

PROPERTIES OF MAGNETIC FORCES

Performance Standard 12D/11A/12 C/13A.A

Students will apply the process of scientific inquiry to explore simple forces around us accordingly:

- *Knowledge:* Know what magnetic force is and what kinds of objects are attracted to a magnet.
- *Application:* Use a magnet to sort objects that are and are not attracted to a magnet.
- *Communication:* Explain why the objects were or were not attracted to the magnet.

Procedures

1. ***In order to know and apply concepts that describe force and motion and the principles that explain them (12D), concepts that describe properties of matter and energy and the interactions between them (12C) and the concepts, principles and processes of scientific inquiry (11A),*** students should experience sufficient learning opportunities to develop the following:

- Explore simple forces around us,
- Explore physical properties of objects, specifically their attraction to magnets.
- Describe this observed science concept.
- Begin and conduct guided inquiry.
- Collect and record their data.
- Analyze and display their results.
- Communicate their results.
- Apply appropriate principles of safety and scientific habits of mind.

Note to teacher: This activity relates to knowledge associated with standard 12D primarily, while addressing the performance descriptors for stage A within standard 11A and 12C. Applying scientific habits of mind noted in standard 13A are foundational to these activities. Using various technologies to estimate, measure and record data address some performance descriptors in 13B.

2. Provide each student with a magnet. Have students review and discuss the assessment task and how the rubric will be used to evaluate their work.
3. Begin guided inquiry by having students share their current understanding about magnets, how they work, what they work on and where they are found. AKWL activity may be suitable (What do you already know about magnets? What do you want to know about magnets? What have you learned about magnets?) Guide students to answer their questions and state their understandings using applicable scientific vocabulary terms and resources.
4. Instruct the students to test familiar objects in the classroom with their magnets. The areas of the classroom may be divided so that individual students or groups of students can be assigned to test and record their findings about the force of magnetism with specific objects. The resource listing which follows also offers suggestions for a sample set of materials to test, if this is preferred.
5. Ask each student to sort the objects into two groups. Those attracted to the magnet and those not attracted to the magnet. After the sorting, ask students to share their ideas about possible patterns linking the properties of the objects attracted to the magnet and of the objects not attracted to the magnet.
6. Encourage students to generalize their data and proposed patterns from individual or group results to draw conclusions about the force of magnetism. (Example: Attracted materials are shiny, metallic, etc. attracted materials are plastic, soft, etc.).
7. Evaluate each student's work using the Science Rubric as follows and add the scores to determine the performance level:
 - *Knowledge:* Identification of objects attracted to magnet was complete and correct.
 - *Application:* Objects sorted correctly into two groups – those attracted to magnet; those not attracted.
 - *Communication:* Explanation of pattern of properties of objects attracted to magnet was thorough, well-reasoned and detailed. Students should mention details such as non-metallic objects will not be attracted and certain metals will not be attracted.

Examples of Student Work not available

Time Requirements

- One class period

Resources

- Science Rubric
- A magnet for each student
- Classroom objects for possible testing:
 - Classroom desks, chairs, lockers, tables, books, clothing, buttons, papers, pens, pencils, crayons, paperclips, classroom manipulatives, etc.
- A sample set of the following materials could be provided for testing, if necessary:
 - Paperclip - steel
 - Clothes pin - wood, no metal spring
 - Brown bag - 1" x 1" section of brown paper bag
 - Penny - Lincoln Memorial type
 - Washer - steel
 - Playing card chip - plastic
 - Folder fastener - bronze
 - Straw - 1/3 of a plastic drinking straw
 - Large nail - steel
 - Film canister lid - plastic
 - Newsprint – 1" x 1" section of a newspaper
 - Aluminum foil - 1" x 1" piece of aluminum foil
 - Toothpick - wood
 - Wire - 1 inch of copper wire – no insulation
 - Small nail – aluminum
 - Bottle cap – steel