



Lesson 3

Identifying Disease with the MRI Machine | NGSS Standards

As students familiarize themselves with the concept of MRI machines, the lesson will further expand on how imaging works with different parts of the body, including: the brain, bones and soft tissue, abdomen and pelvis, and the heart. Students will learn how doctors analyze imaging from the body to diagnose patients.

Recommended Grade Levels: 6-8

NGSS Standards in Lesson: MS ETS 1-3, MS ETS 1-4, MS PS 4-1

This lesson focuses on deepening students' comprehension of MRI's pivotal role in modern medicine, emphasizing its non-invasive nature and its significance in diagnosing a wide range of medical conditions. This objective directly connects with MS ETS 1-3, as students will analyze data from MRI to identify the best characteristics for diagnosis. Furthermore, this lesson helps students to engage with the specific applications of MRI in various medical contexts, such as brain, musculoskeletal, and cardiac imaging. This lesson also empowers students to interpret MRI images from diverse body regions and diagnose common medical conditions associated with those areas. Within this objective, students will follow an iterative testing and modification process, linking with NGSS Standard MS ETS 1-4. They will employ MRI images as models to generate data, facilitating their understanding of the relationship between image characteristics and specific diagnoses. The lesson plan provides students with the opportunity to analyze real-life case studies, enabling students to witness firsthand the benefits of MRI in healthcare. In accordance with MS ETS 1-4, students will work with these case studies, modifying their diagnostic approaches based on real-world data. . Students will explore how MRI technology, rooted in the principles of wave behavior, aligns with mathematical representations of waves (NGSS Standard MS PS 4-1). This holistic approach aims to deepen students' understanding of MRI technology, foster critical thinking, and instill an appreciation for the intersection of science, technology, and society in healthcare.



NGSS Standard	NGSS Performance Expectation	Lesson Alignment Criteria
<u>MS ETS 1-3</u>	Analyze data from tests to determine similarities and differences among several design solutions to identify the best characteristics of each that can be combined into a new solution to better meet the criteria for success. <u>MS ETS 1-3</u>	<ul style="list-style-type: none">- The discussion and analysis in presenting and interpreting MRI images to the class work well with this standard as students are effectively comparing and evaluating the usefulness of MRI technology in diagnosing various conditions.
<u>MS ETS 1-4</u>	Develop a model to generate data for iterative testing and modification of a proposed object, tool, or process such that an optimal design can be achieved. <u>MS ETS 1-4</u>	<ul style="list-style-type: none">- By examining real-life case studies and engaging in class activities about MRI diagnoses, students are working with models of medical input (MRI) and output (diagnoses).
<u>MS PS 4-1</u>	Use mathematical representations to describe a simple model for waves that includes how the amplitude of a wave is related to the energy in a wave. <u>MS PS 4-1</u>	<ul style="list-style-type: none">- The discussion about how MRIs work, given that they rely on radio waves to create images, fits neatly under this standard.

Lesson Performance Expectation:

- Understand the Application: Students should be able to describe how MRI technology works, its importance in modern medicine, and cite examples of diseases and conditions that can be diagnosed using MRIs.
- Making Connections: Students should show an understanding of the link between technological innovation (MRI) and lifesaving medical diagnostics. They should also understand the societal implications of these medical advancements.
- Collaboration: Students should be capable of successfully working in teams, showcasing effective communication and collaboration skills while discussing hypothetical medical cases.