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Weekly Instructions:

Every week, the packet will start with a choice board. This choice board consists of 9 assignments. I am asking your 8th grader to complete 3 of those 9 assignments. The papers that come after the choice board correspond to one of the options. Not all the options have papers in the packet because all that is required is pen and paper. The options on the choice boards range in time from 20- 40 mins (or should). This week, pick choices that you haven't chosen already.

I provided choices because your students learn in many different ways. If I were the parent of an 8th grader, I would want the options that require them to go outside, to spend time with their household, or do something with their hands/experiment, because "the only difference between goofing off and science is writing it down." - Adam Savage

[Waves Choice Board](#)

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PICK 3

Waves Choice Board

Only 3

Create an anchor chart/poster detailing the parts of a transverse wave.

Complete the Graphs-Charts-Tables ~ Electromagnetic Spectrum Worksheet in Google Slides.

Write a rap, rhyme, or song that explains how the energy of a wave and amplitude are connected.

Read Acoustical Instruments Informational Text and answer the questions - (Mini Project Preferable)

Turn the TV on from another room. Write 1 paragraph, using CER, detailing the distance you achieved and how.

Using Google Docs, design and perform (with parental supervision) an experiment exploring sound waves.

Answer the daily Exit Ticket questions. (If you do 1 day, must do all week)

Complete the Electromagnetic Spectrum Writing Prompt.

Venn Diagram Digital v. Analog

Part One: Phenomenon

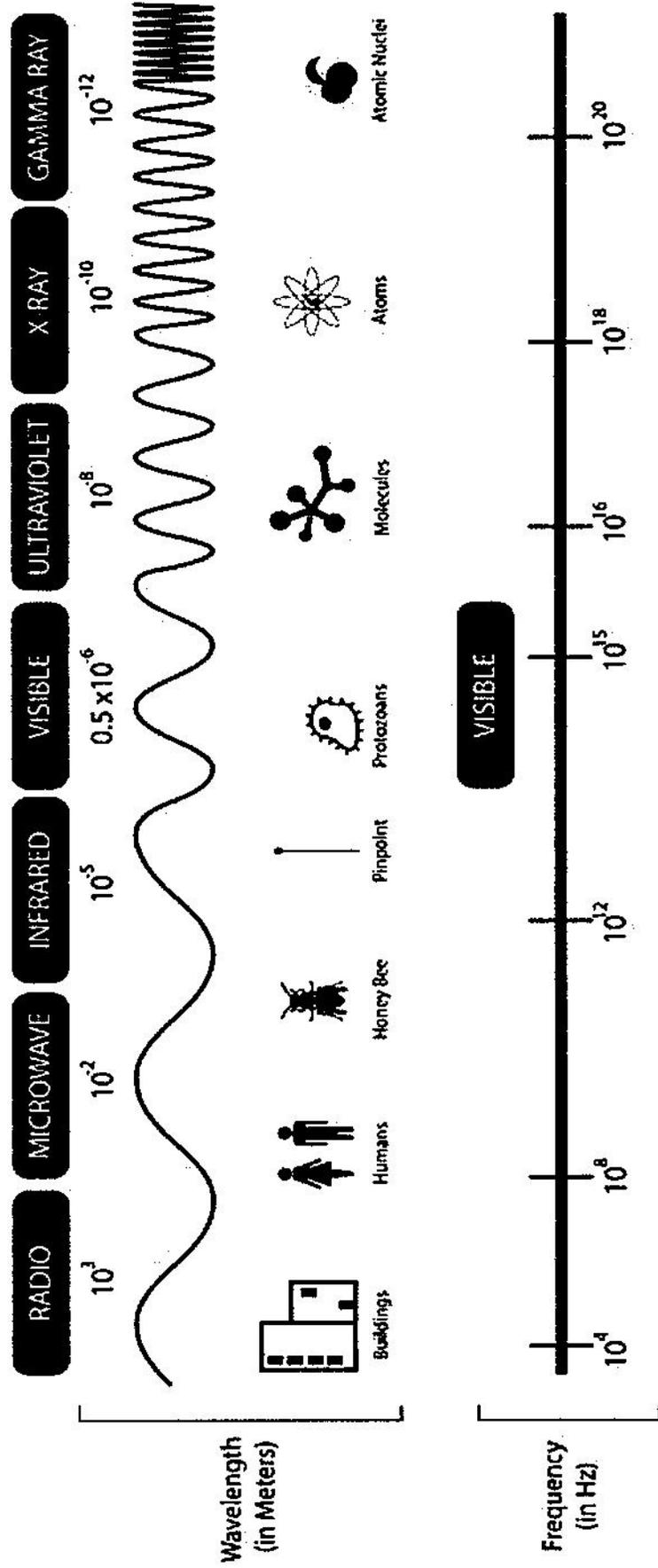
When we see a rainbow, we are seeing all the colors of visible light. Light helps us to see everything around us, however we can't see all forms of light.

