

# The Electromagnetic Spectrum and the Sun

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# Standards (CAS)

## Physical Science

8.1.4 Recognize that waves such as electromagnetic, sound, seismic, and water have common characteristics and unique properties.

## Earth Systems Science

8.3.3 The solar system is comprised of various objects that orbit the sun and are classified based on their characteristics

Evidence outcome C: Design an investigation that involves direct observation of objects in the sky and analyze and explain results.

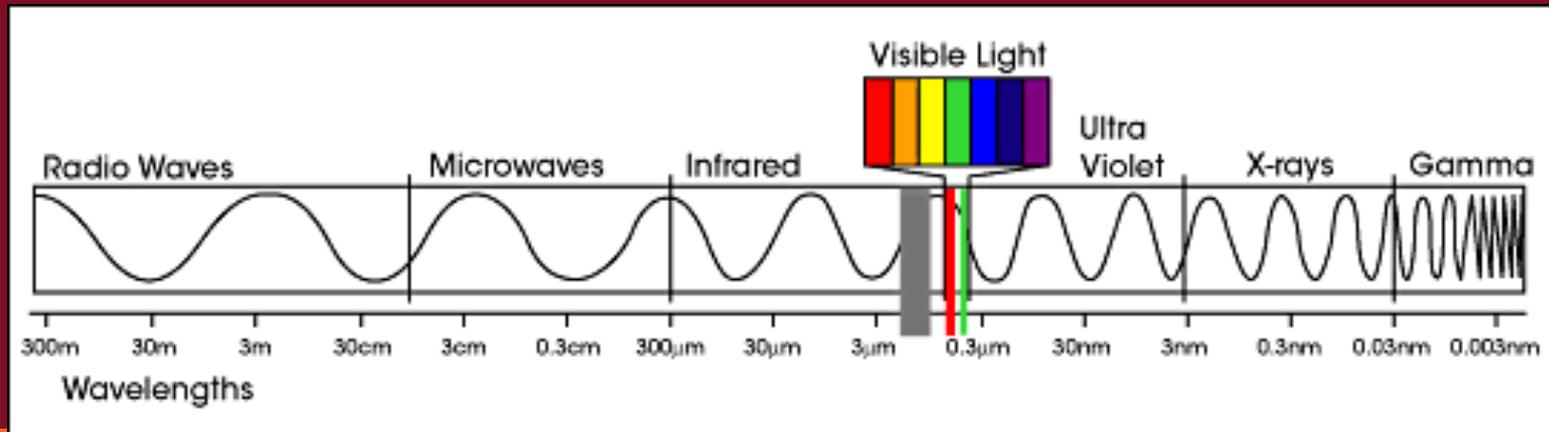
# Standards (NGSS)

## Science and Engineering Practices:

- Asking questions and defining problems
- Planning and carrying out investigations
- Analyzing and interpreting data
- Constructing explanations
- Obtaining, evaluating, and communicating information

# Lesson Objective:

Apply your understanding of the electromagnetic spectrum to design an investigation to study and explain specific aspect(s) of the sun.

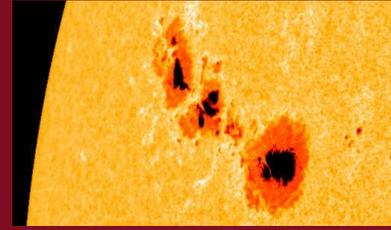


# Lesson Overview

Students will choose a testable question to study and answer using the helioviewer.

They will present their findings and relate their understanding of the electromagnetic spectrum and its uses in science.

# Hook Activity (40-50 min)



Each team of students will be given:

- an image of the sun in one of the wavebands of the electromagnetic spectrum
- a piece of art paper
- a set of colored pencils (can modify by giving students pastels or other art medium)

Each student will draw and label an image of the sun and solar features highlighted in that waveband.

Resources will be placed around the room defining and depicting corona, solar flares, coronal mass ejections (CMEs), magnetic fields and sunspots, so that students can gain background knowledge about these features.

# Exploration of Heliviewer (15 min)



Students will be given time to explore the heliviewer in groups of 2 or 3 and instructed to write three questions that they think could be answered using it.

After exploring students will share out with one other small group the questions they wrote.

# Sharing of Questions (15 min)

Students will write their questions on a piece of large paper and tape them around the room. Questions will be discussed and evaluated as a whole group as to their testability with heliometer.

