

A young girl with red hair, wearing a bright yellow raincoat over a red and white striped shirt, is jumping in a puddle. She is holding a large red umbrella. Water is splashing up around her feet, creating a dynamic and joyful scene. The background is a blurred green lawn and trees, suggesting an outdoor setting on a rainy day.

KINDERGARTEN SCIENCE

FOR UTAH SEED STANDARDS

Kindergarten

for Utah SEEd Standards

Revised 2025

Utah State Board of Education OER

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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

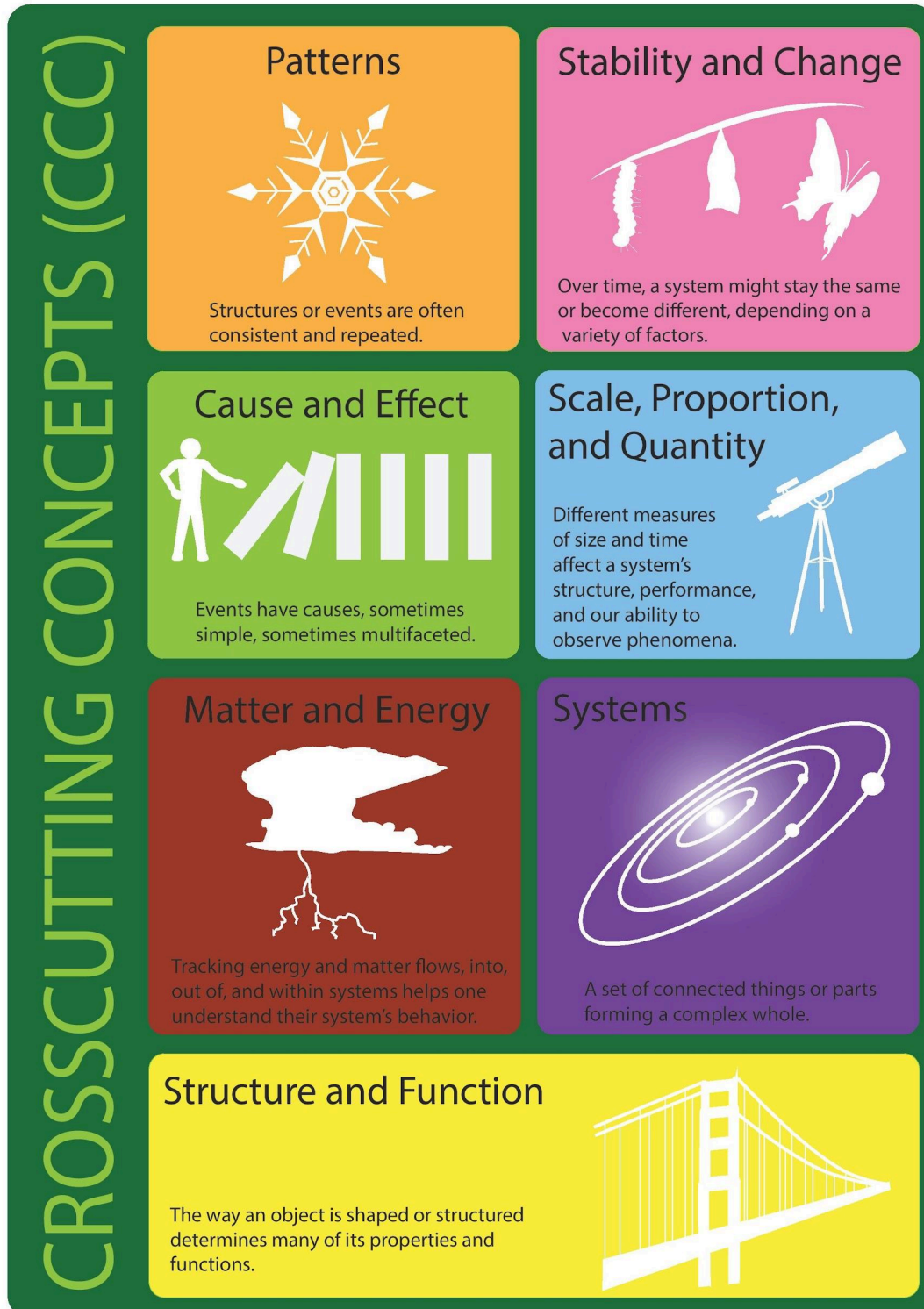
Science and Engineering Practices are what scientists do to investigate and explore natural phenomena



Created by Susan Larson

Crosscutting Concepts

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



What is involved in Engineering Design?