Visible light is a form of electromagnetic radiation, but it is only a very small portion of all the forms of electromagnetic radiation that exist. Radio waves, x-rays, and even microwaves are some of the other forms of electromagnetic radiation that exist in our universe. Each type of wave has its own characteristics, including its wavelength and frequency.

1. What do you know about this phenomenon?
2. What topics could a scientist study about light?
3. What kind of data could scientists collect when studying light?



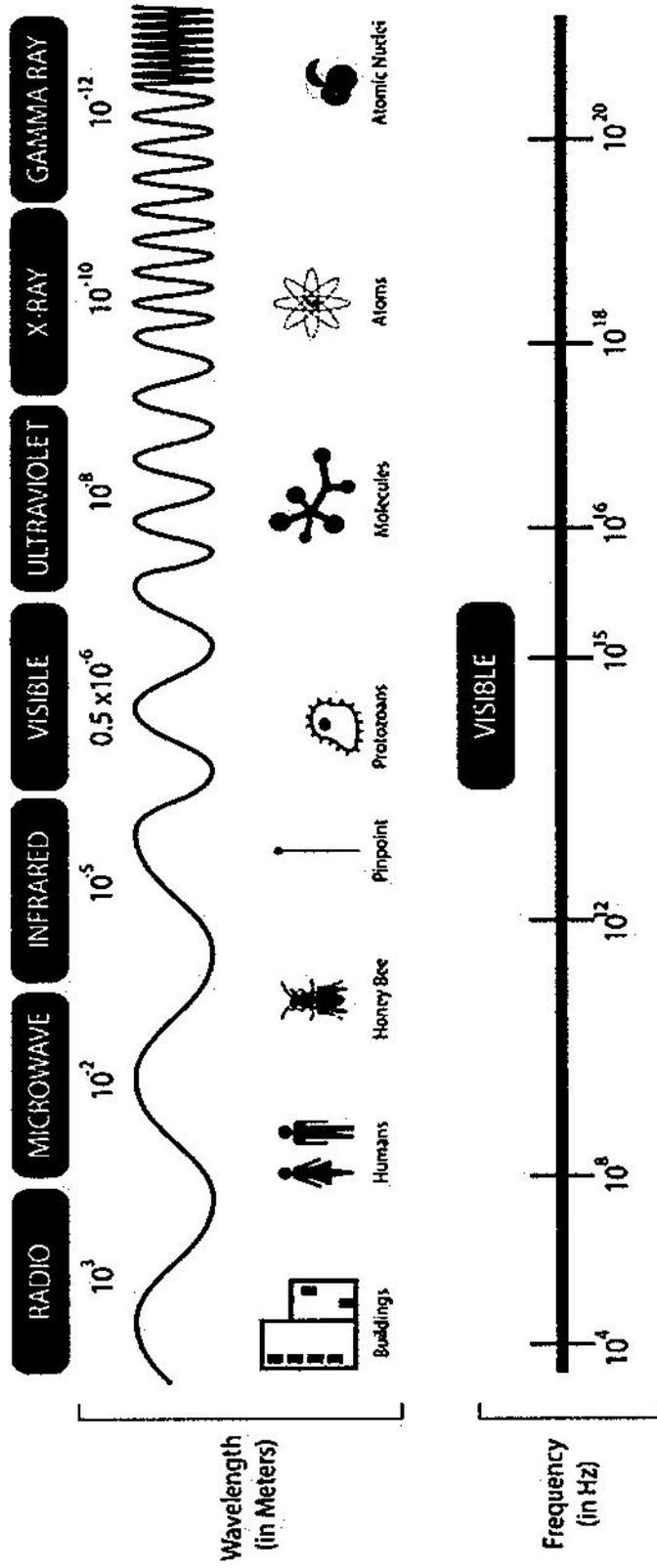
Part Two: Visualizing Data
THE ELECTROMAGNETIC SPECTRUM



