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**REMOTE LEARNING LESSON PLANS**

The Remote Learning Lesson Plans are adapted from the IQWST Teacher Edition to support continuous learning. Each plan condenses what is taught with specific teaching recommendations and identifies the digital resources, print resources, and materials needed to teach and learn IQWST remotely..

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| **UNIT TITLE** | **ES2** |
| **DRIVING QUESTION** | What Makes the Weather Change? |
| **UNIT STORYLINE** | [ES2 Storyline](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1571332095-es2-3.0-storyline-with-appendix.pdf) |
| **IQWST OVERVIEW** | [IQWST 3.0 Overview](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1534960182-iqwst-3-0-overview.pdf) |
| **TEACHER EDITION** | [ES2 Teacher Edition (PDF)](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1533225879-san-es2weatherv3-te.pdf) |
| **STUDENT EDITION** | [ES2 Student Edition (PDF)](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1538741223-san-es2weatherv3-se-color.pdf) |
| **LESSON PLAN OVERVIEW** | [Remote Learning Overview](http://activatelearning.com/wp-content/uploads/2020/05/remote-lesson-plans-overview.pdf) |

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| **STUDENT MATERIALS:** Each student will need the following materials. Teachers can modify lessons based on which materials the students (Ss) have access to. For Blended Learning options, teachers may draw from a combination of digital and print resources. | | |
| **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS NEEDED** (FOR EACH STUDENT) |
| * Access to Interactive Student Edition * Access to teacher-led lesson or video * Access to IQWST lesson videos * Audio recordings of readings   **Access from any device with a web browser.**   * For PCs and Chromebooks, we recommend using **Chrome** as the browser * For Macs and iOS, we recommend using **Safari** as the browser * Internet Explorer is NOT supported * Read the full Technical Requirements [here](https://s3.amazonaws.com/al.general/website/pages/ALDP+Requirements.pdf)   **Login:** <http://activatelearning.com/digital-resources/>   * Select your program * Enter the Username and/or Password provided by your teacher | * ES2 Student Edition * Hard copies of selected Projected Images (PIs)   *Print student editions are necessary for Ss who do not have internet access (or reliable access).* | **IQWST Equipment (from kit)\***  -Pad of sticky notes  -(3)balloon  -(2)straws  -(1)12” balloon  -glue  -clear tape  -(1)ruler  -(1) marker  -(1)piece of cardboard  -(1)sheet of graph paper  -(3)different colored markers or colored pencils  -(1)flashlight  -(1)small styrofoam ball,  -a pencil to stick into the ball as an axis,  **Household Items**  -(1)ice cube  -(1)piece of paper  -hot water  -ice water  -a lamp to represent the sun  -(1)12-16 oz soda or water bottle,  -(2)containers deep enough pour water in, and to submerge the bottle halfway  **Ss may also need the following General Classroom Supplies (if not using the IDE):**  Pencils and sharpener  Colored pencils  Black marker and/or ink pen  Plain paper for drawing (10-20 sheets)  Glue stick or transparent tape  Pad of sticky notes  Scissors  *\* If kits have been purchased, they include enough equipment for 8 groups of 4 Ss. You will need additional equipment if you opt to provide materials to each student.* |

