Student Activity

Design Challenge: Climate in a Container

Introduction

Earth’s climate is affected by natural and anthropogenic factors. You’ve studied these factors in detail over the past few classes. For this activity, you’ll be considering the factors and using them to create a climate model that will heat up quickly when placed under a lamp for 10 minutes. Which factors do you think are the most important? Which are the easiest to reverse? It’s time to find out!

Design

1. Consider phenomena that could affect the climate in your model. What forcing factors are you most likely to model? How would you model them using the allowed materials?

| Forcing Factor | Important Aspect of Forcing Factor | Materials to Include in the Model |
| --- | --- | --- |
|  |  |  |

|  |  |
| --- | --- |
| 2. Sketch your design (use a separate sheet of  paper if you wish): | 3. Discuss your plan with another student. How does the other student’s plan differ from yours? In what ways is the other plan better? How could the other plan be improved?  4. Based on your discussion with the other student, write down one way to improve your design. |

5. Suggest a way to improve the other student’s design.

— Build Your Model —

Test

| Initial Temperature | Final Temperature After 10 Minutes | Change in Temperature |
| --- | --- | --- |
|  |  |  |

Reflect

1. Walk around the room and look at everyone’s models. Discuss in your group which forcing factors were the most effective at increasing air temperature. Why do you think they were effective?

2. Examine another student’s model that heated up a lot. If you were a climate scientist hoping to lessen the effects of climate change, what steps would you take to reduce the heating in the student’s model? Record your answers in the left column.

| Step to Take with Model | Change to Local Environment | Change to Global Environment |
| --- | --- | --- |
|  |  |  |

3. Thinking about Earth and its current temperature, what would these steps look like for the local and global environment? Record your answers in the other columns of the table above.

4. Indicate with an asterisk (\*) which step seems easiest to take at the local level. Do the same for the global level. (Note: Your choices don’t have to be the same.)

5. Which step seems most challenging to accomplish at the local or global level? What social and technological changes are necessary to make this step easier?

6. Compare your answers to questions 4 and 5 with a partner. Be prepared to briefly present this comparison.

Consolidate Your Learning

Answer the following question to check your understanding of concepts relating to climate change and Earth’s climate.

Write an email to your local politician or a social media post that outlines your beliefs, experiences, and understanding of climate change, as well as what you hope to see done in the future. Be sure to justify your ideas using evidence and data. After you complete your draft, get peer or teacher feedback to improve it. Be brave and send or post it!

Written Response Rubric

(adapted from National Council of Teachers of English)

|  | Level 1 | Level 2 | Level 3 | Level 4 |
| --- | --- | --- | --- | --- |
| Drafting Process | - receives or considers one piece of feedback | - receives and loosely considers some feedback | - receives and considers feedback for the most part | - respectfully receives and considers critical feedback |
| Goal/Thesis | - states personal opinion with lack of clarity  - identifies a climate change issue | - states personal opinion with some clarity  - identifies one climate change issue and implies its connection to climate change | - clearly states a personal opinion  - identifies several climate change issues, but details are lacking | - strongly and clearly states a personal opinion  - clearly identifies the climate change issues |
| Supporting Evidence/Underlying Understanding | - provides weak arguments and support; one point is made  - implies at least one connection between a key idea from the unit and the climate change issue | - makes two points, showing some supporting evidence or data, but with weak connections  - includes several key ideas from the unit, implying the connections between the ideas and climate change issue | - makes three or more points with support, but support is somewhat weak in places  - implicitly makes connections between the points, evidence/data, and climate change issue | - makes three or more excellent points with good supporting evidence/data  - explicitly makes connections between the points, evidence/data, and climate change issue |
| Conclusion | - makes concluding statement with no reference to personal opinion | - weakly summarizes personal opinion in a concluding statement | - summarizes personal opinion in a concluding statement | - summarizes personal opinion in a strong concluding statement |
| Organization | - produces very few sentences and paragraphs with correct structure | - produces some sentences and paragraphs with correct structure | - produces sentences and paragraphs with generally correct structure | - produces sentences and paragraphs that are complete, well written, and varied |
| Word Choice/Tone | - uses a few clear and descriptive words  - uses a persuasive tone at least once | - chooses some words that are clear and descriptive  - demonstrates a persuasive tone inconsistently | - chooses words that are clear and descriptive for the most part  - demonstrates a persuasive tone in parts of the email/social media post | - chooses words that are clear, descriptive, and accurate  - maintains consistent persuasive tone throughout email/social media post |
| Mechanics and Grammar | - makes many punctuation, spelling, and/or grammatical errors that interfere with meaning | - makes many punctuation, spelling, and/or grammatical errors, but they do not interfere with meaning | - makes several punctuation, spelling, and/or grammatical errors, but they do not interfere with meaning | - makes few, if any punctuation, spelling, or grammatical errors |