How does this chart relate to the topic we previously discussed? Identify the critical parts of the chart.

Part Three: Questions and Answers

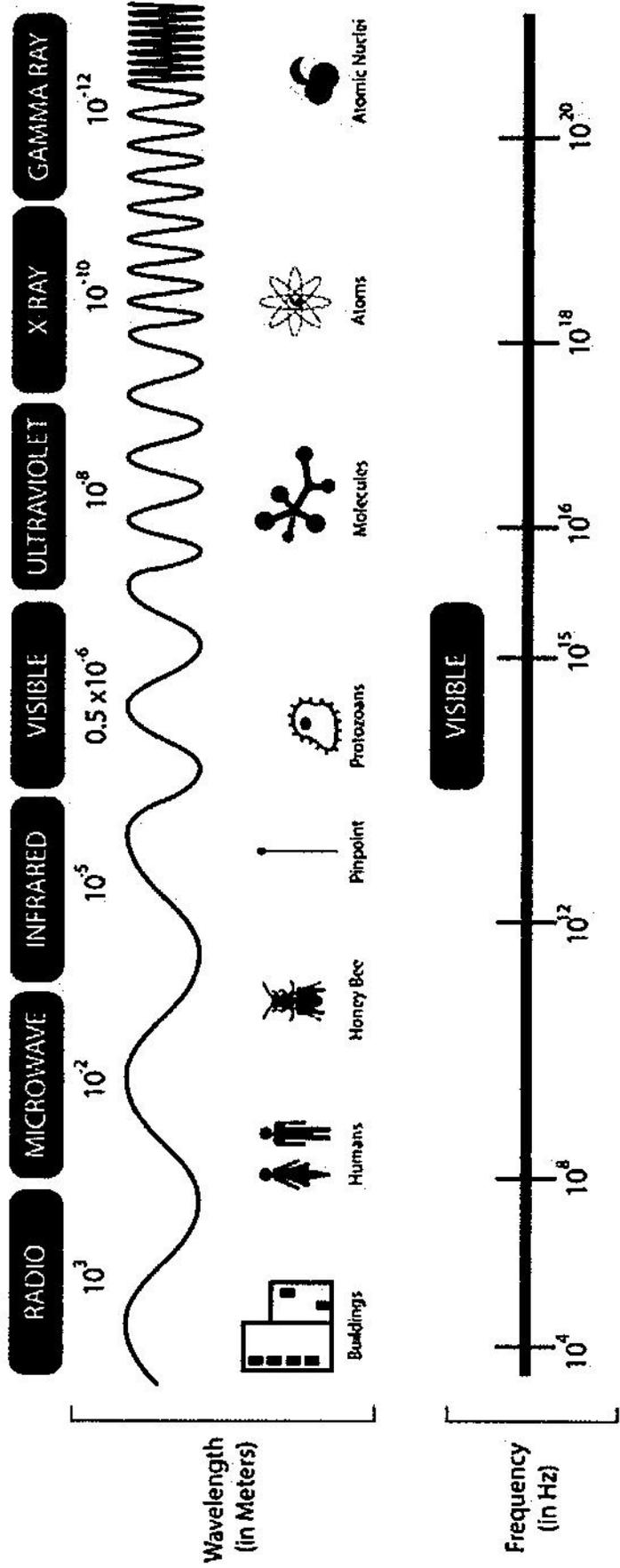
THE ELECTROMAGNETIC SPECTRUM



Come up with two questions you could ask about this chart. Include the answers to your questions.

Part Four: New Forms of Visual Data

THE ELECTROMAGNETIC SPECTRUM



Why do you think this chart was used? Come up with an alternative way to represent the same information. This can be a different type of chart, graph or table.

Part Five: Make Your Own!

A group of students were researching different forms of electromagnetic radiation. They noticed that as the wavelength of the wave increased, the frequency would decrease. They wanted to see if this was always true, so they each collected information