The Weather

Fulldome Version

A Modular Program

The following items are included with this product to provide a complete educational experience:

- The Weather fulldome modular planetarium program designed in three segments that can be paused in-between to allow for live interaction or be played straight through without pauses.
- A list of standards and topics covered
- A suggested live interaction script (including a list of images)
- Program images to be used during the live interaction pieces of the presentation.
    - Pre and Post-planetarium lesson activities.

Science in the Dome Series

The Weather – Standards and Topics Covered

Recommended for Grades K – 2

National Standards Covered: Changes in the Earth and Sky: *Weather changes from day to day and over the seasons. Weather can be described by measurable quantities, such as temperature, wind direction and speed, and precipitation.*

Next Generation Science Standard

1) **Disciplinary Core Ideas:**

ESS2.D: Weather and Climate

- 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 and to notice patterns over time. (K-ESS2-1)
- Scientists record patterns of the weather across different times and areas so that they can make predictions about what kind of weather might happen next. (3-ESS2-1)

PSS1.A: Structure and Properties of Matter and PSS1.B: Chemical Reactions

- Different kinds of matter exist and many of them can be either solid or liquid, depending on temperature. Matter can be described and classified by its observable properties. (2-PS1-1)
- Heating or cooling a substance may cause changes that can be observed. Sometimes these changes are reversible, and sometimes they are not. (2-PS1-4)

2) **Crosscutting Concepts**

Patterns

- Patterns in the natural world can be observed, used to describe phenomena, and used as evidence. (K-ESS2-1)
- Patterns of change can be used to make predictions. (3-ESS2-1),(3-ESS2-2)

Systems and System Models

- Systems in the natural and designed world have parts that work together. (K-ESS2-2)

3) **The Nature of Science**

- Scientists use different ways to study the world (including their five senses).
- Science investigations use a variety of methods, tools, and techniques.

Topics Covered:

- Using the five senses to observe and predict weather
- Cloud types and how they help us predict the weather
- Ways to describe weather.

- Measuring weather (including tools to measure weather)
- Parts of the water cycle

The Weather – Live Script

This program includes three separate automated modules. The modules cover the following topics:

1. Module 1 – Using the senses to observe weather and identifying cloud types.
2. Module 2 –Describing and measuring weather.
3. Module 3 – Identifying the basic features of the water cycle.

The program has been designed to be paused in-between each of the modules to allow for live interaction or to be played straight through.

Live interaction: A live interaction script and supporting visuals are provided to maximize the educational value of this program. The careful design of the live scripting content supports an increase in audience member's content understanding and strengthens their abilities to engage in scientific practices. The supporting visuals for the live interaction segments are designed to come in order as described in the live interaction script. For most systems, an operator would want to pause on each image to allow time for discussion. The scripting is provided as a suggested guide, however, presenters are encouraged to make their live segments their own and adjust the level based on the abilities of audience members.

Suggested Live Interaction Implementation:

- Prior to the running the automated Module 1, present Live Segment A, *Using the Five Senses to Observe Weather.*
- After running Module 1 and prior to Module 2, present Live Segment B, *Reviewing the Types of Clouds and How they Help Us Predict the Weather* and present Live Segment C, *Describing Weather.*
- After running Module 2 and prior to Module 3, present Live Segment D, *Reviewing Ways that We Can Measure the Weather* and present Live Segment E, *Name the Parts of the Water Cycle.*
- After running Module 3, present Live Segment F, *Review the Water Cycle.*

Live Segment A – Using the Five Senses to Observe Weather

Purpose – To introduce using the five senses to learn about weather.

Today we are going to be learning about weather. Weather is something that you all experience every day. It can change your plans for the day. It can help you decide what to wear for the day. It can even change your mood. Like a good scientist, we can use most of our senses to learn about weather. Does anyone know any of the five senses? Answer: Seeing, Hearing, Touching, Smelling, Tasting Great, so let's think about which of these senses we use the most to learn about weather and how they can help us learn about weather. What sense do you think you use to learn about the kind of weather that is going on right now outside? After initial responses are given, such as seeing and feeling, encourage audience to think about if we can use the other senses as well to tell what type of weather it is outside. Possible Answers and Responses: Seeing – we can look with our eyes to see if it is sunny or cloudy or raining or windy. What kind of weather do you think is happening in these images? What can you tell by looking with your eyes? Hearing – sometimes we can use our ears to learn about the type of weather. What kind of weather do you think it is if you hear birds chirping? Answer: sunny, nice What if you hear sounds of water hitting your roof? What kind of weather might that mean? Answer: rainy Touching – when we are outside we can feel weather. What do you think this duck would be feeling? Smelling – sometimes the weather that is going on can actually have a smell. Next time that it rains take a big whiff to see if you can smell the rain. The fifth sense, tasting, is not used as much to learn about	Display Image 1 – "The Weather" As audience members state one of the senses put the corresponding sense image up on the dome. Display Image 2, Image 3, Image 4, Image 5, Image 6 *Take five senses images down off the dome.* Seeing – Display Image 7 (sunny day) and Image 8 (rainy day) together. Discuss each image and how what we see can tell us about the weather. Hearing – Display Image 3 (ear icon) Touching – Display Image 9 – Duck in the rain. Discuss why the duck would be able to tell it is raining by using the sense of touch. Smelling – Display Image 10 – Girl smelling the sky. Tasting – Display Image 11 – Boy eating snow

