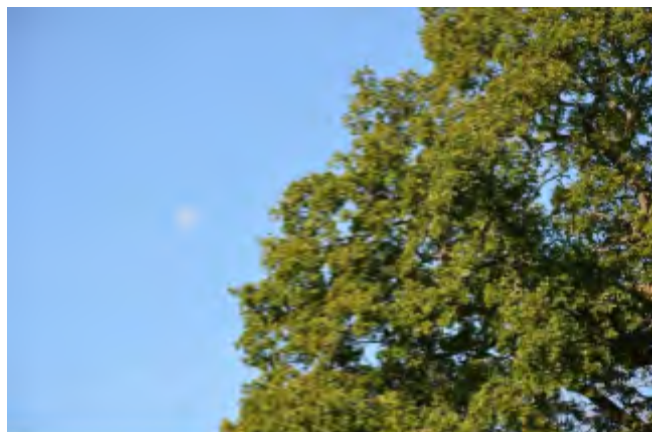


Image by DreamPixar, Pixabay.com, CC0

Putting It Together



Movement of the Sun by Chloe Blanchfield, <https://flic.kr/p/9jhLrr>, CC-BY-NC-ND

The sun seems to be in a different place in the morning than it is in the afternoon.

Using your knowledge, explain the pattern the sun follows during the day.

What patterns do the moon and stars follow?

1.2 Time of Year (1.1.2)

Explore this Phenomenon



Image by Hai Nguyen Tien (HaiRobe), Pixabay.com, CC0

When we leave school in May the sun is shining bright and we have time to play outside. When we leave school in January the sun is starting to set and we can't play outside for very long.



Image by Victoria_Borodinova, Pixabay.com, CC0

What is a pattern you can observe?

As you read the following text, think about the pattern that you can observe and predictions can you make from this pattern?

1.1.2 Time of Year

Obtain, evaluate, and communicate information about the patterns observed at different times of the year to relate the amount of daylight to the time of year. Emphasize the variation in daylight patterns at different times of the day and different times of the year. Examples could include varying locations and regions throughout the state, country, and world.



In this section, see if you can identify the patterns of the amount of daylight observed at different times of year. As you observe these patterns, try to identify the time of year these patterns would be seen. Look at different regions in the state and country where these patterns are different and these patterns are the same.

Changing Amounts of Daylight

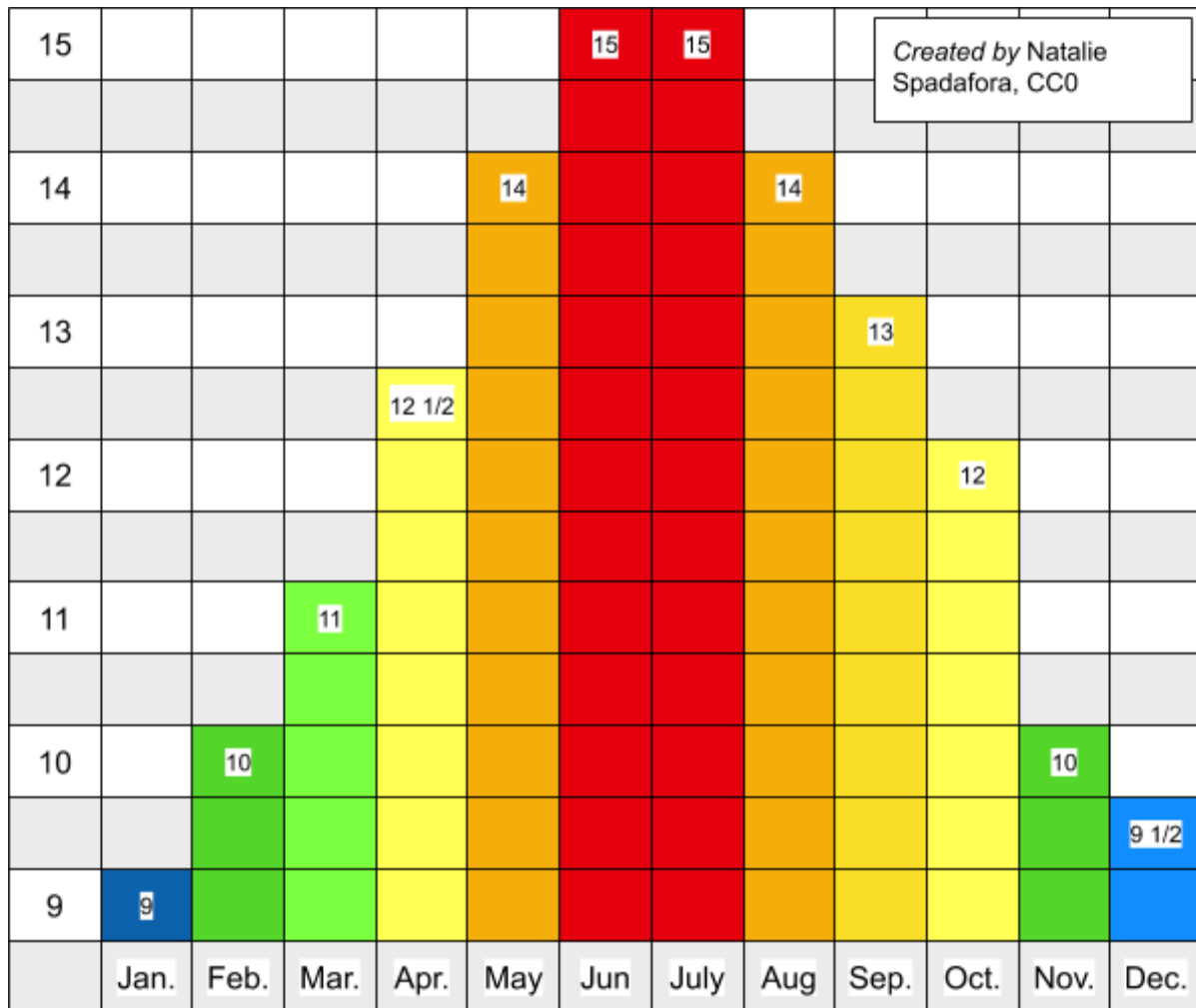
During the year the seasons change. Around the world the seasons may look different, but they all follow the same pattern – winter, spring, summer, fall.