on different forms of radiation. Then they wanted to combine their data. Use the information from each student to create one chart or graph that shows all the data in one place on the next slide.

Darren's Light Research

Form of Radiation	Wavelength (m)	Frequency (Hz)
Microwaves	1.0×10^{-4}	3×10^{12}
Visible Light	6.0×10^{-7}	5×10^{14}
Infrared Light	3.7×10^{-6}	8.2×10^{13}

Sarah's Light Research

Form of Radiation	Wavelength (m)	Frequency (Hz)
Ultraviolet	3.2×10^{-8}	9.4×10^{15}
Radio waves	3.27×10^2	9.17×10^5
Gamma Rays	4.1×10^{-14}	7.3×10^{21}

Graphs – Charts – Tables
WEEKLY VISUAL DATA

PS-18



Name: _____

Date: _____



Exit Ticket

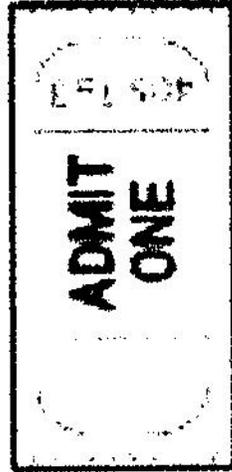
1. What is a wave? List an example of a wave.
2. What is a medium?

Briefly describe the properties of waves on the chart below.