Engineering is a creative process where each new version of a design is tested and then modified, based on what has been learned up to that point. This process includes a number of components:

1. Identifying the problem and defining criteria and constraints.
2. Generating ideas for how to solve the problem. Engineers use research, brainstorming, and collaboration with others to come up with ideas for solutions and designs.
3. Use criteria and constraints to evaluate possible design solutions to identify the one(s) that best address these parameters for the problem in context
4. Build and test the prototypes. Using data collected, the engineer analyzes how well prototypes meet the given criteria and constraints.
5. Suggest or make improvements to prototypes to optimize the design.

In the Science with Engineering Education (SEEd) Standards, specific engineering standards generally involve two types of tasks:

1. If the standard includes the idea of designing, then the design process will contain components of defining the problem (along with identifying the criteria and constraints), developing many possible solutions, and optimizing a solution (e.g., determining a best solution for the situation based on the criteria and constraints, testing the solution, refining the solution).
2. If the standard includes the idea of evaluating, then the design process will contain components of defining the problem (along with identifying the criteria and constraints) and optimizing a solution. The idea of developing many possible solutions is not included because various solutions will be provided. The idea of evaluating then means determining a best solution from the provided solutions for the situation based on meeting the criteria and constraints requirements.

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Strand 1: Weather Patterns

Strand Outline

- 1.1 Local Weather (K.1.1)
- 1.2 Effects of Sunlight (K.1.2)
- 1.3 Human Reaction (K.1.3)
- 1.4 Reduce Warming (K.1.4)



By: Victoria_Borodina / 1810 images, CC0

Weather is made up of sunlight, wind, snow, rain, and temperature in one place at one time.

Scientists measure and record the weather to find patterns over time. They use patterns to predict the weather.

Weather scientists then tell communities the forecast so the people can prepare for good or bad weather.

Sunlight warms Earth's surface.

K.1.1 Local Weather

Phenomenon

The weather in my neighborhood changes throughout the year.



Images from pixabay.com; CC0

Observations and Wonderings:

What are you observing about this phenomenon?

What are you wondering about this phenomenon?

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, look for patterns about weather at different times of the year.

Scientists measure and record the weather in charts.

There are four weather patterns over the year called seasons.

As the weather changes, some trees grow leaves and lose leaves.

Leaves grow when it is warm and fall when it gets cold.



Images from pixabay.com, CC0

Weather Chart 1

Symbols Key:

Condition	Temperature	Temperature
 = Sunny  = Cloudy  = Partly Cloudy  = Raining  = Snowing  = Windy	 = Warm  = Hot  = Very Hot	 = Chilly  = Cold  = Freezing

Month	January									
Day	1	2	3	4	5	6	7	8	9	10
Conditions										
Temperature										

1. What do you notice about the weather from the chart?
2. What patterns do you see?
3. What would the tree look like in this weather?



Weather Chart 2

Symbols Key:

Condition	Temperature	Temperature
= Sunny = Cloudy = Partly Cloudy = Raining = Snowing = Windy	= Warm = Hot = Very Hot	= Chilly = Cold = Freezing

Month	April									
Day	1	2	3	4	5	6	7	8	9	10
Conditions			 	 						
Temperature										

1. What do you notice about the weather from the chart?
2. What patterns do you see?
3. What would the tree look like in this weather?



Weather Chart 3

Symbols Key:

Condition	Temperature	Temperature
 = Sunny  = Cloudy  = Partly Cloudy  = Raining  = Snowing  = Windy	 = Warm  = Hot  = Very Hot	 = Chilly  = Cold  = Freezing

Month	July									
Day	1	2	3	4	5	6	7	8	9	10
Conditions										
Temperature	 	 	 	  	  	 	 	 	 	  

1. What do you notice about the weather from the chart?
2. What patterns do you see?
3. What would the tree look like in this weather?



Weather Chart 4

Symbols Key:

Condition	Temperature	Temperature
 = Sunny  = Cloudy  = Partly Cloudy  = Raining  = Snowing  = Windy	 = Warm  = Hot  = Very Hot	 = Chilly  = Cold  = Freezing

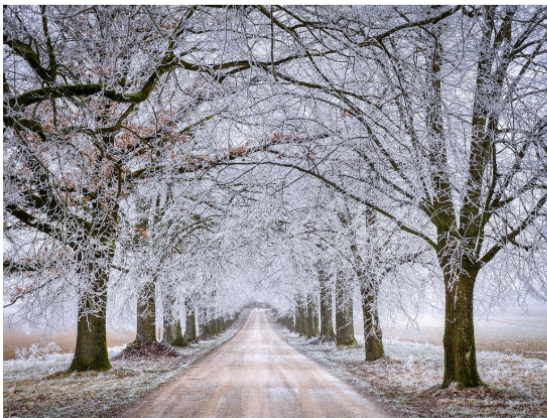
Month	October									
Day	1	2	3	4	5	6	7	8	9	10
Conditions										
Temperature										

1. What do you notice about the weather from the chart?
2. What patterns do you see?
3. What would the tree look like in this weather?