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| **Learning Set 1:** | | | | |
| **Lesson 1**  **(2 sessions)** | **What Is Weather?** | [Download Lesson 1 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595177976-es2lesson-1.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 1.1  *Identifying Weather Conditions around the World* | **Anchoring Phenomenon:** There are patterns in weather conditions on Earth, and analyzing data from cities around the world enables Ss to determine those patterns and to investigate how and why they exist.  If possible, play videos of weather-related sounds and develop a list of weather conditions with Ss.  If possible, share the world map and point out the locations of all of the cities. Discuss patterns in weather conditions data in those cities. Teachers may choose to share one condition across cities (e.g., temperature) to support Ss in determining patterns.  Assign cities to Ss, who can analyze data themselves or in breakout groups. In addition to the target cities, Ss may track data in a city they have visited, or have ancestors or family in, or are interested in for other reasons.  Discussion Prompts: Throughout the unit, teachers should: 1) choose discussion prompts applicable to remote learning and ability to discuss with Ss, or 2) have Ss write answers to teacher-selected prompts that can be added to the slide deck, if discussion is not possible, or 3) choose questions in take-home format for Ss to discuss remotely, perhaps writing responses that are then submitted.  Questions in the SEs: Throughout the unit, teachers should decide on the method by which the lesson will be delivered, and then have Ss ignore any questions in their SEs that do not fit the way in which the lesson needed to be enacted remotely. Teachers may provide a handout for print-only Ss who cannot access the curriculum remotely, so that they know which questions in their SEs they should respond to.  Key: *Weather* is not the same everywhere, but the same weather *conditions* are found in places around the globe. | Access to Student Edition (SE) in Interactive Digital Edition (IDE)  Ss will post their own original questions in the “Questions” tab of the IDE | Hard copy of the Student Edition (SE) to be used for all activities,  readings, writing tasks.  Ss will write questions on sticky notes, and post at the front of their SEs on the *Driving Question Notes* pages. | Pad of sticky notes |
| Reading One | *What Can Clouds Tell Us about Weather?*  See TE for Reading Intro and Followup.  Key: Close observation and improved instrumentation improve weather forecasting accuracy. | SE Reading One | SE Reading One |  |
| Activity 1.2  *Setting Up the Driving Question Board (DQB)* | Introduce the Driving Question Board (DQB): Throughout the unit, Ss record their own, original questions as they arise. See *IQWST Overview* for more information about how to use and manage the DQB.  If possible, lead the brainstorming discussion to help Ss develop questions about weather. Ss can write questions on sticky notes and share as they would in class. Print users can post to the front of their SEs as a holding place during remote learning; IDE users can add new questions to the Questions space in IDE. If teachers use a digital DQB, Ss can also post there.  Key: Generate Ss original questions related to weather and climate. | SE Activity 1.2  Teacher-created DQB (e.g., jamboard, padlet) or physical DQB to share during virtual lessons. | SE Activity 1.2 |  |

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| **Lesson 2**  **(2 sessions)** | **What Makes Air Hot?** | [Download Lesson 2 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595179986-es2lesson-2.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 2.1  *It Is Heating Up* | Discuss and consider three explanations of how air on Earth is heated.  -Air absorbs solar energy and converts it to thermal energy.  -Objects on Earth’s surface (the “ground” being one) absorb most of the solar energy and convert it to thermal energy.  -Both the air and objects on Earth’s surface absorb the solar energy and convert it to thermal energy.  Key: Light energy from the sun is transmitted through the air to Earth’s surface; the surface (“ground”) absorbs some of that energy. | SE Activity 2.1 | SE Activity 2.1 |  |
| Activity 2.2  *A Little Heat from Me to You* | If possible, share the Activity Video. It illustrates the phenomenon Ss would have investigated in class: Energy can be transferred from one object to another (conduction).  Key: 1) Collisions of particles transfer the energy of one particle to another (conduction). 2) The air at Earth’s surface is primarily heated by the transfer of thermal energy from the ground below it. | SE Activity 2.2  [Activity Video 2.2](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-2_2.mp4) | SE Activity 2.2 |  |
| Reading One | *Why Does Conduction Matter?*  See TE for Reading Intro and Followup.  Ss could experience the phenomenon in the Reading remotely---simply holding an ice cube and applying what they have learned about conduction to the physical experience.  Key: This reading connects what Ss have learned about the phenomenon of conduction to their everyday experiences (food cooking, ice melting). The faster molecules move, the more thermal energy in the system. | SE Reading One | SE Reading One | (1)ice cube |

