

THE UNIT PLAN

About the Course: Algebra Review is a one-year course consisting of 10th, 11th, and 12th grade students who have yet to pass the New York State Regents exam in Algebra, a requirement for high school graduation. These students have two opportunities to pass the course during this academic year: January 2014 and June 2014. Students who pass the test in January will remain in the course until its completion in June. This unit plan is meant for those students who pass the Regents exam in January while I focus on test prep with the other students.

Length of time dedicated to Unit Plan: 6 weeks

Overview of Unit Plan: Students will explore the idea of the American Dream from a financial and economic perspective. In addition to researching the GDPs, tax revenue, and national debts of the US and two other countries of their choice (one developed and one developing), they will investigate the life styles in each of those countries and compare them. Essentially, students will provide a qualitative and quantitative analysis of their findings. The qualitative pieces include a comparison of the life styles in the different countries, a description of a famous piece of architecture in the countries researched, and a report card to the President of the US on the state of the American dream. The qualitative analysis will be supported by mathematical concepts including graphs, Venn diagrams, debt-to-revenue ratios, and rates of change. The students will also produce a digital tutorial to teach how to identify a linear, quadratic, and exponential relationship. The students will use their research and analysis to answer the question: *How is the American Dream looking for teenagers in the US and abroad?*

Concepts of the course explored in this unit plan: The concepts explored in this unit plan are the 4 global competencies: investigating the world, gaining perspective, communicating ideas, and taking action. What I would like for the students to get out of this unit plan is an interest in the financial status of our country, an approach to making sound financial decisions when it comes to borrowing money, and a sense of responsibility to not only being conscious world citizens but also responsible diplomats of our country.

Stage 1 Desired Results	
<p>ESTABLISHED GOALS: MATH COMMON CORE</p> <p>Seeing Structure in Expressions A-SSE Interpret the structure of expressions.</p> <ol style="list-style-type: none"> 1. Interpret expressions that represent a quantity in terms of its context. <ol style="list-style-type: none"> a. Interpret parts of an expression, such as terms, factors, and coefficients. 	<i>Transfer</i>
	<p><i>Students will be able to independently use their learning to...</i></p> <ol style="list-style-type: none"> 1. Develop a real connection with the American Dream. 2. Understand the importance and meaning of financial responsibility. 3. Determine the implications of a country's financial status on a people's life style. 4. Be fluent in the use of the financial terms: GDP, debt, and tax revenues. 5. Analyze and interpret graphs. 6. Convert foreign currency into US dollars. 7. Appreciate the mathematics of world famous arches or bridges. 8. Analyze real world situations by utilizing ratios as a basis for comparison.
	<i>Meaning</i>

<p>Create Equations A-CED Create equations that describe numbers or relationships.</p> <p>1. Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and rational exponential functions.</i></p> <p>Seeing Structure in Expressions A-SSE Write expressions in equivalent forms to solve problems.</p> <p>3. Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.</p> <p>a. Factor a quadratic expression to reveal the zeros of the function it defines.</p>	<p>UNDERSTANDINGS <i>Students will understand that...</i></p> <ol style="list-style-type: none"> 1. A country's economic responsibility is important to the life style of its people. 2. The more debt a country takes on as compared to its revenue puts the country at financial risk. 3. Financial responsibility is a healthy balance between debt and revenue. 4. Bridges and arches are examples of the quadratic equation. 5. The zeroes of the quadratic equation are important to the architecture of an arch or bridge. 	<p>ESSENTIAL QUESTIONS</p> <ol style="list-style-type: none"> 1. How financially responsible is the US about how it manages its money? 2. How does the US's financial responsibility compare with other countries, both developing and developed? 3. How accessible is the American Dream to young people today?
<p>Acquisition</p>		