K.1.1 Local Weather

Putting It Together



The weather in my neighborhood changes throughout the year.

Writing Performance Task:

In the tasks that follow, you will observe and identify patterns in the weather to help you decide which tree matches the weather and explain why you chose that tree.

Gather:

Symbols Key:

Condition	Temperature	Temperature
 = Sunny  = Cloudy  = Partly Cloudy  = Raining  = Snowing  = Windy	 = Warm  = Hot  = Very Hot	 = Chilly  = Cold  = Freezing

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This chart shows the weather for one week.

One Week							
Day	1	2	3	4	5	6	7
Conditions			 	  			
Temperature							

A. What do you notice about the weather from the chart?

B. How many days were warm? How many days were chilly?

Reason:

This chart shows the weather for one week.

One Week							
Day	1	2	3	4	5	6	7
Conditions			 	  			
Temperature							

A. What patterns do you notice in the weather?

B. How many days were warm? How many days were chilly?



Communicate:

Circle the tree that matches the weather for this week.
Explain why you chose that tree.

Sentence Stems:

I chose that tree, because_____.

This tree matches the weather
because_____.

K.1.2 Human Reaction

Phenomenon

Month	April									
Day	1	2	3	4	5	6	7	8	9	10
Conditions										
Temperature										

The weather report helps us decide how to prepare for the day.



Boy



Girl

Images from pixabay.com, CC0

Observations and Wonderings:

What are you observing about this phenomenon?

What are you wondering about this phenomenon?

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, look for patterns of when humans use weather data to change their behavior.

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



image by john_loanndis, pixabay.com. CC0



Xander went outside to build a snowman.

What is he wearing in the picture that prepared him to play in the snow?

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?



Playing outside on a sunny summer day is fun.

How would you prepare for a day like the picture?

Circle some things you could hold or wear on a sunny day.



raincoat



mitten



shorts



scarf



swimsuit



umbrella

Why did you choose the items you did?

K.1.2 Human Reaction

Putting it Together

Month	April									
Day	1	2	3	4	5	6	7	8	9	10
Conditions										
Temperature										



Boy

Images from pixabay.com, CC0



Girl

The weather report helps us decide how to prepare for the day.

Writing Performance Task:

In the tasks that follow, observe and identify patterns in the weather to help you decide which items you would use for the identified weather and explain why you choose those items.

Gather:

Symbols Key:

Condition	Temperature	Temperature
 = Sunny  = Cloudy  = Partly Cloudy  = Raining  = Snowing  = Windy	 = Warm  = Hot  = Very Hot	 = Chilly  = Cold  = Freezing

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 IconsLibrary.net / 27425

Month	April									
Day	1	2	3	4	5	6	7	8	9	10
Conditions										
Temperature										

What do you notice about the weather from this chart?

Reason:

Symbols Key:

Condition	Temperature	Temperature
 = Sunny  = Cloudy  = Partly Cloudy  = Raining  = Snowing  = Windy	 = Warm  = Hot  = Very Hot	 = Chilly  = Cold  = Freezing

Images from:
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 PublicDomainVectors.com, CC0
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Month	April									
Day	1	2	3	4	5	6	7	8	9	10
Conditions										
Temperature										

What do you notice about the weather patterns on April 3rd, 4th, 5th and 6th?

Communicate:



raincoat



mittens



shorts



scarf



swimsuit



umbrella

Oral prompt: Circle the two items that could be used for the weather on April 3rd, 4th, 5th and 6th. Explain why you choose those items.

April			
3	4	5	6

Sentence Stem:

I chose _____ and _____

because _____

K.1.3 Local Weather

Phenomenon



The playground equipment is hotter in the afternoon than in the morning.

Observations and Wonderings:

What are you observing about this phenomenon?

What are you wondering about this phenomenon?

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.

Hot or Cold?

Look at the pictures of the slides. What materials are the slides made of?



Images by apriijlamb and ErikaWittleb, pixabay.com, CC0

Compare the sun's effect on each of these materials: plastic and metal. What would each surface feel like on a hot sunny day?

Compare the sun's effect on each of the three materials: sidewalk, grass and road. What would each surface feel like on a hot sunny day?



