Mystery science

Anchor Layer Teacher Guide

A curriculum companion for Anchor Layer users

Grade K

Weather Patterns

Unit Web Link • Pacing Guide • Other Units

Unit Summary

In this unit, students gather evidence in order to identify daily and seasonal weather patterns. They use those patterns to explain mysteries like why you might lose your jacket during the day or why birds lay their eggs at certain times of the year.

Performance Expectations	Science & Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
• K-ESS2-1. Use and share observations of local weather conditions to describe patterns over time. • K-ESS2-2. Construct an argument supported by evidence for how plants & animals (including humans) can change the environment to meet their needs.	• Obtaining, Evaluating, and Communicating Information • Asking Questions and Defining Problems • Analyzing and Interpreting Data • Engaging in Argument from Evidence • Developing and Using Models	• ESS2.E: Biogeology • ESS2.D: Weather and Climate	• Systems and System Models • Patterns • Structure and Function

Anchor Phenomenon Background

Why do arctic foxes have fur that changes so much?

On most days, the temperature on Earth follows a predictable pattern. The temperature is coolest in the morning just before sunrise and then warms throughout the day. When the Sun sets, the temperature begins to drop again, and the pattern repeats during the following day. Animals do many different things to handle these daily temperature changes, such as huddling with others when cold or seeking shade when they are hot.

There are much longer seasonal weather patterns, too. Throughout all four seasons on Earth, different animals respond to the different seasons in different ways.

Some animals exhibit behavioral changes, such as birds building nests and laying eggs in the spring instead of the summer. Other animals physically change along with the changes in weather. Arctic foxes are one example of this. Throughout the fall, they grow a long, thick coat, which helps insulate them from the cold of winter. And throughout the spring, that coat slowly falls out, leaving them with a much thinner coat that helps them moderate their body temperature during the summer.

There are other benefits to the white coat of winter, such as helping the fox to blend in with its surroundings. However, this unit is focused primarily on weather, and therefore the content about the arctic foxes is focused primarily on how their coat helps them to regulate their body temperature.

Anchor Phenomenon: Furry Foxes
Seasonal Weather Patterns

Anchor Phenomenon
15 mins

Guided Inquiry
20 mins

Anchor Phenomenon Lesson Overview

Note: This lesson is part of this unit's Anchor Layer. If you have the Anchor Layer turned on, we recommend teaching all of the lessons in this unit in order.

The anchor phenomenon for this unit is the amazing cycle of changes an arctic fox's fur undergoes throughout the annual cycle of seasonal weather.

During the introduction, students generate observations and questions about the phenomenon and create a list of possible explanations for the phenomenon. Students will use these initial ideas to track how their understanding grows throughout the unit.

Student Work Samples & Notes

Students will gather clues during and after each lesson in this unit to help them improve their understanding and explanations. It is important to encourage students to recognize that even if they don't know the perfect answer yet, they are going to learn a lot throughout the unit and will have an opportunity to revisit the phenomenon over time.

See-Think-Wonder Chart Name: _____ mystery science

See What did you observe?	Think How can you explain what is happening?	Wonder What questions do you have?
The fox looks different colors *The fox is fluffy sometimes but not always* *There is snow on the ground* *There is grass on the ground*	*I think the arctic fox is changing colors* *I think the weather is different*	*Why does the fox change colors?* *Why is the fox puffy sometimes but not always?* *Why is there snow on the ground?*

Lesson 1: How do you know what to wear for the weather?
Daily Weather Patterns (pg 1 of 2)

Digital Book (W/Audio)
20 mins

Hands-On Activity
25 mins

Anchor Connection
15 mins

Assessment
20 mins

Overview

In this Read-Along lesson, students listen to an illustrated digital storybook with student participation. If you would prefer to read the book aloud yourself, you can switch to the non-narrated version. In the story, Kevin becomes a weather detective to figure out why he keeps losing his warm clothes.

In the activity, Weather Window, students track the weather over four days.

Activity Notes

Students will record the weather each day for four days using the Weather Window worksheet.

Think about:

- What time of day do you want students to check the weather? Ideally, it should be about the same time each day.
- How many days do you want students to check the weather? The worksheet has space to record weather for 4 days. If you want students to continue beyond 4 days, use the second page of the worksheet with blank day numbers that can be filled in.

