| **Name:** Laura, Leah, and Kaitlyn | **Class/Period:** 8th Grade Science |
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| **Date:** May 19, 20, 21 | **Unit:** Climate Change |
| **Central Focus** (core concepts students will develop)**: Understanding air quality data and what factors affect air quality.** | |

**Content Standards:**

MS-ESS3-3 - Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

HS-ESS2-2 - Analyze geoscience data to make the claim that one change to Earth's surface can create feedbacks that cause changes to other Earth systems.

**What do you want students to know and be able to do at the end of this lesson? (Learning Objectives)**

* I can explain what environmental factors impact air quality (with emphasis on the PM2.5 measurement) and its significance for people and communities.
* I can read a graph and use a graph to answer questions about changes in air quality in Portland over time.
* I can describe the process of using a large data set to create graphs to help answer specific questions about an environmental issue.

**What evidence of learning will you collect at the end of the lesson? How will you know what students have learned? (Assessment)**

Students will use their notes to answer, “What factors affect air quality and how has air quality changed in our area since 2000?” in a graphic organizer and then write an argumentative letter using evidence to support their claim about an issue that will impact their local air quality. For an extension students can answer, “What other information would you want to find to help you answer another question?” Give 2 or 3 examples.

| **Vocabulary** | **Support:** |
| --- | --- |
| AQI  PM 2.5 and PM 10  Factors  Scatter Plot  Central Tendency  Variability  Variables | Guided notes with definitions and applications. |

**Detailed Lesson Sequence** (What will you do? What will students do? Include a variety of activities that include active participation, integrating literacy and helping students apply their learning.)

Day 1

| **Time** | | **The teacher will…** | **The student will…** | **Materials/Resources** |
| --- | --- | --- | --- | --- |
| 5 mins | | Show the video of [KMart Fire](https://www.youtube.com/watch?v=VGJW9vEwl90) or local fire and ask students to remember what they experienced during this time or what the problems are in the video. Prompt them to discuss with their group and write down their answer. | Warm up: Students will discuss their response to the prompt: “What do you remember from when the skies were red/ the KMart building burned?” Or “What problems were brought up in the video?” | Notebook/ pencil  [KMart Fire Video](https://www.youtube.com/watch?v=VGJW9vEwl90) |
| 30 mins | | Demonstrate how to use the Atmotube to measure air quality. Light a match next to the device to show students what happens to the number shown. Explain how students will be expected to collect data. Gather class data. | Watch the demonstration and then use the Atmotube to measure and record the air quality with the following factors: blow air, fan, air purifier, matches, perfume. Students will test factors 3 times each. Students who are finished can start to gather class data and look for patterns. | Atmotubes - borrow or buy [AQI Tool](https://temtopus.com/products/temtop-professional-pm2-5-air-quality-monitor-p10?currency=USD&variant=28605942431792&utm_medium=cpc&utm_source=google&utm_campaign=Google%20Shopping&gclid=CjwKCAjwtuOlBhBREiwA7agf1nobbPHXnpugahdljP8KV0_qZA1RuBOelw7UTqdGCKknjkgACDsb9hoCevEQAvD_BwE)  Local Air Quality program may have resources  Smart phone or device with apps  Matches  Perfume  Clorox wipes  Etc. |
| 5 mins | | Prompt students to clean up and then answer the exit ticket question on a piece of paper to turn in. | Exit ticket: Students will clean up and write their answer to the question, “What factor affected the air quality the most?” | Small piece of paper  Pencil |

