# Kindergarten Science

## for Utah SEEd Standards 2020-2021

# Kindergarten

for Utah SEEd Standards

Utah State Board of Education OER
2020-2021

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**AUTHOR**

USBE OER

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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

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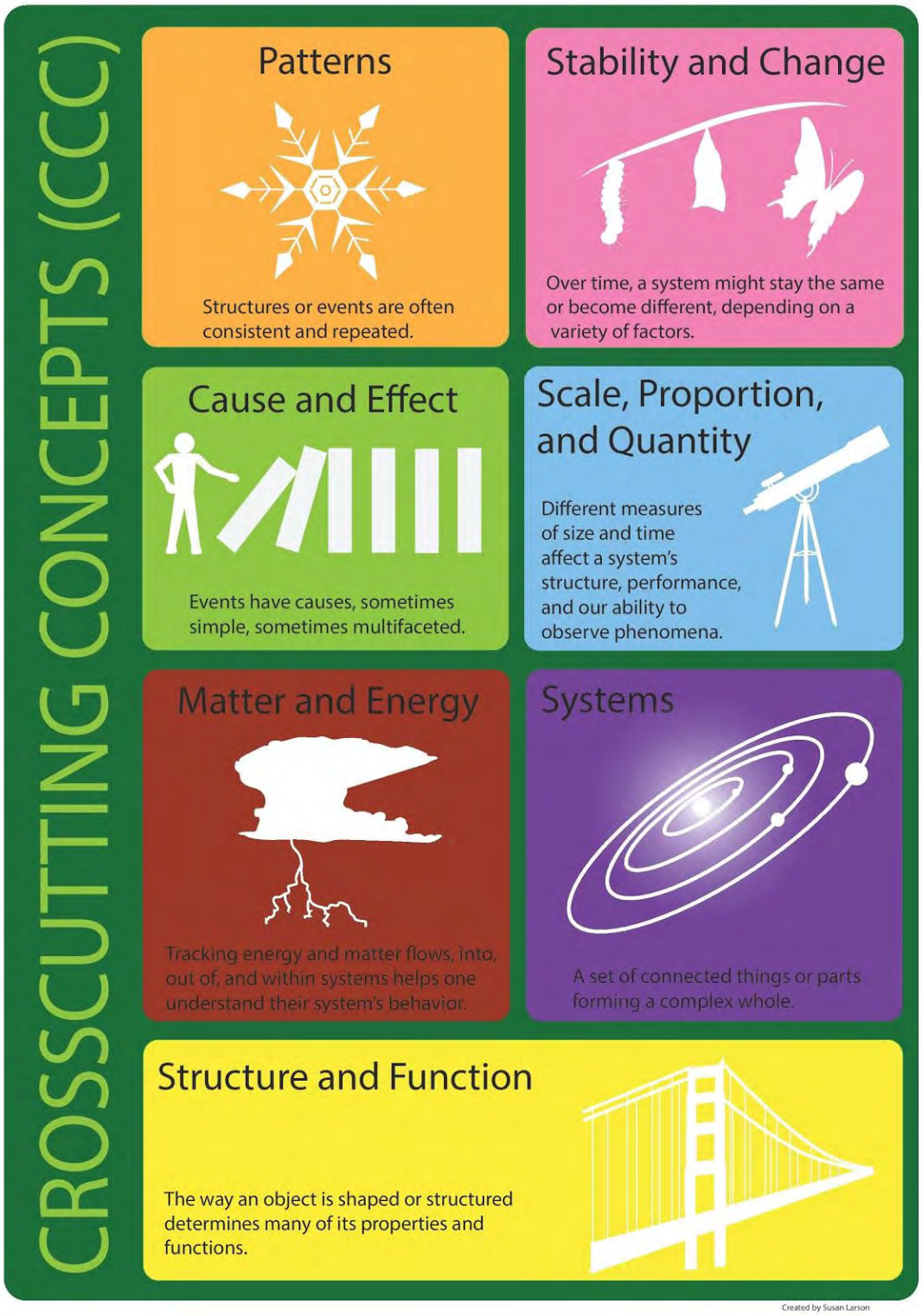
# Cross Cutting Concepts

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



# 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 Kindergarten 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

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# CHAPTER 1

## Strand 1: Weather Patterns

**Chapter Outline**



By: *Victoria_Borodinova / 1810 images, CC0*

Weather is the combination of sunlight, wind, snow or rain, and temperature in a particular region at a particular time.