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

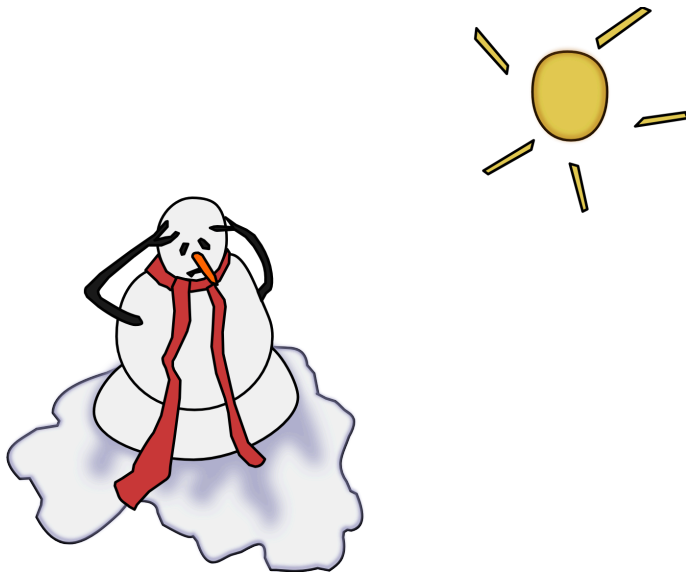
If you were walking to a friend's house on a hot summer day, which surface would feel the hottest on your bare feet?

Which part of the beach would feel cooler on your bare feet, the sand that is in the sun or the sand that is in the shade?



Image by Life-Of-Pix, CC0

Look at the picture of the snowman. Describe what effect the sun has on the snowman.



K.1.3 Local Weather

Putting It Together



The playground equipment feels hotter in the afternoon than in the morning.

Writing Performance Task:

In the tasks that follow, you will investigate the sun's effect on different playground equipment.

Gather:

- A. Which parts of the playground could be investigated for the effect of the sun on its surface?
- B. What are the different parts of the playground made of?

Reason:

A. Which situation would be best for testing the effects of the sun on playground equipment?

☐

On a rainy day

☐

On a sunny day

☐

At night

B. What would be the best plan for testing the effects of the sun on the playground equipment?



metal monkey bars



plastic slide



thick rope

☐

Feel each object ONLY in the morning.

☐

Feel each object ONLY in the afternoon.

☐

Feel each object BOTH in the morning and the afternoon.

Object	Morning	Afternoon
metal monkey bars 	cold 	hot 
plastic slide 	chilly 	warm 
climbing rope 	chilly 	warm 

Communicate:

A. What does the data tell us about the effects of the sun on the playground equipment?

Sentence Stem:

The sun makes the playground equipment _____.

B. Why would the playground equipment be different temperatures at different times of the day?

Sentence Stem:

The _____ the sun shines on the equipment, the
(longer, shorter)
_____ it will get.
(colder, warmer)

K.1.4 Reduce Warming

Authentic Situation

On hot sunny days, some animals like to sit in the shade.



Images by pasja1000 and music4life; pixabay.com, CC0

Observations and Wonderings:

What is the problem in this situation?

How are these animals solving the problem?

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, see if you can find ways to lower the temperature of an object that sits in the sun.

Too Hot?

When it is hot outside, the playground can get very hot from the sun. What could you create or add to keep this playground from getting too hot? How does your creation solve this problem?



Image by Leeza, pixabay.com, CC0

The eating tables can become very hot in the summer. What can you create or add to help them from getting too warm in the sun? How does your creation solve this problem?



Image by Oshomah Abubakar, CC0

Dogs sometimes stay outside on hot summer days. What would the problem be with the dog staying outside on a hot day? What can you create to help the dog? How does your creation solve this problem?



Image by Cparks, pixabay.com, CC0

K.1.4 Reduce Warming

Putting it Together



Images by pasja1000 and music4life; pixabay.com, CC0

On hot sunny days, some animals like to sit in the shade.

Writing Performance Task:

In the task that follows, you will design shade for a small toy using only the materials set out by the teacher.

Gather:

A. How do you know the duck is sitting in the shade?

B. What would be some effects if the animals were sitting in the sunlight?

Reason:



Design shade for a small toy, like this lion, using only the materials set out by the teacher.

Communicate:

Sentence Stem:

I kept my animal cool by _____ (description of model, design, drawing).

Example: I kept my toy tiger cool by folding an index card and making a hat to keep it cool.

Strand 2: Living Things and Their Surroundings

Strand Outline

- 2.1 Needs for Survival (K.2.1)
- 2.2 Needs Relationships (K.2.2)
- 2.3 Effects on Surroundings (K.2.3)
- 2.4 Survival Design (K.2.4)



Image by Christian Bowen, CC0

Living things, like plants and animals (including humans), depend on their surroundings to get what they need. Food, water, shelter, and a favorable temperature are some of the needs of living things. The characteristics of their surroundings influence where living things are naturally found. Plants and animals affect and respond to their surroundings.

