Earth and Space Systems: *Seasons, Water Cycles, Climate, Hazardous Weather*

Washington University in St. Louis
Institute for School Partnership

unit 15

Observing Weather Patterns

mySci™ hands on science for elementary students

MONSANTO Fund®

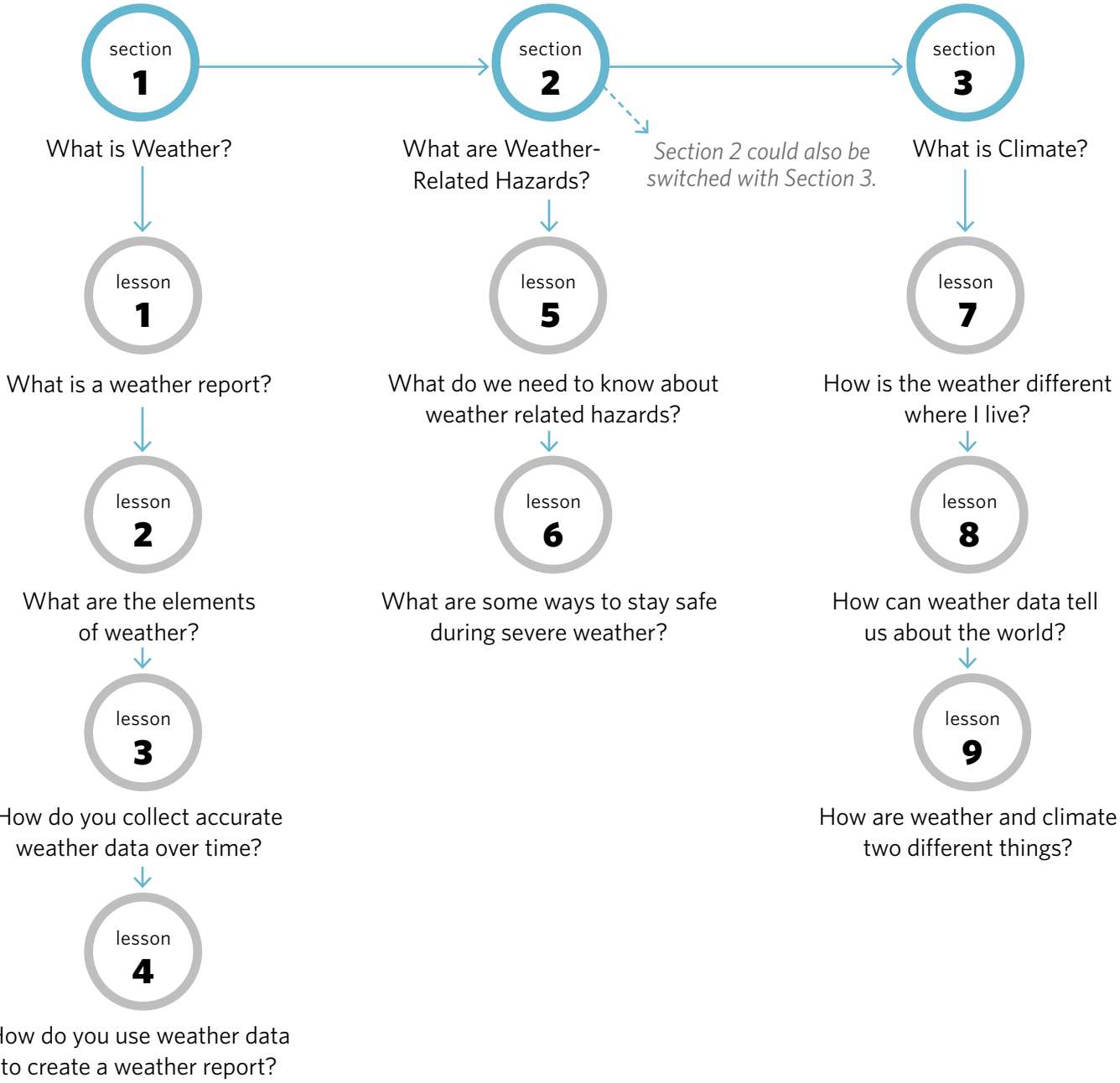
MySci Project-Based Curriculum Unit Structure

Unit 15

Observing Weather Patterns

Visit the Unit 15 Curriculum Page for more resources: http://schoolpartnership.wustl.edu/instructional-materials/mysci-unit-15/

DESIGN CHALLENGE:
What is the best design for a tornado shelter?



Unit 15 Teacher Preparation List

Lesson	Inside MySci kit, you'll find:	Items you must supply:	Extra prep time needed:
Lesson 1		Science notebooks & internet access Chart paper or large whiteboards Today's weather report (printed or displayed for students)	Review MySci Safety Guidelines Copy and administer pre-assessment Copies of Thinking Map (Appendix i)
Lesson 2	*Weather Forecasting* by Gail Gibbons **Part A:** 1 lb bag of gravel **Part B:** 1 small skein of red yarn 12 compasses 15 cardstock 1 small ball of string 30 1" Styrofoam balls 1 box of paperclips **Part C:** 12 thermometers **Part D:** 1 plastic jar 1 rubber band 1 balloon 1 stirrer	2-liter bottles for rain gauges (NOTE: You may wish to cut these before your class session.) Scissors Tape Science notebooks & internet access	Copies of the Rain Gauge and Anemometer Directions (Appendices ii and iii) Copies of Protractor Template (Appendix iv) copied onto cardstock
Lesson 3	Weather instruments made in Lesson 2	Science notebooks & internet access	Copies of the Data Recording Sheet (Appendix v)
Lesson 4		Science notebooks & internet access	Copies of the Weather Report/ Forecast Rubric (Appendix vi)
Lesson 5	*Hurricane* by Gail Gibbons *Tornado* by Gail Gibbons	Science notebooks & internet access Additional trade books from the library, print resources, or on-line access for student research on their assigned weather hazard.	Copies of the Weather Project instructions (Appendix vii) Copies of the Weather Project Scoring Guidelines (Appendix viii)
Lesson 6		Science notebooks & internet access OPTIONAL: Materials to build model storm shelters.	Copies of the Engineering Design Cycle (Appendix ix)
Lesson 7	*On the Same Day in March: A Tour of the World's Weather* by Marilyn Singer	Science notebooks & internet access	
Lesson 8		Science notebooks & internet access	Copies of Daily Temperature & Precipitation Chart (Appendix x) Copies of Location Charts (Appendix xii–xx) one per group
Lesson 9		Science notebooks & internet access	Copy and administer the post-assessment

Special Note to Teachers:

This particular unit on weather and climate has three sections. The "5E's"; Engage, Explain, Explore, Elaborate and Evaluate in this application do not occur in each lesson because the learning activities designed are sometimes longer than the usual time frame for one lesson. The 5 E's occur in the same cycle of learning but are split into several sequenced lessons. Collecting weather data could go for a day, a week, a month or all year.

section 1

What is Weather?

Lesson 1: What is a weather report?

LEARNING TARGET

Describe how the weather is a combination of several elements, including temperature, precipitation, and wind.

SUMMARY

Students will identify their ideas about what weather is on a thinking map and then explore the components of a weather report using a variety of media.

ENGAGE

Hand out copies of the Thinking Map (Appendix i) and create a large version on a chart paper, whiteboard, or smartboard. Give students a few moments to fill out the central question, "What is weather?" Then, take ideas from the class. Then, discuss why understanding the weather is important and record student ideas.

EXPLORE

Ask the class: *Has anyone seen a weather report? Who would like to come to the front of the class and give the weather report for today?* After each report, allow the class to ask questions about today's weather that the student didn't provide. What else might we need to know about the weather?

After one or two reports by students have the students review a weather report in small groups and compile the information given to the audience. Each group will review a different weather report giving the class a variety to discuss. After reviewing, each group will record elements of weather; temperature, wind, precipitation, sunrise, sunset included in their report on a whiteboard or chart paper.

TEACHER PROVIDES:

Copies of Thinking Map (Appendix i)

Internet Access

Chart paper or large whiteboards

Today's weather report (printed or displayed for students)

Teaching Tip:

✓ This icon highlights an opportunity to check for understanding through a formal or informal assessment.

Teaching Tip:

Good sources for weather reports include:

www.accuweather.com

http://www.wunderground.com/printer/cityforecast.asp

http://www.wunderground.com/wxradio/

http://www.weather.com/

Teaching Tip:

If students ask questions or give predictions about tomorrow's weather, be sure to clarify the difference between a weather report (what is happening right now) and a weather forecast (what we think will happen in the future).

Lesson 2: What are the elements of weather?

LEARNING TARGETS

Explain how to measure and record temperature, precipitation, wind speed, wind direction, and air pressure.

SUMMARY

Students will identify the elements of weather and the instruments used to measure them. They will create their own instruments and use them in the collection of weather data, creating an authentic weather report for their peers.

EXPLAIN

Ask the class: *What are the weather elements and how are they measured?*

Students will do a gallery walk of all charts or whiteboards created in Lesson 1 and will make a note of similarities of components. These similarities should be recorded in their notebooks.

Record the groups' observations on a chart or Smartboard. We are going to make simple instruments to measure the weather.

Ask students: *Does anyone know what a scientist who studies weather is called?*

Show video Teachers Domain — ZOOM video about a kid meteorologist http://www.teachersdomain.org/resource/ess05.sci.ess.watcyc.kidmeteor/

Read book *Weather Forecasting* by Gail Gibbons to identify instruments meteorologists use to measure weather elements.

ELABORATE

In this section, students will build instruments to measure different elements of the weather. As they build the different instruments, make sure they understand how the instruments work and what they are measuring.

PART A: PRECIPITATION

Show video, Forms of Precipitation http://www.youtube.com/watch?v=9knozo-moMUU.

Pass out handouts for making rain gauge (Appendix ii). 2-liter bottles will need to be cut prior to lesson. Tape the funnel top to the rest of the bottle to prevent rain from coming in the sides.

PART B: WIND DIRECTION AND SPEED

To determine the wind directions, cut and tie a 6 inch section of the red yarn to a pencil. The student should determine the directions using. Hold the pencil in the wind and note from which direction the wind is coming using the compass.

To determine wind speed, the students need to build an anemometer according to the handout directions (Appendix iii and iv).

MYSCI MATERIALS:

Weather Forecasting by Gail Gibbons

Part A:
1 lb bag of gravel

Part B:
1 small skein of red yarn
12 compasses
15 cardstock
1 small ball of string
30 1" Styrofoam balls
1 box of paperclips

Part C:
12 thermometers

Part D:
1 plastic jar
1 rubber band
1 balloon
1 stirrer

TEACHER PROVIDES:

Internet access

Science notebooks

Copies of the Rain Gauge and Anemometer Directions (Appendices ii and iii)

Copies of Protractor Template (Appendix iv) copied onto cardstock

2-liter bottles for rain gauges (Part A)

Scissors

Tape

Cyberchase template for wind speed http://pbskids.org/cyberchase/activities/how-windy-it/

Cyberchase paper scale for thermometer http://pbskids.org/cyberchase/activities/whats-temperature/

Cyberchase paper ruler for rain gauge http://pbskids.org/cyberchase/activities/my-cyberchase-ruler/

Homemade barometer http://www.wikihow.com/Make-a-Simple-Weather-Barometer

The Wind Blew by Pat Hutchens

I Face the Wind by Vicki Cobb

When the Wind Stops by Charlotte Zolotow

Teaching Tip:

This lesson will take more than one day. You may choose to build and explain the use of one instrument per day.

