12th Grade

Math - Pre-Calculus

**All blue text is a link to the online curriculum.

	Day 1	Day 2	Day 3	Day 4	Day 5
The big idea	**Matrices (9.1.1 and 9.1.2)** Students are introduced to matrices and explore how to perform basic operations on matrices. **Important Vocab: Matrix (Matrices), Row, Column, Entry, Dimension, Scalar, Zero Matrix, Additive Identity Matrix, Additive Inverse of a Matrix, Column Vector, Row Vector** ***Math Notes*** on pages 6 and 15 TI-84 Plus Graphing Calculator				
Key activities	Section 9.1.1 9-1 through 9-3	Section 9.1.1 9-4 through 9-6	Section 9.1.1 9-7 through 9-8	Section 9.1.2 9-15 through 9-18	Section 9.1.2 9-19 through 9-20
Questions to ask	What are the steps you take to add two matrices? Justify your answer in context of the problem. What are the steps you take to multiply two matrices?Justify your answer in context of the problem.	Explain why and how the Additive Identity Matrix is related to an additive identity in the real number system. Explain how the Additive Inverse of a Matrix is related to the inverse of a function.	What are the steps taken to multiply a matrix by a scalar? How is this process different from multiplying two matrices?	Review the dimensions of sets of matrices you multiplied in problems 9-2 through 9-18. What do you notice?	Do you think the order in which you multiply matrices matters? Justify your thinking with an example.
Pages to	1-4	4-6	7	10-11	12

complete (in the PDF)					

	Day 6	Day 7	Day 8	Day 9	Day 10
The big idea	**Matrices (9.1.2 and 9.1.3)** Students continue to explore how to perform basic operations on matrices. **Important Vocab: Square Matrix, Identity Matrix, Determinant** ***Math Notes*** on page 15 TI-84 Plus Graphing Calculator				
Key activities	Section 9.1.2 9-21 through 9-22	Section 9.1.2 9-23 through 9-25	Section 9.1.2 9-26 through 9-28, 9-35	Section 9.1.3 9-43 through 9-47	Section 9.1.3 9-48 through 9-51
Questions to ask	Is there more than one way to create the matrices to represent the real-world situations in Problems 9-21 and 9-22?	What have you learned so far about matrices? What do you still want to know? What will help you increase your understanding?	How can matrices be used to represent real-world situations? Provide a few examples.	What are the connections between a matrix A, the inverse of matrix A, and the determinant of matrix A?	What steps are used to compute the determinant and inverses of 2×2 matrices? Provide clear examples.
Pages to complete (in the PDF)	12-13	13-14	14-19 (selected problems from Key Activities only)	1-3	3-5

History

Topic: U.S. Census 2020		
Day #1	**Day #2**	**Day #3**
Essential Question: What is the census?	**Essential Question:** How have the U.S. Census questions changed over time?	**Essential Question:** Take Action: How can you communicate the importance of the 2020 Census to your family and community?
Student Task(s): Students will describe the census, its purpose, and how it impacts communities. *(source: icivics.org)*	**Student Task(s):** Students will compare the census questionnaires used in 1900 and 2010 and answer questions about how and why the questions have changed from one century to the next. *(source: census.gov)*	**Student Task(s):** Students will create a public service announcement (PSA) to communicate the importance of being counted during the 2020 U.S. Census.
Linked Resources: Teacher Resources Student Resources *(Packet Pgs. 3-10)* Infographic Video: What is the Census?	**Linked Resources:** Activity Overview Teacher Version Student Version *(Packet Pgs. 11-14)* Additional Census Forms: Census 2010 Form Census 2020 *(Sample Form*)	**Linked Resources:** Student Resource *(Packet Pgs. 15-18)* Video PSA: What is the Census? Infographic PSA: Infographic Census Quick Facts Database

12th Grade - Environmental Science

Independent Research Project: **Civil Engineer: Water Treatment** (adapted from *DefinedLearning*)

Big Ideas:

- The health of all living things is directly related to the quality of the environment.
- People acting individually and/or as groups influence the environment.
- Solid, liquid and gaseous earth materials all circulate in large scale systems at a variety of time scales, giving rise to landscapes, the rock cycle, ocean currents, weather, and climate.

Science Understandings:

- The quality of the environment affects the health of all living things within it.
- How humans influence the environment.

