UbD Template 2.0

Biology

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| **Stage 1 Desired Results** |
| ESTABLISHED GOALS: IB Biology * + 1. Draw and label a diagram of the carbon cycle to show the processes involved.
		2. Analyze the changes in concentration of atmospheric carbon dioxide using historical records.
		3. Explain the relationship between rises in concentrations of atmospheric carbon dioxide, methane and oxides of nitrogen and the enhanced greenhouse effect.
		4. Outline the precautionary principle.
		5. Evaluate the precautionary principle as a justification for strong action in response to the threats posed by the enhanced greenhouse effect.
		6. Outline the consequences of a global temperature rise on arctic ecosystems.

Common Core Reading Standards for Literacy in Science and Technical Subjects 6–121. Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.
2. Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.
3. Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.
 | ***Transfer*** |
| *Students will be able to independently use their learning to…* 1. Develop critical thinking skills by analyzing multiple viewpoints.
2. Build informed arguments
3. Critically analyze and evaluate information they find.
4. Demonstrate scientific reasoning and logic
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| ***Meaning*** |
| UNDERSTANDINGS *Students will understand that…*1. Climate change is a complex issue that is a global problem.
2. Due to the global nature of climate change, students need to analyze the subject from multiple perspectives.
3. Media has a role in influencing public policy.
4. They can play an important role in helping to create a sustainable world.
 | ESSENTIAL QUESTIONS 1. What can be done to minimize the impact of global warming?
2. What are barriers that nations have in reducing their carbon footprint?
3. What are the political barriers to environmental protection?
4. How can we balance the need for environmental sustainability with economic growth?
5. How do we know that climate change is caused by humans and not just the earth’s natural cycle?
6. What is the impact of persuasive media on public policy?
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| ***Acquisition*** |
| *Students will know…* 1. Anthropocene
2. Carbon Cycle
3. Greenhouse gases and how they contribute to climate change.
4. Sources of greenhouse gases
5. The projected rate of temperature change and sea level rise in the area in which they live.
6. The impact of climate change in arctic ecosystem.
7. Environmental policies in the local community, state and national level.
 | *Students will be skilled at…* 1. Analyzing historical and current graphs showing the relationship between CO2 and temperature.
2. Analyze cause and effect relationships.
3. Evaluating the precautionary principle as it relates to global warming.
4. Evaluating a community’s ability to face the problem of climate change.
5. Compare local environmental policies to that of another area.
6. Comparing and contrasting TV advertisements and identifying fear tactics and emotional appeal.
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| **Stage 2 - Evidence** |
| **Evaluative Criteria** | **Assessment Evidence** |
| DrawAnalyze and PredictDefine, Explain, Discuss, AnalyzeOutline, Analyze, and EvaluateOutline and PredictIdentify, Predict, Discuss, Evaluate | TRANSFER TASK(S): Create a carbon cycle diagram.Graph CO2 and temperature data. Predict the CO2 and temperature in 10, 20 and 50 years from now based on current trends. How has the rate of increase changed over the past 50,20, and 5 years? Identify the main causes of Climate Change? What are the main contributors to global warming? Discuss possible solutions to increasing greenhouse gases? How can science and technology help solve the problem of Global Warming? Prepare a glogster with information about Global Warming. Outline the Precautionary Principle and Evaluate is as it relates to Global Warming. Research Public Policy relating to Climate Change. Investigate legislation passed on State, National and International levels to control carbon emissions. Participate in a MUN style debate. Students will research assigned country, write a position paper and work to draft and debate resolutions. Outline the impact of global warming on Arctic ecosystem. Predict the effect of temperature rise on the abiotic and biotic factors of the ecosystem. Wildlife in the Arctic face challenges due to rising temperatures in their habitat. Melting polar ice caps add water to the world’s oceans and cause sea levels to rise. How will these effect human communities? Where might the impacts be most keenly felt? Who is responsible for managing and trying to prevent the effects of climate change in the Arctic? Create a storyboard for a commercial which has emotional appeal. Evaluate our community’s ability to handle the sea level rise. Invite a climate change scientist to come in and talk to the class about the impact of climate change in our area. Predict the impact of climate change on their lives and ways they can minimize the impact. Students will develop an action plan describing what individuals can do. The letters will be published online and mailed to representatives in local, state or national government. |
| Define, Identify, Compare and Contrast, Analyze, Discuss, Explain, Predict. | OTHER EVIDENCE:Class DiscussionsHomework Unit Test |
| **Stage 3 – Learning Plan** |
| *Summary of Key Learning Events and Instruction***Lesson 1: Greenhouse Effect Contributors**“What does the term ‘carbon footprint’ mean? Do you think it would be desirable to have a big or small carbon footprint, and why?”Draw the carbon cycle. Incorporate the following terms in your diagram: photosynthesis, cellular respiration, fossilization and combustion. Watch the video on YouTube: What’s the Deal with Carbon. Reflect on the ways in your life you use carbon based-fuels and calculate your own carbon footprint. [www.carbonfootprint.com/calculator.aspx](http://www.carbonfootprint.com/calculator.aspx)Go back to the carbon cycle that was drawn at the beginning of class. Annotate the diagram and personalize it. What are you doing in your daily life to impact the carbon cycle? What are some of the sources and sinks in your life? Are you living a carbon neutral existence? What are ways to decrease your carbon footprint? Have a class discussion about ways to decrease your own carbon footprint. Teacher will present a PowerPoint on Greenhouse Effect. Students will create a Glogster presentation. The presentation will be started in class and finished for homework. They will be given one week to complete the presentation. The Glogster should include, but not limited to, the following information. * Picture or video of the Greenhouse effect along with a brief explanation.
* What are greenhouse gases and where do they come from?
* Diagram of the Carbon Cycle
* Your Carbon Footprint
* Ways to decrease your carbon footprint
* 3 other interesting articles, videos, images about Climate Change.