<p>Creating Equations A-CED Create equations that describe numbers or relationships. 3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. <i>For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</i></p> <p>Linear, Quadratic, and Exponential Models F-LQE Construct and compare linear, quadratic, and exponential models and solve problems. 1. Distinguish between situations that can be modeled with linear functions and with exponential functions. Prove that linear functions grow by equal differences over equal intervals, and that exponential functions grow by equal factors over equal intervals.</p> <p>ESTABLISHED GOALS: ELA COMMON CORE Writing Standards 6-12: Text Types & Purpose 1. Write arguments to support claims in an analysis of substantive topics or texts, using valid reasoning and relevant and sufficient evidence. Explore and inquire into areas of interest to formulate argument.</p>	<p><i>Students will know...</i></p> <ol style="list-style-type: none"> 1. How to investigate the national debt, tax revenues, and GDP of different countries. 2. How to develop a perspective on the life style in the US compared to that in other countries. 3. How to use technology to communicate their findings on the US's financial responsibility to other students. 	<p><i>Students will be skilled at...</i></p> <ol style="list-style-type: none"> 1. Accessing national data on tax revenues, GDP, and debt. 2. Graphing linear and quadratic equations. 3. Deriving linear equations based on graphs. 4. Developing their own conclusions based on the data they collected and analyzed. 5. Utilizing technology to communicate their findings to other students.
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Stage 2 - Evidence	
Evaluative Criteria	Assessment Evidence
<p>(1) Utilizing EXCEL, students organize data on GDP, tax revenues, and national debt in a table by year.</p> <p>(2) Students produce a total of 3 tables, one for each country researched: US plus two other countries.</p>	<p>INVESTIGATE THE WORLD: Collect Data for Tables Students will collect historical data of GDP, tax revenues, and debt of the US and other developed countries and underdeveloped countries from a list of websites provided to them. Students must choose one developed country and one underdeveloped country to which compare the US.</p>
<p>(1) Utilizing EXCEL, students graph the data from the tables with the year on the x-axis and the corresponding data on the y-axis. The axes should be labeled, and each graph should have a title.</p> <p>(2) Utilizing EXCEL, students graph the debt-to-revenue ratio for each country on one grid.</p>	<p>INVESTIGATE THE WORLD AND GAIN PERSPECTIVE: Create Graphs of Tax Revenues vs. National Debt by Country and Conclusions Sheet Students will use the data tables of tax revenues and debt of the US and 2 other countries to create 3 graphs, each comparing the country's tax revenue to national debt, the latter being the constraint in the model. A fourth graph will compare the debt-revenue ratio of the 3 countries. Students will use the graphs to provide evidence (ELA standard) in answering the questions: 1) Compare the financial status of the 3 countries, and 2) Is the financial status of the US viable?</p>
<p>(1) Student produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.</p> <p>(2) Utilizing MS Word, students will complete a Venn Diagram to summarize the points made in the qualitative analysis.</p>	<p>INVESTIGATE THE WORLD AND GAIN PERSPECTIVE: Write a Qualitative Analysis and Venn Diagram Comparing the Life Styles of the 3 Countries Students will utilize the graphs on GDP to write a qualitative analysis report (ELA standard) comparing the life styles of the US to the life styles of the other developed country and the developing country. The qualitative analysis report will include an illustration of their qualitative analysis in the form of a Venn Diagram.</p>

<ul style="list-style-type: none"> (1) Students create a graph of the quadratic equation illustrated by the famous architecture (building/arch) they chose. (2) The students clearly label all parts of the graph: the quadratic equation, x- and y-axes, a title for the graph, and zeroes. (3) Students provide the original image of the famous architecture. (4) The students write a paragraph: a brief description and the meaning of the zeroes. 	<p>INVESTIGATE THE WORLD: Find Quadratic Equations in Famous Arches and Bridges Around the World Students will research famous arches and bridges in the US plus the other two countries which they have chosen for their research. Using tracing paper, they will copy the pictures of the three arches on three different graph papers. Students will need to derive the quadratic equation of each of the 3 graphs. By choosing one of the strategies: factoring or using the graphing calculator, the students will find the zeroes of the quadratic equation. Students will write a brief description of the famous architectural point of interest to accompany the graph. In the description, the students will describe the meaning of the zeroes to the architecture. This portion of the project will be done manually.</p>
<p>Stage 2 - Evidence (continued)</p>	
<p>Evaluative Criteria</p>	<p>Assessment Evidence</p>
<ul style="list-style-type: none"> (1) The students complete a table on EXCEL showing the rates of change for 3 coordinate pairs in each of the 3 graphs (linear, quadratic, and exponential). (2) The students synthesize the differences of the three types of equations: the degree of the equation, the rates of change, the shape of each graph, and the type of real-world situation. (3) The students use digital media to demonstrate the differences in the three types of graphs. 	<p>COMMUNICATE IDEAS: Create a Digital Tutorial to Teach Other Students How to Identify a Linear, Quadratic, and Exponential Equation/Graph Students will compare their linear and quadratic graphs to exponential graphs by looking at the rates of change of each graph, the degree of the equation, and the shape of the graph. The students will need to find the rates of change between 3 pairs of points in each of the 3 graph types. They will record this information in a table. The students will use a digital media to demonstrate the differences in the three types of graphs and their corresponding equations: linear, quadratic, and exponential. The students will include real-world examples that exemplify each type of equation. The students can create a digital graphic organizer, a Powerpoint presentation, a video, or any other digital format.</p>

<p>(1) Write an argument to support claims in the analysis of the question, <i>what is the state of the American dream and how accessible is it to teenagers</i>, using valid reasoning and relevant and sufficient evidence from the tables and graphs.</p> <p>(2) Giving an equal attention to both, students explore the question from their perspective living in the US, as well as, from the perspective of teenagers living in other countries.</p>	<p>TAKE ACTION AND GAIN PERSPECTIVE: Write a Report Card to President Obama on the State of the American Dream Students will watch the documentary, <u>Park Avenue: Money, Power, and the American Dream</u> and then write a report card to the U.S. President about the state of the American dream and how accessible it is to them as teenagers living in the US and then how attractive is the American dream to teenagers from countries. Students will be encouraged to write recommendations or suggestions.</p>
<p>(1) The work exhibits an even distribution of the voices of each member as shown by the use of the different colors.</p>	<p>OTHER EVIDENCE: Collaboration Students will demonstrate their ability to make decisions as a group and be accountable as a group, in addition to being accountable individually. Students will write in 2-3 voices depending on the number of members in the group. Each student chooses a color (red, green, or blue) and types or writes in that color throughout the duration of the project.</p>