Properties of Waves	Description
Wavelength	
Amplitude	
Frequency	
Speed	

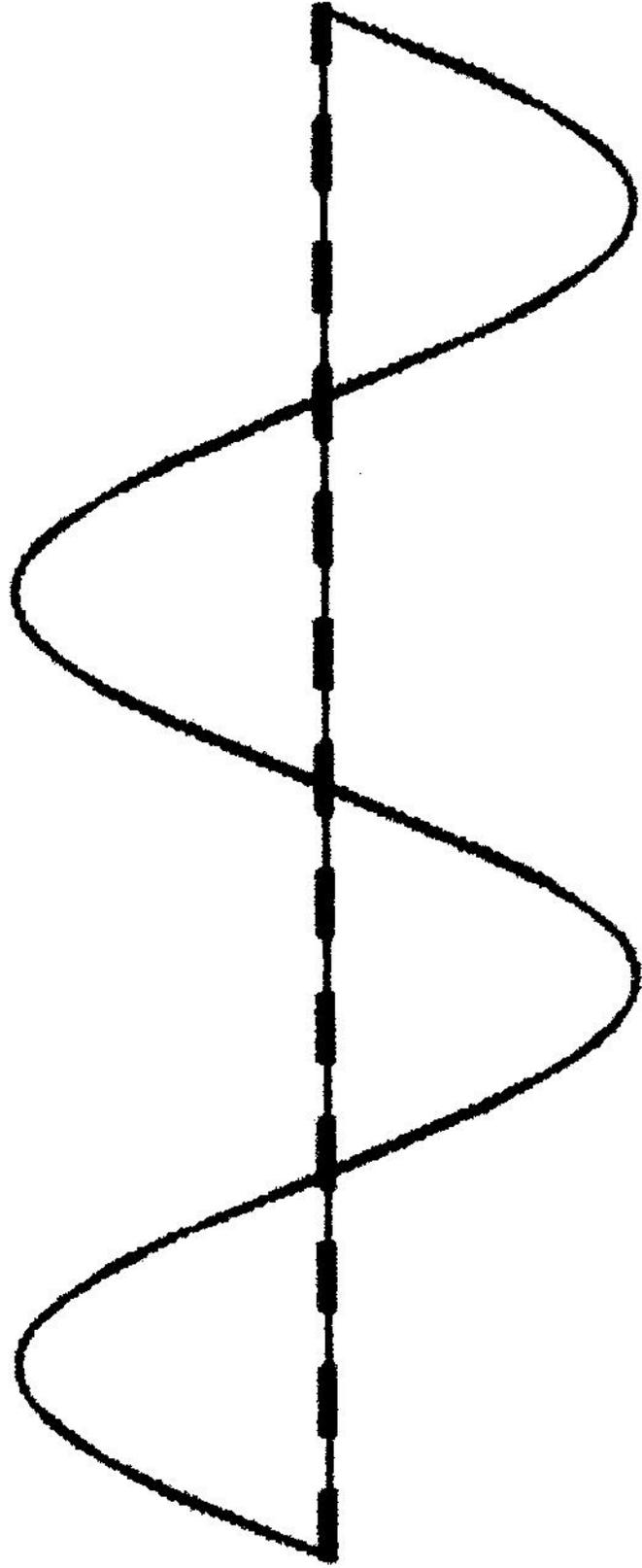
Name: _____

Date: _____



Exit Ticket

Below is a diagram of a transverse wave. The dotted line represents the rest position. Label the wavelength, amplitude, frequency, crests, and troughs.



Name: _____

Date: _____



Exit Ticket

1. What is the electromagnetic spectrum?
2. List the waves on the electromagnetic spectrum from longest to shortest wavelength.
3. List the waves on the electromagnetic spectrum from highest to lowest frequency.
4. Which type of wave has the greatest amount of energy?
5. Which type of wave has the least amount of energy?

Name: _____

Date: _____



Exit Ticket

Match the waves from the electromagnetic spectrum to a possible use for each

- | | | |
|-------|------------------|--------------------|
| wave. | A. Radio Wave | E. Ultraviolet Ray |
| | B. Microwave | F. X-Ray |
| | C. Infrared Ray | G. Gamma Ray |
| | D. Visible Light | |

1. _____ Can be seen by the human eye
2. _____ Used in heat lamps to keep food warm in cafeterias
3. _____ Penetrates food and causes it to get hot
4. _____ Helps to diagnose and treat cancer
5. _____ Picked up by an antenna and travels through wires to produce sound
6. _____ Helps the body to produce vitamin D; causes severe sunburns
7. _____ Penetrates the body and is absorbed by bones

SHOW WHAT YOU KNOW!

How are microwaves similar to visible light?

How are they different?

A series of ten horizontal dashed lines for writing answers.

ACOUSTICAL Instruments

Sound is a type of energy produced by waves transmitted through matter (solid, liquid, and gas). The vibrations from the sound waves strike the eardrum causing it to vibrate. The sound waves or vibrations reach the middle ear and finally the cochlea of the inner ear which transmits these vibrations into nerve signals. The brain interprets this as sound. Music is an art form that combines vocal or instrumental sound to create a composition.

