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Course/Grade: Advanced Functions and Modeling (11th & 12th), integrating Science

Lesson Title: Warm Enough Yet?

Summary: This is a global lesson that will alert students to the issue of global warming, its causes, and its repercussions. Students will research data, current and past events, and the actions of the governments and people all over the world to contain global warming and its aftermath. Global competence will be gained through applications of research, perspectives, and action plans.

<http://www.epa.gov/gateway/science/land.html>

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| **Stage 1 Desired Results** |
| ESTABLISHED GOALS**G1: Research the cause and effects of global warming using the internet, news media, and other tools.** **G2: Understand the concept of a function and use function notation to*** Gain an understanding of the effects of global warming, the interconnectedness of people in the world through natural disaster
* Realize the cause and effect of the human population on our changing climate, and its effect on the human population.

**G2: Interpret functions that arise in application in terms of context to**Relate the effects of natural disasters to time, the human population, and other factors, predict future happenings, and human impact.**G3: Analyze functions using different representations such as*** Graphing the results of global warming to each part of the United States, neighboring countries, and also, countries around the world.
* Creating a line of best fit to predict the climate in 10, 20, or 50 years
* A website to provide others with methods of recycling, getting rid of hazardous materials, going “green,” installing solar panels, and other ways of being proactive.
* Create an interactive map that spotlights the efforts people all over the world have been making a change.

**G4:** **Build a function that models a relationship between two quantities*** Research new methods of combating Global Warming to create a model graph representing the method’s success
* Present school-wide the steps we can take to change the climate here at EWHS.

**G5: Build new functions from existing functions**Students will manipulate the model of global warming to represent how simple steps of human care and responsibility can positively impact the damages and dangers of global warming.  | ***Transfer*** |
| *Students will be able to independently use their learning to…*T1: Consider and analyze the effect global warming has on our future and what influence we have on its impact.T2: Research and analyze what efforts the US as well as other countries are making to curb global warming.T3: Provide a long-lasting lifestyle at Eastern Wayne High School to make our community more “green” and globally aware of our impact on global warming. |
| ***Meaning*** |
| UNDERSTANDINGS *Students will understand that…*U1: Global warming is a side effect of the choices we make in life.U2: Global warming will alter the weather for everyone in the future.U3: There are multiple ways to reduce the effects of global warming.U4: Global warming will affect us all in a variety of ways depending on location and climate and can be altered and reduced with simple lifestyle changes. U5: Natural disasters are thought to be results of global warming. | ESSENTIAL QUESTIONS E1: What kind of footprint are you leaving on this world, and how will our future be impacted by globally created-weather?E2: What are citizens in other countries doing to work parallel to the US in fighting global warming? What more could they do? Do they, like some US citizens, blame global warming for recent natural disasters?E3: Why should we consider global warming as a newsworthy topic?E4: What, if anything, can we do here at EWHS to alter global warming? E5: How does climate change affect the future for you, your children, grandchildren, etc.E6: How do natural disasters brought on by global warming effect the economies of those impacted? What are those countries doing to address this?E7: How does global warming in China affect US citizens and economy? E8: Are humans to blame for Hurricane Sandy, the Tsunami in Indonesia, or even Haiti’s 2010 earthquake? |
| ***Acquisition*** |
| *Students will know…* K1: The damages and dangers of global warming.K2: The effect global warming will have on their lifestyles in twenty-thirty years.K3: The importance of global perspectives when dealing with natural disasters and global issues. K4: Their impact on the world around them in terms of climate.K5: What global warming means for their local community.K6: How much can be done by a small group of people. | *Students will be skilled at…* S1: Researching the timelines of natural disasters and changes of global warming, and gathering data.S2: Creating functions that represent data gathered.S3: Using formulas to graph the history and current and future effects of global warming.S4: Applying new technology and tools to combat the effects of global warmingS5: Creating graphs and presentations to reflect the impact time, the human population, and other factors can have on climate change.S5: Reading and interpreting graphs to determine the future in relation to climate change.S6: Reflecting on past natural disasters and provide reasons for and against opinions of how each could be a result of global warming in three countries. |
| **Stage 2 – Evidence** |
| **Evaluative Criteria** | **Assessment Evidence** |
| ExplainInterpretApply, Perspectives, EmpathyApplication | TRANSFER TASK(S): 1. Students will create and participate in “Who Wants to be a Globalnaire?” Much like the popular game show “Who Wants to be a Millionaire,” students will provide questions and answers that relate to global warming, climate change, natural disasters, and relief work of various countries.
2. Students will break into two groups and present their findings using technology:
* Cause group: Students will use collected data to model past, current, and future impact humans have on global warming.
* Effect group: Students will use collected data to create graphs that represent the relationship between global warming and natural disasters
1. Create an interactive map of at least 3 countries that details the characteristics of natural disaster at that location, and the effect global warming has had on weather, crop production, import/export, etc. This map should be partnered with graphs, charts, or other method of representation to describe the destruction global warming can have on lives, economies, and cultures, and what some countries are doing to reduce the consequences of inaction.
2. Students will create a website that displays the aftermath of global warming-related natural disasters, graphs and charts that provide representative predictions on what a future will look like if humans remain inactive, and representation of how plants, business, and residences contribute to the global warming effect here in Wayne County.
3. Students will take research to create a local program that fights global warming through “going green,” walkable communities, etc. like those stated on the website <http://www.nrdc.org/globalwarming/solutions/>. Components of this program will include publication of website made in #4, creation of section in the Media Center focused solely on their work in class and this program, and a set schedule of days to beautify the grounds of EWHS and discard of materials and waste. This program will be student led and grown to create a lasting lifestyle at Eastern Wayne High School.
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| InformativeApplicationsParticipation | Pre-Assessment on the topic of Global Warming to develop student knowledge or lack thereof.QuizzesTestsProjectsReading/ResearchClass DiscussionsGroup Work |
| **Stage 3 – Learning Plan** |
| *Summary of Key Learning Events and Instruction****Day 1**** Skill Lesson-reviewing/introducing function notation, representations, and concepts.
	+ Discuss what the slope, intercepts, max, min, etc. of a function represent. Also review the concepts and creations of charts, bar graphs, and other data representation.
* Global Warming Introduction
	+ Allow students to relate their knowledge and perspectives on the existence of global warming, how it has evolved, possible causes of global warming, and likely effects it has on the world, our community, and their own lives.
	+ Using the mobile laptop lab, students (in groups of four) will actively research and collect data on the global warming to present reliable information on the cause, and effect of global warming.