The Four Seasons by George Hoden, PublicDomainPictures.net, CC0

The amount of sunlight we have throughout the day changes during the year.

Look at the graph. What pattern can you see?



In the summer the weather is warmer. The days get longer and the nights get shorter.



Image by StockSnap, Pixabay.com, CC0

In the winter the weather is colder. The days get shorter and the nights get longer.



Image by benralexander, Pixabay.com, CC0

Putting It Together



Image by Hai Nguyen Tien (HaiRobe), Pixabay.com, CC0



Image by Victoria_Borodina, Pixabay.com, CC0

Using your knowledge, What is a pattern you can observe in the amount of daylight at different times of the year?

1.3 Daylight Patterns (1.1.3)

Explore this Problem



Image by piviso, Pixabay.com, CC0

I was camping in the mountains and didn't have my watch. I needed to know approximately what time of day it was (morning, afternoon, or evening). I needed a way to measure where the sun was in the sky to help me guess the time.

What patterns help us observe daylight?

What could you design to measure or track the pattern?

1.1.3 Daylight Patterns

Design a device that measures the varying patterns of daylight. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs.* Examples could include sundials for telling the time or tracking the movement of shadows throughout the day.



In this section, see if you can design a device that measures the varying patterns of daylight. Use this device for telling time or tracking the movement of shadows during the day. Use this device to compare the length of daylight during different times of the year. Communicate your findings through a physical model and information you found.

Shadows

The Sun is a source of light.



Image by Alexas_Fotos, Pixabay.com, CC0

Light from the sun travels in a straight line.



Image by marcelkessler, Pixabay.com, CC0

If it didn't, it would wrap around you. You would not have a shadow. Because it does travel in a straight line, light is blocked by your shape.



<https://www.ck12.org/book/CK-12-First-Grade-Science/section/1.0/>

You move and your shadow moves. How can you make your shadow move?



shadow by 613NN, <https://flic.kr/p/6HrAq8>, CC-BY-NC

Objects that block light create shadows.



Happiness is... blue skies #2 by Rachel Kramer, <https://flic.kr/p/7Eajoz>, CC-BY

Where a shadow appears depends on where the light is coming from that's why shadows change directions during the day.

When the Sun is rising, shadows will be long. When the Sun is setting, shadows will be long.



Shadow by Kedra Miller,
<https://flic.kr/p/apBaNW>, CC-BY-ND

If the Sun is above an object, the shadow will be short.



Image by Mylene2401, Pixabay.com, CC0

A shadow always points in the opposite direction of the light source.



Image by EvgeniT, Pixabay.com, CC0

In the past, people used shadows to tell time. They measured the shadows as they moved throughout the day. Using patterns of daylight they were able to tell the time of day.



Image by Mark Caldicott (mcsc1995), Pixabay.com, CC0

Putting It Together



Image by piviso, Pixabay.com, CC0

I was camping in the mountains and didn't have my watch. I needed to know approximately what time of day it was (morning, afternoon, or evening). I needed a way to measure where the sun was in the sky to help me guess the time.

What patterns help us observe daylight?

What could you design to measure or track the pattern?

