Physical Aspects of Climate - Introduction (Part 1:4)

Type of Lesson: Introductory, Direct Instruction, Lab

Description of lesson: This program covers the physical aspects of climate change. There are three main activities that cover the direct content: Atmosphere, Oceans, and Cryosphere. This program is intended for classroom teachers to use as direct instruction and a hands-on activity for the students to complete. Direct instruction is given as a PowerPoint the teacher can project and a student note sheet has been created for interactive notebooks, or for students to fill out digitally. In addition, a lab has been curated that pairs with the material so students can have a kinesthetic learning experience to reinforce the material learned. Activities for vocabulary development and review have been included, as well as an end of the unit assessment where students show their knowledge of how the interactions between the Atmosphere, Cryosphere and Ocean create climate zones.

Enduring Understandings:	**Essential Questions:**
Climate is made up of multiple variables, a change in any of those variables can have a major impact on the planet	If predicted future impacts of Climate Change are as bad as the scientific community is predicting, is our home planet doomed or saveable?

Academic Standards:

HS-ESS2-4. Use a model to describe how variations in the flow of energy into and out of Earth's systems result in changes in climate.

HS-ESS2-8.* Construct an explanation of how heat (energy) and water (matter) move throughout the oceans causing patterns in weather and climate.

HS-ESS2-9.* Construct an explanation for how energy from the Sun drives atmospheric processes and how atmospheric currents transport matter and transfer energy

HS-ESS3-3. Create a computational simulation to illustrate the relationships among management of natural resources, the sustainability of human populations, and biodiversity.

HS-ESS3-6. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

HS-ENV1-2.* Use a computational representation to illustrate that humans are part of Earth's ecosystems and how human activities can, deliberately or inadvertently, alter ecosystems

HS-ENV1-3. Use a computational representation to illustrate the relationships among Earth systems and how those relationships are being modified due to human activity.

Student learning targets:

- Describe the composition of the atmosphere
- Define climate related vocabulary
- Describe how greenhouse gasses work
- Recall atmospheric and ocean circulation work
- Recall albedo
- Recall carbon sinks and sources
- Pose questions related to climate change

Assessment task - At the end of part 4 students are given a climate zone and are tested to see if they can put together how the atmosphere, cryosphere, and hydrosphere come together to form that climate zone. Students will be tested in a Free Response format. Please see lesson 4 for a complete description of the assessment task

Differentiation:
For students who already know the material well - give them the attached practice assessment to see how well they can put the pieces together of how climate zones are formed
Climate Zone Pre-Assessment

For students who do not have prior knowledge (new students or otherwise) consider giving them a pre-reading assignment to prime them to learn about climate change. Consider this article from CK-12 - https://www.ck12.org/book/cbse_biology_book_class_xii/section/21.6/

Accommodations:
- Pre-filled notes printed out for students
- Embedding the PowerPoint in the LMS so that students can follow along at their own pace
- Vocabulary as a reference only instead of having them fill it out
- The use of notes during assessments

Prior Learning:
The climate unit is based on students who have learned about the atmosphere, hydrosphere and cryosphere. Before starting this unit students should be familiar with the following concepts
- Convection, ocean circulation and atmospheric circulation
- Greenhouse gasses
- Atmospheric composition
- Water holds more heat
- Carbon cycle, sources and sinks
- Albedo
- Coriolis effect

Prerequisite skills:
- Asking Questions
- Defining problems and creating solutions
- Data analysis
- Graphing
- Defending and argument with evidence
- Writing a free response

Materials
- White boards for students to brainstorm questions
- Large blank poster paper to write and display students questions around the classroom
- Printed copies of the Climate Intro notes, or a pdf uploaded for students to fill out digitally
- Vocab foldables for interactive notebook

Technology:
- Computer and projector to play the video
- Access to Quizlet so students could play Quizlet live if there is time
- Youtube

Vocabulary Development: (40 minutes or assigned as homework)
There will be many new vocabulary words that students may need to know in order to move forward in this unit. Take some time to develop those vocabulary words.

Follow the link to find Physical Aspects of Climate Change Quizlet:
https://quizlet.com/590519939/climate-change-unit-from-cees-flash-cards/?new

Attached is a **Vocabulary Foldable** for an interactive notebook

Procedures:

This program is intended to be used as an introduction to a larger climate unit that includes impacts of climate change and what students can do to mitigate climate change.

When Introducing the unit consider the following activity

Climate Unit Introduction Activity: 20 minutes

1. Have the students watch the following video: https://www.youtube.com/watch?v=dcBXmj1nMTQ
2. Have students work in groups to come up with a list of questions they have after the video
    a. It is alright to guide student questions. Examples might include:
        i. What causes climate change?
        ii. Why does climate change cause floods and also droughts?
        iii. Does everywhere experience climate change the same?
        iv. How does the greenhouse effect work?
3. Post the list of questions somewhere in the classroom for you and the students to reference as you go through the unit. This is great practice to ensure the material being taught is relevant to what the students actually want to learn.
    a. Possibly organize the questions into the following categories
        i. Atmosphere
        ii. Ocean
        iii. Cryosphere
        iv. Impacts of Climate Change
        v. How can we solve the problems of climate change

Introduction of New Material/Review of Old Material (30 minutes)

For the remainder of class take this opportunity to review concepts that students need to understand before beginning the climate unit such as:

- Atmospheric composition
- Atmospheric circulation
- Albedo
- Ocean heat capacity
- Ocean circulation
- Cryosphere components

Attached: Climate Intro Slide Show and Notes

Vocabulary Development: (40 minutes or assigned as homework)

There will be many new vocabulary words that students may need to know in order to move forward in this unit. Take some time to develop those vocabulary words.

Follow the link to find Physical Aspects of Climate Change Quizlet:
https://quizlet.com/590519939/climate-change-unit-from-cees-flash-cards/?new

Attached is a **Vocabulary Foldable** for an interactive notebook

Attach: Climate Intro Slides Show
Climat Intro Note sheet

Vocabulary foldable
Practice Test