**LESSON 2: Carbon Dioxide and Temperature Correlation** Teacher will discuss with students ways in which CO2 is measured. Obtain carbon dioxide data and using Excel (or another graphing program) and create a graph of the data. Watch video from NOAA about warmest year on record. <http://www.climatewatch.noaa.gov/video/2012/the-making-of-the-hottest-year-on-record-usa-temperature-update> Add the temperature data to the graph. Paste your graph on your Glogster and write a short summary of the graph. Calculate rate of change over the past 50, 20 and 5 years. Explain how the rate has changed over time. Pick an article from the following website <http://www.climatewatch.noaa.gov/Articles> add a link to if on your Glogster. **LESSON 3: Climate Change in the Chesapeake**Invite a climate change scientist to be the guest lecturer for the class. She will be presenting a lesson on how climate change in impacting the Chesapeake. She will also talk about some of the local and state policies in our area that relate to climate change. The students will write a first draft of a letter detailing an action plan to their local or state government official. **LESSON 4: Science and Technology (Geoengineering)**Students will complete the online lesson on Geoengineering. <https://www.e-education.psu.edu/meteo469/node/178> After the readings we will discuss:What is the purpose of geoengineering? Why the anthropogenic climate change does not qualify as geoengineering?Discuss one of the geoengineering approaches that have been proposed to address climate change.  What are the potential benefits of this scheme?  What are the potential risks?  In you opinion, do the benefits out-way the risks? Do you think geoengineering is a viable option for dealing with climate change? Do you see any ethical problems with continuing business-as-usual emissions and offsetting the warming consequences with geoengineering strategies?**LESSON 5: Media and Public Policy**Teacher will introduce the Precautionary Principle. Students will investigate the precautionary principle as it relates to climate change. Discuss the impact of climate change on the arctic. Will exercising the Precautionary Principle impact the Arctic? Watch the “Train” global warming TV add from the Environmental Defense and the Ad Council – on YouTube <http://www.youtube.com/watch?v=s-_LBXWMCAM> Watch 1964 Johnson Campaign Video “Peace Little Girl (Daisy) <http://www.youtube.com/watch?v=oYcgw0xfAZ0> Students will identify the message/intent of each clip as well as the similarities between the two ads. Review the concept of emotional appeal in persuasive writing, debate, or advertising with students. What is the problem with using mostly emotional appeal in argument, and what is the most powerful human emotion? Allow students are few minutes to debate. Watch Cool It! Chapter 4: Fear. How have fear tactics been used in media to promote various viewpoints in the global warming debate? Research Kyoto and Copenhagen conferences. Watch Cool It! Chapter 3: European Union. “IN what ways have persuasive media and fear tactics influenced public policy such as Kyoto and Copenhagen as well as a push for cap and trade legislation? Are media such as advertisements and documentary films helpful or harmful in encouraging positive public policy? Design a storyboard for a commercial on the impact of climate change on the Arctic Ecosystem. **Lesson 6: Economies of Climate Change**How can climate change be addressed in a fiscally responsible way during an international recession? Watch Cool It! Chapter 10 Funding. Considering that technologies create during and refined since the Industrial Revolution are blamed for the speed and severity of climate change, do you think science and technology can be used to help address the problem of global warming? Watch Cool It! Chapter 2: Notorious Figure. In the past few decades, there have been several major international climate conventions including Rio, Kyoto, and most recently, Copenhagen, which have not led to significant action to combat climate change. Why have these international efforts failed at reducing carbon dioxide and/or mitigating climate change? What would it take to truly make a positive impact on mitigating climate change? Watch Cool It! Chapter 11: A Radically Practical Solution. Does Professor Lomborg’s proposal seem reasonable? Why or Why not? If climate change in an impending catastrophe of a large scale, should economics and cost-benefit analysis be primary considerations in addressing it? Is it possible to address global warming and catastrophic climate change without bankrupting the world? Why or why not?