

## Photo Description



This picture shows old rusty nails and screws on a wooden board. The metal pieces are brown and orange colored because they have rust on them. Some nails are straight and some are bent.

## Scientific Phenomena

The anchoring phenomenon here is corrosion/rusting - the chemical process where iron and steel react with oxygen and water in the air to form iron oxide (rust). This occurs when metal objects are exposed to moisture and air over time, causing the metal to slowly change from its original silver color to reddish-brown. The wooden surface provides a perfect backdrop to observe how different metals weather and change when left outdoors.

## Core Science Concepts

- Materials and Their Properties: Different materials (metal vs. wood) behave differently when exposed to weather and time
- Observable Changes: Objects can change color, texture, and appearance over time due to environmental factors
- Cause and Effect: Water and air cause metal to rust and change appearance
- Material Durability: Some materials last longer than others in different conditions

### Pedagogical Tip:

Use real rusty objects (safely handled) alongside shiny new nails to help students make direct comparisons. This concrete, hands-on approach helps kindergarteners understand abstract concepts like "change over time."

### UDL Suggestions:

Provide multiple ways for students to explore this concept: visual comparison charts, texture exploration (with safe materials), and simple before/after drawings to accommodate different learning preferences and abilities.

## Zoom In / Zoom Out

- Zoom In: At the tiny level we cannot see, oxygen molecules in the air are sticking to iron atoms in the metal, creating new rust molecules that are a different color than the original metal.
- Zoom Out: This same rusting process happens to metal objects everywhere - playground equipment, cars, bridges, and tools - showing us how all materials interact with their environment over time.

## Discussion Questions

1. What do you notice is different about these nails compared to new nails? (Bloom's: Analyze | DOK: 2)
2. What do you think caused these changes to happen? (Bloom's: Evaluate | DOK: 3)
3. How do you think we could protect metal from rusting? (Bloom's: Create | DOK: 3)
4. What other metal things have you seen that look rusty like this? (Bloom's: Apply | DOK: 2)

## Potential Student Misconceptions

1. Misconception: "The rust came from dirt getting on the metal"  
Clarification: Rust forms when metal reacts with air and water, not from dirt sticking to it
2. Misconception: "All metals turn the same color when they get old"  
Clarification: Different metals change in different ways - some turn green, some turn black, and iron turns reddish-brown
3. Misconception: "Rust happens very quickly"  
Clarification: Rusting is a slow process that takes weeks, months, or years to become visible

## Cross-Curricular Ideas

1. Math - Sorting and Counting: Students can sort the nails and screws by size (big/small), color (light/dark), or condition (rusty/shiny). They can count how many of each type they find, practicing number recognition and one-to-one correspondence.
2. ELA - Descriptive Language: Read books about rust and corrosion, then have students use sensory words to describe what they see and feel. Create a word wall with descriptive words like "bumpy," "orange," "rough," and "rusty." Students can dictate or draw stories about what happened to the nails.
3. Art - Texture Exploration and Rusted Art: Create textured collages by drawing or rubbing over rusted objects (safely) to make imprints on paper. Students can paint with oranges and browns to create their own "rusty" artwork, exploring color mixing and texture.
4. Social Studies - Community Helpers: Discuss how construction workers, plumbers, and maintenance workers use metal tools and must protect them from rust. Invite a community helper to talk about tools they use and how they care for them.

## STEM Career Connection

1. Materials Engineer/Scientist: These people study what things are made of and figure out how to make materials stronger and longer-lasting. A materials engineer might work to create special coatings that stop rust from forming on bridges, cars, and buildings. They test new ideas to keep metal from getting damaged. Average Salary: \$65,000 - \$85,000
2. Corrosion Specialist/Inspector: These workers check metal structures like bridges, buildings, and ships to see if they are getting rusty or damaged. They figure out how to fix problems before the metal breaks. It's like being a doctor for metal! Average Salary: \$55,000 - \$75,000
3. Tool and Equipment Designer: These engineers design and create tools and equipment that won't rust easily or that work well even when they get old. They think about what materials to use so tools last a long time and work safely for people who use them. Average Salary: \$60,000 - \$80,000

## NGSS Connections

- Performance Expectation: K-2-ETS1-1 - Ask questions, make observations, and gather information about a situation people want to change
- Disciplinary Core Ideas: 2-PS1.A - Different kinds of matter exist and many of them can be either solid or liquid
- Crosscutting Concepts: Patterns - Patterns in the natural world can be observed and used as evidence

## Science Vocabulary

- \* Rust: The reddish-brown coating that forms on iron when it mixes with air and water
- \* Metal: A hard, shiny material that can be shaped and is often used to make tools
- \* Change: When something becomes different from how it was before
- \* Material: What something is made of, like wood, metal, or plastic
- \* Property: How something looks, feels, or acts

## External Resources

Children's Books:

- Materials by Karen Bryant-Mole
- What Is It Made Of? by Robin Nelson
- From Metal to Bicycle by Robin Nelson