CHAPTER 2

Strand 2: The Needs of Living Things and Their Offspring

Chapter Outline

- 2.1 Sun and Water (1.2.1)
- 2.2 Surviving Locations (1.2.2)
- 2.3 Traits of Parents (1.2.3)
- 2.4 Survival Behaviors (1.2.4)



Image by homecare119, Pixabay.com, CC0

Living things (plants and animals, including humans) depend on their surroundings to get what they need, including food, water, shelter, and a favorable temperature. Plants and animals have external features that

allow them to survive in a variety of environments. Young plants and animals are similar but not exactly like their parents. In many kinds of animals, parents and offspring engage in behaviors that help the offspring to survive.

2.1 Sun and Water (1.2.1)

Explore this Phenomenon



#wilted #plant #brownthumb #nofilter the succulents were fine over vacation tho by j bizzie, <https://flic.kr/p/c9XZ5d>, CC-BY

This plant is struggling to survive.

- What could be causing this plant to die?
- As you read, think about how you could plan and carry out an investigation to determine the cause?

As you read, think about what plants need and how would you test how much it needs.

1.2.1 Sun and Water

Plan and carry out an investigation to determine the effect of sunlight and water on plant growth. Emphasize investigations that test one variable at a time.



In this section, try to determine what plants need to survive. Then determine how these needs affect the growth of plants.

Plants Have Needs

Humans have needs to survive.

We need to eat food and drink water.



Image by JillWellington, Pixabay.com CC0



Image by Gary G (GSquare), Pixabay.com, CC0



Image by JillWellington, Pixabay.com, CC0

Plants also have needs to survive.

Plants need sunlight and water.

The tree that gets more sunlight is healthier.



Image by Annette Fannesbeck, CC0

Some types of plants need a lot of water.

Some types of plants need little water.

An Iris needs a lot of water.



Image by MiKi-Studio, Pixabay.com, CC0

A cactus needs very little water to survive.



Image by Pexels, Pixabay.com, CC0

Some plants need a lot of sunlight.

Some plants need little sunlight.

Pansies need a lot of sunlight.



Image by Nähe Bonn (Anelka), Pixabay.com, CC0

A Peace Lily needs very little light.



Image by Adriano Gadini, Pixabay.com, CC0

A scientist that studies what plants need is called a botanist. Botanists plan and carry out investigations to test what plants need.



DaemonNoire 446×394×8 (67922 bytes) Taken by Jennifer Cross at the Texas A&M University Herbarium, <https://commons.wikimedia.org/wiki/File:HerbPrepLG.jpg>, CC-BY-SA

Botanists test different amounts of sunlight and water plants get.

Botanists can observe the growth of the plants to determine the effect of different amounts of water and sunlight.



Enchanted Garden Dish Garden Event by Howard County Library System, <https://flic.kr/p/SMV2xN>, CC-BY-NC-ND

Botanists might observe the structure, size, and color of the leaves. Botanists might observe the structure, size, and color of the roots.

Look at the structure of the leaves.

How would you describe them?

Are they big or small?

What is their color?

Are they all the same?



Image by ekta.varia, pxhere.com, CC0

Look at the structure of the roots.
How would you describe them?
Are they big or small?
What is their color?
Are they all the same?



Image by Robert Owen-Wahl, Pixabay.com, CC0

Botanists take good notes for evidence.
Botanists use their notes to help plants survive.



Gabrielle Graeter taking notes by U.S. Fish and Wildlife Service Southeast Region, <https://flic.kr/p/uyqqWv>, CC-BY

A botanist's notes include pictures of the plant and writing.



Image by Frederick Edwin Church, Public Domain

Putting It Together



#wilted #plant #brownthumb #nofilter the succulents were fine over vacation tho by j bizzie, <https://flic.kr/p/c9XZ5d>, CC-BY

Let us revisit this phenomenon.

What could be causing this plant to die?

How would you plan and carry out an investigation to determine the cause?

2.2 Surviving Locations (1.2.2)

Explore this Phenomenon



Image by Free-Photos, Pixabay.com, CC0

Many animals that live in the desert are awake at night and sleep during the day. Animals that you might find awake are a Coyote, Antelope Squirrel, and Desert Cottontail.



Image by Tom Ferguson, Pixabay.com, CC0



Image by Skeeze, Pixabay.com, CC0



Image by Skeeze, Pixabay.com, CC0

Are there patterns we see between these animals?

Can you explain why these animals would be awake at night in the desert?

As you read, look for patterns in plants and animals that help you explain why they can survive in their environment.

1.2.2 Surviving Locations

Construct an explanation by observing patterns of external features of living things that survive in different locations. Emphasize how plants and nonhuman animals, found in specific surroundings, share similar physical characteristics. Examples could include that plants living in dry areas are more likely to have thick outer coatings that hold in water, animals living in cold locations have longer and thicker fur, or most desert animals are awake at night.



