5E Lesson Plan (NGSS)

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| **Teacher:** |
| **Date:** |
| **Subject / grade level:** Science, Grade 7, Lesson # |
| **Topic:** Indoor Air Pollution |
| **Materials:**  Computer, COSMOS Technology Toolkit, COSMOS mobile node, COSMOS IoT sensors for CO**2**, humidity and dust |
| **Essential Question(s):**  How can we prevent or minimize harm from a natural disaster? |
| **New York State P-12 Science Learning Standards (NGSS):**  **MS-ESS3-3**. Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.   |  |  |  | | --- | --- | --- | | **Science & Engineering Practices (SEPs)** | **Disciplinary Core Ideas (DCIs)** | **Crosscutting Concepts (CCs)** | | **Analyzing and Interpreting Data**  Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.  ■■ Analyze and interpret data to determine similarities and differences in findings. (MS-ESS3-2)  **Constructing Explanations and Designing Solutions**  Constructing explanations and designing solutions in 6–8  builds on K–5 experiences and progresses to include  constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.  ■■ Construct a scientific explanation based on valid and  reliable evidence obtained from sources (including the students’ own experiments) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue  to do so in the future. (MS-ESS3-1)  ■■ Apply scientific principles to design an object, tool, process or system. (MS-ESS3-3) | **ESS3.C: Human Impacts on Earth Systems**  ■■ Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth’s environments can have different impacts (negative and positive) for different living  things. (MS-ESS3-3)  ■■ Typically as human populations and per-capita  consumption of natural resources increase, so do the  negative impacts on Earth unless the activities and technologies involved are engineered otherwise.  (MS-ESS3-3), (MS-ESS3-4) | **Patterns**  ■■ Graphs, charts, and images can be used to identify patterns in data. (MS-ESS3-2)  **Cause and Effect**  ■■ Relationships can be classified as causal or correlational, and correlation does not necessarily  imply causation. (MS-ESS3-3)  ■■ Cause and effect relationships may be used to predict phenomena in natural or designed systems.  (MS-ESS3-1), (MS-ESS3-4)  **CONNECTIONS TO ENGINEERING, TECHNOLOGY, AND APPLICATIONS OF**  **SCIENCE**  **Influence of Science, Engineering, and Technology**  **on Society and the Natural World**  ■■ All human activity draws on natural resources and has both short and long-term consequences, positive as well as negative, for the health of people and the natural environment. (MS-ESS3-1), (MS-ESS3-4)  ■■ The uses of technologies and any limitations on their use are driven by individual or societal needs, desires,  and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and  over time.  (MS-ESS3-2), (MS-ESS3-3)  **CONNECTIONS TO NATURE OF SCIENCE**  **Science Addresses Questions About the Natural and Material World**  ■■ Scientific knowledge can describe the consequences of actions but  does not necessarily prescribe the decisions that society takes. (MS-ESS3-4) |   **Common Core State Standards (CCSS):**  **SL.8.5** Integrate multimedia and visual displays into presentations to clarify information, strengthen claims and evidence, and add interest.  **RST.6-8.9** Compare and contrast the information gained from experiments, simulations, video, or multimedia sources with that gained from reading a text or prepared information on the same topic. |
| **Lesson Topic:** Indoor Air Pollution  **Learning Target:** I will:   * Perform an experiment to see how polluted the air is in certain rooms in a school by detecting the levels of CO**2**, dust, and humidity in the air. |
| **Differentiation strategies to meet diverse learner needs:**   * **Bodily kinesthetic learners** - Local and Express demonstration hands-on activity * **Audio and Visual learners** – Slide show, Visual representation of activity using computer, transmitter and receiver, The observations/data collected throughout the activity * **ELL/Low reader** - Guided notes printed for those who require them * **Technology**- Utilizing COSMOS Technology Tool Kit, heart rate sensor, timer * **Extended time** for those who require it * **Small groups** according to levels, behavioral needs, and activity requirements |
| **ENGAGEMENT**   1. Discussion Question(s)  * Which room in your house has the worst air pollution? Why? What causes this? |
| **EXPLORATION**   1. Students will view a short slide show to introduce the lesson. Materials & equipment are set up on student’s desks. 2. Activity: 3. Students are arranged in 4 heterogeneous groups each with a COSMOS mobile node and sensors. Ensure that the sensors are connected to the mobile node and functioning properly. 4. Students will go with the functioning mobile node and sensors to the prescribed rooms and take the readings. Each of the 4 groups will go to a different room initially but will continue on to the other rooms so as to take readings in them as well. 5. Students will also observe and take physical observations/readings about their perception about the quality of the air quality in the rooms they visit. *i.e. does it feel hot, stuffy, dusty, moist, dry, cold etc. or does it feel normal.* 6. Students would then record their findings in the appropriate table provided for the respective rooms. 7. They will then answer questions on their handout about the activity they just did |
| **EXPLANATION**  After students complete the activity there will be a discussion/share-out with their observations and comments about the experiment - facilitated by the teacher. Analyzing information collected on their handout and identifying any errors that may have been made and correct them. Explanation and clarification of how the factors of CO**2**, humidity, and dust affects indoor air quality and in-turn affect humans (us) will be done. Vocabulary words: *Carbon dioxide, relatively humidity, pollution, pollutant, and mold.* |
| **ELABORATION**  Students will extend their knowledge of air pollution by discussing the following question(s):  Humidity is a major problem in many homes especially in the winter time. Do you think how houses are constructed contributes to the problem of humidity in homes? Can you make suggestions as to changes that could be made to the building codes to address the problem of humidity in homes? |
| **EVALUATION**   1. Teacher Observation 2. Correctly following procedures 3. Students complete the questions on their handouts |
| **HOMEWORK**  In 1 paragraph state how air pollution can affect your health |