PART C: TEMPERATURE

Show video Cyberchase: Reading a Thermometer http://www.teachersdomain.org/resource/wnet08.math.measure.sys.wnettemp1/. Students will need practice in reading thermometer scales.

PART D: AIR PRESSURE

EVALUATE

Show http://www.wikihow.com/Make-a-Simple-Weather-Barometer. Directions for making Barometer:

1. Gather the things you'll need. These consist of: Scissors, tape, a balloon, a jar, an elastic rubber band, a straw.

2. Blow up the balloon carefully and then let the air out of it again. (This is to stretch it.)

3. Cut the balloon in half. Discard the piece with the neck on it.

4. Take the remaining piece of the balloon and stretch it across the glass or jar. Keep it stretched firmly across and seal it down with the rubber band, around the rim of the glass jar. To make an airtight seal, avoid gaps between the balloon and the glass.

5. Tape the straw onto the balloon lid; the straw should be sitting one quarter of a way on the lid, with the tape about 2 cm or 1 inch from the edge of the straw end that is sitting on the balloon lid. The straw is your indicator "needle". Trim the straw if it's too long, but leave more length off the jar as what is attached to it.

6. Put the finished glass jar next to a wall and tape a piece of paper or card to the wall behind it.

7. Mark the current position of the straw on the paper, and mark one above and below the mark, about the same length away, and label the high and low pressure. Arrange the paper so there is room above and below the straw for you to make more marks when the straw moves.

8. Check the straw regularly and keep marking its location on the paper for a few days. Add notes that tell you what the weather is like (for example, "rainy," "windy," or "sunny,") next to the mark.

Examine the paper after several days. Check the markings and the weather statements you've put next to them. What do you notice? Can you tell if and when the weather is about to change?

✓ Ask the student to match each instrument with what it measures:

Instruments: Thermometer, Anemometer, Barometer, Wind Vane, Rain Gauge

Elements of Weather: Precipitation, Wind speed, Wind direction, Air Pressure, Temperature

Teaching Tip:

Practice using the scale with rulers prior to making the rain gauge. Worksheets can be made for students to use for additional practice.

Teaching Tip:

If you do not know the cardinal directions on your schoolyard, you should take a compass (or use a compass app) to determine the wind direction.

Teaching Tip:

As the straw moves up with higher air pressure, the days should be sunnier. As the straw lowers, the skies may be looking gray and you should expect cloudy or rainy weather on the way.

When you fitted the balloon over the glass, you captured air under a certain pressure. The balloon now indicates changes in the atmospheric pressure, that is, the pressure of the air around you. Higher air pressure pushes the balloon into the jar and makes the straw go up. Conversely, the air inside the jar expands against lower pressure and will bulge the balloon, moving the straw down. The straw makes it easier to see the motions of the balloon.

Also notice that the straw moves up or down just before a weather change since a change in weather typically coincides with a change in the atmospheric pressure.

Try to take each reading at the same temperature, since air expands when heated and contracts when cooled, which would also move the straw-indicator.

Check your results against the pressure from weather reports for your area. If you didn't do it correctly, keep trying until you get it right.

Try this over a longer period of time if you're having a week of rain or a week of sunshine. Try and choose the seasons likely to bring the most changes during a short period of time in your part of the world.

This is a delicate item. Place it away from foot traffic and daily activity.

Don't leave the balloon in direct sunlight; this will wear it out and can affect the experiment.

Make sure there are no gaps or air holes in the balloon during the experiment; this will affect the outcome.

Lesson 3: How do you collect accurate weather data over time?

LEARNING TARGET
Use basic weather instruments to record data over time.

SUMMARY
Students participate in setting up scientific guidelines for collection of accurate weather data over multiple days or weeks. Student teams collect and record data for specified period of time.

ENGAGE
Today we are going to start using the weather instruments to make readings. We will make many measurements over time to try and see weather patterns. What do you think we will find today with each of our instruments? What do you think the readings will be? Why?

Guide students in a discussion of each of the instruments (Thermometer, Anemometer, Barometer, Wind Vane, Rain Gauge). Make sure they recall what each one measures and how to uses it. Then, ask them what kinds of readings do they expect to get today?

EXPLORE
Do you think we will all get the exact same readings? How could different students get different readings?

Teacher Guide for Student Responses: If students are confused by this question, ask if the temperature will be the same in the sun and in the shade. As if the temperature is the same in the morning and in the afternoon. Ask if the wind will be the same out in the open as it is next to a building.

To get good data, we have to be sure that we are taking the same readings, in the same locations, at the same time of day. This is one way to make sure that we have a "fair test."

EXPLAIN
Put your students into groups and make sure each group has at least one copy of the Data Recording Sheet (Appendix v), a thermometer, an anemometer, and a wind vane. The barometer can stay in the classroom and you may only have one rain gauge per class. Decide which group will go to which location outside and take their measurements.

EXTEND
When students return to the classroom, have them compare their readings. What is the same or similar in all locations? What is different? What do you think the weather will be like tomorrow? Why?

EVALUATE
Allow your students to collect daily weather data for at least one week. Each day, ask them to predict the next day's readings. Make sure that each student gets to practice taking each type of reading.

MYSCI MATERIALS:
Weather instruments made in Lesson 2

TEACHER PROVIDES:
Copies of Data Recording Sheet (Appendix v)

Teaching Tip:

Fair test: Data collection should be done at the same time each day and in the same location.

Consideration should be given to how to represent data over the school year within a classroom, between several classes, etc. Data could be collected in a class notebook, posted in a classroom or posted in a hallway or any combination as deemed appropriate by the teachers involved. Throughout the year will each class be responsible for data collection? Will classes alternate or rotate the responsibility?

Teaching Tip:

These graphs will be helpful for students to see patterns in the weather in different places and for use in their final weather reports.

EXTEND (OPTIONAL)

If you wish, you can ask your students to compare their predictions to their actual measurements on a daily basis. To do this, use every other row of your Data Recording Sheet as the prediction for the next day. You can also have them compare their measurements to the weather reports you find on line and discuss any differences.

Lesson 4: How do you use weather data to create a weather report?

LEARNING TARGET

Represent weather data in tables and graphs to reveal patterns and relationships.

Combine weather data to create a weather report.

Use previous weather data to make a forecast for future weather.

SUMMARY

After at least a week of data collection, students (in groups) will create a weather report that includes temperature, wind direction, wind speed, air pressure and precipitation for the week. They will use their data as a resource and predict the general weather for the week ahead.

ENGAGE

What is the difference between a weather report and a weather forecast? Think about it for a moment and then discuss with a partner. Finally, discuss it as a class. (A weather report is about past or present weather; a forecast is about future weather.)

EXPLORE

Ask: *Is a forecast the same as a guess? Why or why not?*

Have students record their ideas in their science journals, then discuss it with a partner or small group. As they share out their ideas, record similarities and differences between forecasts and guesses on a three-column chart on the board. Have students use evidence to back up their ideas.

Teacher guide for student responses: Your chart may look like the following.

FORECAST	BOTH	GUESS
Based on science Uses patterns from the past to predict the future The more you know and understand, the better your chances of making a correct forecast	Can be right or wrong	Not based on science Does not have a pattern; is truly random It doesn't matter how much you know, you have the same chance of being right or wrong

How Do Meteorologists at AccuWeather Make Your Forecast? http://www.accuweather.com/en/weather-news/how-do-meteorologists-make-forecast/4716627

EXPLAIN

Hand out copies of the Weather Report/Forecast rubric (Appendix vi).

Today, you are going to use the weather data that you have collected to make both a weather report and a weather forecast. Discuss the rubric as a class and introduce your class to the format of their weather report and forecast. It is up to you to decide if your students will work in pairs or small groups

TEACHER PROVIDES:

Copies of Weather Report/Forecast Rubric (Appendix vi)

Teaching Tip:

Students could continue to collect data throughout the year.

Extension Lesson Ideas:

As noted in the teaching tip, you will need to make decisions about the method used for collection and recording. Will this be done by one class only? Are there several 3rd grade classes that will be participating in data collection? What time of day will be best for collecting data based on your schedule(s)? How will that data be recorded and represented? After all students present their forecasts , monitor the weather for the week and see whose forecast was most accurate.

and what format they will use. Example formats for weather reports: posters, videos, multimedia presentations using apps or programs such as *Educreations, I-movie, Little Bird Tales, Moviemaker, Photo Story*, etc. (See Weather Report/ Forecast Rubric, in Appendix vi.)

EVALUATE

Have each pair or group present their report and forecast to the class or do a gallery walk. Evaluate students based on the rubric.

EXTEND (OPTIONAL)

After all students present their forecasts , monitor the weather for the week and see whose forecast was most accurate.

section 2

What are Weather-Related Hazards?

Lesson 5: What do we need to know about weather related hazards?

LEARNING TARGETS

Explain the hazards that come from severe weather events.

SUMMARY

Students identify types of severe weather events and the hazards they present by exploring a number of children's trade books and presenting what they find through a variety of technology applications.

ENGAGE

Ask the class: *What are the types of severe weather?*

Read aloud one of the following books: *Tornado* or *Hurricane* by Gail Gibbons. Ask students: *What weather event is described in the book we read? What are other severe weather events?* Students will generate a class list that can be posted on chart paper or Smartboard.

EXPLORE

Ask the class: *What are the hazards that result from severe weather?*

Gather nonfiction books from the library on a variety of severe weather events such as hurricanes, tornadoes, thunderstorms, heat wave, drought, lightening, hailstorms, dust storms, blizzards and floods. It should be noted that these are natural **weather** disasters.

Students may choose or you may assign a severe weather event to pairs or groups of students to research. You can also assign or have students decide whether to do a paper, poster, or oral presentation. Scoring guides for each type of format are given in Appendix viii. Hand out the appropriate scoring guide and make sure your students understand how they will be evaluated. Their research must include the hazards that result from their assigned severe weather event. The research should result in presentations or sharing of information by students with each other. These could include using online presentation tools or apps such as *Animoto, I-movie, Moviemaker, Photo Story, Educreations, Little Bird Tales*, etc. See Embedded Video/Websites section for links.

EXPLAIN

When students are finished, have them present their work to the class (oral presentations), perform a gallery walk (posters), or exchange papers in small groups and read about the other weather hazards.