Live Segment B – Reviewing the Types of Clouds and How they Can Help Us Predict the Weather

Purpose – To reinforce cloud types and how they can help us predict the weather.

We saw how our senses can help us learn about the weather. The type of clouds that we see with our eyes is one way that we can predict what the weather will be like in the future. Does anyone remember the name of one of the three main types of clouds? Answer: Cirrus, Cumulus, and Stratus	Display Image 12 – Girl touching the sky As the audience responds display the image up of each of the cloud types. Image 13-Cirrus cloud tablet image Image 14 - Cumulus cloud – tablet image Image 15 - Stratus cloud – tablet image *Remove cloud images down.*
Good. And each of these cloud types looks different in the sky. How would you describe the cirrus clouds? Possible Answers and Responses: thin, feathery looking clouds What did the girl find out about cirrus clouds? What does it mean if they are moving? Possible Answers: They usually appear on nice days, but can mean a change is coming. The direction the cirrus clouds move tells us the direction that the weather is moving. So the movement of cirrus clouds can help us predict where new weather is coming from. This can mean that the weather is changing. How would you describe Cumulus clouds? Possible Answers and Responses: puffy, round, sometimes gray on the bottom These are often described as a cotton balls in the sky. If these are all white, it usually means it will be a nice day as well. But what if the bottom of these puffy clouds starts to look gray. What does that mean? Possible Answer: That it will probably rain soon. Yep, and speaking of rain, what do stratus clouds look like? Possible Answers and Responses: blanketing clouds, gray	Display Image 16 - Cirrus cloud Display Image 17 - Feathers Display Image 18 - Cumulus cloud Display Image 19 - Cotton balls Display Image 20 – Grey Cumulus clouds Display Image 21 – Stratus cloud Display Image 22 - Blanket

Live Segment C – Describing Weather

Purpose – To introduce ways that we can describe weather.

Now, let's talk about ways that we can describe the weather outside. If you have ever watched a meteorologist (that is a person that tells you about the weather) you probably noticed that meteorologist often describe different aspects of weather. Can anyone think of one of the ways that we describe the type of weather that we experience? Possible Answers: Temperature, Amount of Sunlight, Humidity, Air Pressure, Wind Direction If audience is having difficulty in thinking of these provide some hints. Well there a bunch of different ways that we can describe the weather. Part of a meteorologist's job is to measure the different types of weather. We are going to watch the next part of our program to learn some of the ways we can describe and measure weather.	Display Image 23 – Girl in rain **Play Module 2.**

Live Segment D – Reviewing Ways that We Can Measure Weather

Purpose – To review and reinforce the ways (including instruments that are used) to measure weather.

A suggestion for this module is to have sample of real weather tools available for audience members to see.

Let's review some of the ways that we can measure weather? Let's start with temperature. Who knows what instrument we use to measure the temperature? Answer: A thermometer. Yes, a thermometer is used to measure the temperature. There are different types of thermometers. Some just show numbers and some you have to read in a glass or plastic tube. Can anyone tell me what temperature the digital thermometer says? Answer: The digital thermometer is 98.6 degrees Fahrenheit Do you think this is a hot day or a cold day? Answer: Hot day Yes, temperatures near 100 degrees Fahrenheit are hot. The next weather tool that the girl learned about in the program was a barometer. Does anyone remember what a barometer measures? Answer: Air Pressure. Yes, a barometer measures air pressure. When a barometer is rising it means sunny and dry conditions. So what do you think it means if a barometer is falling? Answer: It can mean stormy and wet conditions. To help you remember just thinking a falling barometer might lead to falling rain!!! Speaking of rain, who knows what the instrument is called that we can use to measure the amount of rain that is falling? Answer: A rain gauge. Rain gauges have numbers on the side that can let us know just how much rain has fallen in a given spot. You could put one outside your house or classroom next time it rains!	Display Image 24 and Image 25 (thermometers) Display Image 26 - Barometer. Display Image 27 - Rain gauge.