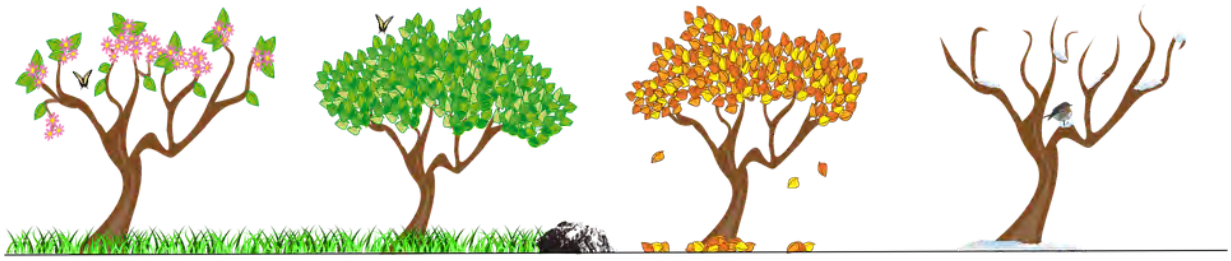
People measure these conditions to describe and record the weather to identify patterns over time.

Weather scientists forecast severe weather so that communities can prepare for and respond to these events.

Sunlight warms Earth's surface.

# 1.1 Local Weather (K.1.1)

## Explore this Phenomenon



Trees look different at different times of the year.

Which tree is experiencing cold weather?

Which tree is experiencing hot weather?

Is there a relationship between the way the tree looks and the weather?

# K.1.1 Local Weather

**Obtain, evaluate, and communicate information** about local, observable weather conditions to describe patterns over time. Emphasize the students' collection and sharing of data. Examples of data could include sunny, cloudy, windy, rainy, cold, or warm. (ESS2.D)

In this section, use the information given to see if you can identify a pattern about weather. As you look at the information, remember to think of ideas that you want to share with the class.

## Weather Charts

This chart shows the weather for 10 days in a specific month.

Symbols Key:

 = Warm (long sleeve shirt and pants)

 = Hot (shorts and short sleeve shirt)

 = Very Hot (swimming suit)

 = Chilly (Sweatshirt)

 = Cold (coat)

 = Freezing (winter gear)

| | 10 day outlook | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Month | January | | | | | | | | | |
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Conditions |  |  |  |  |  |  |  |  |  |  |
| Temperature |  |  |  |  |  |  |  |  |  |  |
| Month | March | | | | | | | | | |
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Conditions |  |  |  |  |  |  |  |  |  |  |
| Temperature |  |  |  |  |  |  |  |  |  |  |
| | June | | | | | | | | | |
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Conditions |  |  |  |  |  |  |  |  |  |  |
| Temperature |  |  |  |  |  |  |  |  |  |  |

| | September | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Conditions |  |  |  |  |  |  |  |  |  |  |
| Temperature |  |  |  |  |  |  |  |  |  |  |



Questions:

1. What do you notice about the information?
2. Do you see any patterns?
3. Describe a pattern that you notice.

## Putting It Together

What kinds of weather can be expected for each tree in the picture?

Draw a chart or picture that shows a weather pattern for one of the seasons.  Be able to explain your drawing.

# 1.2 Human Reaction (K.1.2)

## Explore this Phenomenon

| Month | September | | | | |
|---|---|---|---|---|---|
| Day | 1 | 2 | 3 | 4 | 5 |
| Conditions |  |  |  |  |  |
| Temperature |  |  |  |  |  |

Image by VisionPic.net, CC0

Weather affects our behavior in a lot of different ways. When we know what the weather will be, we can make choices about how we will respond.

1. How does the girl know to get out her rain gear?
2. What information is helping her make this choice?

Look at the following information to create an explanation about how humans can prepare for changes in weather.

# K.1.2 Human Reaction

**Obtain, evaluate, and communicate** information on the effect of forecasted weather patterns on human behavior. Examples could include how humans respond to local forecasts of typical and severe weather such as extreme heat, high winds, flash floods, thunderstorms, or snowstorms. (ESS3.B)

In this section, use information to see if you can identify when humans can use weather data to change their behavior. As you look at the information, remember to think of ideas that you want to share with the class.