**Lesson 7: Global Politics (this is a multiday lesson)**The students will apply the lessons they have learned over the past couple of weeks to a final project. Each student will be assigned a country. There will be a mix of developed and developing countries. The students will need to first do some background research on their country (Government, Economy, People and Geography). *Government:*What is your country’s governmental system? Who is the leader of your country? (President, Prime Minister, etc.) What are the official languages of your country?*Economy:*What is the GDP and growth rate of your country? What are the major cities in your country? How do they contribute to your country’s economy? What is your country’s overall infrastructure status? (Good, poor, etc.) (Suggested source: <http://rru.worldbank.org/businessplanet/default.aspx?pid=5>) List the major imports and exports of your country.*People:*What is the population and growth rate of your country? What are the major religions and ethnicities in your country? What are some major events in your country’s history? Who are some famous people from your country?*Geography:*Where is your country located? Which countries share a border with your country? What is your country’s climate? How does your country’s overall geographical location affect its role in the United Nations? (HINT: Is your country geographically isolated? Is it positioned near wealthy or poor countries?) *Development:*What is your country’s general developmental status? (Developed, underdeveloped, etc.) Does your country have environmental problems? Have they enforced laws to regulate these issues? Has your country met any of the Millennium Development Goal targets? If so, which ones? (Suggested source: http://www.undp.org/mdg/countries.shtml) *United Nations:*When was your country admitted to the United Nations? Has the United Nations ever intervened in a conflict involving your country? If so, where and how? How does your country contribute to the United Nations peacekeeping efforts? (Suggested source: http://www.un.org/en/peacekeeping/) Has the United Nations cited your country for human rights violations? If so, why? (Suggested source: http://www.hrw.org/) Does your country belong to any intergovernmental organizations outside the United Nations system? (i.e. North Atlantic Treaty Organization (NATO), Organization of the Petroleum Exporting Countries (OPEC), etc.?) Does your country belong to any regional organizations? (i.e. European Union (EU), African Union (AU), Organization of American States (OAS), etc.?) Does your country belong to any trade organization or agreements? (i.e. North American Free Trade Agreement (NAFTA), Organisation for Economic Co-­‐operation and Development (OECD), etc.?) *Questions to Consider*1.) How does your country’s governmental system influence their position in international affairs?2.) What types of ideologies (political, religious, etc.) influence your country’s government? 3.) How does your country’s geography affect its political relationships? 4.) Which countries are considered allies of your country? Which are considered enemies of your country? Why?5.) Which domestic (national) issues might influence your country’s foreign policy? 6.) How does your country’s economy compare with that of its neighbors and how does it affect your country’s role in international affairs?7.) How does your country’s history affect its position on the topic?Students will then write a position paper. The position paper contains the following information: * A brief introduction to the country and its history regarding the topic and/or UN body;
* The country's background on the topic, including:
* Political and/or foreign policy;
* Action taken by the government in relation to the topic;
* Resolutions, conventions and declarations that the country supports;
* Quotes taken from speeches made by heads of government;
* Statistics regarding the issue; and
* The country's recommendation for a resolution for the topic.

The last part of the assignment is to work to draft a resolution. The draft resolutions will then be debated. A resolution presents a problem in the world to solve and proposes a solution(s) to the problem. A nation or a group of nations in a committee submits resolutions where delegates debate for or against them. After debate is closed, they are voted on and either passed as is, passed with amendments, or rejected. Delegates often base their vote on their country's stance and policy, as well as the specifics of the resolution.A resolution is always in the form of one long sentence divided into two basic parts: The pre-ambulatory and operative sections. The pre-ambulatory section explains the problems using current events and past UN actions. The operative section states a proposed solution, often in many parts, to the problem. Each clause is preceded by a phrase. |