Patterns help us find what is similar and what is different. Look for patterns in plants and animals that might help them to survive in their environment.

Look in the mirror.
What do you see?
You have two arms.
You have two hands.
Each hand has five fingers.
What do you do with your hands?



Image by Prashant Sharma, Pixabay.com, CC0



Image by PublicDomainArchive, Pixabay.com, CC0

You also have two long legs and two feet.
How do you move your legs and feet?

Animal Features

Dogs have four legs.

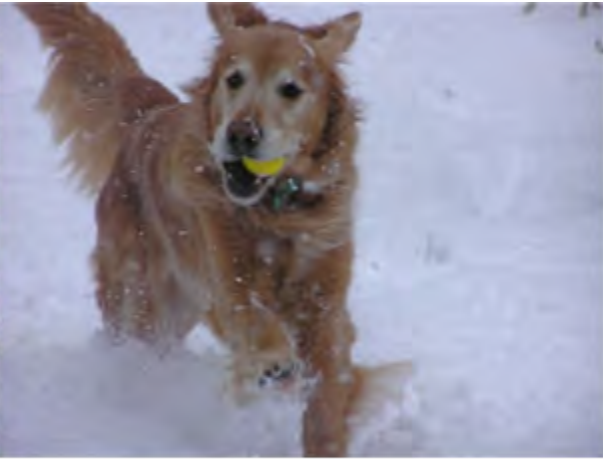
They are covered in fur.

They don't have any hands.

Can you name some other differences?



Contemplative Pup by Normanack, <https://flic.kr/p/6X35Vw>, CC-BY



Jamie in the Snow by Normanack, <https://flic.kr/p/4hPXou>, CC-BY

An animal's features help them.

How would four legs help a dog?

How would a dog's fur help?



Image by Claudia (bella67), Pixabay.com, CC0

Can you think of other animals with fur?
How does their fur help them?



Image by Robert Balog (bergadder), Pixabay.com, CC0



Image by Antonios Ntoumas (Atlantios), Pixabay.com, CC0

Some animals have sharp claws.
The claws are good for climbing trees.

A Koala has sharp claws.
A Koala climbs high in the trees.



*Image by Swallowtail Garden Seeds, <https://flic.kr/p/pWDzab>,
Public Domain*

Can you think of other animals with sharp claws?

Do they use their claws for climbing?
Animals have all kinds of features that help them do things. Look for patterns in the pictures below.

What features help them get food? Explain how the feature helps them.



Image by Skeeze, Pixabay.com, CC0



Image by Kobus van Leer, Pixabay.com, CC0



Image by congerdesign, Pixabay.com, CC0



Image by PublicDomainPictures, Pixabay.com, CC0



Image by christels, Pixabay.com, CC0



Image by congerdesign, Pixabay.com, CC0

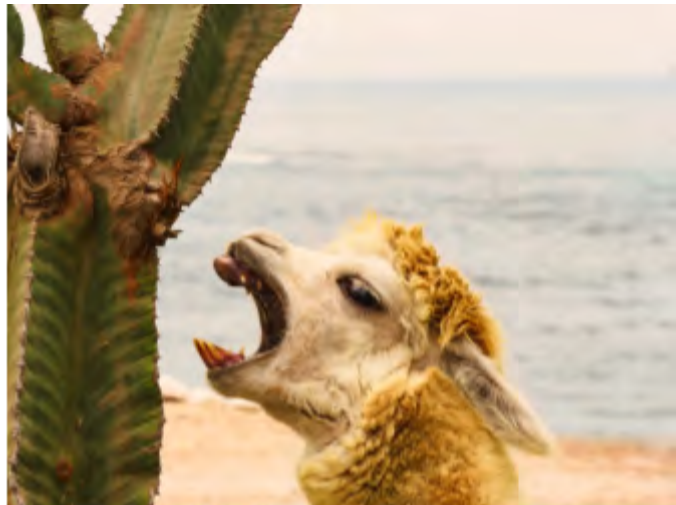


Image by MonicaP, Pixabay.com, CC0



Image by HowardWilks, Pixabay.com, CC0



Image by Karsten Paulick, Pixabay.com, CC0



Image by Pexels, Pixabay.com, CC0

What features help them stay safe? Explain how the feature helps them.



Image by Skeeze, Pixabay.com, CC0



Pixabay.com, CC0



Image by zgmorris13, Pixabay.com, CC0



Image by Capri23auto, Pixabay.com, CC0



Image by Pexels, Pixabay.com, CC0

What features help them build shelters? Explain how the feature helps them.