## Human Choices

You learned about different weather patterns in section 1, now let's look at how understanding weather patterns can be useful. Scientists, called meteorologists, look at weather patterns and make predictions about what will happen. This prediction is called a weather forecast.

How can we use weather forecasts to help us prepare for the day?

Look at the following picture and determine what you would do if the type of weather shown were predicted.

Floods can happen quickly and put people in dangerous situations.

What type of weather pattern would help you decide if a flood was going to happen?

How would you prepare if you heard a flood was forecasted?

*Morpeth Flood* by johndal, CC-BY-SA https://flic.kr/p/5jBSSY

Playing outside on a sunny summer day is fun.

What things would you want to know if you were going to be outside all day?

How would you prepare for a day like the picture?

## Putting It Together

| Month | September | | | | |
|---|---|---|---|---|---|
| Day | 1 | 2 | 3 | 4 | 5 |
| Conditions |  |  |  |  |  |
| Temperature |  |  |  |  |  |

Image by VisionPic.net, CC0

Has there been a time when you weren't prepared for the weather and you were caught off guard?

What information would have helped you make better choices?

How would you use this information in the future?

# 1.3 Local Weather (K.1.3)

## Explore this Phenomenon

*Old Playground Slide* by MikeGoad, CC0

Using your five senses, determine the effect of the temperature on the slide due to the sunlight.

1. How would it feel?
2. What can you see that makes it appear hot?
3. Which senses did you use to help you gather this information?

Use the following images to help compare the sunlight on these different surfaces.  Use the information to investigate the sun's effect on different materials.

# K.1.3 Local Weather

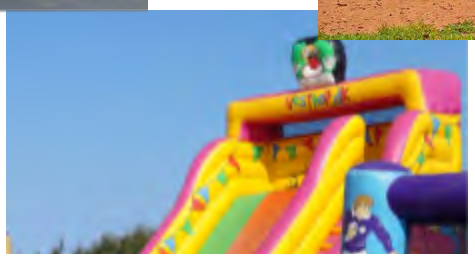
**Carry out an investigation** using the five senses, to determine the effect of sunlight on different surfaces and materials. Examples could include measuring temperature, through touch or other methods, on natural and man-made materials in various locations throughout the day. (PS3.B)

In this section, use your five senses to see if you can identify the effect of sunlight on different surfaces and materials. Think of ways that you could explore this idea in different ways.

## Hot or Cold?

Look at the pictures of the playground slides, the bouncy house slide, and the metal slide. What are the slides made of?

On a sunny day, which material would feel warmer to the touch? Which slide would you prefer to slide down and why?



Compare the sun's effect on each of the three materials, grass, sidewalk, and road. Which material would feel warmer?

If you were walking to a friend's house on a hot summer day, which surface would feel warmer on your bare feet?

On which one would you prefer to walk?

*770_sidewalks by Chris Monsere, CC-BY-NC, https://flic.kr/p/pcD1cc*

Which part of the beach, the sand that is in the sun or the sand that is in the shade, would feel warmer to the touch?

Where would you prefer to sit on a hot sunny day?

Why?

*Image by Life-Of-Pix, CC0*

## Putting It Together

*Image by cherylt23, CC0*

Now that you have observed the sun's effect on different materials, what predictions can be made based on what you know?

What effect did the sunlight have upon these objects?

What are ways you can test and confirm your predictions.

# 1.4 Reduce Warming (K.1.4)

## Explore this Problem

*Ice Cream Cone on the Street* by Tamorian, CC-BY 3.0
https://commons.wikimedia.org/wiki/File:Fallen-ice_cream-cone.JPG

When the sun shines on objects, like sidewalks or playground slides, those objects become warm and sometimes even hot to the touch.

Why is the ice cream in the picture melting?

How is this related to the sun?

Use the following pictures and information to design a way to keep the sun from making an area too hot.

# K.1.4 Reduce Warming

**Design a solution** that will reduce the warming effect of sunlight on an area. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs*. (PS3.B, ETS1.A, ETS1.B, ETS1.C)

In this section, use the information given to see if you can identify ways to lower the temperature of an object that sits in the sun. Think of ways that you could explore this idea in different ways.

## Too Hot?

When kids are playing outside it can get hot if it's sunny out.

What could you create to keep this playground from getting warm or hot?

*Image by RitaE, CC0*

Kids at the pool need to take a break and eat lunch, what can you create to help them from getting too warm in the sun?