MYSCI MATERIALS:

Hurricane by Gail Gibbons

Tornado by Gail Gibbons

TEACHER PROVIDES:

Copies of Weather Project Instructions (Appendix vii)

Copies of Weather Project Scoring Guide (Appendix viii)

Internet access

Teaching Tip:

Volcanoes, earthquakes and tsunamis are natural disasters that are NOT related to weather.

ELABORATE

Ask the class: *How are these severe weather hazards alike and different?*

Create a grid on the whiteboard, chart paper or smartboard with the weather events your students researched in the first column and weather statements across the top. For each statement, ask the students if they think it applies to that weather hazard. Push them to provide evidence for their opinion. Check off the statements that the students believe are true for each hazard.

This severe weather event has:

- High winds
- Excessive water
- Lightning
- Excessive snow
- Extreme temperatures (hot or cold)

This severe weather event could cause:

- Loss of property
- Loss of power
- Flooding
- Fire
- Injury to humans

EVALUATE

Have students answer this prompt in their science notebooks: Choose one of the weather hazards that we studied that could happen where you live. What is one thing that you could do to stay safe if that hazard happened?

Once they have finished, have them discuss with a partner or small group before sharing them out to the class.

Lesson 6: What are some ways to stay safe during severe weather?

LEARNING TARGET

Describe ways to stay safe in extreme weather.

Research and evaluate different storm shelter designs.

SUMMARY

Students review human actions and engineering design to prevent impacts of hazardous weather and develop an opinion paper to support their choice of the best design for a tornado shelter. Students form scientist teams and present their supported design to fellow student scientists in a simulated scientific convention on storm hazard prevention.

ENGAGE

Ask the students if they have ever experienced any dangerous or scary weather. Have them describe what they saw or experienced.

EXPLORE

Discuss with students the variety of ways we can protect ourselves from hazardous weather. Ask students if they know what engineers do? Move discussion toward idea that engineers use scientific information to apply it to solutions to human needs. Hand out copies of the Engineering Design Cycle (Appendix ix). Tornado shelters are one thing that engineers have been involved in to solve a human need for storm protection. Architects might also be involved in these designs.

EXPLAIN

Students will evaluate the merits of tornado shelters and make a claim to answer this question: *Which shelter would be best in a tornado?* The claim should be supported by evidence (student reasoning).

Give pairs of students access to information on a variety of tornado shelters. This can be online or printed copies. The following websites will have some resources:

House Logic Tornado Shelters http://www.houselogic.com/photos/torna-does-severe-storms/tornado-storm-shelters-safe-room-protection-when-it-counts/slide/still-standing/#still-standing

Tennessee Storm Shelters http://www.tennstormshelters.com/

ELABORATE

Ask the class: *Which shelter would be best in a tornado?* Have the pairs or small groups of students present their findings.

TEACHER PROVIDES:

Internet access

Copies of Engineering Design Cycle (Appendix ix)

OPTIONAL: Materials to build and test model storm shelters.

Teaching Tip:

This is a good place to include 3rd grade opinion writing.

EVALUATE

Today we learned about shelters to protect people in a tornado or hurricane. What might an engineer design to keep people safe in a flood? Draw a diagram of your design idea and describe how it will keep people safe.

Teacher Guide for Student Responses: Make sure their diagram has labels and includes information on how it will either float to keep people safe or keep water out of their homes.

EXTEND (OPTIONAL)

There are two optional extensions for this project. One would be to provide students with materials to construct and test models of a storm shelter. It can be tested with a high-powered fan, in floods, or by throwing small rocks at it to simulate flying debris.

The second option is the following writing exercise. Here is a Common Core ELA writing standard under Text Types and Purposes for grade 3.

1. Write opinion pieces on topics or texts, supporting a point of view with reasons.
   a. Introduce the topic or text they are writing about, state an opinion, and create an organizational structure that lists reasons.
   b. Provide reasons that support the opinion.
   c. Use linking words and phrases (e.g., because, therefore, since, for example) to connect opinion and reasons.
   d. Provide a concluding statement or section.

Students will write their opinion in a format to be determined by the teacher. Students will then be organized into a scientific convention on tornado preparedness. Student scientist teams will be formed of all those students who wrote their piece on a particular shelter. Each team will use the written pieces they developed to plan a presentation to the other student scientists on the shelter they agreed was best. Have students comment after each team's presentation on whether the team presentation changed their thinking about a particular shelter. The whole convention will then vote on a shelter to recommend the public.

section 3

What is Climate?

Lesson 7: How is the weather different where I live?

LEARNING TARGET
Explain the difference between daily weather and long-term climate.

SUMMARY
Students compare the temperature and precipitation of different locations in the United States over a given time.

ENGAGE
Ask the class: *What is weather like around the world?*

Read aloud the book *On the Same Day in March: A Tour of the World's Weather* by Marilyn Singer. Discuss with the students how the weather is different around the world in March.

EXPLORE
Ask the class: *Remember when we monitored the weather for week? Could you use that data to forecast what the weather would be 2 months from now? What about 5 months from now? Why or why not? Write your predictions in the science notebook. What would you need to know to predict the weather for the next 5 months? Could we use our data to predict next week's forecast for Hawaii?*

EXPLAIN
If students are confused by this question, ask if they can predict the weather tomorrow based on the weather today? This is easy, but what does today's weather have to do with the weather 5 months from now? What month will it be 5 months from now? What do you think the weather will be like in 5 months? Why do you think that? You have to base your prediction on last year's weather around that time, or the weather at that time over many, many years. This is called "climate". Climate is what we expect to happen from month to month because we have seen it happen again and again over many years. We don't know exactly what the weather will be like in 5 months, but we have an idea based on many years of data.

ELABORATE
Can you describe the climate of St. Louis? Divide the class into 6 groups (and assign each group 2 months) or 12 groups/pairs (and assign each pair one month). Ask them to describe what the weather is usually like in their assigned month or months. Why do they think the weather will be like that? Encourage them to use the elements of weather that they learned about earlier in the unit. After they have had time to describe the weather in their month,

MYSCI MATERIALS:
On the Same Day in March: A Tour of the World's Weather by Marilyn Singer

organize the teams in correct month order and have them share their ideas. This long-term trend of weather data is called climate.

EVALUATE

Ask students to answer this question in their science notebooks: What is the difference between how we predict tomorrow's weather and how we predict what the weather will be like 5 months from now?

ANSWER: We base tomorrow's forecast on today's weather, but we base our forecast for 5 months from now on many years' worth of data.

Lesson 8: How can weather data tell us about the world?

LEARNING TARGET

Read line and bar graphs to understand climate in various locations.

Compare climate data with actual weather data for various locations.

SUMMARY

Students find and compare weather data of different locations.

EXPLORE

Have you ever traveled to one of the places mentioned in "The Same Day in March?" Would you like to travel to any of the places it talked about? If you were going to travel very far away, how would you know what kind of clothes to pack for your trip?

EXPLORE

Put your students into 8 groups. Give each group ONE of the charts for a location from the book "The Same Day in March" from the previous lesson (Appendix xii - xx) and a copy of the Daily Temperature and Precipitation Chart (Appendix x).

While the students have their graphs in front of them, explain how to read the charts using the and the Teacher Instructions for Reading Graphs (Appendix xi) and Teacher Example charts (Appendix xii). Have the students fill in the first two rows of the Daily Temperature and Precipitation Chart with information from the two locations on the Teacher Example page (Santiago, Chile and Helsinki, Finland). Make sure students are following along with how to read the graph.

These are climographs that show temperature and precipitation over a long period of time for the location. The US graphs give the time period, but the international ones do not. The red line shows temperature over the year by month with the scale on the right y-axis. The green bars show precipitation amount over the year by month with the scale on the left y-axis. It is important that students understand how to read these independently so they are able to use them in their exploration of the location being assigned to them.

Assign each group one location from the book *On the Same Day in March: A Tour of the World's Weather* by Marilyn Singer.

Refer to world map of regions found on this webpage for assistance in determining locations in each climate region:

Science Dictionary: Climate Zones (3) http://www.webquest.hawaii.edu/kahihi/sciencedictionary/C/climatezone.php

The students' task is to determine the weather in that location for today and to determine the weather over time (climate) for their location yearly.

TEACHER PROVIDES:

Copies of Daily Temperature & Precipitation Chart (Appendix x)

Teacher Instructions for Reading Graphs (Appendix xi)

Copies of Location Charts and Teacher Example Chart (Appendix xii-xx)

Internet access

EXPLAIN

Have each group of students examine their graph and answer the questions on the handout. Then, they should make their charts or posters showing what their location looks like at 4 times of the year. If possible, have your students use the internet to find today's weather at their location and record it in Appendix x.

ELABORATE

If you are using Appendix x, have students share data from their locations to have a complete chart (2 example locations plus 8 student sheets).

Students will do a gallery walk, writing notes at each station about daily weather and what they notice about temperature and precipitation over time.

EVALUATE

✓ Of the 10 locations we researched, which one do you think has the best weather overall? Why?

Teacher guide to student responses: Student responses should include some discussion of the general weather, trends over the course of the year, and why they like that type of weather.

Lesson 9: How are weather & climate two different things?

LEARNING TARGET

Understand the characteristics of Earth's major climate zones.

Explain the difference between weather and climate.

SUMMARY

Students refer back to their collected data from locations around the world to look at weather patterns and their relationships to world regions. Students learn the reason and definition for the difference between weather and climate from this exploration and apply this understanding to a final long-range weather report for their specific location in the world.

EXPLAIN

Ask the class: *How is climate different from weather?*

Show the following video (3:14): NASA Connect — Our World: What is Weather? http://www.youtube.com/watch?v=UtgFHHhm1xU

Explain the difference between weather and climate. Discuss the four climatic regions: polar, temperate, desert and tropical so students are familiar with them. Students may make a four flap foldable for their notebooks. Polar — cold and dry; Temperate — moderate with temperature fluctuations between summer and winter and moderate precipitation; Tropical — warm and wet; Desert — hot and dry.

Science Dictionary: Climate Zones (3) http://www.webquest.hawaii.edu/kahihi/sciencedictionary/C/climatezone.php

Ask the class: *Which locations are in the same climate regions?*

Students will be looking for patterns in their information. Groups will go back and discuss the similarities in data for each location and be ready to report their findings. They should be ready with evidence to support their claims.

ELABORATE

Ask the class: *How do meteorologists use this type of information to make long-range forecasts?*

Get student ideas in answer to the question and clarify any possible misconceptions about accuracy. Record students ideas that will be useful to them in completing a final long-range weather report for a specified month (other than March) in the future.

Teacher Background Information:

In third grade we will discuss four climatic regions: polar, temperate, desert and tropical.

EVALUATE

Imagine that you discover a new planet and decide to live there. How long would we to record the daily weather to understand the climate of your new home? Why do you think that?