Image by Alexas_Fotos, Pixabay.com, CC0



Image by PublicDomainPictures, Pixabay.com, CC0



Photo by bodellia, goodfreephotos.com, Public Domain



Image by Maret Hoseman (MIH83), Pixabay.com, CC0

Plant Features

Plants also have features that help them.

Plants have leaves to absorb sunlight.



Image by Ilona (Couleur), Pixabay.com, CC0

A cactus has needles to protect it from animals.



Image by stanbalk, Pixabay.com, CC0



Image by Albert Dezetter (DEZALB), Pixabay.com, CC0



Image by Urike (eose (jules), Pixabay.com, CC0

A tree has bark to protect it from animals and weather.



Image by Peter H (Tama66), Pixabay.com, CC0



Image by Peter H (Tama66), Pixabay.com, CC0

Some plants have tough waxy surfaces to hold in water.



Image by tammcd, Pixabay.com, CC0



Image from Pixabay.com, CC0

What other features do plants have? Explain how this feature helps them.

Putting It Together

Let us revisit the phenomenon.



Image by Free-Photos, Pixabay.com, CC0

Many animals that live in the desert are awake at night and sleep during the day. Animals that you might find awake are a Coyote, Antelope Squirrel, and Desert Cottontail.



Image by Tom Ferguson, Pixabay.com, CC0



Image by Skeeze, Pixabay.com, CC0



Image by Skeeze, Pixabay.com, CC0

Are there patterns we see between these animals?

Can you explain why these animals would be awake at night in the desert?

2.3 Traits of Parents (1.2.3)

Explore this Phenomenon



Image by Markus Spiske, Pixabay.com, CC0

Carrots at different stages of growth look similar but not the same.

What patterns can you identify? How are they the same?
How are they different?

As you obtain information from your reading, evaluate the patterns that you see between parent and offspring and be prepared to communicate what you learned with a partner.

1.2.3 Traits of Parents

Obtain, evaluate, and communicate information about the patterns of plants and nonhuman animals that are alike, but not exactly like, their parents. An example could include that most carrots are orange and shaped like a cone but may be different sizes or have differing tastes.



In the section, see if you can identify patterns in how plants and nonhuman animals are alike, but not exactly like, their parents.

Inherited Traits

Offspring look like their parents but not exactly like their parents.

A chick looks like an adult chicken but not exactly.



Image by Philip Kleinlenst (onefox), Pixabay.com, CC0



Image by Hung Nguyen (vipbum), Pixabay.com, CC0

How are they the same?
How are they different?

A puppy looks like an adult dog but not exactly.



Image by Free-Photos, Pixabay.com, CC0



Image by Petra (Pezibear), Pixabay.com, CC0

How are they the same?
How are they different?

A lion cub looks like an adult lion but not exactly.



Image by Robert Greene, Pixabay.com, CC0



Image by Christine Sponchia, Pixabay.com, CC0

How are they the same?
How are they different?

A tadpole looks like an adult frog but not exactly.



Image by Kei Rothblack, Pixabay.com, CC0



Image by Couleur, pixabay.com, CC0

How are they the same?
How are they different?

A corn shoot looks like a full grown corn stalk but not exactly.



Corn by vistavision, <https://i.flic.kr/p/6wP2X4>, CC-BY-NC-ND

Image by Pexels, Pixabay.com, CC0



Image by Nicole Pankalla (Medienservice), Pixabay.com, CC0

How are they the same?
How are they different?

A bean sprout looks like a full grown bean plant but not exactly.



Image by annawaldl, Pixabay.com, CC0



Image from Pixabay.com, CC0

How are they the same?
How are they different?

Putting It Together



Image by Markus Spiske, Pixabay.com, CC0

Carrots at different stages of growth look similar but not the same.

What patterns can you identify? How are they the same?
How are they different?

2.4 Survival Behaviors (1.2.4)

Explore this Phenomenon



Image by jcrane, pixabay.com, CC0

Some penguins build a nest of rocks and keep the egg between its legs.

Why would this type of penguin build a nest and keep the egg between its legs?

Construct an explanation to describe the penguins' behavior.

1.2.4 Survival Behaviors

Construct an explanation of the patterns in the behaviors of parents and offspring which help offspring to survive. Examples of behavioral patterns could include the signals that offspring make such as crying, chirping, and other vocalizations or the responses of the parents such as feeding, comforting, and protecting the offspring.



As you read, look for patterns in the behaviors of animals. What behaviors do they use to survive?

Behaviors of Animals

Animals do things to protect themselves.
Parents do things to protect their offspring.
Offspring do things to protect themselves.

Next are some patterns of behavior that scientists have observed.



Image by Dean Ward, Unsplash.com, CC0

Birds build nests to protect their eggs and chicks.