K.2.1 Needs for Survival

Phenomenon

Young swans and young tomato plants both grow.



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



Image by Kruscha, CC0

Observations and Wonderings:

What are you observing about this phenomenon?

What are you wondering about this phenomenon?

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, see if you can identify a pattern about what all living things need to survive.

Staying Alive

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



(Image by Scott Webb, CC0)



Food



Water

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

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



Seedling by Pappert with a Camera <https://iStockphoto.com>, CC-BY



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



2016 August 16, Tomato plant by garden41, CC-BY-SA

What did this plant need for the changes you noticed?



Image by Phichit Wongsunthi (Slnw), CC0



Image by Patrick Sehn, CC0

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

What do deer need to survive?



Image by Vincent van Zalinge, CC0

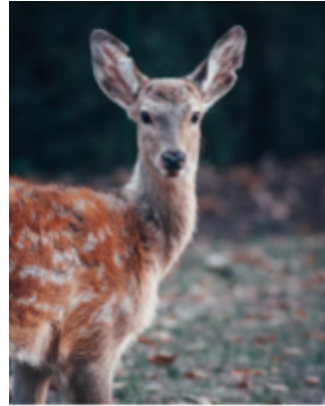


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K.2.1 Needs for Survival

Putting it Together



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

Young swans and young tomato plants both grow.



Image by Kruscha, CC0

Writing Performance Task:

In the task that follows, you will describe what a pet or a plant needs to survive.

Gather:

How are plants and animals similar?

What do plants and animals need to survive and grow?

Reason:

1. What pattern do you observe about how all living things survive?
2. What are the differences between what plants need to survive compared to what animals need to survive?

Communicate:

In the task that follows, you will describe (verbally, pictorially or written) what a pet needs to survive.

Brainstorm different types of animals as a class.

My pet needs _____ to survive.

Word Bank	
Air	 Copyright © 2010 by The McGraw-Hill Companies, Inc.
Water	 Copyright © 2010 by The McGraw-Hill Companies, Inc.
Food	 Copyright © 2010 by The McGraw-Hill Companies, Inc.
Sunlight	 Copyright © 2010 by The McGraw-Hill Companies, Inc.

K.2.2 Needs Relationships

Phenomenon

These plants are living in the middle of a desert.



Image by victorrdynnes, Pixabay.com, CC0

Observations and Wonderings:

What are you observing about this phenomenon?

What are you wondering about this phenomenon?

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, identify a pattern about the needs of living things and where they live.

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 agatw022, Pixabay.com, CC0

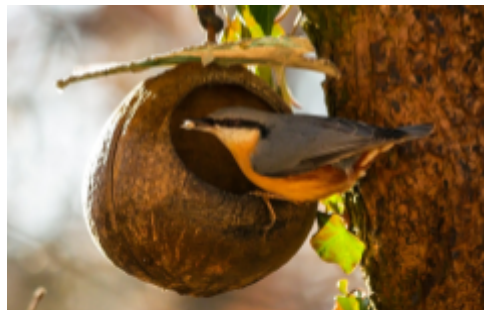


Image by Gerhard Gellinger, Pixabay.com, CC0



Image by Cyfls, Pixabay.com, CC0



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Image by WelshPixie (Dorothy Williams), Pixabay.com, CC0





Image by Taken, Pixabay.com, CC0



Image by Skeeze, Pixabay.com, CC0

K.2.2 Needs Relationship

Putting it Together



Image by victorddymnes, Pixabay.com, CC0

These plants are living in the middle of a desert.

Writing Performance Task:

In the following tasks, you will draw a picture of what an animal needs, including where it lives and what it needs to survive.

Gather:

How are these plants surviving?

What are the essential things the plants need to survive?

Reason:



Image by victorrdyrnes, Pixabay.com, CC0

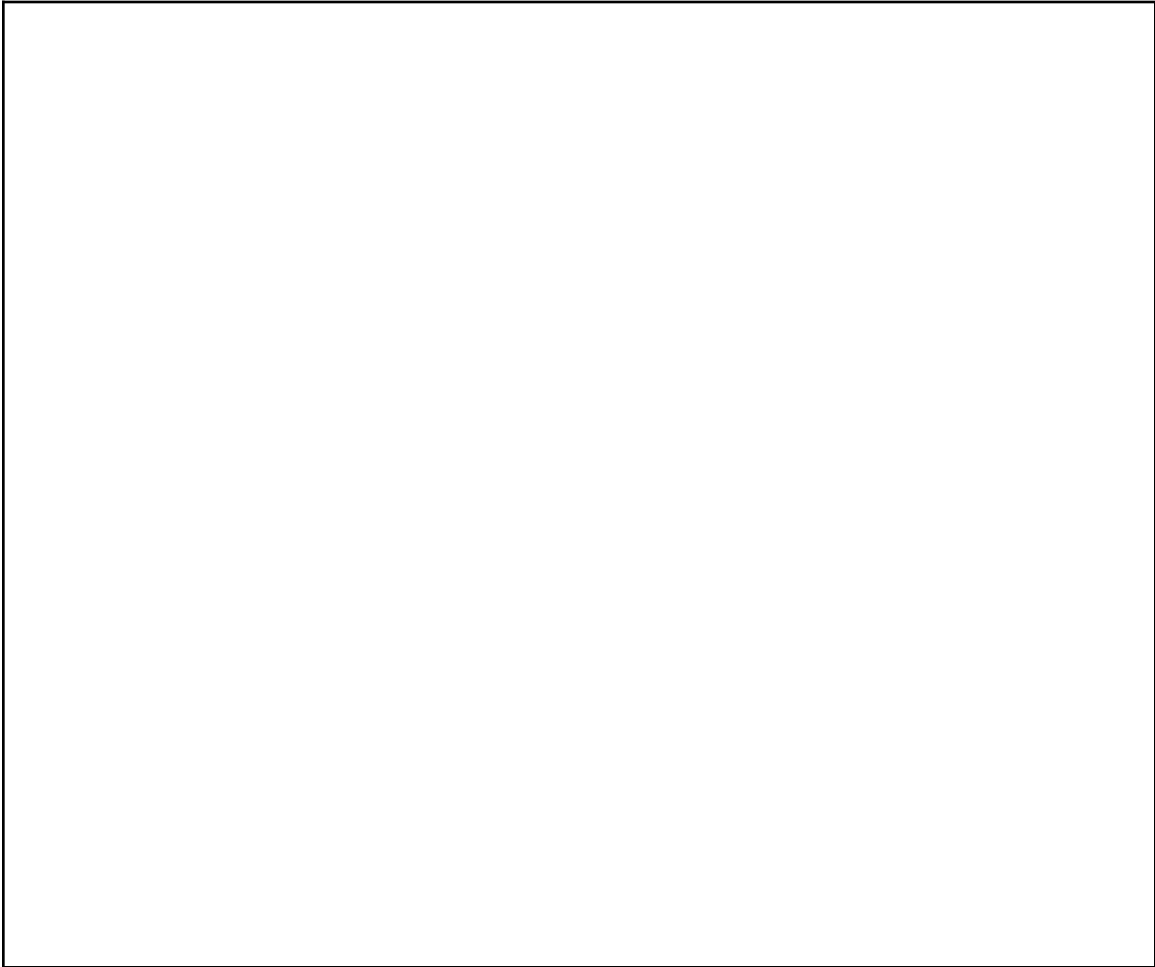
- A. Besides plants, what other living things could live in the middle of this desert?
- B. What would these living things need to survive in this place?
- C. Why are there no trees the farther you get away from the water?
- D. Where would most animals live?
- E. Do you see any patterns between the needs of different living things and the places they live?

Communicate:

Draw a picture of what an animal needs, including where it lives and what it needs to survive. (food, water).

Label your drawings.

Example: This lizard lives in the desert (a very dry place) because it gets hot and it needs just a little water and eats bugs found in the sand.



K.2.3 Effects on Surroundings

Phenomenon

The plant is growing from a crack in the blacktop.



Image by Skeeze, Pixabay.com, CC0

Observations and Wonderings:

What are you observing about this phenomenon?

What are you wondering about this phenomenon?

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, see if you can find ways that living things affect their surroundings.

How do you affect your surroundings?

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



Bird



Nest



Caterpillar



Leaf that has been eaten



Bee



Pollinating flower



New trees



Tree root growing through sidewalk



Person



House

K.2.3 Effects on Surroundings

Putting it Together



Image by Skeeze, Pixabay.com, CC0

The plant is growing from a crack in the blacktop.

Writing Performance Task:

In the tasks that follow, you will match cause and effect pictures about how living things affect their surroundings.

Gather:

How is the plant surviving in the blacktop?

How is the plant affecting its surroundings?

Reason:

Match the animal or human cause to how they affect their surroundings.



Communicate:

Pick one set of pictures from the Reason section and describe the cause/effect relationship.

Sentence Stem:

I noticed that the _____ (living thing) changed the
_____ (surroundings) because_____.

K.2.4 Survival Designs

Authentic Situation

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.



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

Observations and Wonderings:

What is the problem in this situation?

How are the burrowing owls solving the problem?