Teacher Guide to Student Responses: The best answer to this question is that we would have to measure the daily weather for many years in order to understand the climate because climate is the average of daily weather over many years. If you only measured for one year (which some students might say), it is possible that you are having an unusually hot, cold, wet, or dry year and the next year will be different. However, over time, your average data will show you the climate.

NEXT GENERATION SCIENCE STANDARDS

Key to Understanding the NGSS Codes

NGSS codes begin with the grade level, then the "Disciplinary Core Idea code", then a standard number. The Disciplinary Core Ideas are:

Physical Sciences

PS1: Matter and its interactions

PS2: Motion and stability: Forces and interactions

PS3: Energy

PS4: Waves and their applications in technologies for information transfer

Life Sciences

LS1: From molecules to organisms: Structures and processes

LS2: Ecosystems: Interactions, energy, and dynamics

LS3: Heredity: Inheritance and variation of traits

LS4: Biological evolution: Unity and diversity

Earth and Space Sciences

ESS1: Earth's place in the universe

ESS2: Earth's systems

ESS3: Earth and human activity

Engineering, Technology, and Applications of Science

ETS1: Engineering design

ETS2: Links among engineering, technology, science, and society

For more information, visit *http://www.nextgenscience.org/next-generation-science-standards*

NGSS PERFORMANCE EXPECTATIONS

Content

3-ESS2-1

Represent data in tables and graphical displays to describe typical weather conditions expected during a particular season.

3-ESS2-2

Obtain and combine information to describe climates in different regions of the world.

3-ESS3-1

Make a claim about the merit of a design solution that reduces the impacts of a weather-related hazard.

3-5-ETS1-1

Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.

3-5-ETS1-2

Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

3-5-ETS1-3

Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

SCIENCE AND ENGINEERING PRACTICES

Concepts

Asking Questions and Defining Problems
- Identify scientific (testable) and non-scientific (non-testable) questions.
- Ask questions that can be investigated and predict reasonable outcomes based on patterns such as cause and effect relationships.
- Use prior knowledge to describe problems that can be solved.
- Define a simple design problem that can be solved through the development of an object, tool, process, or system and includes several criteria for success and constraints on materials, time, or cost.

Developing and Using Models
- Develop a model using an analogy, example, or abstract representation to describe a scientific principle or design solution.
- Develop and/or use models to describe and/or predict phenomena.
- Develop a diagram or simple physical prototype to convey a proposed object, tool, or process.
- Use a model to test cause and effect relationships or interactions concerning the functioning of a natural or designed system.

Planning and Carrying Out Investigations
- Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution.
- Test two different models of the same proposed object, tool, or process to determine which better meets criteria for success.

Analyzing and Interpreting Data
- Represent data in tables and/or various graphical displays (bar graphs, pictographs and/or pie charts) to reveal patterns that indicate relationships.
- Analyze and interpret data to make sense of phenomena, using logical reasoning, mathematics, and/or computation.
- Compare and contrast data collected by different groups in order to discuss similarities and differences in their findings.

Using Mathematics and Computational Thinking
- Organize simple data sets to reveal patterns that suggest relationships.
- Describe, measure, estimate, and/or graph quantities (e.g., area, volume, weight, time) to address scientific and engineering questions and problems.

Constructing Explanations and Designing Solutions
- Construct an explanation of observed relationships (e.g., the distribution of plants in the back yard).
- Apply scientific ideas to solve design problems.
- Generate and compare multiple solutions to a problem based on how well they meet the criteria and constraints of the design solution.

Engaging in Argument from Evidence
- Compare and refine arguments based on an evaluation of the evidence presented.
- Construct and/or support an argument with evidence, data, and/or a model.
- Use data to evaluate claims about cause and effect.
- Make a claim about the merit of a solution to a problem by citing relevant evidence about how it meets the criteria and constraints of the problem.

Obtaining, Evaluating and Communication Information
- Read and comprehend grade-appropriate complex texts and/or other reliable media to summarize and obtain scientific and technical ideas and describe how they are supported by evidence.
- Obtain and combine information from books and/or other reliable media to explain phenomena or solutions to a design problem.
- Communicate scientific and/or technical information orally and/or in written formats, including various forms of media as well as tables, diagrams, and charts.

DISCIPLINARY CORE IDEAS

Concepts

Weather and Climate

ESS2.D: Weather and Climate

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)

Climate describes a range of an area's typical weather conditions and the extent to which those conditions vary over years. (3-ESS2-2)

ESS3.B: Natural Hazards

A variety of natural hazards result from natural processes.

Humans cannot eliminate natural hazards but can take steps to reduce their impacts. (3-ESS3-1) (Note: This Disciplinary Core Idea is also addressed by 4-ESS3-2.)

Engineering Design

ETS1.A: Defining and Delimiting Engineering Problems

Possible solutions to a problem are limited by available materials and resources (constraints). The success of a designed solution is determined by considering the desired features of a solution (criteria). Different proposals for solutions can be compared on the basis of how well each one meets the specified criteria for success or how well each takes the constraints into account. (3-5-ETS1-1)

ETS1.B: Developing Possible Solutions

Research on a problem should be carried out before beginning to design a solution. Testing a solution involves investigating how well it performs under a range of likely conditions. (3-5-ETS1-2)

At whatever stage, communicating with peers about proposed solutions is an important part of the design process, and shared ideas can lead to improved designs. (3-5-ETS1-2)

Tests are often designed to identify failure points or difficulties, which suggest the elements of the design that need to be improved. (3-5-ETS1-3)

ETS1.C: Optimizing the Design Solution

Different solutions need to be tested in order to determine which of them best solves the problem, given the criteria and the constraints. (3-5-ETS1-3)

CROSSCUTTING CONCEPTS

Patterns
- Patterns of change can be used to make predictions.
- Patterns can be used as evidence to support an explanation.

Cause and Effect: Mechanism and Prediction
- Cause and effect relationships are routinely identified, tested, and used to explain change.
- Events that occur together with regularity might or might not be a cause and effect relationship.

Scale, Proportion, and Quantity
- Standard units are used to measure and describe physical quantities such as weight, time, temperature, and volume.

Stability and Change
- Change is measured in terms of differences over time and may occur at different rates.
- Some systems appear stable, but over long periods of time will eventually change.

MISSOURI GLE STANDARDS

Key to Understanding the GLE Codes

GLE codes are a mixture of numbers and letters, in this order: Strand, Big Idea, Concept, Grade Level and GLE Code.

The most important is the strand. The strands are:

1. **ME**: Properties and Principles of Matter and Energy
2. **FM**: Properties and Principles of Force and Motion
3. **LO**: Characteristics and Interactions of Living Organisms
4. **EC**: Changes in Ecosystems and Interactions of Organisms with their Environments
5. **ES**: Processes and Interactions of the Earth's Systems (Geosphere, Atmosphere and Hydroshpere)
6. **UN**: Composition and Structure of the Universe and the Motion of the Objects Within It
7. **IN**: Scientific Inquiry
8. **ST**: Impact of Science, Technology and Human Activity

For more information, visit http://dese.mo.gov/college-career-readiness/curriculum/science

GLE Standards

Concepts

First Grade

ES 2 F 1 a

Observe, measure, record weather data throughout the year (i.e., cloud cover, temperature, precipitation, wind speed) by using thermometers, rain gauges, wind socks

ES 2 F 1 c

Compare weather data observed at different times throughout the year (e.g., hot vs. cold, cloudy vs. clear, types of precipitation, windy vs. calm)

ES 2 F 1 d

Identify patterns indicating relationships between observed weather data and weather phenomena (e.g., temperature and types of precipitation, clouds and amounts of precipitation)

Fifth Grade

ES 2 F 5 a

Identify and use appropriate tools (i.e., thermometer, anemometer, wind vane, rain gauge, satellite images, weather maps) to collect weather data (i.e., temperature, wind speed and direction, precipitation, cloud type and cover)

ES 2 F 5 b

Identify and summarize relationships between weather data (e.g., temperature and time of day, cloud cover and temperature, wind direction and temperature) collected over a period of time

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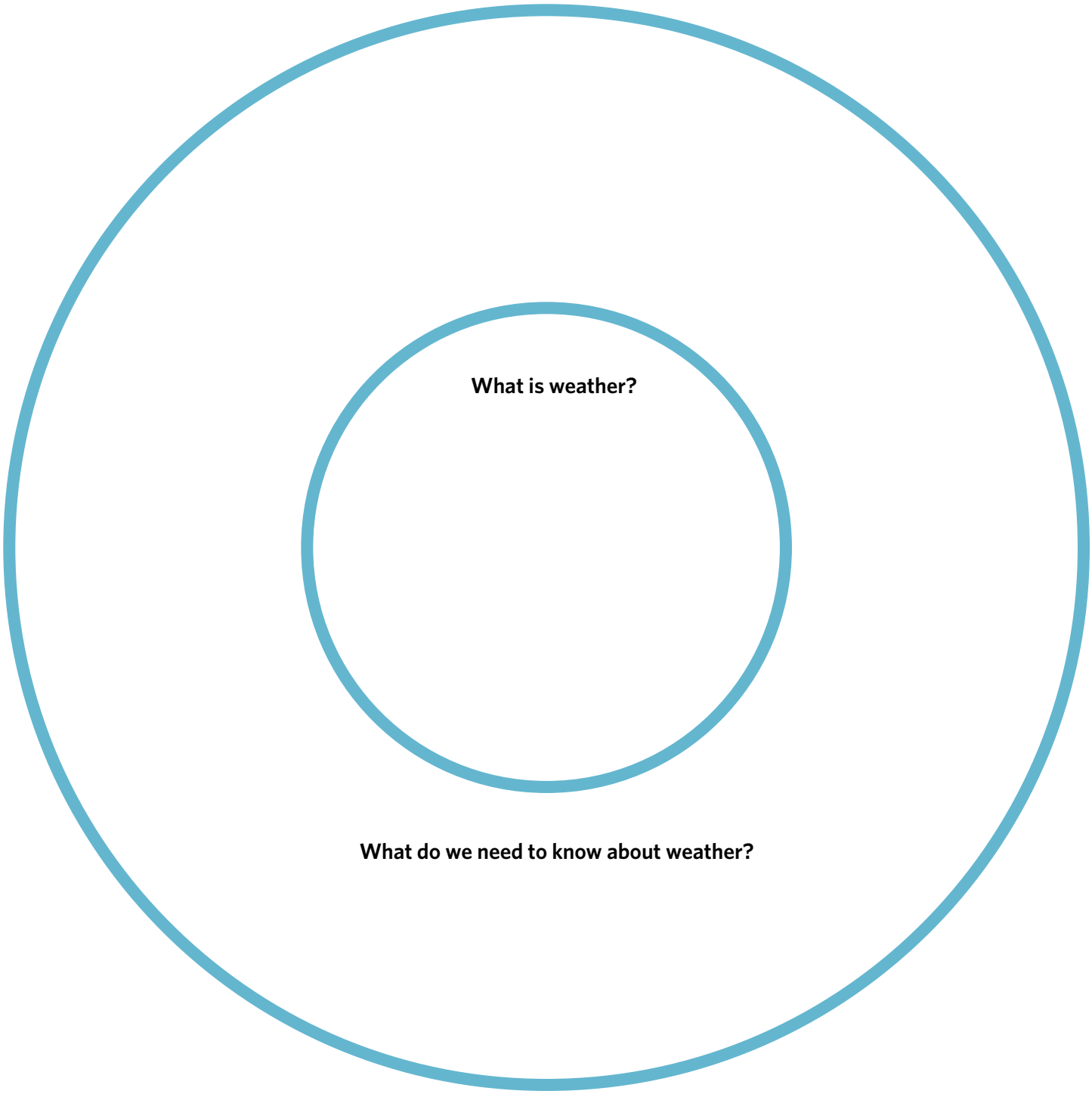
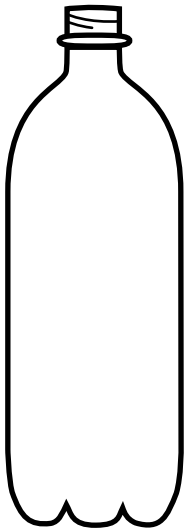
Thinking Map

