Title	It's Hot, Hot, Hot!
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Source:	Poca PBL Project, 2008-2009
Project Idea:	Many naturally occurring phenomena can be modeled with mathematical equations. One of these is temperature, such as average daily temperature. (See, for example, Larson/Hostetler, Trigonometry,6th edition, p. 173 #73) Students will create a presentation that interprets the significance of global warming and explain how its effects must be considered as part of a modification of American foreign policy. Use maps, charts, graphs, and graphics, etc., to show how you reached your conclusions.
Entry Event:	Letter from POTUS; Letter from United States Secretary of State.

Content Standards & Objectives:

Objectives Directly Taught or Learned Through Discovery	Identified Learning Target	Evidence of Success in Achieving Identified Learning Target
M.O.T.3.6 To identify a real life problem utilizing graphs of trigonometric functions and/or the inverse functions; make a hypothesis as to the outcome; develop, justify, and implement a method to collect, organize, and analyze data; generalize the results to make a conclusion; compare the hypothesis and the conclusion; present the project using words, graphs, drawings, models, or tables.	Students will develop a plan to collect, organize and analyze data pertaining to global warming; Students will collect, organize, and analyze data evidence of global warming from various sources, e.g., National Oceanic & Atmospheric Administration, National Weather Service, World Meteorological Organization, & U.S. Global Ocean Ecosystems Dynamics, NASA;	Students will use technology such as Microsoft Excel or TI-84 graphing calculator to store and graph the data they have collected; Students will compare several years of data to determine the extent of global warming within a global region; Students will write a report stating their hypothesis, evidence in support or against, their conclusions, and their recommendations;
M.O.T.3.7 To model periodic data sets using graphs, tables, and equations and use them to analyze real-world problems such as electricity and harmonic motion.	Student groups design research and record keeping protocol for collecting data in a world region	Students will create a "United States Department of State Bulletin" designed to inform readers of their research and final conclusions and recommendations;
SS.O.11.1.4 develop positions and formulate actions on the problems of today and predict challenges of the future (e.g., terrorism, religious conflict, weapons of mass destruction, population growth).	Students will gather information with regard to global warming;	Students will give an oral presentation designed to inform listeners of their research and final conclusions and recommendations;
SS.O.11.4.6 assess the impact of anticipated annual climate change (e.g., monsoon, flooding).	Students will gather information with regard to global warming;	Students will give an oral presentation designed to inform listeners of their research and final conclusions and recommendations;
SS.O.11.5.17 evaluate, take and defend positions on foreign policy issues in light of American national interests, values and principles	Students will gather information that describes and exemplifies American foreign policy within a global region;	Final project rubric will be given to students at the beginning and will be used to guide instruction. Rubric will aid in the creation of Know/Need to Know Chart, which informs teacher instruction.

21st Century Skills	Learning Skills & Technology Tools	Teaching Strategies Culminating Activity	Evidence of Success

Information and Communication Skills:	21C.O.9-12.1.LS1 - Student recognizes information needed for problem solving, can efficiently browse, search and navigate online to access relevant information, evaluates information based on credibility, social, economic, political and/or ethical issues, and presents findings clearly and persuasively using a range of technology tools and media. 21C.O.9-12.1.LS3 - Student creates information using advanced skills of analysis, synthesis and evaluation and shares this information through a variety of oral, written and multimedia communications that target academic, professional and technical audiences and purposes.	Student groups will use reputable internet sites to gather relevant data and information; The teacher will engage students in online investigations of the real-world applications of trigonometric functions and establish links between the computer and graphing calculators	Rubric score on both content and presentation Students search and navigate the Internet to find relevant information about trigonometric functions, and represent this information using a variety of media. Students communicate this information using graphing calculators, computer algebra software, spreadsheets and/or word processing software. Rubric score on both content and presentation
Thinking and Reasoning Skills:	21C.O.9-12.2.LS1 - Student engages in a critical thinking process that supports synthesis and conducts evaluation using complex criteria. 21C.O.9-12.2.LS2 - Student draws conclusions from a variety of data sources to analyze and interpret systems. 21C.O.9-12.2.LS3 - Student engages in a problem solving process by formulating questions and applying complex strategies in order to independently solve problems. 21C.O.9-12.2.LS4 - Student visualizes the connection between seemingly unrelated ideas and independently produces solutions that are fresh, unique, original and well developed. Student shows capacity for originality, concentration, commitment to completion, and persistence to	The teacher will model data collection, including how to separate needed information from a collection of related data. The teacher will provide opportunities for students to analyze graphs and apply information to real-life situations	Students explain and support conclusions made from the data collected and graphed. Students use appropriate technology to collect and consolidate information.