K.2.4 Survival Designs

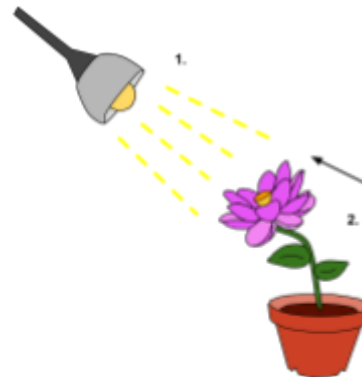
Design and communicate a solution to address the effects that living things (plants and animals, including humans) experience while trying to survive in their surroundings. *Define the problem by asking questions and gathering information, convey designs through sketches, drawings, or physical models, 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, see if you can design a solution to a problem that living things have while trying to survive in their surroundings.

Survival

We learned 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:Phototropic_Response_to_Stimulus.svg#/media/File:Phototropic_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 (Gera01), Pixabay.com, CC0

Humans understand that trees are important for building houses, but are 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?



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

What other solutions can you think of?

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



image by Graham Allister (Graham-A), Pixabay.com, CC0

The beaver builds their home, called a beaver lodge, in the pond. The lodge provides protection for the beaver and gives 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 build its house so that it can still breathe while in its house?

K.2.4 Survival Designs

Putting it Together

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.



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

Engineering Design Task:

In the tasks that follow, you will design a solution to prevent yourself from getting wet and cold while at recess using found objects (natural resources). Remember, you don't have a coat or umbrella! Show your thinking by creating a model using drawings and words.

Gather:

Students go outside for recess in cold and rainy weather.



<https://pixabay.com/photos/rain-boy-baby-autumn-spring-kids-4112380/>

- A. Name two solutions the students could use to go outside in the cold and rain.

- B. Name one possible negative effect of going outside in the cold and rain.

Reason:

Some animals live in trees. As trees are removed from the surroundings, these animals may have trouble finding ways to meet their survival needs.



A. What animals might need to find a new home because their tree got cut down?

B. Where could they find a new home?

C. What would their new home be made of?

Communicate:

In the task that follows, if you were a dog, how would you keep yourself from getting wet and cold while out in the rain using found objects (natural resources). Remember, the dog doesn't use an umbrella! Show your thinking by creating a model using drawings and words.

Sentence Stem:

If I were a dog, I would use _____ (materials) to create a _____ (object) to keep me from getting cold and wet.



Strand 3: Forces, Motions, and Interactions

Strand Outline

3.1 Motion (K.3.1)

3.2 Change in Speed (K.3.2)



IMG_3756 by Justin Walther, <https://flic.kr/p/4vGtJg>, CC-BY-NC

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

K.3.1 Motion

Phenomenon

The kids are making their scooters move.



Image by Kelly Sikkema, Unsplash.com, CC0

Observations and Wonderings:

What are you observing about this phenomenon?

What are you wondering about this phenomenon?

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 “strengths and directions” change the motion of an object.

Moving

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

How are the children affecting the car?

How are they moving the cars differently?



Image by Dayron Waverde (DayronV), Pixabay.com, CC0

Do the cars always move the same speed? Why or why not?

Do the cars 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 Dlhý, unsplash.com, CC0

How could they move this tree?

What force are the boy and his dad using to try to move the branch?

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?



Image obtained from Pixabay.com, CC0

During a baseball game, the pitcher throws the ball towards home plate. Then a player in the outfield who 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

What happened to cause the baseball to move in a different direction than the direction that the pitcher threw it?



The kids are taking their stuff with them in the wagon. What do they need to do to make the wagon move? What can they do to change the direction of the wagon?

K.3.1 Motion

Putting it Together



Image by Kelly Sikkema, Unsplash.com, CC0

The kids are making their scooters move.

Writing Performance Task:

In the tasks that follow you will use an object to push and/or pull. Determine how you make it move. See if you can make it move at different speeds.

Gather:

Add “push” and “pull” to word wall or student vocabulary journals.

(Refer to word bank below)

Students can play a Simon Says game to introduce what motion is and what it looks/feels like to experience “push” and “pull”.

Reason:

These children are riding their scooters. Use what you have learned in the reading to answer the following questions.



Image by Kelly Sikkema, Unsplash.com, CC0

A. How could the children cause the scooters to go faster?

B. How could the children cause the scooters to move in a different direction?

Communicate:

Use an object the teacher has provided to determine how to move it at different speeds.



<https://pixabay.com/photos/car-toy-toy-car-childhood-child-1577045/>

Sentence Stems:

When I push harder/softer it causes _____ to move _____.

When I pull harder/softer it causes _____ to move _____.

Push: when force is used to move an object away from something

Pull: to use force to grab or yank something toward you.