Section 1, Lesson 1

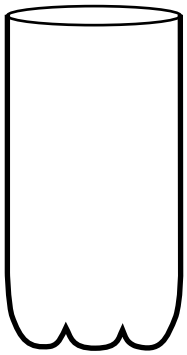


Rain Gauge Instructions

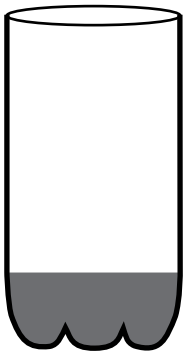
Section 1, Lesson 2 (Part A)



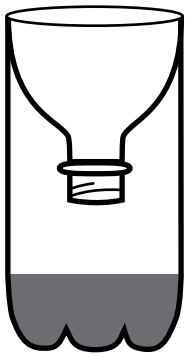
1. Start with a 2-liter bottle.



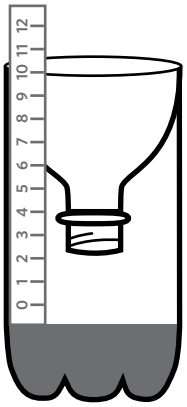
2. Cut off the top of the bottle.



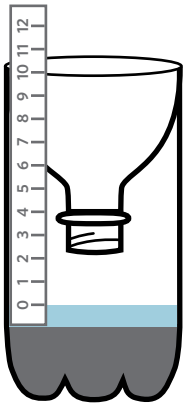
3. Put some gravel in the bottom (up to the straight part).



4. Put the top and bottom together to create a funnel. Tape where the two pieces meet to keep water out.



5. Glue or tape the ruler onto the side of the bottle. Make sure that the ruler is going straight up and down and that the zero point on the ruler is a little bit **above** the top of the gravel.



6. Before you start making measurements, fill the bottom of the bottle with water up to the zero line. You are now ready to measure any new precipitation.

Anemometer Directions

Section 1, Lesson 2

1. Give each student a copy of the protractor (printed on card stock), a Styrofoam ball, and a one-foot length of string.

2. Tape, glue or use a paperclip to attach one end of the string to a ball, and tie or tape the other to the small hole at the center of the protractor's flat edge.

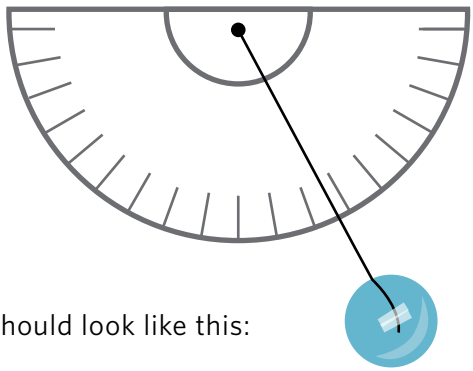
3. Instruct students to label the protractor as follows:
   - mark the 90° mark of the protractor "0 mph"
   - mark the 80° mark of the protractor "8 mph"
   - mark the 70° mark of the protractor "12 mph"
   - mark the 60° mark of the protractor "15 mph"
   - mark the 50° mark of the protractor "18 mph"
   - mark the 40° mark of the protractor "21 mph"
   - mark the 30° mark of the protractor "26 mph"
   - mark the 20° mark of the protractor "33 mph"

4. To use this anemometer, hold it with the flat base at the top, so it's level. The ball should hang straight down.

5. Keep the protractor as far from your body as you can, so you're not blocking any of the wind.

6. Aim the protractor straight into the wind so the ball is blown along the side of the protractor, not into or away from it. You can measure the wind's speed by seeing which degree mark the string is pointing at.

7. Go outside and measure the real wind.



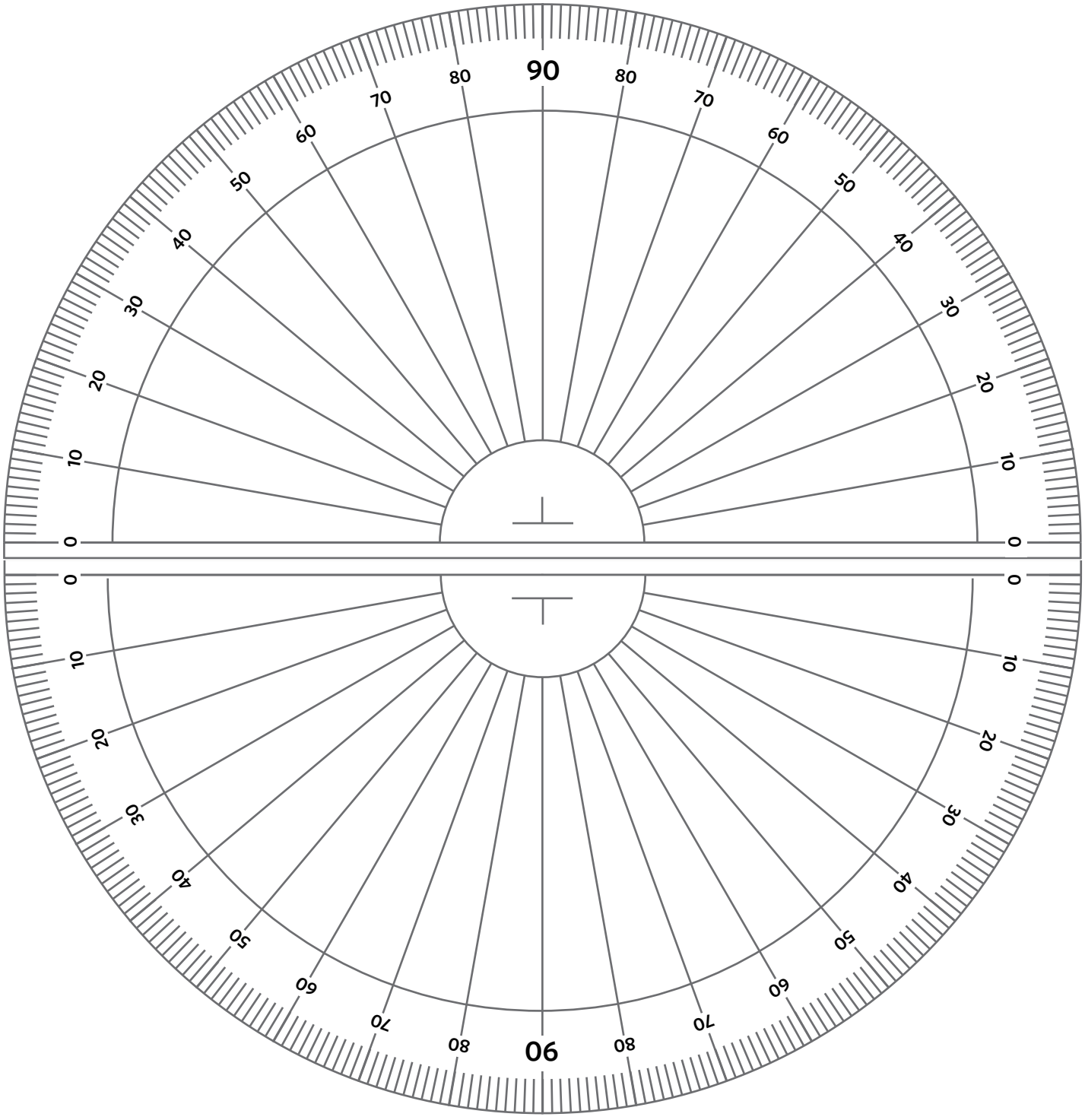
It should look like this:

Teaching Tip:

Practice inside with a fan. Try the different settings of the fan. How consistent are different student's readings?

Protractor Template

Section 1, Lesson 2



Data Recording Sheet

Section 1, Lesson 3

Name(s): _____ **Date:** _____

Location: _____

DATE	TIME	TEMP.	WIND SPEED	WIND DIR.	RAIN GAUGE READING	RAIN SINCE LAST READING	DESCRIBE THE WEATHER

Weather Report and Forecast Rubric

Section 1, Lesson 4

	1 BEGINNING	2 APPROACHING	3 MEETING
Weather Report Data (Past)	Not all data was presented. Did not give a clear picture of the weather over the past week.	Most of the data was presented but it was not all clear or easy to understand.	The collected data was presented completely and in a way that was easy to understand.
Weather Forecast Data (Future)	The weather forecast was incomplete and difficult to understand.	The weather forecast was mostly complete.	The weather forecast for the next week was complete and easy to understand.
Discussion and Justification	Students did not make connections between the past data and their future forecast.	Students made some connections but did not connect all parts of their forecast to the data.	Students make clear connections between the data they collected, trends, and predictions for the next week.

Weather Project

Section 2, Lesson 5

Name: _____ **Date:** _____

For this project, you will choose a weather topic that interests you, do research, write a report, create a poster about your topic, and prepare an oral presentation.

RESEARCH

You will find information about your topic using the Internet, encyclopedias, and/or books. Read about your topic and decide three questions you would like to answer with your research. Take notes to use for the actual writing.

REPORT

Your report will include:

1. Five paragraphs:
   a. An introductory paragraph that tells what your three Big Ideas are,
   b. Three body paragraphs that explain details about your Big Ideas, and
   c. A concluding paragraph that wraps it all up.
2. A bibliography — a separate page that lists the resources you used to find your information.
   a. Books — include the title and author.
   b. Web sites — include the address.

POSTER

Create a poster for your topic. Use the large size poster board, any color that you prefer. (If you cannot get one, please let me know and I will provide a white one.) Your poster should include:

1. A title — it might just be what the topic is. For example, BLIZZARDS in big letters on the top.
2. A diagram that is labeled. This might be a side view and top view, a drawn picture of the event with labels to show the weather occurring, or however else you would like to illustrate your topic.
3. It should be colorful, but use appropriate colors. (Don't make rain pink just because it is your favorite color.)
4. All words should be spelled correctly. It would be a good idea to use a pencil first, check all of your spelling, then go over it with a marker so it shows up better.
5. It should be neat. No scribbling, no scratching out, just your best work.