Anchor Connection on Next Page

Lesson 1: How do you know what to wear for the weather?
Daily Weather Patterns (pg 2 of 2)

Digital Book (W/Audio)
20 mins

Hands-On Activity
25 mins

Anchor Connection
15 mins

Assessment
20 mins

Anchor Connection

In this lesson, students gathered observations of the relationship between the clothes that people choose to wear and the temperature of the weather. In colder weather, people wear more puffy clothing. The arctic fox doesn't wear clothes, but it does have a fur coat that is more puffy when the weather is cold.

Students revisit the See-Think-Wonder chart that they worked on during the Anchor Phenomenon. They should understand the foxes have more puffy fur when the weather is cold, and less puffy fur when the weather is hot. This is similar to how people change their clothes in different weather.

Connecting Storyline Question

How do the foxes know what the weather will be like each year?

Lesson 2: What will the weather be like on your birthday?
Seasonal Weather Patterns (pg 1 of 2)

Exploration
5 mins

Hands-On Activity
30 mins

Wrap-Up
5 mins

Anchor Connection
15 mins

Assessment
20 mins

Overview

In this lesson, students use observations of the four classic seasons to spot patterns and thereby determine the seasons' order.

In the activity, Circle of Seasons, students make observations of the four classic seasons of the temperate zone: snowy winter, warm spring, hot summer, and cool autumn with colorful leaves. Students spot patterns and determine the order of the seasons.

Activity Notes

We suggest students work in pairs. If you live somewhere that doesn't experience four seasons, we strongly recommend extending this lesson and discussing the seasonal changes where you live. You can print out a blank "Circle of Seasons" chart and fill this out with your students so that it matches the seasonal weather patterns where you live.

Anchor Connection on Next Page

Lesson 2: What will the weather be like on your birthday?
Seasonal Weather Patterns (pg 2 of 2)

Exploration
5 mins

Hands-On Activity
30 mins

Wrap-Up
5 mins

Anchor Connection
15 mins

Assessment
20 mins

Anchor Connection

In this lesson, students created a model of the seasonal changes in weather that take place over the course of a year. By looking at the ground in the pictures of the arctic foxes, we can find clues about how the weather changes over the seasons in the places where the arctic foxes live.

Students revisit the See-Think-Wonder chart that they worked on during the Anchor Phenomenon. They should understand that foxes have fur that changes between seasons. The puffy fur falls out each spring, and it grows back each fall.

Connecting Storyline Question

Why do the foxes change in the same way every year?

Lesson 3: Why do birds lay eggs in the spring?
Animals Changing Their Environment

Exploration
10 mins

Hands-On Activity
30 mins

Anchor Connection
15 mins

Assessment
20 mins

Overview
In this lesson, students learn why spring is the best time for babies to be born.

In the activity, Build A Bird Nest, students make a model of a bird nest and notice how birds can change their environment to meet their needs when they build their nests.

Activity Notes
We suggest students work in pairs. We also suggest encouraging students to modify the materials you provide -- tearing and crumpling them to make them fit in their nest. That's what birds do, after all!

Anchor Connection
In this lesson, students observed how animals do different things to adjust to different temperatures at different times of year. Arctic foxes also do different things at different times of year: they grow and shed their coat as temperatures get colder or warmer.

Students revisit the See-Think-Wonder chart that they worked on during the Anchor Phenomenon. They should understand that the seasons change in a predictable pattern every year. This is why the fox's fur changes in a predictable pattern, too.

Connecting Storyline Question
Which kind of weather do the foxes have the most?

Performance Task: What's the weather like for the arctic foxes?

Seasonal Weather Patterns

Unit Review
15 mins

Hands-On Activity
30 mins

Overview

In this performance task, students use observations of weather conditions in the areas where arctic foxes live to identify patterns over time.

After a brief review of the unit, students observe and describe different kinds of weather that the foxes experience. Then, they analyze data about the weather to identify seasonal patterns.

Performance Task Notes

Students can work as a class, in small groups, or individually. Each student will need one copy of the What's the weather? Worksheet.

With your students, begin the lesson. It begins with a brief unit review. Then, move through the activity. The activity includes a step-by-step guide and discussion questions throughout.

Crosscutting Concepts

Patterns: All living things are affected by the weather in the places where they live. The weather changes in short and long-term patterns, and animals respond by exhibiting short and long-term patterns of their own. Over the course of a single day, animals might huddle together at night for warmth, while seeking shade during the heat of the day. Patterns such as this one repeat on a daily basis. On the other hand, long-term seasonal changes can affect when animals lay eggs or how their feathers or fur shed and are grown again and again, each year.