Image by Maurice Shauker, unsplash.com, CC0

Sea Turtles bury their eggs to protect them from predators.



Image by Skweze, pixabay.com, CC0



1st leatherback sea turtle nest by U.S. Fish and Wildlife Service Headquarters, <https://flic.kr/p/bAmcTt>, CC-BY

Elephants stand circles around the young elephants.



Image by cocoparisienne, pixabay.com, CC0

Kangaroos carry their young in their pouches.



Image by Ethan Brooke (seoulinspired), pixabay.com, CC0

Penguins sing a song that only their young know.



*Gentoo Penguin with Chicks by Liam Quinn,
<https://flic.kr/p/ak21az>, CC-BY-SA*

Does will leave their fawns in tall grass to hide them from predators.



Image by amarko, pixabay.com, CC0



Image by Robert Jones (bones46), pixabay.com, CC0



Image by David Porter (pooch_eire),
pixabay.com, CC0

Ewes recognize their baby lambs by smell.

Puppies whine to let their mom know they are hungry.



Mom and Her Puppies by born1945, <https://flic.kr/p/93qmGR>, CC-BY

Ducklings follow their mothers everywhere.



Image by skeeze, pixabay.com, CC0

Have you observed any patterns of behavior in animals?
Does this behavior help them to survive? Explain.

Putting It Together



Image by jcrane, pixabay.com, CC0

Some penguins build a nest of rocks and keep the egg between its legs.

Why would this type of penguin build a nest and keep the egg between its legs?

Construct an explanation to describe the penguins' behavior.

CHAPTER 3

Strand 3: Light and Sound

Chapter Outline

- 3.1 Sound Vibrations (1.3.1)
- 3.2 Effects of Light (1.3.2)
- 3.3 Light Pathways (1.3.3)
- 3.4 Communication (1.3.4)



Image by Jill Wellington, pixabay.com, CC0

Sound can make matter vibrate, and vibrating matter can make sound. Objects can only be seen when light is available to illuminate them. Some objects give off their own light. Some materials allow

light to pass through them, others allow only some light to pass through them, and still others block light and create a dark shadow on the surface beyond them where the light cannot reach. Mirrors can be used to redirect light. People use a variety of devices that may include sound and light to communicate over long distances.

3.1 Sound Vibrations (1.3.1)

Explore this Phenomenon

You can make a sound by clapping your hands together.



Image by Vijaya narasimha, pixabay.com, CC0



Image by dhanelle, pixabay.com, CC0

What causes your hands to make a clapping sound?

How do your hands feel when you clap?

1.3.1 Sound Vibrations

Plan and carry out an investigation to show the cause and effect relationship between sound and vibrating matter. Emphasize that vibrating matter can make sound and that sound can make matter vibrate.



In this section plan and carry out an investigation that explores the cause of sound through vibration of matter. See if you can determine how vibrations cause sound to occur and how the vibrations can be felt and seen. Also, explore how the sound vibrations can cause matter to vibrate.

Sound

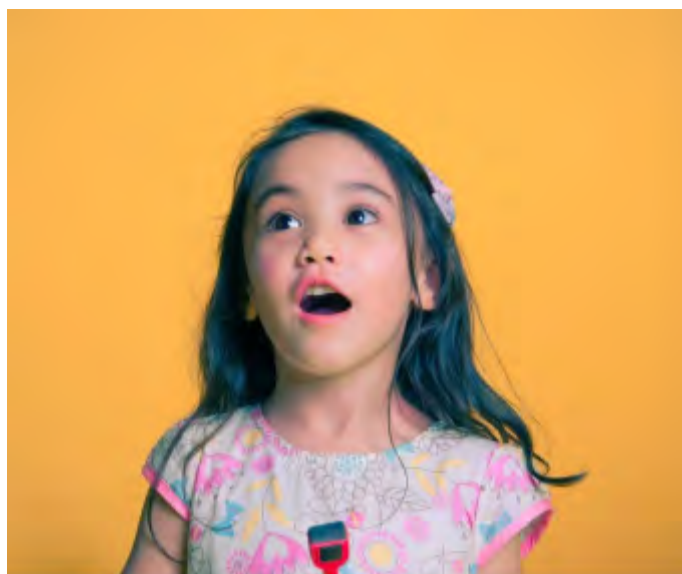


Image by tookapic, pixabay.com, CC0

Put your hand on your throat.

What do you feel when you talk?

What do you feel when you are not talking?

Put your hand on your throat when you are singing?

What do you feel when you are not singing?

Vibrations in your vocal cords make sound.
As you talk or sing you can feel those vibrations.

The boy is playing the guitar.



Image by Pexels, pixabay.com, CC0

The boy moves the strings of the guitar to make vibrations. The vibrations make the sounds that create music.