ORAL PRESENTATION

Practice at home so you can present your poster to the class. You should be able to:

1. Speak with a loud enough voice so everyone can hear you.
2. Speak slowly and clearly so we can understand what you are saying.
3. Make eye contact with the audience — that means looks at us, not just at your poster or notes.
4. Know how to say all of the words — that's one reason you need to practice at home.
5. Be prepared to answer questions from the audience about your presentation.

Due on: _____

Weather Project Scoring Guide

Section 2, Lesson 5

WEATHER PROJECT WRITTEN REPORT

_____ Turned in on time (5 points)

_____ Has a beginning paragraph that introduces the topic and has no spelling, punctuation, or grammar errors (15 points)

_____ Has at least three paragraphs in the body of the report that show research into the topic and has no spelling, punctuation, or grammar errors (45 points)

_____ Has a concluding paragraph that wraps up the report and has no spelling, punctuation, or grammar errors (15 points)

_____ Has a bibliography with at least 2 sources (10 points)

_____ Is typed or neatly handwritten (10 points)

_____ **/100 Total Points**

WEATHER PROJECT POSTER

_____ Poster has a bold title (5 points)

_____ Poster has a diagram of a weather topic (20 points)

_____ Poster goes more in depth than we did in class (10 points)

_____ Diagram is labeled with bold print (10 points)

_____ Poster is neatly done (20 points)

_____ All spelling is correct (20 points)

_____ Poster has bright, eye-catching colors (10 points)

_____ Turned in on time (5 points)

_____ **/100 Total Points**

WEATHER PROJECT ORAL PRESENTATION

_____ Voice quality — volume, expression, clearness (30 points)

_____ Explanation of topic — demonstrated knowledge learned from research (30 points)

_____ Answered questions from others about the topic (20 points)

_____ Faced the audience, made frequent eye contact (20 points)

_____ **/100 Total Points**

Engineering Design Cycle

Section 2, Lesson 6

1. Identify Need/Problem

2. Research & Brainstorm

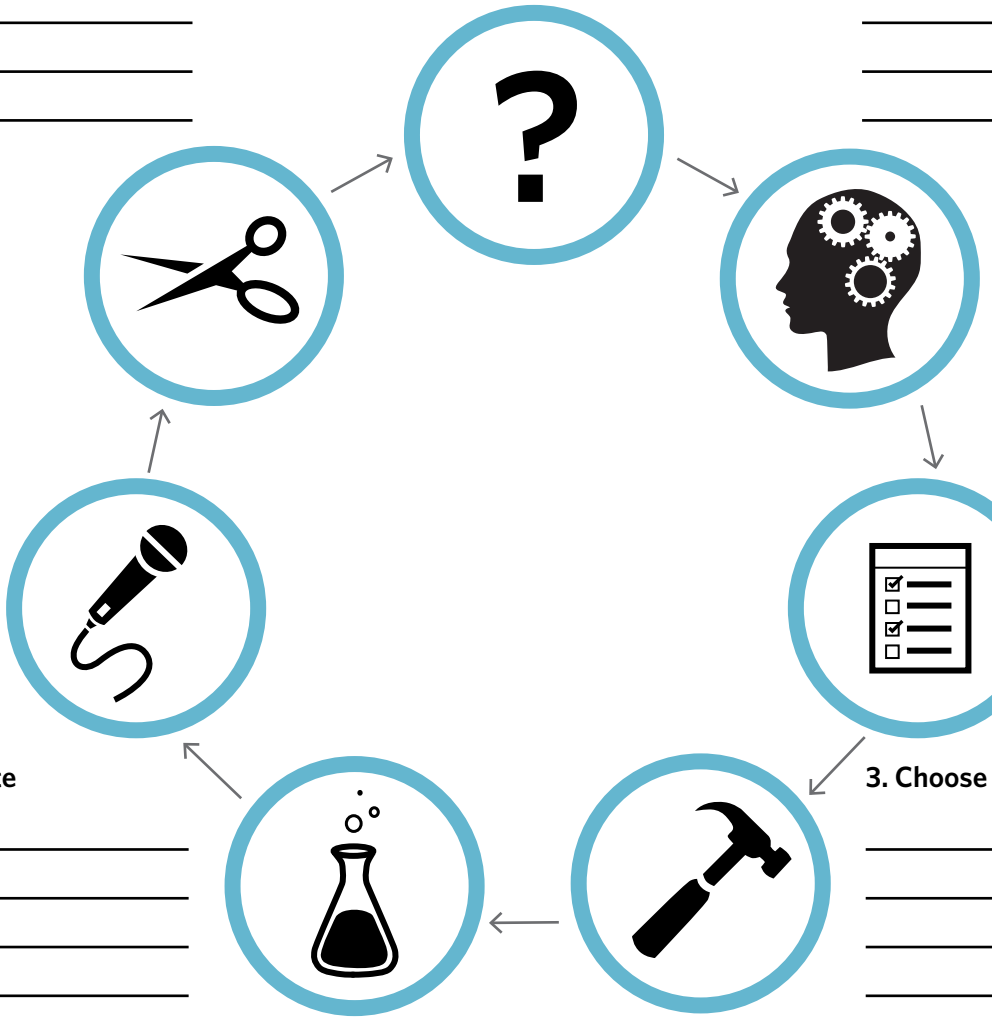
3. Choose Best Ideas

4. Construct Prototype

5. Test & Evaluate

6. Communicate

7. Redesign



Daily Temperature & Precipitation Chart

Section 3, Lesson 8

LOCATION	TEMPERATURE TODAY	TEMPERATURE OVER TIME	PRECIPITATION TODAY	PRECIPITATION OVER TIME

Teacher Instructions for Reading Graphs

Section 3, Lesson 8

NOTE! Each student or student group gets only **ONE** of the following 8 graphs! Make sure that all 8 graphs are represented in the room! Project the sample graphs on the board and point out these points:

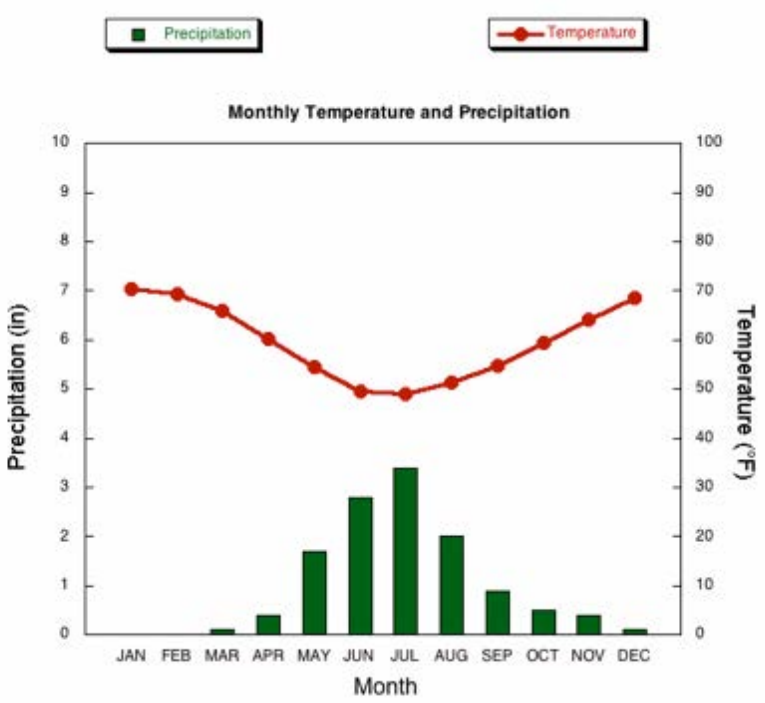
- The data is average data over many years of data collection
- The bars show how much total precipitation fell in each month. You read that on the left scale.
- The line and dots show the average temperature for that month. You read that on the right scale.

GUIDED QUESTIONS TO CHECK FOR STUDENT UNDERSTAND OF THE SAMPLE GRAPHS (SANTIAGO, CHILE AND HELSINKI, FINLAND)

- What do you think it would be like in March in Santiago, Chile? (65–70 degrees and no rain). Make sure students explain why they think what they mean, point out the readings and axes.
- What do you think it would be like in March in Helsinki, Finland? (25-30 degrees and snowing)
- What do you think the weather is like in Santiago, Chile today? Record this on Appendix x under "Temperature over time" and "Precipitation Over time" (answers will vary based on when you do the unit)
- Now, check the actual weather in Santiago, Chile. http://www.weather.com/weather/today/CIXX0020:1 Record this under "Temperature Today" and "Precipitation today."
- Why aren't our two answers the same? How different are they? Why? (Weather is what happens day to day; climate is what happens over many years of averages); the weather is often very different in the daytime and at night)
- What do you think the weather is like in Helsinki, Finland today? (answers will vary based on when you do the unit) Record this on Appendix x under "Temperature over time" and "Precipitation Over time.
- Now, check the actual weather in Helsinki. http://www.weather.com/weather/today/Helsinki+FIXX0002:1:FI Record this under "Temperature Today" and "Precipitation today."
- Why aren't our two answers the same? How different are they? Why? (Weather is what happens day to day; climate is what happens over many years of averages); the weather is often very different in the daytime and at night)
- Describe what it would be like to be in Santiago, Chile or Helsinki, Finland for a year. What kinds of clothing would you need?

