MAGNETIC FORCE

Performance Standard 12D/11B.B

Students will apply the processes of technological design to compare and contrast common forces around us accordingly:

- *Knowledge*: Understand the concepts of attraction and repulsion within invisible magnetic fields of force.
- *Application*: Demonstrate how opposite poles of a bar magnet attract and how like poles repel.
- *Communication*: Explain what happens when the opposite and like poles of a magnet are moved close to each other.

Procedures

1. ***In order to know and apply concepts that describe force and motion and the principles that explain the (12D) and the concepts, principles and processes of technological design (11B),*** students should experience sufficient learning opportunities to develop the following:
   - Observe magnetic forces with different materials.
   - Propose ways to test the force of magnetism.
   - Record data that documents effects of the force of magnetism.
   - Make conclusions about the poles of magnets.
   - Test the effect of magnets on a compass.
   - Propose explanations for this effect on a compass.

   Note to teacher: This activity relates to knowledge associated with standard 12D, while addressing the performance descriptors for stage B within standard 11B. Applying scientific habits of mind noted in standard 13 A are foundational to these activities.
2. Have students review and discuss the assessment task and how the rubric will be used to evaluate their work.
3. Begin a guided inquiry with questions about the students' prior experience with magnets. What do we know about magnets already? What is a pole? What does attract or repel mean? What does it feel like? Can it make something move? Record their statements and additional questions for a classroom K-W-L chart.
   - Part 1: Provide each student with two bar magnets, and a copy of the "Magnetic Force" task sheet. If you do not have enough magnets, this assessment can be done in small groups. Ask students to complete the task sheet. Also, remind students not to move the magnets until they are finished drawing what happened. Tell students to use arrows to show how magnets attract $\rightarrow \leftarrow$ or repel $\rightarrow\rightarrow$. Have each student perform the items on the task sheet and orally explain what happens when opposite and similar poles of the magnets are brought close to each other.
   - Part 2: Make sure all students have completed #1 correctly before continuing. Continue the guided inquiry to determine prior knowledge about compasses: What do they do? Is this pole like a magnet's pole? Provide students with compasses to test the force of magnetism on them. Ask them to sketch what happened on the back of the task sheet and to explain their observations. How is a compass like a magnet?
4. Evaluate each student's work using the Science Rubric as follows and add the scores to determine the performance level:
   - *Knowledge*: Identification of opposite poles attracting and like poles repelling was complete and correct.
   - *Application*: The arrows on the drawings were drawn appropriately and correctly.
   - *Communication*: The explanations were complete and correct:

Examples of Student Work not available

Resources

- Bar magnets with N and S ends marked
- Compasses
- Copies of the "Magnetic Force" task sheet
- Science Rubric

Time Requirements

- 30 minutes

NAME _____ DATE _____

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Do each of these activities several times before you draw.

1. Move the north pole (N) of one magnet toward the north pole (N) of the other magnet. Draw a picture of what happens.

2. Move the north pole (N) of one magnet toward the south pole (S) of the other magnet. Draw a picture of what happens.

3. Move the south pole (S) of one magnet toward the south pole (S) of the other magnet. Draw a picture of what happens.

4. Move the south pole (S) of one magnet toward the north pole (N) of the other magnet. Draw a picture of what happens.

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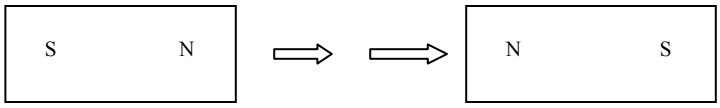
Teacher Key

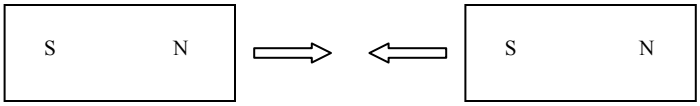
Do each of these activities several times before you draw.

** The same answers will apply to the compass extension activity. The compass needle will spin when the magnet is brought nearby. Encourage students to test how far away the magnet can affect the compass.

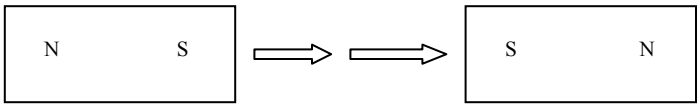
1. Move the north pole (N) of one magnet toward the north pole (N) of the other magnet. Draw a picture of what happens.



2. Move the north pole (N) of one magnet toward the south pole (S) of the other magnet. Draw a picture of what happens.



3. Move the south pole (S) of one magnet toward the south pole (S) of the other magnet. Draw a picture of what happens.



4. Move the south pole (S) of one magnet toward the north pole (N) of the other magnet. Draw a picture of what happens.