Final Project: Wave, Energy, and Information

Background:

In our unit so far, we have touched upon many different aspects of waves. We have seen how we can describe waves (frequency, wavelength, etc.) and represent them mathematically, and we have seen many examples of how waves behave and interact. We have investigated some of the properties of sound waves, such as resonance and pitch. Finally, we have investigated some of the ways light can interact with matter and how images are created and perceived through our eyes.

Now I am asking you to start to put some of the ideas we have explored together to *explain how we use waves in our technology in real life*. You will be using the resources we have gathered in class and doing some of your own research to support your investigation. We will be working on this project throughout the rest of this semester, and you will turn in your finished product as the final of this class.

Introduction:

With this project, you are answering the question: *"How do we use waves to transmit energy or information?"* To get an answer you will need to:

- I. Identify some technology which uses waves in some way
- II. Collect information about it through research and what you know from class
- III. Produce an explanation of how the technology uses waves to function.

This project will serve as your final for this semester, and is due on the day of the final (for 4th period this is June 2nd, for 5th period this is June 3rd). You will have time in class to work on it during the next two weeks. You may work in groups or alone, but grades will be individual--the group work is not the majority of your grade.

Research Guiding Questions:

- 1. What does this technology do? What does it not do?
- 2. Who uses the technology? What are the things it is used for?
- 3. How does the technology work? How are the waves it uses interacting with matter?
- 4. Who invented this technology? What was it first used for? How has that changed?
- 5. What benefits does this technology provide? Are there any potential downsides?

Products (What you are making):

- 1. Research Bibliography (20 points) Cite all of your sources in either MLA or APA format. You should also include a two-sentence summary of each source; what is it telling you or why you are using it. (For example: "This source gave me a diagram of how a laser works. It shows how light waves add up to make a laser.")
 - a. You will use the same bibliography for both of the next two parts
 - b. The more group members working together, the more sources I expect you to be able to incorporate
- 2. Poster (60 points) A science-fair style poster that depicts and describes the technology. You should create drawings and diagrams to show the key pieces and how they function. Provide labels and descriptions to supplement your visuals. Your poster should describe and show how waves are being used within the technology, and whether it is energy, information, or both that are being transmitted.
 - a. Your poster should be mostly visual and self-explanatory. You can include labels and text, but you should not be writing essays on this.
 - b. It should use scientific representations to show how the technology uses waves to transmit information or energy (for example, ray diagrams, waveforms, mathematical equations, and/or data)
 - c. Create your own images! Using references is fine, but do not just print out and paste images onto the poster. Trace diagrams and images and modify them as needed for **your** explanation.
 - d. Use clear, academic language and appropriate vocabulary in your explanations and descriptions

You are welcome to work in a group on your poster.

- **3. Presentation or Paper** (70 points) A 10-slide presentation or two-page (double-spaced) written paper which tells a story about the following:
 - a. What you knew (or thought you knew) before you started the project, and what you have since learned about the technology.
 - b. A summary of the history of the technology. Who invented it & when, how has it changed, what hurdles did people overcome to make it work, etc.
 - c. What do you think about the technology? Describe questions you still have related to the technology, why you chose your technology, and what your opinion is on how it is used/could be used.

The paper/presentation should be your own work. This part is NOT group work.

Total: 150 points

Timeline

We have two weeks left, which means only seven more days of class together! We will be using some of our class time to work on these posters, and here is the timeline for how we will approach our projects:

			5/12	5/13
			Assignment given	
			Decide on a research topic Decide who is bringing poster board	
5/16	5/17	5/18	5/19	5/20
Have at least 3 sources of info	Be working on poster design		Have at least 5 sources of information	
	Start outlining your paper or presentation		Keep working on your products	
5/23	5/24	5/25	5/26	5/27
GOAL: Bibliography complete	Products are in their final stages		GOAL: Paper/Presentation turned in Poster ready to present	
5/30	5/31	6/1	6/2	6/3
			FINALS! Turn in everything if you haven't already. We will display our posters and have a class walk-around to see	
			each other's work!	

We will also be doing some activities with electricity during this time, so you won't have every minute of class to devote to your project. Plan accordingly!

Potential Ideas:

Broadband communication

Radio Television Cellphones WiFi Satelites The Internet Fiber-Optic Cable Wireless technology (Remote controls, earbuds, wireless mice, chargers, etc.)

Navigation

Sonar Instrumental Airplane Flight GPS (and/or Satellites) Drone (UAV) Mapping (Cartography) Thermal Imaging (Night vision) Ultrasound Imaging

Waves in Medicine

Laser eye Surgery Laser hair removal MRI Machines Radiation Therapy X-Rays Cancer treatments

Energy

Solar Panels/Solar Energy Solar Heating/Cooking Wireless Chargers Microwave Ovens

Scoring Sheet

Name: _____

Bibliography: __ / 20

Citations are used in both the poster and the paper/presentation: _ / 5 At least five sources of information are used: _ / 5 Citations are in a consistent and proper format: _ / 5 Bibliography is annotated: _ / 5

Poster: __ / 60

Accurately explains/depicts how the technology transmits energy/info: __ / 30 Use relevant scientific representations of waves in descriptions: __ / 10 Uses appropriate vocabulary and/or academic language: _ / 5 Is well-organized and uses original artwork: __ / 5

Presentation/Paper: __ / 70

Gives a history of the technology with key events and/or people: __ / 30 Conveys a story about what they have learned about the technology: __ / 15 States their opinion/thoughts on the technology and its usage __ / 15 Is organized logically and conveys information clearly: __ / 10

Total: ____ / 150