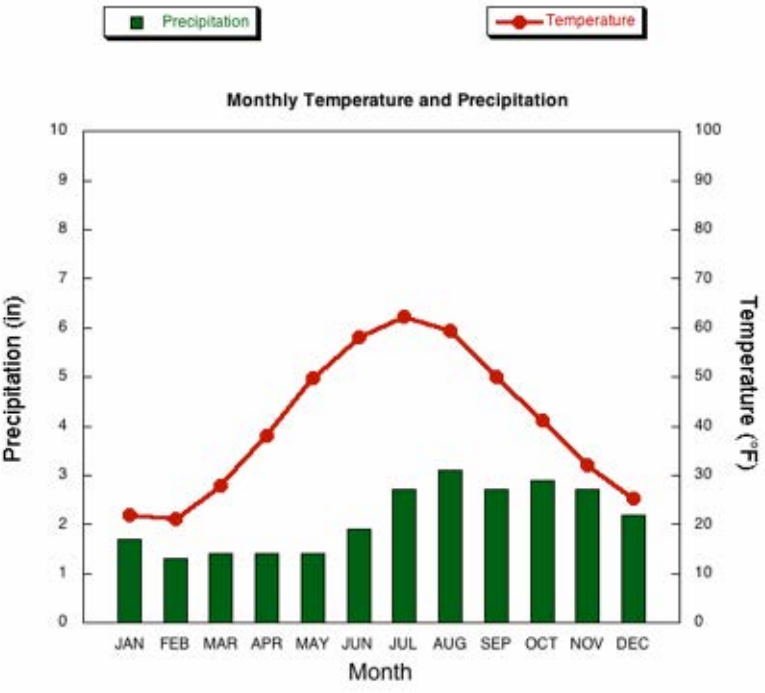
Teacher Examples

Section 3, Lesson 8



SANTIAGO, CHILE

Annual Climatology
http://drought.unl.edu/archive/iclimographs/SantiagoMTMP.htm

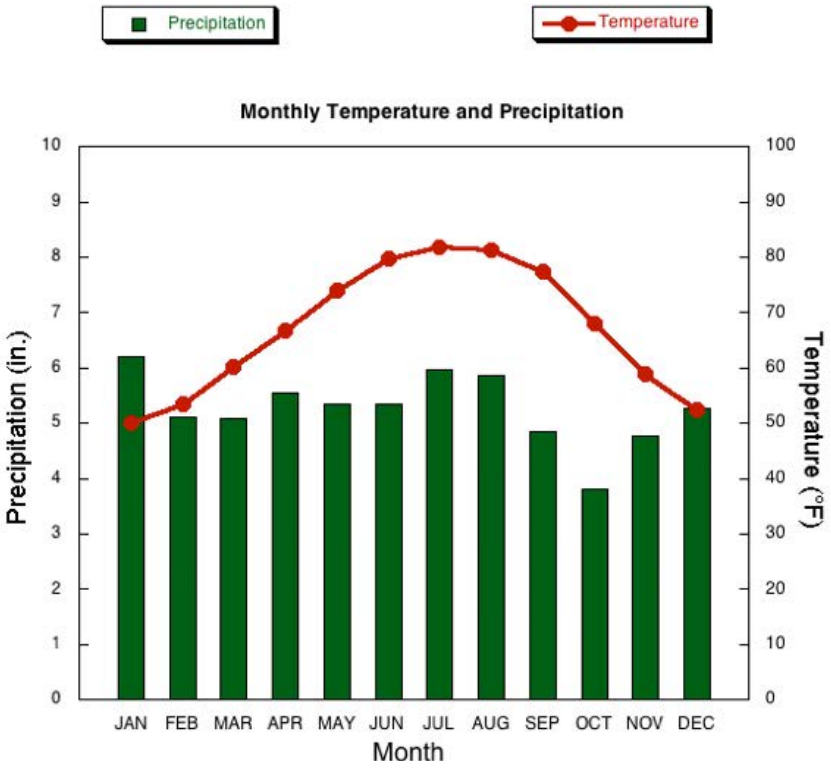


HELSINKI, FINLAND (NEAR THE ARCTIC CIRCLE)

Annual Climatology
http://drought.unl.edu/archive/iclimographs/HelsinkiMTMP.htm

Baton Rouge, LA

Section 3, Lesson 8



Annual Climatology
http://drought.unl.edu/archive/climographs/BatonRougeANC.htm

1. Describe an average day in March. What should you wear to go outside?

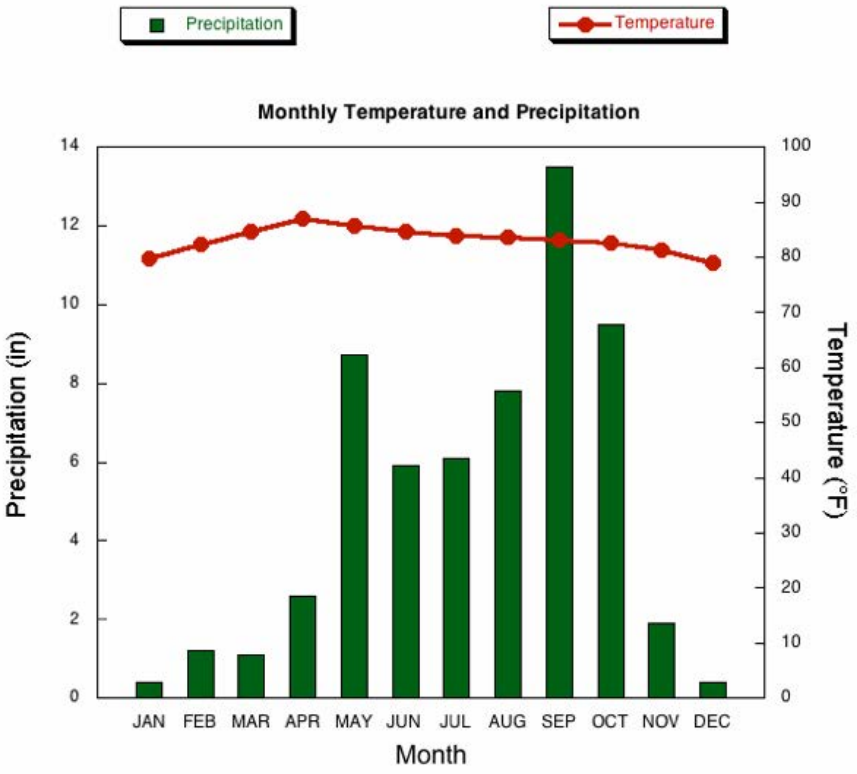
2. Describe an average day in July. What should you wear to go outside?

3. When is the best time of year to visit this location? Why?

4. Use 4 blank pieces of paper to draw what it looks like in your location at four times of the year (March, June, September, and December). Can you include any plants or animals?

Bangkok, Thailand

Section 3, Lesson 8



Annual Climatology
http://drought.unl.edu/archive/iclimographs/BangkokMTMP.htm

1. Describe an average day in March. What should you wear to go outside?

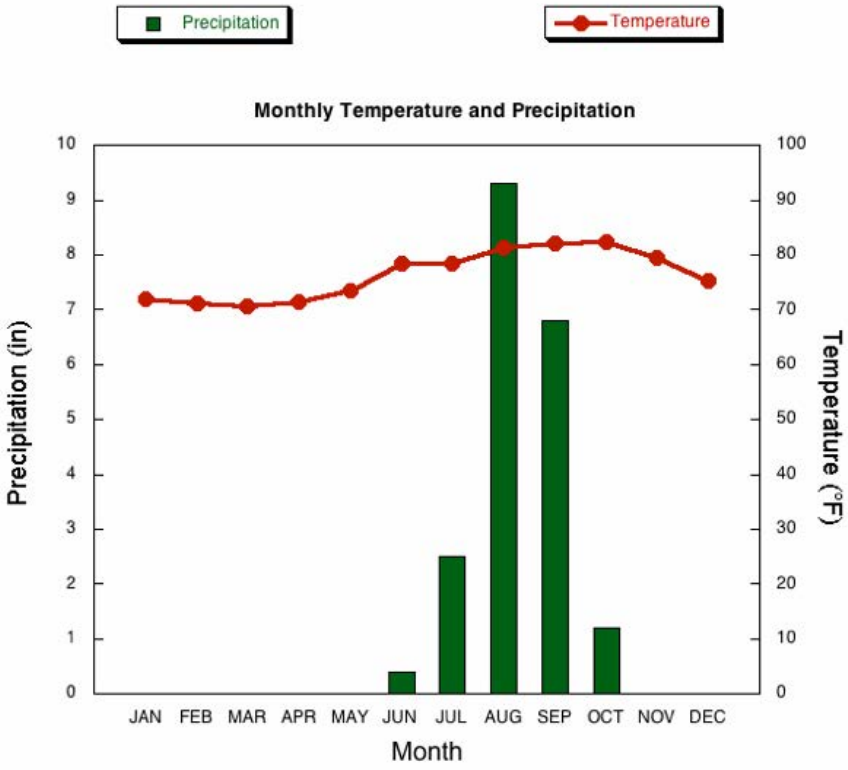
2. Describe an average day in July. What should you wear to go outside?

3. When is the best time of year to visit this location? Why?

4. Use 4 blank pieces of paper to draw what it looks like in your location at four times of the year (March, June, September, and December). Can you include any plants or animals?

Dakar, Senegal

Section 3, Lesson 8



Annual Climatology
http://drought.unl.edu/archive/iclimographs/DakarMTMP.htm

1. Describe an average day in March. What should you wear to go outside?

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2. Describe an average day in July. What should you wear to go outside?

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3. When is the best time of year to visit this location? Why?

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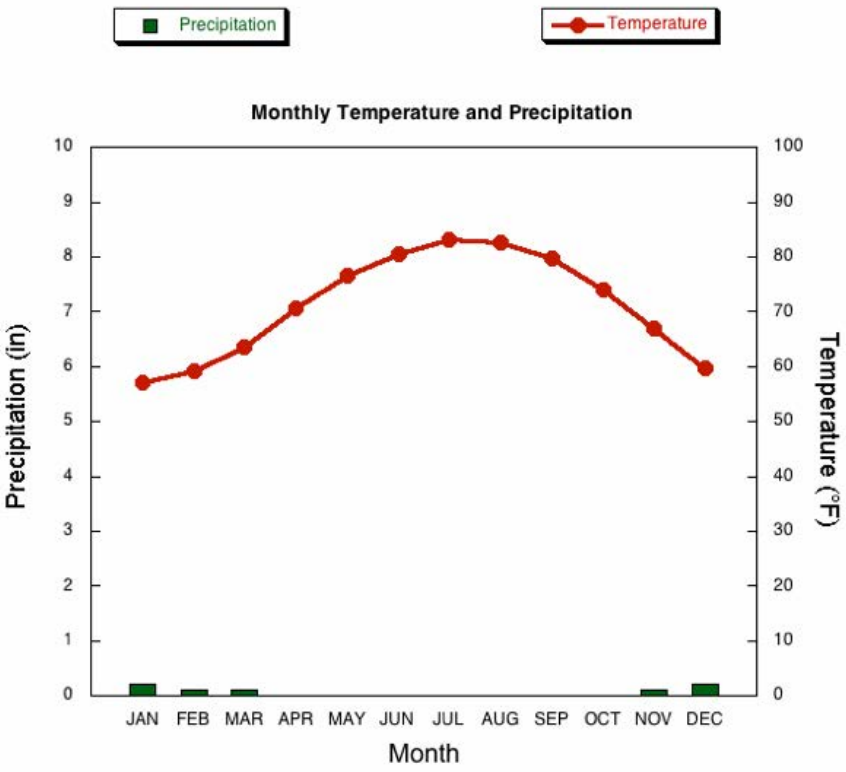
4. Use 4 blank pieces of paper to draw what it looks like in your location at four times of the year (March, June, September, and December). Can you include any plants or animals?