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| **Lesson 3**  **(3 sessions)** | **What Happens to the Hot Air?** | [Download Lesson 3 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589918684-ES2%20Lesson%203.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 3.1  *How Do Differences in Temperature Affect Air Masses?* | Demo the investigation or share the Activity Videos, so Ss can observe the phenomenon of convection.  Understanding that air is matter made of particles in constant motion is important in this investigation. Teachers may focus on an example to begin (i.e., the temperature difference between Morro Bay and San Luis Obispo that are close to one another but different in temperature).  From their remote observations, Ss should draw and describe how the air (and smoke) moved on both the cold and hot sides, and should explain what happened to both matter and energy.  Key: Convection. Warmer air rises, and cooler air sinks. Molecules at the surface have more energy being transferred to them (they move faster). As the molecules move faster, they transfer energy to the cooler air around them. | SE Activity 3.1  [Activity Video 3.1a](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-3_1-0.mp4)  [Activity Video 3.1b](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-3_1-1.mp4)  [Activity Video 3.1c](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-3_1-2.mp4) | SE Activity 3.1 |  |
| Activity 3.2  *What Happens When Air Is Heated or Cooled?* | If possible, demo the phenomenon, otherwise, share the videos. If Ss have the materials available, they can do this investigation remotely.  Teachers may choose to share the video twice so that there is time for Ss to record all data and complete the SE questions. If possible, review Ss knowledge of mass and volume and how that relates to this phenomenon.  Key: When matter is heated, it becomes less dense as the molecules move faster and farther apart. The volume increases and there are fewer molecules in the same amount of space. When matter is cooled, it becomes denser as the molecules move more slowly, move closer together, and take up less space. | SE Activity 3.2  [Activity Video 3.2a](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-3_2-0.mp4)  [Activity Video 3.2b](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-3_2-1.mp4) | SE Activity 3.2 | (1)balloon  (1)12-16 oz soda or water bottle,  (2)containers deep enough pour water in, and to submerge the bottle halfway,  hot water, ice water, (1)balloon |
| Activity 3.3  *Why Heat Rises* | Review results from 3.1 and 3.2 investigations. If possible, discuss in order to develop class consensus on a model of how air behaves  (convection in air). Ss should be able to use the model to explain why hot air rises.  if video conferencing is possible, Ss can develop models and share. Teachers can also share sample models (from the TE) after Ss have developed their own. Discuss samples posted, and have Ss revise their models after discussion.  Key: The temperature and density differences between cooler and warmer air cause convection. | SE Activity 3.3 | SE Activity 3.3 |  |
| Reading One | *Why Learn about Convection?*  Key: The reading identifies everyday experiences with convection such as toasting marshmallows and convection ovens, and provides more information on the process. | SE Reading One | SE Reading One |  |