<p style="text-align: center;">Stage 2 - Evidence (continued)</p>	
<p>Evaluative Criteria</p>	<p>Assessment Evidence</p>
<p>(1) The students use multi-media to demonstrate their findings and conclusions and exhibit their tutorials.</p> <p>(2) The students appropriately and effectively use the different features on the multi-media.</p>	<p>OTHER EVIDENCE: Innovation Students will demonstrate their ability to explore and experiment with technology to best showcase their ideas, findings, and conclusions.</p>

<p>(1) Students present their work without reading from index cards. They only use index cards to reference or keep track of their presentation.</p> <p>(2) Students use evidence to answer questions and think critically about their responses.</p> <p>(3) Students are friendly presenters.</p>	<p>OTHER EVIDENCE: Presentation Students demonstrate the ability to present their research, analysis, and conclusions with conviction, and they present their work and respond to questions from the audience intelligently and politely.</p>
<p>The students meet the deadlines of each phase of the project.</p>	<p>OTHER EVIDENCE: Work Ethic Students submit their work at each stage on time and complete.</p>

Stage 3 - Learning Plan

Summary of Key Learning Events and Instruction

- ∞ **The Government Shutdown:** I will survey the class about what countries they or their parents come from and ask them why their families chose to come to the US. The questions I want the students to keep in mind while watching the video are: 1) How important is the financial status of a country important when deciding to visit a country for relocation or tourist purposes, 2) What does the government shutdown in the US say to other countries about the US, and 3) Whom does the government shutdown affect. The video is from the instructional blogs on *The New York Times* website: <http://www.nytimes.com/video/us/politics/10000002482877/the-cost-of-the-shutdown-by-the-numbers.html>.
- ∞ **Where does the money a country make come from?** I will provide students with an article, *The Numbers: What are the federal government's sources of revenue*, to answer the question where does the money a country make come from. The answer is taxes. Article: <http://www.taxpolicycenter.org/briefing-book/background/numbers/revenue.cfm>
- ∞ **To what countries do we want to compare the US?** Based on a few online sources I provide and current events, students will choose which two countries they will use in their research and analysis to answer the question: *How is the American dream looking for teenagers here and abroad?*
- ∞ **How to make graphs using spreadsheets?** Students will take an online tutorial that teaches them how to create graphs on EXCEL. They will need this skill in order to perform the research and analysis portion of the project will follows. <http://video.about.com/spreadsheets/How-to-Create-a-Line-Graph-in-Excel.htm>
- ∞ **Research and Analysis:** Students will research different websites to collect data and enter the data into tables on EXCEL. Students will use this data to create graphs. Students will also research life styles of the countries they chose. This includes the qualitative and quantitative portion of the project. It is in this section where students also calculate and compare debt-to-revenue ratios of each country.
- ∞ **Let's Go Sightseeing!** Students visit their countries virtually to identify a famous arch or bridge in each country that is worth seeing. In this portion of the project, students will create the graphs to the parabolic images and develop an accompanying writing piece.

Stage 3 - Learning Plan (Continued)

Summary of Key Learning Events and Instruction

- ∞ **Explore Exponential Functions:** Students will be given samples of exponential functions by which to compare visually their linear and quadratic functions. Students will be asked to find the rates of change of each graph and compare them as well. This will be in a template on EXCEL. Students will also be asked to compare the equations in terms of the degree of the equation. I will provide students with online resources to guide them in finding the distinctions among the different types of equations.
http://www.mathsteacher.com.au/year7/ch15_linear/04_modelling/linear.htm
- ∞ **Make A Digital Tutorial:** Students will create a digital tutorial to teach other students how to identify linear, quadratic, and exponential functions. In the tutorial, students will also provide real-world examples of each type of function and how they differ.
- ∞ **The American Dream:** Students will watch the documentary, Park Avenue: Money, Power, and the American Dream. This will serve as a basis for the students to think critically about the accessibility and the reality of the American dream for them as young adults living in the US and the availability of the American dream to young adults living outside the US. After watching the documentary, students will write a report card to the President of the US.
- ∞ **Who's the Best Online Tutor:** I will post the students' tutorials on ECHO, the school's website (or other source), and classmates will vote on the best tutorial for identifying linear, quadratic, and exponential functions.
- ∞ **Presentations:** Students will present their report cards on the state of the American Dream to their peers and teachers from the school. The students will provide evidence from their research and analysis. The students will utilize technology to showcase their work and reference evidence during their presentation.

Questions I have:

1. Is there an online forum for students to write to Obama?
2. What is the best way to have students vote online?