*Image by Oshomah Abubakar, CC0*

A dog needs to stay outside on a summer day. Create something to help the dog from getting too hot while outside.

*Image by Octavian Catană, CC0*

## Putting It Together

*Ice Cream Cone on the Street* by Tamorian, CC-BY 3.0
https://commons.wikimedia.org/wiki/File:Fallen-ice_cream-cone.JPG

What could be created so that someone can eat their ice cream cone before it melts.

# CHAPTER 2

## Strand 2: Living Things and Their Surroundings

**Chapter Outline**



*Image by Christian Bowen, 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. The characteristics of surroundings influence where living things are naturally found. Plants and animals affect and respond to their surroundings.

# 2.1 Needs for Survival (K.2.1)

## Explore this Phenomenon

Look at the two pictures below. One picture shows a group of young swans swimming together and the other shows a tomato plant just beginning to grow.

How are plants and animals similar? What things do plants and animals need to survive and grow?

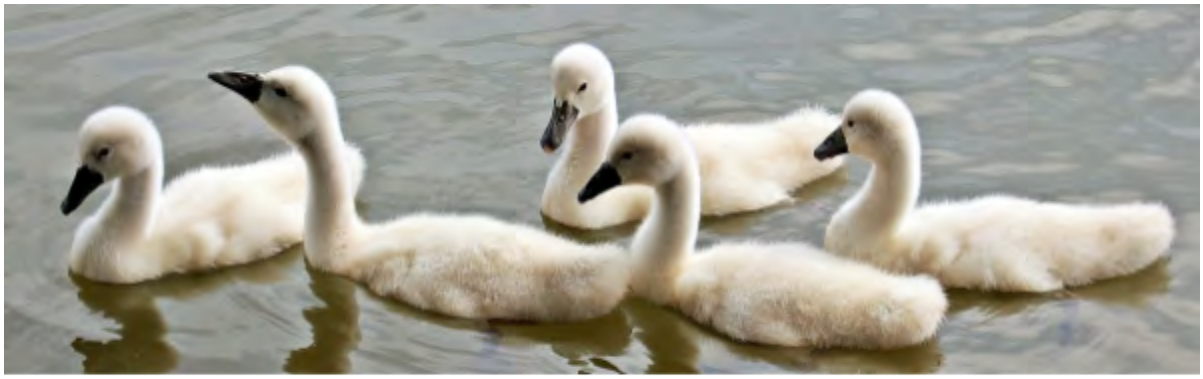


Image by S. Hermann & F. Richter (pixel2013), CC0

Image by Kruscha, CC0

Use the following information and the following pictures to learn more about how plants and animals survive in their surroundings.

# K.2.1 Needs for Survival

**Obtain, evaluate, and communicate information** to describe patterns of what living things (plants and animals, including humans) need to survive. Emphasize the similarities and differences between the survival needs of all living things. Examples could include that plants depend on air, water, minerals, and light to survive, or animals depend on plants or other animals to survive. (LS1.C)

In this section, use the information given to see if you can identify a pattern about what all living things need to survive. As you look at the information, remember to think of ideas that you want to share with the class.

## Staying Alive

Think about your house, how does it help you survive?

Image by Scott Webb, CC0

What are some things in your kitchen that help you survive?

Image by deborah Bloden, CC0

What changes do you notice when looking at the different pictures of this plant?

Seedling by Pepper with a Camera https://flic.kr/p/bDGVSe, CC-BY

*Large Tomatoes - Plant Alpha by Chris Vaughan, CC-BY-SA*

2015 August 16 Tomato plant by gardenerd1, CC-BY-SA

What did this plant need for the changes you noticed?

Image by Phichit Wongsunthi (Sirrw), CC0

*Image by Patrick Selin, CC0*

*Image by Christian Hermann, CC0*

What changes do you see in these pictures of the deer?

What do deer need to survive?