	develop unique and cogent products.		
Personal and Workplace Skills:	21C.O.9-12.3.LS1 - Student remains composed and focused, even under stress, willingly aligns his/her personal goals to the goals of others when appropriate, approaches conflict from win-win perspective, and derives personal satisfaction from achieving group goals. 21C.O.9-12.3.LS3 - Student demonstrates ownership of his/her learning by setting goals, monitoring and adjusting performance, extending learning, using what he/she has learned to adapt to new situations, and displaying perseverance and commitment to continued learning. 21C.O.9-12.3.LS5 - Student exhibits positive leadership through interpersonal and problem-solving skills that contribute to achieving the goal. He/she helps others stay focused, distributes tasks and responsibilities effectively, and monitors group progress toward the goal without undermining the efforts of others. 21C.O.9-12.3.LS6 - Student maintains a strong focus on the larger project goal and frames appropriate questions and planning processes around goal. Prior to beginning work, student reflects upon possible courses of action and their likely consequences; sets objectives related to the larger goal; and establishes benchmarks for monitoring progress. While working on the project, student adjusts time and resources to allow for completion of a quality product.	The teacher will engage the students in a discussion of privacy in regards to computer passwords, copyright laws and general personal computer safety. The students will also discuss appropriate group etiquette. Student teams will create a planning document that includes a timeline and a contract outlining responsibilities for each team member.	The student develops a plan to complete a project and makes adjustments as needed. The student demonstrates appropriate behavior in groups.

Performance Objectives:	**Know** The implications of global warming Natural phenomena can be modeled using mathematics How to use a graphing calculator How to collect and interpret statistical data How to research using reputable websites **Do** Collect data Create mathematical models Research the topic Create a persuasive research paper and presentation
Driving Question:	How must the United States modify or redesign its foreign policy due to the effects of global warming?

Assessment Plan:

Major Group Products	Presentations, written, oral, and multimedia Group planning document and contract Task checklist Collected data with mathematical models
Major Individual Projects	Individual task lists

Assessment and Reflection:

Rubric(s) I Will Use:	Collaboration	X	Written Communication	X
	Critical Thinking and Problem Solving	X	Content Knowledge	X
	Oral Communication	X	Other	
Other Classroom Assessments For Learning:	Quizzes/Tests		Practice Presentations	
	Self-Evaluation	X	Notes	
	Peer Evaluation	X	Checklists/Observations	
	Online Tests and Exams		Concept Maps	
Reflections:	Survey		Focus Group	
	Discussion		Task Management Chart	X
	Journal Writing/Learning Log		Daily Log	X

Map The Product:

Product: Create a mathematical model.

Knowledge and Skills Needed	Already Have Learned	Taught Before the Project	
1. Entering data into a calculator	X		
2. Finding the line of best fit for a set of data	X		
3. Use of presentation software	X	X	
4. Finding data relevant to the project		X	

Resources:

School-based Individuals:
Social Studies and Science Teachers

Technology:
Weather Underground: http://www.wunderground.com/
Utah Climate Center: http://climate.usurf.usu.edu/
National Climatic Data Center: http://www.ncdc.noaa.gov/gcag/index.jsp
NASA: http://mynasadata.larc.nasa.gov/

Community:

	National Weather Service, Charleston, WV **Materials:** Presentation software Multimedia software Computers with internet access newspaper article (see attached)
Manage the Process:	Students will be grouped into 2 groups of 5 and 3 groups of 4. Each group will create a presentation that addresses the driving question. Each team will create its own planning document that includes a timeline and task checklist. Each team must create a contract outlining individual responsibilities and relating these to the timeline and task checklist. Differentiated instruction is integrated by: • Students work individually and small groups; • Learning styles are addressed through visual presentations, graphing software, group work and individual work; Technology is integrated throughout. See project map.
Project Evaluation:	Task checklist Presentation rubric Content rubric applied to presentation & other group product
Resource Files Uploaded	**Resource Files** • UP3365WS2.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS2.doc) • UP3365WS3.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS3.doc) • UP3365WS4.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS4.doc) • UP3365WS5.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS5.doc) • UP3365WS6.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS6.doc) • UP3365WS7.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS7.doc) • UP3365WS8.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS8.doc) • UP3365WS9.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS9.doc) • UP3365WS10.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS10.doc) • UP3365WS11.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS11.doc) • UP3365WS12.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS12.doc) • UP3365WS13.doc (http://wveis.k12.wv.us/Teach21/CSO/Upload/UP3365WS13.doc)