Words to support student discourse related to the Disciplinary Core Ideas (DCIs):

Word Bank			
push	 Copyright © 2013 Pearson Education, Inc.	effects	 Copyright © 2013 Pearson Education, Inc.
pull	 Copyright © 2013 Pearson Education, Inc.	change	 Copyright © 2013 Pearson Education, Inc.
faster	 Copyright © 2013 Pearson Education, Inc.	strength	 Copyright © 2013 Pearson Education, Inc.
cause	 Copyright © 2013 Pearson Education, Inc.	speed	 Copyright © 2013 Pearson Education, Inc.

K.3.2 Change in Speed

Authentic Situation

Soccer players on different teams are trying to kick the same ball.



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

Observations and Wonderings:

What is the problem in this situation?

How could the soccer players solve the problem?

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' causes a change in the speed or direction of an object.

Speed

Have you ever watched a very slow moving bowling ball? How many pins did it knock over? How many pins could it knock over if it was going really fast?

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 move to not get tagged?



Image by JudaM, Pixabay.com, CC0

Look at the following picture: What would need to happen to the track if you wanted a train to go in the direction of the arrow?



Image by The DigitalArtist, Pixabay.com CC0

K.3.2 Change in Speed

Putting it Together



Image by Philipp Kotler (flooy), pixabay.com, CC0

Soccer players on different teams are trying to kick the same ball.

Engineering Design Task:

In the task that follows, use a ramp and toy car, to test which ramp makes a car roll faster. Place a car on the high ramp and another car on the low ramp. Start the race at the same time to see which car moves down the ramp the fastest.

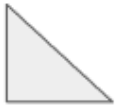
Gather:

In the task that follows, use a ramp and toy car, to test which ramp makes a car roll faster. Measure if a car moves faster or slower when pushed on the ramp.

Place a car on the high ramp and another car on the low ramp. Start the race at the same time to see which car moves down the ramp the fastest. Circle your answer.

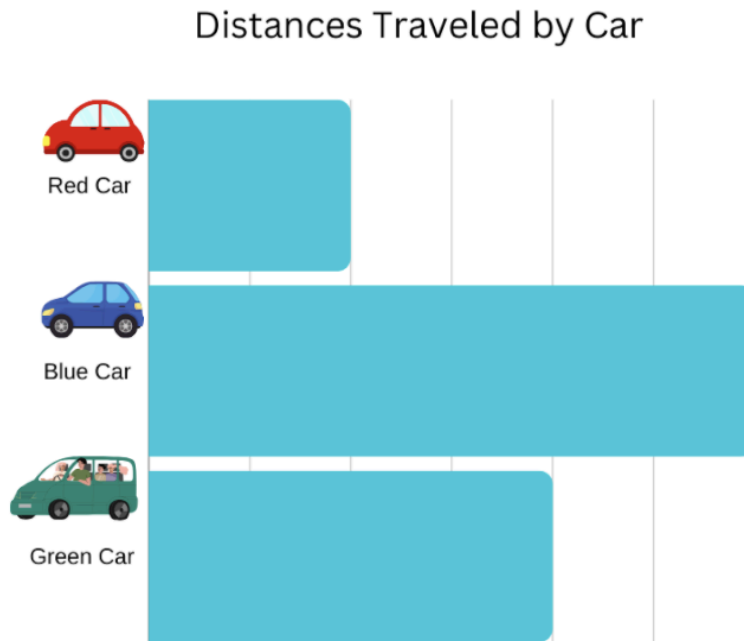
Test 1: Measure which car goes faster and slower because of the height of the ramp.

Test 2: Measure which car goes faster or slower when pushed with more or less force.

<u>Type of Ramp</u>	<u>Speed</u>
High ramp 	Faster or slower
Low ramp 	Faster or slower
High ramp 	Faster or slower
Low ramp 	Faster or slower

Reason:

These three cars went down the same ramp and the distance they traveled was measured and recorded below.



What force made the blue car go farther?

Circle one: Push Pull

Can you give a reason about why the red car didn't go as far as the others?

Communicate:

Analyze the data from the Race Experiment and share your results using the following sentences.

<u>Type of Ramp</u>	<u>Speed</u>
High ramp 	Faster or slower
Low ramp 	Faster or slower
High ramp 	Faster or slower
Low ramp 	Faster or slower

Sentence Stems:

The car goes faster because _____.

The car goes slow because _____.

If I push the car hard it _____.

If I push the car softly it _____.

Words to support student discourse related to the Disciplinary Core Ideas (DCIs):

Word Bank			
push		effects	
pull		change	
strength		direction	
motion		problem	
solution		incline	
data		test	
compare		speed	