Research will address the following general questions:* What causes have been attributed to the evolution of global warming?
* How long has global warming been an issue?
* What effect does global warming have on our environment, economy, and future locally, nationally, and globally?
* Are we (humans) taking global warming too seriously or not seriously enough?

Read and research:* + - <http://environment.nationalgeographic.com/environment/global-warming/>
		- <http://www.nrdc.org/issues/>
		- <http://www.epa.gov/climatechange/>
		- <http://www.edf.org/climate/global-warming-facts>

Students will present as a group their findings as a PowerPoint, Prezi presentation, pie or flow chart, or other applicable media.* Homework: research one way we can “Go Green” here at Eastern Wayne High School

***Day 2**** Skill lesson: Use concepts of algebraic functions to analyze key terms of global warming function.
* Start class with “Who Wants to be a Globalnaire?” to review lesson from Day 1. Participation will be used as formative assessment.
* Using the mobile laptop lab, students will actively research the locations of significant natural disasters around the world and limit their findings to one continent that has experienced at least three natural disasters.
	+ What is the climate of each location before the disaster occurred?
	+ Why do natural disasters differ based on location of site affected?
	+ What steps have the affected countries taken/not taken to prevent global warming, and thus a natural disaster?
	+ Could mathematical concepts have been used to prevent global warming and disaster before it occurred?
* Homework: Ask a custodian how much waste we throw away each day here at Eastern Wayne High School. Be sure to ask specifically about paper, hazardous materials, and other waste that is detrimental to our environment.

***Day 3**** Skill Lesson: Students will create interactive map and bar graphs, pie charts, etc. to represent data collected from Day 2. Students will apply a function to determine the future of global warming
* Students will use a function that represents the global temperature change to
	+ Label what slope and intercepts represent.
	+ Predict future temperatures
	+ Compare present and future temperatures with past temperatures
	+ Determine how the percent of warming temperatures will affect us globally. Are natural disasters predictable when referencing this function?

<http://www.algebra.com/algebra/homework/Exponential-and-logarithmic-functions/Exponential-and-logarithmic-functions.faq.question.399711.html><http://www.nature.org/greenliving/carboncalculator/>* Once knowledge is stable, students will use the function found in link above and Dipity to create a timeline that portrays past events (natural disasters, etc) and future possible events they believe could occur due to global warming.
* Using Mimio Teach Board, students will watch as teacher explores interactive map examples.
* Combining the research collected on Day 1 and Day 2, students will use [imapbuilder.net](http://www.imapbuilder.net/) to create an interactive map of at least 3 natural disasters of at least 1 continent, providing links to websites, pictures, and other data to solidify their data. Information included should explain causes by humans, effects on economy and climate, steps taken by citizens and government to prevent or control future disasters, and any other relevant information.
* Along with the interactive map, students will create pie charts, bar graphs, line graphs, and other representation of the effect global warming has had on the continent(s) they chose due to natural disasters.
* Homework: At home, create a list of the chemicals in your home. Research on the internet what chemicals are detrimental to our environment and how.

***Day 4*** (Continue and Review Day)* Students will complete Timelines and Interactive Maps from Day 3 and upload to Edmodo.
* Once all group projects are in, each group will present their timeline and maps for fellow students to appreciate.

***Day 5**** Students will work on classroom website that reveals their work on this Unit. Votes will be cast on which timeline and map to use on the website, as well as other informational links and resources to include. Students will spend time gathering the best resources discovered during the unit, touching up the map and timeline to be used, and researching design options for the website. Each group will be assigned to provide different sections of the website such as the timeline page, map page, informational link page, etc. This will be added to Eastern Wayne High School’s website.

***Day 6**** Today students will collaborate on their homework assigned each night of the Unit Plan. We will use this information along with research data to create EW Going Green (EWGG). This group will be born in this class, but will develop and evolve as an outside club for all students to participate in. Students will use the information they have gained during this unit to create a “wasteland” in our display case that will alert students to the dangers of contributing to global warming. EWGG will plan days of school campus cleanup, informational pamphlets for students on how to leave a cleaner footprint on this earth, raise money to plant trees, etc.
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