

Greenhouse Gas Game

Relay/Roleplay Game

KNOWLEDGE

- Difference between weather and climate; how climate has been changing over past 1300 years
- Understand why our global system is experiencing climate change and the different earth cycles and systems that influence this effect
- Highlight human influence on climate change, and how individual changes in behaviour can lessen impact
- Explain different greenhouse gases and their sources, as well as potential warming influence (if age appropriate)

ACTIVE

- Students will mimic sun's rays by travelling to the atmosphere from the sun, and interact with the atmosphere by reflecting and refracting on Earth's surface
- Students will avoid greenhouse gases between the atmosphere and Earth's surface to reduce global warming

TIME	GROUP SIZE	LOCATION	GRADE LEVEL	EQUIPMENT
30 minutes+	Any	Outdoor open space	5-7	Small cones or pylons (2 sizes, ideally) Pinnies for greenhouse gases (optional)

DEBRIEF/REFLECTIVE COMPONENT

- As more greenhouse gases are present in the atmosphere, what happens to sun rays? What trend would this create in climate?
- In the later point of the game, what was the ratio of greenhouse gases: sun rays; what is this trying to illustrate?
- What period in time could the later levels be alluding to?
- What are sources of greenhouse gases in your city?
- What could we do to reduce these sources?
- What are sinks that trap greenhouse gases? How are these changing in a warming climate?

HELPFUL TIPS

OCEAN LITERACY PRINCIPLES

3 – The ocean is a major influence on weather and climate.

- a. The interaction of oceanic and atmospheric processes controls weather and climate by dominating the Earth's energy, water, and carbon systems.
- b. The ocean moderates global weather and climate by absorbing most of the solar radiation reaching Earth. Heat exchange between the ocean and atmosphere drives the water cycle and oceanic and atmospheric circulation.
- e. The ocean dominates Earth's carbon cycle. Half of the primary productivity on Earth takes place in the sunlit layers of the ocean. The ocean absorbs roughly half of all carbon dioxide and methane that are added to the atmosphere.
- f. The ocean has had, and will continue to have, a significant influence on climate change by absorbing, storing, and moving heat, carbon, and water. Changes in the ocean's circulation have produced large, abrupt changes in climate during the last 50, 000 years.

Setup

1. Create a small circle with (small) cones in the middle of playing field. Explain that this represents the Earth.
2. Create a much larger circle with (large) cones, relatively even spaced from center circle. Explain that this represents the atmosphere.
3. Demonstrate to students that sunlight comes as rays of energy emitted from the Sun (somewhere outside atmosphere) and travel through the atmosphere toward Earth.
4. Explain that when the atmosphere is functioning normally, it allows some sunrays through to warm Earth's surface, which the students will role play. Play a round of children running back and forth from atmosphere to Earth and back.
5. When ready, introduce some leaders (or other students) as greenhouse gases which can tag rays of sunshine as they travel between Earth and atmosphere, which will "trap" them in the atmosphere. Have tagged participants remain in atmosphere as obstacles (act as warming the planet). Finish round when a few rays of sunshine are trapped. Explain that this is the atmosphere during beginning of Industrial Revolution (1800s).
6. Begin a new round, and allow trapped rays of sunshine to now join greenhouse gases in trapping more rays of sunshine. Play game until few or no sunshine rays exist stopping every once in a while to highlight increasing amount of trapped sunlight due to greenhouse gases, warming planet and allow trapped rays to re-enter gameplay as greenhouse gas.
7. When gameplay is over, regroup in classroom or on field to discuss reflective component. Touch on when greenhouse gases increased (Industrial Revolution), and causes (agriculture, meat production, transportation, energy production, waste, etc.). Get students to brainstorm one way they could change their behaviour to reduce carbon emissions and footprint.