Live Segment E – Name the Parts of the Water Cycle

Purpose – To introduce the parts of the Water Cycle

The last part of our program today is going to discuss something called the water cycle. We are going to take a few minutes first to learn the different parts of the water cycle. First, does anyone know what a cycle is? Answer: A cycle is a repeating pattern that happens over and over again. Yes and when you understand the order of a cycle you can predict what is going to happen next. The parts of the water cycle include: Evaporation, Condensation, Precipitation and Collection. These are all pretty big words so let's practice saying each of them once. Repeat after me: Evaporation Condensation Precipitation Collection Let's watch and learn what each of these parts of the water cycle is and order of the water cycle.	Display Image 29 – Parts of the water cycle **Play Module 3**

Live Segment F – Review the Water Cycle

Purpose – To review the parts of the water cycle.

Let's review how the water cycle works. We usually think of the water cycle as starting when water is heated up and leaves the land by rising into the sky. Who remembers what that is called?	
Answer: Evaporation	Display Image 30 - Evaporation
Yes, evaporation is how the water gets back up into the sky. Water takes the form of steam and rises into the air. Who knows what happens after it gets into the sky?	
Answer: It collects in the sky and cools. When this happens it turns back into liquid form.	Display Image 31 - Condensation
When the water that rose into the sky turns back into liquid form we call that condensation. This is what forms clouds in the sky.	
After a while more and more water condenses and the air cannot hold it anymore. At this point it falls back to the ground in what we call precipitation. Can anyone give an example of types of precipitation?	Display Image 32 - Precipitation
Answers: rain, sleet, hail, snow	
Does anyone remember the last step of the water cycle?	
Answer: Collection.	Display Image 33 - Collection
Yes collection is when the water that falls ends up back on the earth. This water could end up in oceans, rivers or lakes, or back on the land.	
Together evaporation, condensation, precipitation and collection form that we call the water cycle.	Display Image 29 – Parts of the water cycle

List of Images for Live Segment

- Image 1 – The Weather
- Image 2 – Eye Icon
- Image 3 – Ear Icon
- Image 4 – Mouth Icon
- Image 5 – Hand Icon
- Image 6 – Nose Icon
- Image 7 – Sunny Day
- Image 8 – Rainy Day
- Image 9 – Duck in the Rain
- Image 10 – Girl Smelling the Sky
- Image 11 – Boy Eating Snow
- Image 12 – Girl Touching the Air
- Image 13 - Cirrus Cloud Tablet Image
- Image 14 – Cumulus Cloud Tablet Image
- Image 15 – Stratus Cloud Tablet Image
- Image 16 – Cirrus Clouds
- Image 17 – Feathers
- Image 18 – Cumulus Clouds
- Image 19 – Cotton Balls
- Image 20 – Grey Cumulus Clouds
- Image 21 – Stratus Clouds
- Image 22 – Blanket
- Image 23 – Girl in the Rain
- Image 24 – Digital Thermometer
- Image 25 – Glass Thermometer

- Image 26 – Barometer
- Image 27 – Rain Gauge
- Image 28 – Weather Vane
- Image 29 – Parts of the Water Cycle
- Image 30 – Evaporation
- Image 31 – Condensation
- Image 32 – Precipitation
- Image 33 – Collection

Pre-Planetarium Program Lesson

Materials: Five Senses Worksheet, Water Cycle Worksheet, The Weather PowerPoint, Water Cycle Demonstration Equipment

Lesson:

Part 1 – Five Senses and Observing Weather

- Using the PowerPoint, identify the five senses and discuss how each of the five senses helps us observe the world around us. Discuss how good scientists use their five senses to learn about the world around them.
- Have students do the Five Senses Worksheet individually or as a class. This worksheet helps students make the connection between the five senses and how they can be used to observe the weather (where applicable).

Part 2 – Ways to Describe Weather

- Looking at the Five Senses Worksheet, have students identify which of the words could describe the weather. Have students underline each of the describing words and then discuss as a group how these words are related to the sense that observes them.

Part 3 – The Water Cycle

- Review the parts of the water cycle on the PowerPoint.
- Teacher Demonstration – Using a heating source, glass container, water, and a lid demonstrate how water goes through the water cycle. Using the Water Cycle Worksheet, have students draw each stage of the water cycle as they observe the demonstration. Students may use the images on the PowerPoint to help them. Always use precaution around heat sources. As an extensions activity measure the mass of the water/container/lid combination throughout the water cycle (before heating, as some of the water is evaporated and condensing, and after the water is collected). This will demonstrate the conservation of mass as water goes through a physical change.

Post-Planetarium Program Lesson

Materials:

Lesson:

Part 1 – Cloud Types

Part 2 – Measuring Weather

Part 3 – The Water Cycle

The Weather

Program Notes