Introduction: Communities and society create a tremendous amount of waste that is carried, either directly or indirectly by water. Wastewater-treatment facilities can be found in most countries. However, in many poor countries they do not exist, or the ones that do exist are not up-to-date and as such, do not provide the necessary treatment. The ability of these facilities to adequately treat wastewater can have an impact on the environment and on human health. These facilities cost money to build, run and maintain. Economics is one of the primary reasons that these facilities are not found in some countries or are not up-to-date. During your meeting with the national government, be sure to address each of these concerns. It will also be important to educate the citizens of the countries on the potential impact of water treatment.

WEEK 1	**Days 1and 2:** Set the Stage for completing the project	**Days 3 - 5:** Do the Research: How is water treated?
Key activities	● Read the *Introduction* to the project ● Review the Big Ideas & Essential Questions ● Read the *Goal*, *Role*, *Audience*, and *Situation* ● Review the chosen *Product(s)* ● Review Rubrics ● Review Research Questions	Watch the following video: How Do Wastewater Treatment Plants Work? Water Resources Engineer Read the following articles: ● Water flowing from toilet to tap may be hard to swallow. ● Water and human health. ● Africa: The reuse of treated wastewater for drinking

		water. ● The importance of clean water. ● CDC: Community and Household Water Treatment Processes
Questions to ask	● What is the project that I will be completing? ● What do I need to know to complete this project?	● What is the basic process used to treat water? How could this process be duplicated with limited resources? ● How do civil engineers use science to understand and math to control the water treatment process? ● How does a water treatment facility mimic natural biological processes?
Tasks to complete	Notebook/Journal entries - write your responses to the questions above.	Notebook/Journal entries - write your responses to the questions above.

WEEK 2	**Days 6 - 9:** Design and create products that demonstrate your understanding of how water is treated and the benefits of water treatment plants.	**Day 10:** Project Reflection
Key activities	● Watch: the Design Process video From the Design Process and Product Creation Section: Complete any two of the following: ● Informational Brochure: Create an informational brochure to be distributed to the people of the country about the benefits of water treatment facilities. This should be simple to read and should highlight the health benefits, water conservation benefits, and potential economic benefits. This brochure can be done by hand, through the	Notebook/Journal entries: ● What was your biggest takeaway from this topic? ● What classroom content did you use to create your products

	use of software or through a web-based tool. Please remember that many of the people of the country may not be able to read English. The visuals, symbols, and easy-to-understand diagrams and/or graphs will be critical to their understanding of the water treatment. ● Position Paper: Write a position paper detailing the many aspects of water treatment as this process relates to human health concerns and how the building of such facilities can positively affect the people of a society. This paper should utilize mathematical models as related to organic and inorganic aspects of the water entering and exiting the water treatment facility. How do these numbers provide evidence of the value of water treatment for human health? ● Demonstration: Before the government can begin to understand how a large-scale water treatment works, they will need to understand the simple processes used to help make the water safe to drink. To do this, you will need to develop a demonstration helping the audience understand the various steps of the water treatment process. As you work through the demonstration be sure to discuss what is happening and the connections with a water treatment plant. One way to demonstrate this is by using household products to show the people how the processes involved with water treatment works and can remove various pollutants from the water. Be sure to include the removal of solids of different sizes and other chemical treatment processes that are critical. Although you may not want to use actual chemicals, food color may be helpful to show the movement of chemicals through the water. ● Oral Presentation: Develop an oral presentation using visual aids as needed. The presentation should be between 3-5 minutes and should be directed to the government's executive team including the Minister of Health and the Minister for Environmental Affairs. The purpose of the presentation is to convince the government that the building of the water treatment facility in their country can be very beneficial for the citizens, farmers, fishermen, and the environment.	and solve the issue/challenge? ● What skills did you use (21st century skills) to work through the task and finish the project? ● What problems did you encounter while you were working on this task? How did you solve them? ● What did you learn were your greatest strengths? Your biggest areas for improvement? ● What part of your work are you most proud of? What would you do differently next time? Why?

	● Diagram: Construct a linear diagram that shows the process of water entering the water treatment plant, the various forms of treatment that occur and how it re-enters the ecosystem. Within your diagram be sure to share brief explanations of the processes that are occurring and their purpose. Think about how the system could be refined to increase the amount of water produced is safe/balanced for humans.	
Questions to ask	● How does the quality of the environment affect the health of all living things within it? ● How do humans influence the environment?	See questions above.
Tasks to complete	See tasks above.	Notebook/Journal entries - write your responses to the questions above.