Sound can also make vibrations.



3D Tin Can Phones by Chris Potter, <https://flic.kr/p/dvyIH1>, CC-BY

You can even make a telephone with cans and string.

When you talk into the can, it makes the string vibrate. The vibration makes the sound on the other side.

Putting It Together



Image by dhanelle, pixabay.com, CC0

Using your knowledge, explain what happens when you clap your hands?

3.2 Effects of Light (1.3.2)

Explore this Phenomenon



Image by Anja (cocoparisienne), pixabay.com, CC0

We can see objects during the daytime.
It is harder to see objects at night.

What causes us to see the objects during the daytime?

What do we need to be able to see objects at night?

1.3.2 Effects of Light

Use a model to show the effect of light on objects. Emphasize that objects can be seen when light is available to illuminate them or if they give off their own light.



In this section create a model that shows how light affects objects. The model needs to demonstrate how objects can be seen when light illuminates them or when they give off their own light.

How We See Things

I need light to see the world.



Ck12.org, CC-BY-SA

Some things need to be illuminated by a light to see it.

Some things can be seen because it produces its own light.

Light illuminates objects so I can see them.

I can see how light illuminates the apple.



Image adapted from *Summer Red_CMD1506093 copy*
by Apple and Pear Australia Ltd.,
<https://flic.kr/p/vJfDvW>, CC-BY

I can see how light illuminates the coins.



Image by günter (moritz320), pixabay.com, CC0

The street lights illuminate the road at night.



Image by Jan W. (photographer2575), pixabay.com, CC0

I can see objects that give off their own light.

The sun makes its own light.



Image by PublicDomainPictures, pixabay.com, CC0

This street light gives off its own light.



*The Sun Goes Down in London by flyheatherfly,
<https://flic.kr/p/4qhvin>, CC-BY*

This lamp gives off its own light.



Just a Bit Shady... by Tony Fischer,
<https://flic.kr/p/64ZrqD>, CC-BY

Some animals can make their own light.



Image by Janice Trayers (lieliant), pixabay.com, CC0



glow by Jessica Lucia, <https://flic.kr/p/9Uy6wi>, CC-BY-NC-ND

A firefly makes its own light.

Look around your classroom.

What items are being illuminated?

What items are producing their own light?

If you turned off the lights, would you be able to see?

Putting It Together



Image by Anja (cocoparisienne), pixabay.com, CC0

We can see objects during the daytime.
It is harder to see objects at night.

Using your knowledge to explain why we can see objects during the day.

What causes us to see objects during the day?

Why is seeing objects during the day different than seeing objects at night?

What helps us to see objects at night?

Use a model to explain how light helps us to see.

3.3 Light Pathways (1.3.3)

Explore this Phenomenon



Mirror Ball Amsterdam by Ewan Topping, <https://flic.kr/p/rmE9o>, CC-BY

A mirror ball is used to fill a room with sparkling light along the walls.

How does a mirror ball cause spots of light along the wall?

How could you plan and carry out an investigation to test your idea?

1.3.1 Light Pathways

Plan and carry out an investigation to determine the effect of materials in the path of a beam of light. Emphasize that light can travel through some materials, can be reflected off some materials, and some materials block light causing shadows. Examples of materials could include clear plastic, wax paper, cardboard, or a mirror.



As you read, think about how you would plan and carry out an investigation to determine how different materials cause an effect on a stream of light.

How Materials Affect Light

A stream of light moves in a straight line.



Image by TheOtherKev, pixabay.com, CC0

It will keep moving until it reaches an object.

The material an object is made of determines where the light goes next.



If the material is clear the light will travel through.

1135/365 Bulb of inspiration by Maarten Takens,
<https://lic.kr/p/9RFRy5>, CC-BY-SA

A glass window is clear and lets light through.

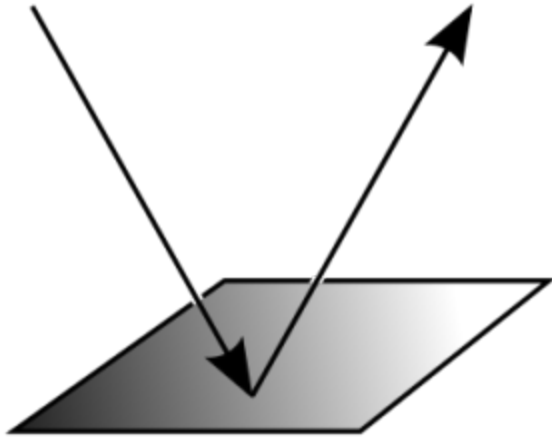


Image by PIRO4D, pixabay.com, CC0

Can you think of other materials that would let light through?

If an object is shiny it will reflect the light.