- Questions will also be identified as testable or not and corrected if possible to create a testable question.
- As the questions are discussed, students should make connections to the electromagnetic spectrum and how they are related to the data being explored.

# Discussion of Project and Criteria (5-10 min)

Students will be placed in homogenous groups and instructed to design an experiment based on the question they choose to explore.

This is a good place to differentiate. Low-level students can be provided with scaffolded notes to fill in the variables or be given the choice to follow one of the solar dynamics observatory (SDO) guided activities.

# Criteria for Helioviewer Activity

Each student will record the following things into their own notebooks:

1. Testable question
2. Hypothesis
3. Independent variable
4. Dependent variable
5. Controlled variable(s)
6. Data (this could be a movie, table, graph, pictures...)
7. Defined parameters chosen on helioviewer
8. Method (includes a description of what instrumentation is used and how it works to collect data)
9. Write a conclusion (RERUN) that includes an analysis of the role of the electromagnetic spectrum in attaining your results.

Students will be instructed to have their experiment checked by the teacher before actually beginning.

# Experiment and Project (2-3 class periods)

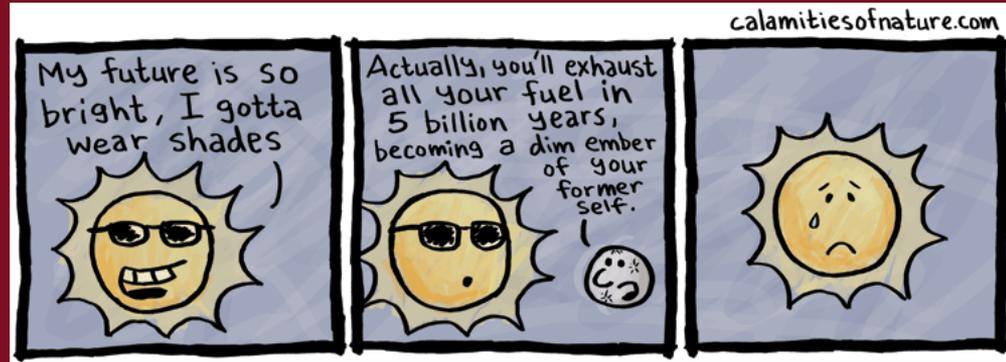
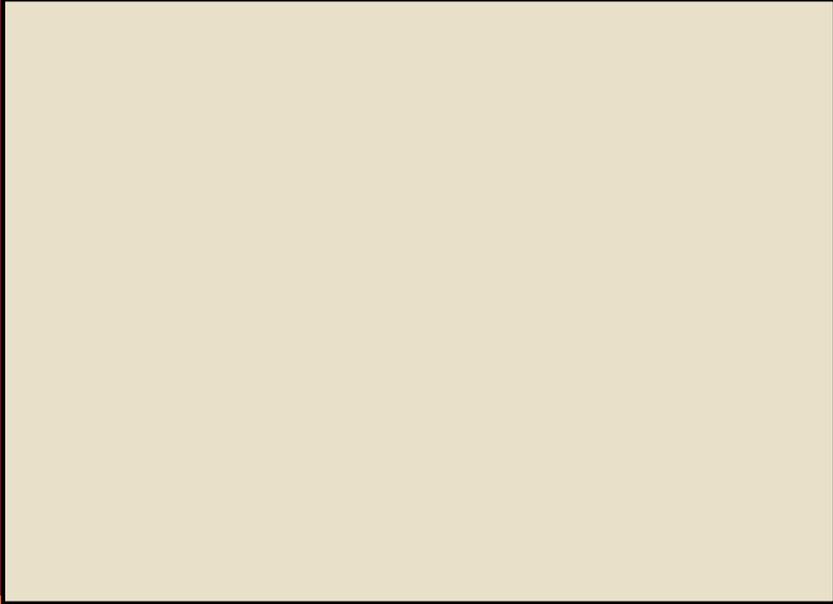
After completing their experiments, the team will create will create a stand alone project in a format of their choosing.

The final project must include:

1. The testable question
2. The results (data)
3. The conclusion relating the experiment back to the electromagnetic spectrum

# Project Ideas

Project choices should incorporate each of the multiple intelligences, and stand alone:



# Sharing of Projects (30 min)

Students will visit at least two other group projects and write a summary of what the other group studied and learned through the electromagnetic spectrum.



# Questions?