Day 2

| **Time** | | **The teacher will…** | **The student will…** | **Materials/Resources** |
| --- | --- | --- | --- | --- |
| 10 mins | | Ask students to brainstorm on their own first and then with their group factors that might affect air quality outside. (Factors: cars, traffic, factories, weather, fires, cows, landfills, garbage, water treatment)  Show the tile plot graphs of Portland and then LA. Ask them: “What patterns do you notice?” | Students will think on their own first and then with their group write down factors that might affect air quality outside. Then they will look at the graphs and discuss what patterns they notice. (Maybe July 4th line or March 2020) Each group can write down what they notice and wonder on a whiteboard if available. | Sticky notes  Pencils  [EPA AQI Data](https://www.epa.gov/outdoor-air-quality-data/air-data-multiyear-tile-plot)  White boards  White board markers |
| 10 mins | | Demonstrate scrolling through the large EPA AQI data set. Then show how the preset code creates the green and yellow graphs to show the categories of air quality. Ask students, “Does this graph show the story that you were expecting to see?” | Students watch the demo and discuss with their group what they heard and what they wonder. Write down quick notes and sketches of the graphs. Students will answer the question, “Does this graph show the story that you were expecting to see?” with their group. | [EPA AQI Data](https://www.epa.gov/outdoor-air-quality-data/air-data-multiyear-tile-plot)  Updated AQI data |
| 20 mins | | Play the [video](https://www.youtube.com/watch?v=zj4rd77EAt4) about 2.5 PM and ask students to think about why we care about air quality. Prompt students to read the [Oregonian article AQI is off the charts](https://www.oregonlive.com/news/2020/09/portlands-air-quality-is-off-the-charts-on-sunday-and-much-of-oregon-is-just-as-bad-due-to-wildfires.html) or the [Guardian article about Amazon truck warehouses](https://www.theguardian.com/technology/2021/apr/15/amazon-warehouse-boom-inland-empire-pollution) and highlight words that are new. Then guide students through notes writing down the definitions of PM 2.5, AQI, sources of PM, who it affects. Prompt exit ticket. | Students will watch the video and discuss why we care about air quality. They will read the Oregonian article and highlight new words. Next they will follow guided notes to write down the definitions of key vocabulary. Then students will answer the question, “Why do we care about PM 2.5?” | [1 min video about 2.5 PM](https://www.youtube.com/watch?v=zj4rd77EAt4)  [Oregonian article AQI is off the charts](https://www.oregonlive.com/news/2020/09/portlands-air-quality-is-off-the-charts-on-sunday-and-much-of-oregon-is-just-as-bad-due-to-wildfires.html)  [Guardian article about Amazon truck warehouses](https://www.theguardian.com/technology/2021/apr/15/amazon-warehouse-boom-inland-empire-pollution)  Highlighter  Small piece of paper  Pencil  [AQI Exit Ticket](https://docs.google.com/document/d/1lEhYONoM7ZNUolQUwxp6H42iyhdXANh7fdyaNPOwdFk/edit?usp=sharing) |

Day 3

| **Time** | | **The teacher will…** | **The student will…** | **Materials/Resources** |
| --- | --- | --- | --- | --- |
| 10 mins | | Show the Spiderman video and ask students to practice writing a short CER making a claim about the question, “Should Spiderman get a driver's license?” Prompt students to write a CER based on evidence from the video and go over their ideas as a class. | Watch the Spiderman video and write a practice CER based on the question, “Should Spiderman get a driver's license?” Students will participate in a class discussion about evidence that can support their claim. | Notebook  Pencil  [Spiderman Video](https://www.youtube.com/watch?v=bGuHgRQSEuk&t=2s) |
| 30 mins | | Explain the assessment as a graphic organizer with spaces to use evidence from the graphs and articles to answer the question, “What factors affect air quality and how has air quality changed in our area since 2000?” or “Should the ProLogis company build a truck warehouse across the street from a school?” We will use this info to write an argumentative letter to a company, politician, or someone the students choose. Prompt students with an extension question. | Students will use their notes to answer, “What factors affect air quality and how has air quality changed in our area since 2000?” in a graphic organizer and then write an argumentative letter. For an extension student can answer,  “What other information would you want to find to help you answer another question?”  Give 2 or 3 examples. | [Air Quality CER graphic organizer](https://docs.google.com/document/d/1ZmF1u-25lXA9tjEJs8Okd_PmPtRhEQyW/edit?usp=drive_link&ouid=102489052810943387113&rtpof=true&sd=true)  Lined paper  Envelopes |

**Adaptations/Modifications** (What adjustments will you make for students with special needs? This includes ELLs, students with IEPs, and any other special considerations you should use when planning and carrying out instruction. *Use italics in lesson sequence description to indicate where these supports will be implemented.*):

| **Emergent Bilingual** | All materials will be printed in home language and students will be paired up with a student who speaks their home language (if possible). Images and videos with subtitles will be used to help understanding. Sentence starters and word banks will be provided for the writing and speaking parts. |
| --- | --- |
| **TAG** | Students may use chromebooks to code their own graphs and they may also design a lab procedure to test different variables. There will be extension questions to prompt students to think about what other information they would want to find in order to answer another question. |
| **Special Needs** | A graphic organizer will be provided and students may work with me in a small group to get started. Sentence starters and word banks will be provided for the writing and speaking parts. |
| **Other** |  |