Cairo, Egypt

Section 3, Lesson 8



Annual Climatology
http://drought.unl.edu/archive/iclimographs/CairoMTMP.htm

1. Describe an average day in March. What should you wear to go outside?

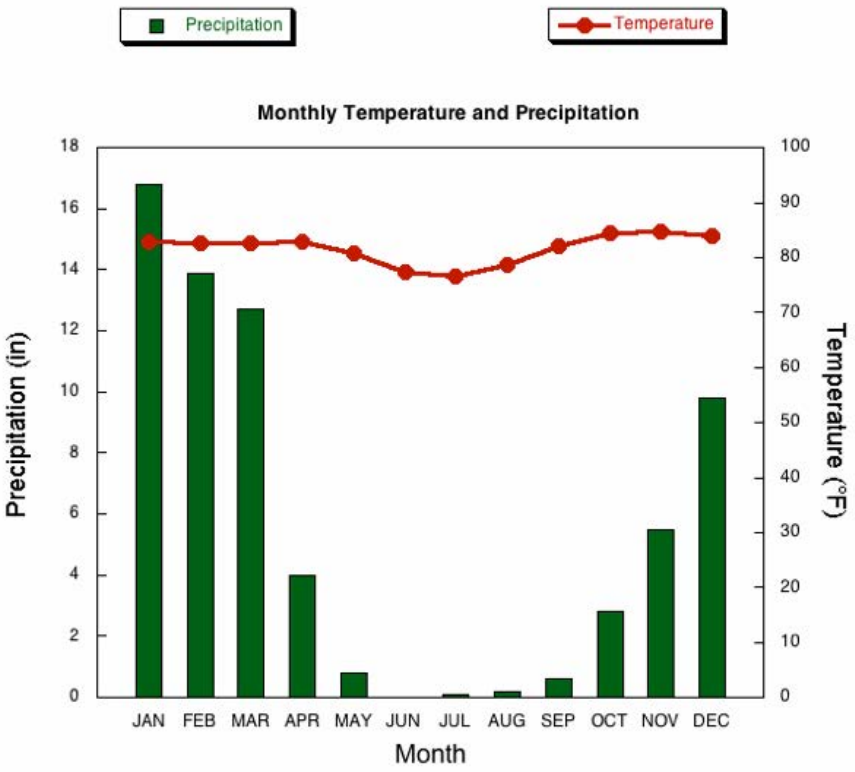
2. Describe an average day in July. What should you wear to go outside?

3. When is the best time of year to visit this location? Why?

4. Use 4 blank pieces of paper to draw what it looks like in your location at four times of the year (March, June, September, and December). Can you include any plants or animals?

Darwin, Australia

Section 3, Lesson 8



Annual Climatology
http://drought.unl.edu/archive/iclimographs/DarwinMTMP.htm

1. Describe an average day in March. What should you wear to go outside?

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2. Describe an average day in July. What should you wear to go outside?

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3. When is the best time of year to visit this location? Why?

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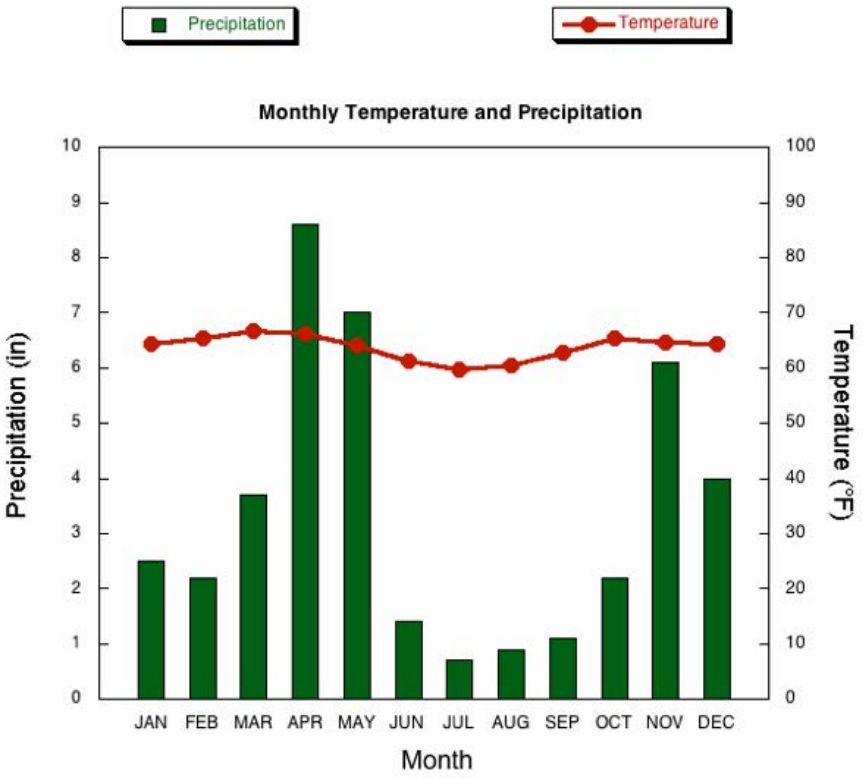
4. Use 4 blank pieces of paper to draw what it looks like in your location at four times of the year (March, June, September, and December). Can you include any plants or animals?

Nairobi, Kenya

Section 3, Lesson 8



Annual Climatology
http://drought.unl.edu/archive/iclimographs/NairobiMTMP.htm

1. Describe an average day in March. What should you wear to go outside?

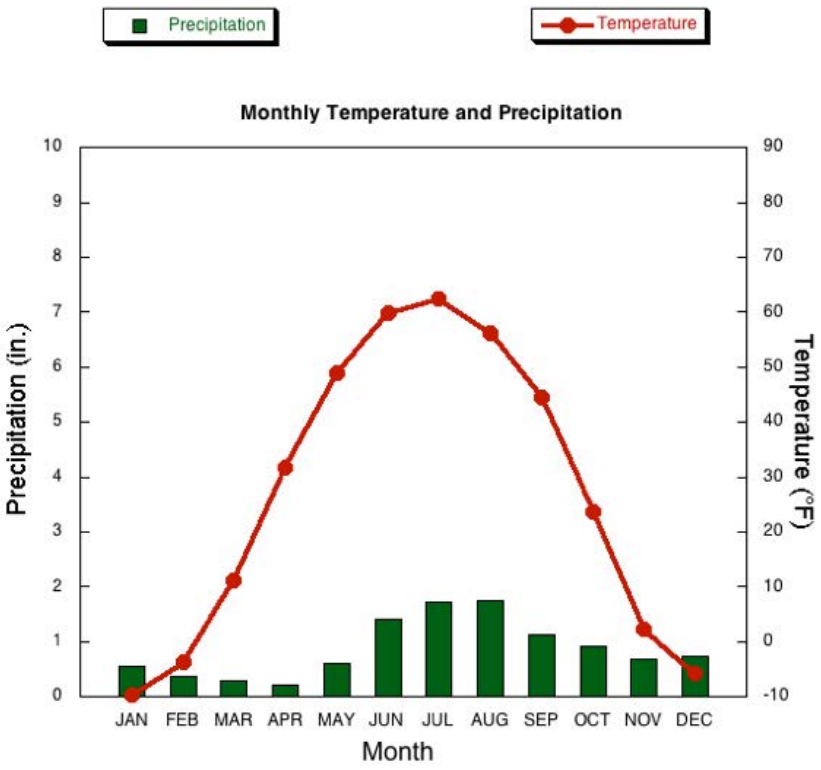
2. Describe an average day in July. What should you wear to go outside?

3. When is the best time of year to visit this location? Why?

4. Use 4 blank pieces of paper to draw what it looks like in your location at four times of the year (March, June, September, and December). Can you include any plants or animals?

Fairbanks, AK (Near Arctic Circle)

Section 3, Lesson 8



Annual Climatology
http://drought.unl.edu/archive/climographs/FairbanksANC.htm

1. Describe an average day in March. What should you wear to go outside?

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2. Describe an average day in July. What should you wear to go outside?

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3. When is the best time of year to visit this location? Why?

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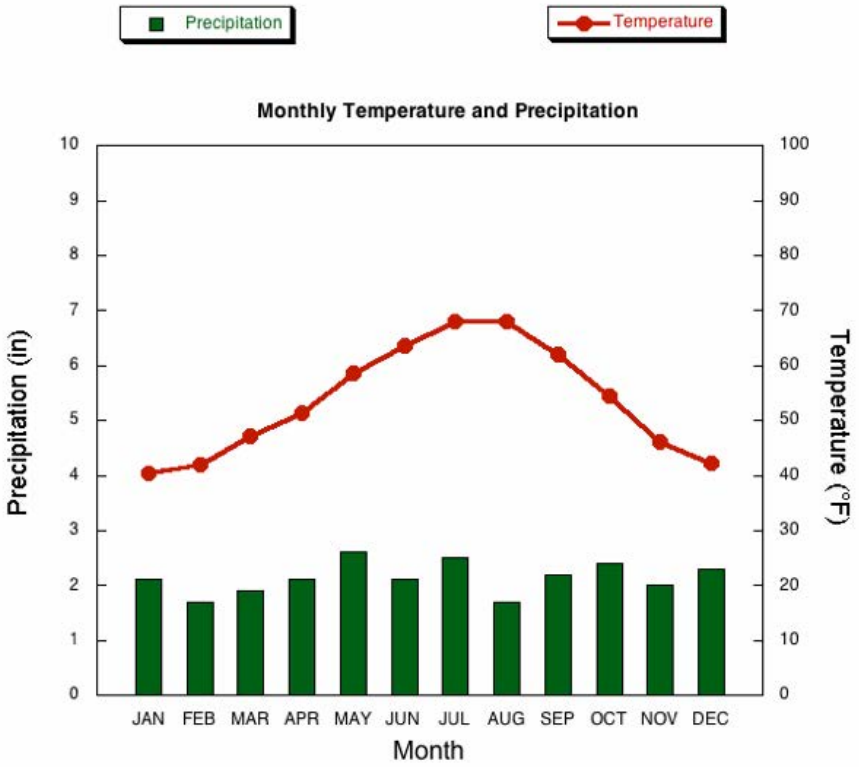
4. Use 4 blank pieces of paper to draw what it looks like in your location at four times of the year (March, June, September, and December). Can you include any plants or animals?

Paris, France

Section 3, Lesson 8



Annual Climatology
http://drought.unl.edu/archive/iclimographs/ParisMTMP.htm

1. Describe an average day in March. What should you wear to go outside?

2. Describe an average day in July. What should you wear to go outside?

3. When is the best time of year to visit this location? Why?

4. Use 4 blank pieces of paper to draw what it looks like in your location at four times of the year (March, June, September, and December). Can you include any plants or animals?

Vocabulary Words

All Sections and Lessons

RECOMMENDATION

We recommend that students participate in investigations as they learn vocabulary, that it is introduced as they come across the concept. MySci students work collaboratively and interact with others about science content also increasing vocabulary. The hands-on activities offer students written, oral, graphic, and kinesthetic opportunities to use scientific vocabulary and should not be taught in isolation.

weather

observe

forecast

meteorology

elements

precipitation

gauge

wind

anemometer

temperature

thermometer

hazard

hurricane

tornado

typhoon

region

climate

polar

temperate

desert

tropical