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| **Lesson 4**  **(1-3 sessions)** | **Where Does the Energy Come from in a Storm?** | [Download Lesson 4 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595180015-es2lesson-4.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 4.1  *Constructing a Barometer* | Teachers might demo the activity and set the barometer up for data collection, or share the video so that Ss have a visual sense of what a barometer measures. However, given the likelihood of reduced time for remote learning, Activities 4.1 and 4.2 can be combined into a single lesson, and barometric pressure readings may be accessed on the internet and recorded on a daily basis without constructing a barometer.  If teachers have access to the large syringe from IC1, they can demonstrate pushing on the plunger while a finger blocks the end of the syringe, increasing pressure inside the syringe.    If possible, use the class model to summarize with Ss what they know about what is happening to the air. Have Ss complete the Making Sense questions.  Note: Given the likelihood of reduced time for remote learning, teachers may choose to skip Activity 4.1 and focus on Activity 4.2, adding discussion of pressure to Activity 4.2.  Key: Temperature and density differences cause convection, and cause air masses of different temperatures to exert different pressures on the Earth’s surface. A barometer measures air pressure. | SE Activity 4.1  [Video: Barometer](https://www.youtube.com/watch?v=wSILpxbZjVk) | SE Activity 4.1 |  |
| Activity 4.2  *Temperature Difference and Movement of Air Masses* | This investigation uses water to represent air because water is easier to see, and because both air and water are fluids.  Demo the investigation, if possible--otherwise, share the Activity Videos for Trial 1 and Trial 2.  For Trial 1, share the first Activity Video (4.2a), where both the red and blue colored water are at room temperature. Have Ss record observations, describing the water in each cup as well as what happened when the card between the cups was removed.  For Trial 2, share the Ss the second Activity Video (4.2b), in which the red water is hot and the blue water is cold. Ss should again describe observations and answer the Making Sense question in which they explain why hot and cold water behaved as they did.  If possible, discuss the phenomenon Ss observed, relating observations from this investigation to what happens with air masses that are different temperatures. Revise the consensus model.  Key: Temperature differences cause air to move. Air masses move when high-pressure, more dense (cooler) air pushes into the space of lower-pressure, less dense (warmer) air, causing it to be lifted upward. Less dense air is unstable as it moves upward and transfers energy to the surrounding air, cooling as it rises. | SE Activity 4.2  [Activity Video 4.2a](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-4_2-1.mp4)  [Activity Video 4.2b](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-4_2-2.mp4) | SE Activity 4.2 |  |
| Reading One | *How are Oceans like Air?*  Key: Ocean currents move much as air currents do, and patterns in ocean currents (e.g., the Gulf Stream) affect weather patterns.  Note: This reading was inadvertently omitted from the published, print version of IQWST 3.0. The TE and SE pages, and the audio reading are found in the “Updates” folder under “Unit Resources” in the Teacher Portal. The reading is in IDE. The audio recording is in both the IDE and the Portal. |  |  |  |
| Activity 4.3  *Is a Storm Cloud Different from Other Clouds?* | Share PIs   * Cirrus Clouds * Cumulonimbus Clouds * Altocumulus Clouds * Fair Weather Cumulus Clouds * U.S. Surface Analysis Map   Search for storm video as directed in the TE preparation section or share: <https://www.youtube.com/watch?v=LEAYUAy8DcI>  Have Ss revise their models from Lesson 3. Teachers might share the sample model from the TE for discussion, then allowing Ss to revise their model as needed.  Note: Given the likelihood of reduced time for remote learning, teachers may choose to skip Activity 4.3. It is high-interest for students but less important to standards, although Ss should understand this activity’s key about cloud formation.  Key: Clouds form as water vapor in the atmosphere condenses around dust particles. | SE Activity 4.3 | SE Activity 4.3  Print PIs   * Cirrus Clouds * Cumulonimbus Clouds * Altocumulus Clouds * Fair Weather Cumulus Clouds * U.S. Surface Analysis Map |  |

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| **Lesson 5**  **(0-2 sessions)** | **What Can Weather Maps Tell Us?** | [Download Lesson 5 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595180040-es2lesson-5.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 5.1  *What Can Weather Maps Tell Us?* | Share PIs:   * U.S. Surface Analysis Map (3/9/12) * U.S. Satellite Map (3/9/12) * U.S. Radar Map   Teachers can share regional/local data and maps for this activity rather than (or in addition to) those provided. The source used for the maps in this lesson is <http://www.intellicast.com>. National and regional maps for all three types of data used in the discussion (clouds, precipitation, and pressure) can be found on this site.  Note: Given the likelihood of reduced time for remote learning, teachers might choose to skip Lesson 5, which focuses on teaching Ss to read weather maps.  Key: Reading weather maps. | SE Activity 5.1 | SE Activity 5.1  Print PIs   * U.S. Surface Analysis Map (3/9/12) * U.S. Satellite Map (3/9/12) * U.S. Radar Map |  |
| Reading One | *How Do Scientists Get the Data?*  Key: Satellite data improves scientists’ ability to interpret weather patterns and to predict weather. | SE Reading One | SE Reading One  A colored version of the SE pages is needed in order for Ss to interpret the maps in the reading. |  |
| Activity 5.2  *Creating an Isobar Map* | Share PIs  1) Surface Area Map with Pressure Lines  2) Pressure Map  3) Map Overlay  Teachers may want to share sample Isobar maps as the basis of their discussion and for Ss to self- check/correct their own maps.  Key: The role of air pressure in weather. | SE Activity 5.2 | SE Activity 5.2  Print PIs   * Surface Area Map with Pressure Lines * Pressure Map * Map Overlay |  |
| Checkpoint: The Making Sense questions in SE .5.1 and SE 5.2 can be used to assess Ss developing ability to read weather maps. | | | | |