Acoustical musical instruments generate sound physically rather than electronically and are organized into four basic groups. Percussion instruments are hit or shaken like drums or tambourines. These are the basic forms of acoustical instruments. Another group of acoustic instruments is the wind instruments, which are blown into—such as woodwinds (clarinets, bassoons, saxophones) and brass (trumpets, trombones, and French horns). They get their energy from vibrating air generated by someone's lips.

String instruments are bowed or plucked and include the violins, violas, cellos, and the double bass. The vibrating strings of these instruments travel through the air to produce sound. The final acoustic group is played with fingers such as the piano. A piano or organ uses a keyboard to move a hammer which strikes strings causing the vibration.

A sound vibration has two main physical properties, amplitude and frequency. Amplitude is the size of the vibration or the loudness of the sound. It comes from the word amplifier, which is a device that increases the amplitude or the height of the wave. Turn up a radio to amplify the sound.

Frequency describes the speed of the vibrations, which determines the pitch (how high or low the sound) of a musical instrument. The higher the frequency, the higher the sound. Frequency is measured in Hertz (Hz). Hertz measures the number of wave cycles that occur in one second.

A young person can hear sounds in the range of 20-20,000 Hz, but as a person ages, he/she loses this range of hearing. Dogs can hear 40-60,000 Hz, which explains why they can hear a dog whistle and humans cannot.

The way acoustic instruments produce sound waves varies according to their classification, but all instruments share the physical properties of amplitude and frequency when creating sound.



ACOUSTICAL Instruments

Comprehension QUESTIONS

Answer the questions below based on the article about acoustical instruments.

1. What type of energy is produced by waves and transmitted through matter? Underline your answer in the article. _____
2. What is the definition of an acoustical instrument? Circle your answer in the article. _____
3. What are the four (4) basic acoustic groups?
✓ _____
✓ _____
✓ _____
✓ _____
4. What is music, according to the article?

What is your personal definition of music?

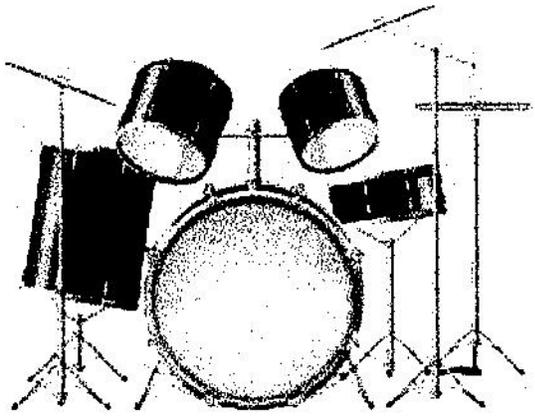
5. Describe how string instruments make sound.

6. Based on what you've learned from the article, why do you think a younger person hears better than an older person? Explain your reasoning.

Mini-PROJECT: DIY INSTRUMENT

DIRECTIONS: Design and make your own acoustical instrument using everyday items (for example, empty tissue rolls, rocks, paper, rubber bands, etc.).

1. Design your percussion instrument using the template provided on the next page. Complete the action steps on this page prior to physically creating your instrument.
2. Using everyday items, your design, and the information you've learned about sound and music from the Acoustical Instruments article, create a physical representation of your instrument and answer the final question on the bottom of your design page.



INSTRUMENT DESIGN

Prompt	Answer
Name of instrument	
Materials needed to build your instrument and where you'll find them	
Based on what you've learned about acoustical instruments, explain how your instrument will fit into one of the four categories.	
Sketch the design of your instrument. The more detailed you are, the easier it will be to create your instrument.	
AFTER YOU BUILD: Describe the building process and how you adjusted your design to create a working acoustical design.	<hr/>

Waves Self Experiment

- I. **Question** (What are you observing or exploring?)

- II. **Hypothesis** (If/then... statement)

- III. **Materials** (What do you need to safely conduct this experiment?)

- IV. **Procedure** (Every step must be reproducible by another scientist.)

Waves Self Experiment

V. **Data Analysis** (Write down every observation. How will you record your data?)