*Image by Vincent van Zalinge, CC0*

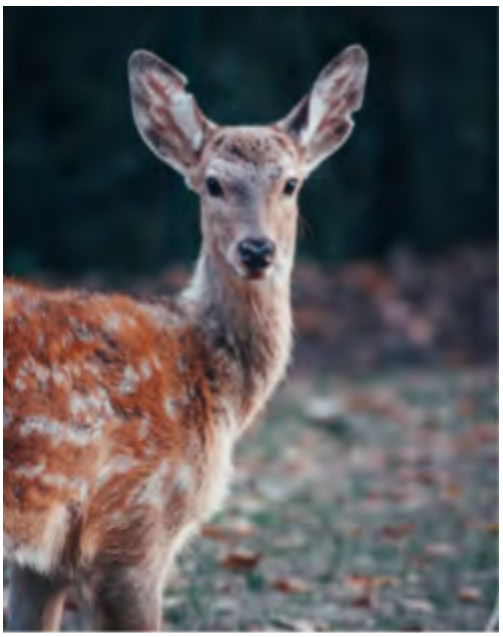


*Image by Benjamin Raffetseder, CC0*

*Image by Alysa Bajenaru, CC0*

*Image by Revolver Creative Company, CC0*

## Putting It Together

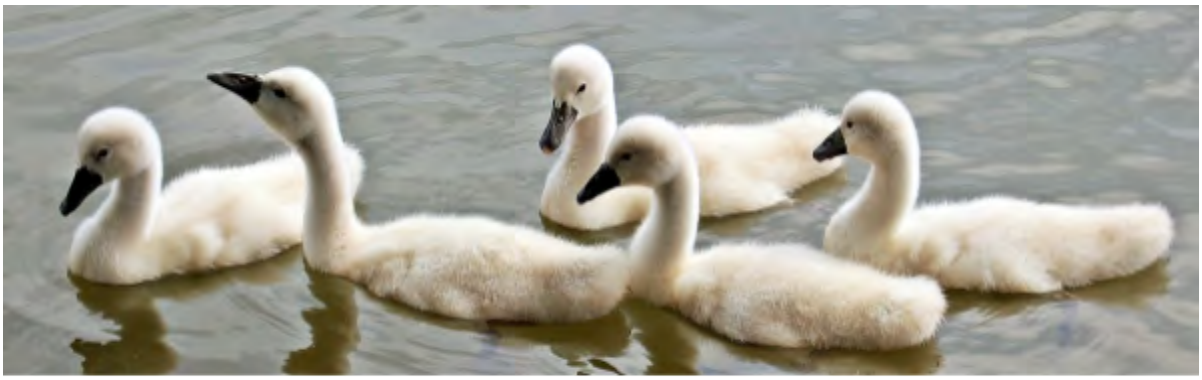


Image by S. Hermann & F. Richter (pixel2013), CC0

Image by Kruscha, CC0

Now that you have learned about what plants and animals need to survive, what do all living things need to survive? What changes do all living things experience as they survive?

# 2.2 Needs Relationships (K.2.2)

## Explore this Phenomenon

Image by victorrdyrnes, Pixabay.com, CC0

These plants are living in the middle of a desert.

How are these plants surviving?

What are the essential things it needs to survive?

# K.2.2 Needs Relationships

**Obtain, evaluate, and communicate** information about patterns in the relationships between the needs of different living things (plants and animals, including humans) and the places they live. Emphasize that living things need water, air, and resources and that they live in places that have the things they need. Examples could include investigating plants grown in various locations and comparing the results or comparing animals with the places they live. (LS2.B, ESS3.A)

In this section, use the information given to see if you can identify a pattern about the needs of living things and where they live. As you look at the information, remember to think of ideas that you want to share with the class.

## Where do you live?

We just learned about what living things need to survive. All living things have similar needs, but live in different surroundings. Explore how the needs of living things are met in different surroundings.

Each of these living things live in a different type of surroundings. In the pictures below identify what needs are being met by each living thing. Which patterns do you notice?