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| **Learning Set 2: Why is Weather Different from Place to Place?** | | | | |
| **Lesson 6**  **(3 sessions)** | **Does the Storm Model Fit Data from a Storm?** | [Download Lesson 6 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589918837-ES2%20Lesson%206.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 6.1  *Can We Identify Patterns in Data?* | Ss use data to explore the phenomenon of a storm that results from a particular congruence of weather conditions.  Share PIs:   * Surface Analysis (6/2/10) * Zoomed Regional Map (6/2/10) * Chart of Conditions * Regional Map after Storm (6/3/10)   Key: Data analysis (patterns) indicates that rain forms just ahead of where two pressure areas meet, because that is where less dense lower pressure air is rising and forming clouds. | SE Activity 6.1 | SE Activity 6.1  Print PIs:  •Surface Analysis (6/2/10)  •Zoomed Regional Map (6/2/10)  •Chart of Conditions  •Regional Map after Storm (6/3/10) |  |
| Activity 6.2  *Can the Storm Model Explain the Data?* | Share PIs:   * Temperature Data * Humidity Data * Pressure Data * Precipitation Data   Post discussion questions for multiple student responses if possible and then summarize responses for group explanation. Ss will revise their model from Activity 4.2.  Key: Checking the model against the data: Scientists revise models, as needed, to fit new understandings (new data). | SE Activity 6.2 | SE Activity 6.2  Print PIs:  •Temperature Data  •Humidity Data  •Pressure Data  •Precipitation Data |  |
| Reading One | *Is It Going to Snow or Rain or . . .*  Key: Temperature and humidity predict the type of precipitation. | SE Reading One | SE Reading One |  |
| Checkpoint: Use the Making Sense question at the end of SE 6.2 to check Ss ability to synthesize what has been learned thus far, as they explain: Why did the storm happen?” | | | | |