Reflect means the light bounces back from the object.



Light matter reflection by Klaus-Dieter Keller, CC-BY



Image by asifrom, CC0



Image by Arek Socha (qimono), pixabay.com, CC0

A mirror, aluminum foil, and sequins can reflect light.



Mirror by eltpics, <https://flic.kr/p/fy8coa>, CC-BY-NC



Image by Skeeze, pixabay.com, CC0

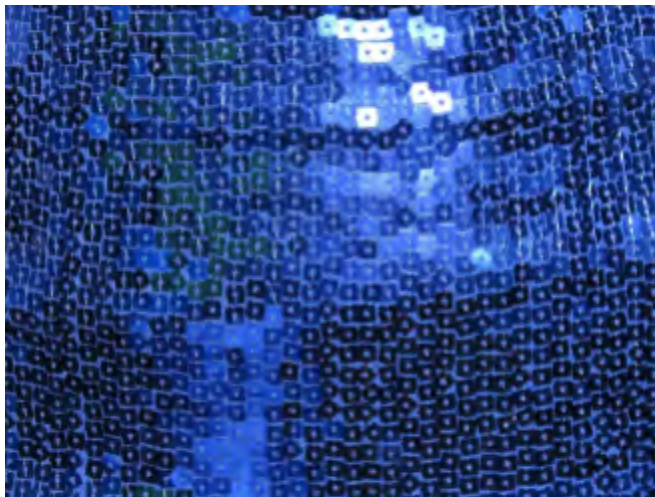


Image by Hans Braxmeier, pixabay.com, CC0

Can you think of other materials that would reflect light?

If an object is a solid it will block light.
A door is solid.
A door blocks the light.

When light is blocked shadows appear.

Shadows appear when light cannot pass through an object.



<https://www.maxpixel.net/Door-Light-Corridor-2126910>, CC0



Shadows by henry..., <https://i1ic.kr/p/ei6Vt4>, CC-BY-NC-ND



Image by ykaienvu, pixabay.com, CC0

A tree, car, chair, and even you block light and create shadows.



Image by Johannes Plenio, [pixabay.com](https://www.pixabay.com/), CC0



The Ultimate Car Of Sabah (North Borneo) by Jason Thien, <https://flic.kr/p/7zizge>, CC-BY



Chair Shadow by Scott Meis, <https://flic.kr/p/amvxQQ>, CC-BY-ND



14/365 - 10/11/09 [365 Days @ 50mm] - Our next soccer start! by Shardayyy Photography, <https://flic.kr/p/76xR1g>, CC-BY

Can you think of other materials that would block light?

How could you test materials to see how they affect light?

Putting It Together



Mirror Ball Amsterdam by Ewan Topping, <https://flic.kr/p/rmE9o>, CC-BY

A mirror ball is used to fill a room with sparkling light along the walls.

How does a mirror ball cause spots of light along the wall?

How could you plan and carry out an investigation to test your idea?

3.4 Communication (1.3.4)

Explore this Problem



Image by Free-Photos, pixabay.com, CC0

You have been grounded. You would like to let your friend next door know. However, you can't use a cell phone or go outside.

How could you design a structure to communicate to your friend?

How would your friend know that you were grounded?

1.3.4 Communication

Design a device in which the structure of the device uses light or sound to solve the problem of communicating over a distance. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs.* Examples of devices could include a light source to send signals, paper-cup-and-string telephones, or a pattern of drum beats.



As you read, focus on how different structures communicate information from a distance.

Devices Used for Communication

People use devices to communicate over long distances.

Light can help communicate with others.

A stoplight communicates to drivers.



Image by John R Perry (jp25jp), pixabay.com, CC0

A green light means go.
A red light means stop.
A yellow light means
prepare to stop.
All drivers need to know
what each light means.

A lighthouse communicates to ships.

A lighthouse means
there are rocks
nearby.

Can you think of any
other examples
where lights
communicate
information?



Lighthouse at Pigeon Point before the fog by
Waqas Mustafeez, <https://flic.kr/p/78jjwF>, CC-BY

Sound can help communicate with others.

A fire alarm communicates to people in a building.
The alarm sound means we need to exit the building.

A phone rings to
communicate to its
owner.
A ringtone means
someone is calling.



Image by Free-Photos, pixabay.com, CC0

Can you think of any other examples where sounds communicate information?

There are many ways to communicate with others. People have had to design structures and technology such as stoplights, lighthouses, alarms, and ringtones to communicate.

Putting It Together



Image by Free-Photos, pixabay.com, CC0

You have been grounded. You would like to let your friend next door know. However, you can't use a cell phone or go outside.

How could you design a structure to communicate to your friend?

How would your friend know that you were grounded?

Utah State Board of Education