Image by agata822, Pixabay.com, CC0

Image by Gerhard Gellinger, Pixabay.com, CC0

Image by Cytis, Pixaby.com, CC0

Image by Christels, Pixabay.com, CC0

Image by Free-Photos, Pixabay.com, CC0

Image by Skeeze, Pixabay.com, CC0

Pixabay.com, CC0

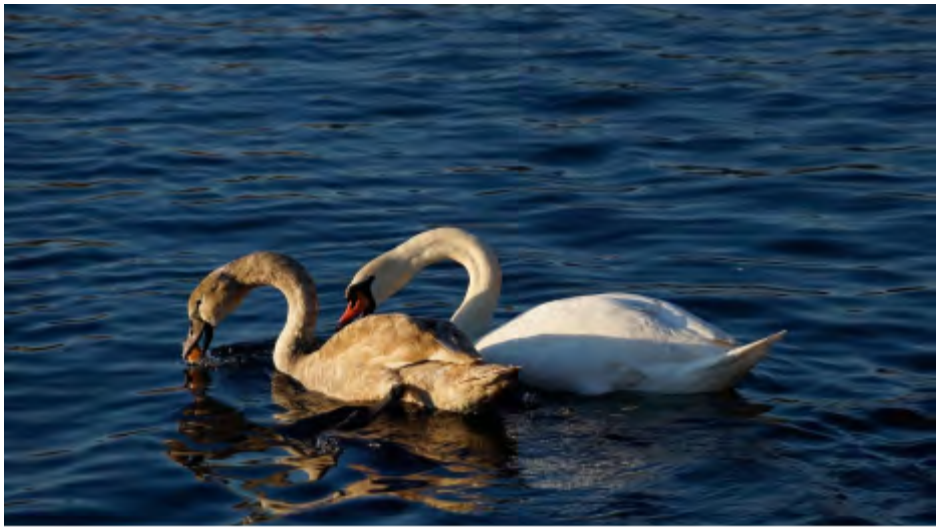


*Image by Taken, Pixabay.com, CC0*

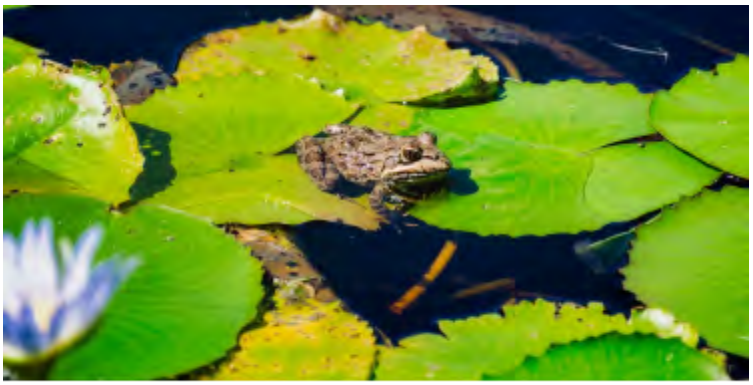


*Image by WelshPixie (Delyth Williams), Pixabay.com, CC0*

*Image by Skeeze, Pixabay.com, CC0*

## Putting It Together

Image by victorrdyrnes, Pixabay.com, CC0

Look at this picture.

What other things could live there?

What would they need to survive?

# 2.3 Effects on Surroundings (K.2.3)

## Explore this Phenomenon

*Image by Skeeze, Pixabay.com, CC0*

Plants depend on their surroundings for survival, but plants can also affect their surroundings.

How is the plant in the picture affecting its surroundings?

# K.2.3 Effects on Surroundings

**Obtain, evaluate, and communicate information** about how living things (plants and animals, including humans) affect their surroundings to survive. Examples could include squirrels digging in the ground to hide their food, plant roots breaking concrete, or humans building shelters. (ESS2.E)

In this section, use the information given to see if you can find ways that living things affect their surroundings. As you look at the information, remember to think of ideas that you want to share with the class.

Look at the pictures below. In what ways do plants, animals, and humans affect their surroundings?

Image by MabelAmber, Pixabay.com, CC0

Image by Steve Buissinne (stevepb), Pixabay.com, CC0

Image by Kevin (Kevsphotos), Pixabay.com, CC0

IMG_0227.jpg by Paul Cannons, https://flic.kr/p/dA1jnd, CC-BY-NC-ND

## Putting It Together

*Image by Skeeze, Pixabay.com, CC0*

Use what you have learned to answer the following questions.

In what other ways could living things affect their surroundings? Name some ways that plants, animals, and humans affect their surroundings.

# 2.4 Survival Designs (K.2.4)

## Explore this Problem

*Burrowing Owls at VTA Cerone by Yosemite James, https://flic.kr/p/9i5f13, CC-BY*

This bird, called the burrowing owl, builds its home in the ground.  Sometimes this bird will use holes that were dug by other animals to build their nests.

1.Why would an animal that flies want to build their home in the ground?

2.Name some positive (good) and some negative (bad) effects of living in the ground.

Use the following information and the following images to design a solution to problems that animals might face when trying to survive in their surroundings.