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| **Lesson 7**  **(3-5 sessions)** | **Why Does Temperature Vary in Different Locations?** | [Download Lesson 7 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595180057-es2lesson-7.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 7.1  *How Can We Compare Cities on Earth?* | Given the likelihood of reduced time for remote learning, time could be shortened by presenting the data in 7.1 and 7.2 (or having Ss look at these data ahead of time and coming prepared to discuss patterns), and then moving directly to demos (or use of the videos) for Activities 7.3 and 7.4.  Share PI: Data Table on Temperature  If possible, post the map with the cities plotted on it on the DQB.  Key: Areas near the Equator are warmer, which means more thermal energy is being transferred from Earth’s surface to the air above the Earth. | SE Activity 7.1 | SE Activity 7.1  Print PI: Data Table on Temperature |  |
| Activity 7.2  *Does the Number of Daylight Hours Vary in Different Locations on Earth?* | (See 7.1 section)  Share PI: Data Table on Daylight Hours  Since all the places get the same number of hours of daylight each year, something else must be happening to account for the difference in temperature.  Key: All places on Earth get the same number of hours of daylight each year, but temperature varies by latitude. | SE Activity 7.2 | SE Activity 7.2  Print PI: Data Table on Daylight Hours |  |
| Activity 7.3  *Does the Earth’s Shape Affect Temperature?* | Explain *light intensity* and that a light sensor measures it. And explain the physical model: locate the equator, the wire circles represent different latitudes, each pin represents a specific location.  Demo the finished lantern, if possible, or share the videos. (Note: The paper lantern model will be used again in Lesson 8.)  Ss should fill in the data table during the demo or video. Discuss the pattern in the intensity readings data.  Key: Higher intensity readings correspond to the highest temperatures at the equator, while the lower intensity readings correspond to the lower temperatures closer to the poles. | SE Activity 7.3  [Setup Video 7.3](https://d16dnhlej6sizh.cloudfront.net/assets/portal/Teacher-Portal-Resources/ES2_se_v2_0_5_video-lesson_7-201.mp4)  [Activity Video 7.3](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-7_3-1.mp4) | SE Activity 7.3 | (1)piece of paper  (1)balloon  (1) marker |
| Activity 7.4  *Does the Angle that Light Hits the Earth Affect Intensity?* | Demo this investigation or share the Activity Video. If Ss are able to obtain the materials and have a helper, they could do this investigation remotely.  Ss should fill in the data table during the demo or video. Discuss the patterns (number of squares covered) and what this represents in terms of temperature differences at the equator and the North Pole when the Earth model is tilted at different angles.  Key: Light intensity varies depending on the angle of the light hitting a location. This explains why temperatures vary from colder at the North Pole and warmer at the Equator. | SE Activity 7.4  [Activity Video 7.4](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-7_4-1.mp4) | SE Activity 7.4 | (1)piece of cardboard  (1)sheet of graph paper  (3)different colored markers or colored pencils  (1)flashlight |
| Activity 7.5  *Can We Explain the Pattern in the Data?* | Ss develop a model to explain the pattern that connects temperature, latitude, and the intensity of light. This can be a causal chain or another way of showing “because of this, this happens.” It does not need to be written in the CER format. It will be helpful to review the key ideas before Ss begin to construct their explanation and diagram.  Key: Temperature varies at different latitudes because the light intensity is different at different places on the Earth since the angle that the light hits the Earth is different-more direct at the equator and less direct at the poles. The places with more direct light are warmer while those with less direct light are cooler. | SE Activity 7.5 | SE Activity 7.5 |  |
| Exercise 7.5  *Do the Data Match the Explanation?* | Given the likelihood of reduced time for remote learning, time could be reduced by omitting this exercise or using it as an extension for some Ss, but not required for all.  Share PI: Average Surface Temperature (January), especially if Ss do not have access to the map in color in IDE.  Ss are to explain in the Making Sense questions how their explanation fits the data on the map. Any new questions that arise may be placed on the DQB if possible. There will probably be questions about temperature, so those will lead to the next lesson.  Key: Temperature varies at different latitudes because the light intensity is different at different places on the Earth since the angle that the light hits the Earth is different-more direct at the equator and less direct at the poles. The places with more direct light are warmer while those with less direct light are cooler. | SE Activity 7.5 | SE Activity 7.5  Color version of graphic in SE for Exercise 7.5. |  |

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| **Lesson 8**  **(2-3 sessions)** | **What Else Is Affecting Temperature?** | [Download Lesson 8 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1589918921-ES2%20Lesson%208.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 8.1  *Does the City Data Match the Visualizations* | Teachers should use the paper lantern model from Lesson 7 and share PI: City Temperature Data to prompt discussion.  Given the likelihood of reduced time for remote learning, time could be shortened by using the prompts in this activity to raise questions that 8.2 and 8.3 will answer, and combining 8.1, 8.2, and 8.3 into a single remote learning session.  Key: To arrive at the questions: What causes seasons? and Why are seasons opposite one another in the Northern and Southern hemispheres. | SE Activity 8.1 | SE Activity 8.1  PI: City Temperature Data |  |
| Activity 8.2  *How Does the Earth Move?* | Demo the Earth model or share the videos and discuss. If Ss are able to have the materials, they can experience this phenomenon remotely.  Note: The model is also needed for Activity 8.3.  Key: Earth rotates on its axis once a day, creating day and night. Earth revolves around the sun once a year. Earth’s distance from the sun does not vary much across the year.  Key: Seasons cannot be explained if Earth’s axis is vertical. | SE Activity 8.2  [*Activity Video 8.2a*](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-8_2-1.mp4)  [*Activity Video 8.2b*](https://s3.amazonaws.com/s3-static.iwqst.com/assets/media/iqwstv3/activity-videos/es2/es2-8_2-2.mp4) | SE Activity 8.2 | (1)small styrofoam ball, colored markers, a pencil to stick into the ball as an axis, a lamp to represent the sun |
| Reading One | *Day and Night*  Key: Reinforces *how* day and night occur, and introduces shadows as a way to tell time. | SE Reading One | SE Reading One |  |
| Activity 8.3  *Does a Tilted Earth Explain the Seasons?* | The styrofoam ball and lamp  Key: The Earth’s tilt causes light to strike the Earth more intensely and for longer periods of time at different places and at different times of year, which is what causes seasons. | SE Activity 8.3 | SE Activity 8.3 | Styrofoam ball model from Activity 8.2, lamp |
| Checkpoint: Ss need to be able to summarize key ideas from Lessons 7 and 8 (found in the TE), which is the task in the Making Sense section of SE Activity 8.3. | | | | |
| Reading Two | *Seasons of the Year*  Key: Reinforces seasons and why different locations on Earth see greater changes in temperature and precipitation than others do. | SE Reading Two | SE Reading Two |  |
| Activity 8.4  *Why Is the Temperature Not the Same Everywhere?* | Ss will need the list of scientific principles--key ideas from across the unit--in order to engage with this activity and write this explanation. If needed for remote learning, Ts should supply that summary list.  Key: Ss construct an evidence-based explanation that answers: Why is weather different from place to place? | SE Activity 8.4 | SE Activity 8.4  Completed list of scientific principles (key scientific ideas) developed throughout the unit. |  |