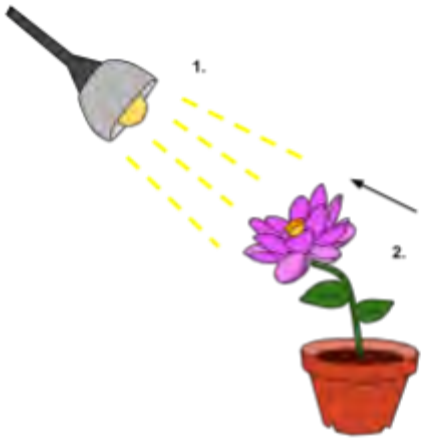
# K.2.4 Survival Designs

**Design and communicate a solution** to address the effects that living things (plants and animals, including humans) experience while trying to survive in their surroundings. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare designs*. Emphasize students working from a plant, animal, or human perspective. Examples could include a plant growing to get more sunlight, a beaver building a dam, or humans caring for the Earth by reusing and recycling natural resources. (ESS3.C, ETS1.A, ETS1.B, ETS1.C)

In this section, use the information given to see if you can design a solution to a problem that living things have while trying to survive in their surroundings. As you look at the information, remember to think of ideas that you want to share with the class.

## Survival

We learned earlier that plants need light to grow. Plants will grow toward the light, bending around obstacles or reaching out of small areas to get light for survival.




*Phototropic Response to Stimulus* by Mtomanelli15, https://commons.wikimedia.org/wiki/File:Phototrophic_Response_to_Stimulus.svg#/media/File:Phototrophic_Response_to_Stimulus.svg, CC-BY-SA 4.0

The plant below is growing in a crack in the sidewalk. If you were a plant would you choose to grow in the sidewalk crack?

Why or why not?

What if this was the only place you could live?

What things would you do to survive?

Lawnless dandy lion by Whatnot, https://flic.kr/p/Vvw3WE, CC-BY-NC-ND

Humans use their surroundings to build houses. Trees are cut down to be used for building materials. Trees are living things that provide shelter and food for other living things. As trees are removed from the surroundings, other living things may have trouble finding ways to meet their survival needs.

What are some living things that might be affected by the removal of trees from their surroundings?

Image by mohamed_hassan, Pixabay.com, CC0

Image by Wolfgang Brauner (John-Silver), Pixabay.com, CC0

Image by Dennis (Gerak01), Pixabay.com, CC0

Humans understand that trees are important for building houses but also for providing food and shelter for other living things.

How does the next picture show a solution to the problem of cutting down trees to build houses?

What other solutions can you think of?

*Seedling Planting* by Pacific Southwest Region 5, https://flic.kr/p/6tWQJp, CC-BY

Beavers are animals that live near rivers and streams and build structures called dams. The dam blocks the water to create a small pond.

Image by Graham Hobster (Graham-H), Pixabay.com, CC0

The beaver builds their home, called a beaver lodge, in the pond. The lodge provided protection for the beaver and gave them a place to store food.

*Image by USDA, Public Domain*

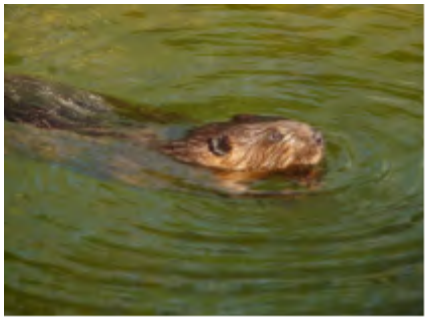


*Image by Hans Braxmeier (Hans), Pixabay.com, CC0*

Why would an animal that is not a fish want to build a house in water?

What problems do you think the beaver faces when trying to build its house?

Beavers must breathe air to survive, how does the beaver design its house so that it can still breathe while in its house?

## Putting It Together

*Burrowing Owls at VTA Cerone by Yosemite James, https://flic.kr/p/9i5f13, CC-BY*

Using what you have learned about animals and their surroundings, design a solution to address the effects of one of these problems.

1. How do plants, animals, and humans use their surroundings to survive?

2. Why would some animals choose to live in places that seem weird?(An owl is a flying animal but lives in the ground, beaver is a land animal that builds its house in the water)

3. Humans use their surroundings but also choose to replant what they have used.  How does this solution help solve problems of other living things?

# CHAPTER 3

## Strand 3: Forces, Motions, and Interactions

**Chapter Outline**




*IMG_3756* by Justin Walther, https://flic.kr/p/4vGtjg, CC-BY-NC

The motion of objects can be observed and described. Pushing or pulling on an object can change the speed or direction of an object's motion and can start or stop it. Pushes and pulls can have different strengths and different directions. A bigger push or pull makes things go faster and when objects touch or collide, they push on one another and can change motion.