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| **Appendix 1**  **(2 sessions)** | Climate Change | [Download Appendix 1 Teaching Slides](https://d16dnhlej6sizh.cloudfront.net/assets/portal/1595180074-es2appendix-lesson-1.pptx) | | |
| **ACTIVITY** | **TEACHING RECOMMENDATIONS** | **DIGITAL RESOURCES** | **PRINT RESOURCES** | **MATERIALS**  **FOR EACH STUDENT** |
| Activity 1.1  *Global Warming* | This Lesson addresses MS-ESS3-5 via data and an investigation.  Share PIs:   * Greenhouse Gases * Carbon Dioxide Emissions and Atmospheric Carbon Dioxide Concentration * Global Population and Carbon Dioxide Emission * Carbon Dioxide Concentrations and Global Temperature * Historic Carbon Dioxide Concentrations   Key: Global warming: Human activities produce greenhouse gases, which get trapped in the atmosphere, and as concentrations increase, temperatures increase. | SE Activity 1.1 | SE Activity 1.1  Print PIs  •Greenhouse Gases  •Carbon Dioxide Emissions and Atmospheric Carbon Dioxide Concentrations  •Global Population and Carbon Dioxide Emissions  •Carbon Dioxide Concentrations and Global Temperature  •Historic Carbon Dioxide Concentrations |  |
| Reading One | *Greenhouse Gases*  Key: The many effects of global warming and of climate change (and that the two are not synonymous). Also, the concept of a carbon footprint. | SE Reading One | SE Reading One |  |
| Activity 1.2 | *Greenhouse Gases*  If possible demo this investigation for Ss, otherwise, share the video so that Ss are able to observe evidence for the phenomenon (the more--and more concentrated--the greenhouse gases, the more the temperature increases).  Key: Connecting human activity (causes) to the environmental outcomes (effects) and considering positive impacts of human interventions to mitigate effects. | SE Activity 1.2  [Activity Video Apx 1.2 Greenhouse Effect](https://iat.wistia.com/medias/08vpqoz3qb) | SE Activity 1.2 |  |
| Checkpoint: Question prompts in the TE could also be used for written responses. Those that focus on human activities/behaviors and solutions can be written in CER format, with data from the graphs, the investigation, and the reading marshalled as evidence in constructing an argument. | | | | |

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| **SUMMATIVE ASSESSMENT:** By the end of the unit, Ss should be able to answer with a full, CER explanation based on evidence from their investigations, the question from Learning Set 2 “Why is weather different from place to place?” and/or the Driving Question, “What makes the weather change?” |

***Teachers might choose to emphasize only a portion of this as a final assessment, given what they are able to teach and what Ss are actually able to do during this remotely taught unit.***