# 3.1 Motion (K.3.1)

## Explore this Phenomenon

*Image by Kelly Sikkema, Unsplash.com, CC0*

How do the children make the scooters move?

Describe the motions you make with your body to make a scooter move?

# K.3.1 Motion

**Plan and conduct an investigation** to compare the effects of different strengths or different directions of forces on the motion of an object. Emphasize forces as a push and pull on an object. The idea of strength should be kept separate from the idea of direction. Non-contact forces, such as magnets and static electricity, will be taught in Grades 3 through 5. (PS2.A, PS2.B, PS2.C, PS3.C)

In this section, determine how different "strength and directions" change the motion of an object. Think of ways that you could explore this idea in different ways.

## Moving

Look at the following pictures. What are these children doing?

How are the children affecting the car?

How are they moving them differently?

*Image by Cengizhan Konuş, Unsplash.com, CC0*

*Image by Dayron Villaverde (DayronV), Pixabay.com, CC0*

Does it always move the same speed?

Why or why not?

Does it always move in the same direction?

Why or why not?

What other things can you think of that might move in the same way?

*Image by Peter Dlhy, unsplash.com, CC0*

How could they move this tree?

What are the differences in forces applied between the boy and the dad?

What other things can you think of that might need to be moved in a similar way?

How does a wheelchair help people?

What  forces make the wheelchair move?

What other things can you think of?

*Image obtained from Pixabay.com, CC0*

Look at all of these pictures of a baseball game:

During a baseball game the pitcher throws the ball towards home plate. Then a player in the outfield that is behind the pitcher catches the ball.

*Image by Keith Johnston, unsplash.com, CC0*

*Image by Nathaniel Yeo, unsplash.com, CC0*


*Image by Skeeze, Pixabay.com, CC0*

*Image by Phil Goodwin, unsplash.com, CC0*

What happened so that the baseball started moving in a different direction than when the pitcher threw it?

This girl has been riding her bike and wants to go home now.

What does she need to do to make her bike move?

What can she do to change the direction of the bike?

*Image by Caroline Hernandez, unsplash.com, CC0*

## Putting It Together

*Image by Kelly Sikkema, Unsplash.com, CC0*

Use what you have learned to answer the following questions:

How could the children make the scooter go faster?

How could the children go a different way?

# 3.2 Change in Speed (K.3.2)

## Explore this Design

*Image by Philipp Kofler (flooy), pixabay.com, CC0*

1. How could you get the soccer ball to move faster?

2. What happens if your opponent gets in the way?

3. How do speed and direction change the way the ball is moved?

# K.3.2 Change in Speed

**Analyze data** to determine how a design solution causes a change in the speed or direction of an object with a push or a pull. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs*. Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, or knock down other objects. (PS2.A, PS2.B, PS2.C, PS3.C, ETS1.A, ETS1.B, ETS1.C)

In this section, use the information given to observe how a 'design solution' changes the speed or direction of an object. As you look at the information, remember to think of ideas that you want to share with the class.

## Speed

The following video shows what can happen when objects change speed and direction in amazing ways.
https://www.youtube.com/watch?v=qybUFnY7Y8w

If you watched the video, answer the following questions:

1. What was the end result of all the objects moving?
2. Was there an easier way to get to the end result?
3. Can you find all the ways that objects changed direction or speed?
4. How were objects used to change the speed of another object?
5. How were objects used to change the direction of another object?

These kids are playing tag. The girl that is running away is trying to not get tagged. There are different ways she can try to get away:

- She can run in a straight line.
- She can run in a zigzag line.
- She could walk.

What do you think is the best way for her to not get tagged?

*Image by JudaM, Pixabay.com, CC0*

Look at the following picture:
What types of movement might help the deer escape the lion?

*Image from pxhere.com, Public Domain*

## Putting It Together

*Image by Philipp Kofler (flooy), pixabay.com, CC0*

Analyze data to determine how a design solution causes a change in the speed or direction of an object with a push or a pull. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, and compare and test designs*. Examples of problems requiring a solution could include having a marble or other object move a certain distance, follow a particular path, or knock down other objects.

1. How did you increase the speed or direction of the object?
2. What causes the changes in this object?
3. How can you use cause and effect in your design?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