



# Magnetic Pull

Boys and Girls Club After School Science  
NSF Center for Chemical Innovation  
Chemistry at the Space Time Limit (CaSTL)  
<https://www.castl.uci.edu/>

**Lesson Objective:** Children will understand the forces of magnets while in cooperative groups and by making observations and talking to their partners to notice patterns of push and pull.

**Materials Used:** donut magnets, a staple, a crayon, a paper clip, a nail, a cotton ball, a pin, and a paper fastener, pencils, aluminum foil, penny, large classroom-sized versions of the worksheets, and copies of the attached worksheets

**Student Talk Strategies:** *Report to a Partner, Revoicing*

## Classroom Management: CHAMPs

**Conversation:** Children may talk with inside voice to their partners only. **Help:** If children need help, one of the group will raise a hand to let the teacher know. **Activity:** Children will use manipulatives, make observations, and draw the materials and forces. **Movement:** Children will stay at their place. **Participation:** All children in the group are expected to take turns and handle the manipulatives.

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| <b>ENGAGE: <i>Connect to Prior Knowledge and Experience, Create Emotionally Safe Learning Environment, Preview New Vocabulary</i></b>          |  |  |
|--|--|--|
|  |  | <b>Estimated time: 10 minutes</b>                                |
| <b>Teacher's Role</b>  | <b>Teacher Questions</b>   | <b>Children's Role</b>   |
| 1. Teacher gives students a magnet and asks them, in pairs, to investigate different objects around the room that are attracted to the magnet. | 1. Report to a partner: Ask your elbow partner, "What is attracted to the magnet?" | 1. Children respond individually by talking to an elbow partner. |
| 2. Teacher has pairs report out. Teacher records findings  | 2. What did you find around the room that was attracted to                         | <b>Naïve conception:</b> Some children think that all metals     |

| on chart paper- using drawings and words.   | the magnet?   | are attracted to magnets.   |
|---|---|---|
| <b>EXPLORE: <i>Hands-On Learning, Contextualize Language, Use of Scaffolding (Graphic Organizers, Thinking Maps, Cooperative Learning), Use of Multiple Intelligences, Check for Understanding</i></b><br><b>Estimated time: 30 minutes</b>   |   |   |
| <b>Teacher's Role</b>   | <b>Teacher Questions</b>  | <b>Children's Role</b>  |
| <p>1. Teacher has students move the magnets out of reach (or teacher removes them) momentarily. Teacher gives students several objects (a staple, a crayon, a paper clip, a nail, a cotton ball, a pin, and a paper fastener). Teacher models how to examine each object and predict whether it will be attracted to the magnet. Teacher models how to record the prediction next to the drawing of the object on the "Magnetic Pull" worksheet.</p> <p>2. Teacher has students report out their predictions. Teacher uses a large, poster-sized version of the "Magnetic Pull" worksheet and tallies the results.</p> <p>See attached worksheet and directions pages.</p> <p>3. Teacher gives the magnets back to the student pairs. Teacher demonstrates the activity on the large "Magnetic Pairs" worksheet. Each pair will place the object over its picture on the worksheet. They will put the magnet at the opposite end of the page and record how far the magnet travels before it attracts the item.</p> | <p>1. You will now observe different objects and predict if they will be attracted to the magnet. Record your prediction on the right side of the "Magnetic Pull" worksheet.</p> <p>2. What did you predict? Will the ____ attract the magnet?</p> <p>3. What do you observe? Why do you think this is happening? What do you notice about the objects?</p> | <p>1. The students observe the items and predict whether they will attract the magnet. Students record their predictions.</p> <p>2. Students report out their predictions.</p> <p>3. Students perform the exploration. Partners should talk about what they observe and record their information together on one sheet.</p> |

**EXPLAIN: *Listening, Speaking, Reading, and Writing to Communicate Conceptual Understanding*** **Estimated time: 10 minutes**

| <b>Teacher's Role</b>   | <b>Teacher Questions</b>   | <b>Children's Role</b>  |
|---|--|---|
| <p>1. Teacher tells groups to share their observations and findings. Relate the findings back to the predictions.</p> <p>2. Teacher listens to groups' reports and repeats or <b>Revoices (one of the five productive talk moves)</b> what they say to be sure that the class is noticing patterns and the learning is addressing the standards.</p> <p>3. Teacher helps students understand a temporary magnet by doing a magnet TPR (Total Physical Response). Students at each table stand up and face in a direction that is different from that of other students at other tables. The teacher then walks down the center aisle with a magnet in hand. As the teacher passes by each table, students then orient themselves to the direction of the magnet and consequently all face the same direction. They have now modeled a temporary magnet. Each table is a domain within a metal. Each student is a charged particle within that domain.</p> | <p>1. Each group will now tell us what they observed. Was your prediction correct?</p> <p>2. What evidence do you have to make that statement?</p> <p>3. What did you observe?</p> | <p>1. Children in their groups tell the whole class what they observed.</p> <p>2. Students connect their exploration back to their predictions.</p> <p>3. Students act as particles to react to a magnet. Students report what they think happened.</p> |

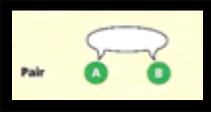
**EVALUATE: *Thinking Maps, Summarize Lesson and Review Vocabulary, Variety of Assessment Tools, Games to Show Understanding*** **Estimated time: 10 minutes**

| <b>Teacher's Role</b>   | <b>Teacher Questions</b>  | <b>Children's Role</b>   |
|---|---|--|
| <p>1. Teacher holds up a different object (one at a time: aluminum foil, penny, and</p> | <p>1. Teacher asks each student to ask their partner, "Do you think this ____ will be</p> | <p>1. Children decide whether the object will be attracted. They vote.</p> |

|   |  |  |
|---|--|--|
| <p>aluminum pan) and asks the students if the objects will be attracted to the magnet. Teacher takes a vote.</p> <p>2. Teacher then places objects next to the magnet to test the students' predictions.</p> <p>3. Teacher repeats with the next object.</p> <p>4. Teacher uses a large, poster-sized version of the "Have you ever seen a magnet?" song to sing with the students.</p> <p>5. Teacher revisits findings from the Explore.</p> | <p>attracted to the magnet?" Each student must respond.</p> <p>2. Was the object attracted to the magnet?</p> <p>5. What do the pin, the staple, nail, paper clip all have in common? Why did they all attract the magnet?</p> | <p>2. Students observe and reflect on their prediction.</p> <p>4. Students read and sing along.</p> <p>5. <i>They must be made of iron, just like in the song.</i></p> |
| <p><b>EXTEND: Group Projects, Plays, Murals, Songs, Connections to Real World, Connections to Other Curricular Areas</b></p>  |  |  |
|   |  | <p><b>Estimated time: 5 minutes</b></p>  |
| <p><b>Teacher's Role</b></p> <p>1. Teacher connects the lesson to the real world.</p>   | <p><b>Teacher Questions</b></p> <p>1. When you leave the classroom, notice the objects and people around you. Would they be attracted to a magnet?</p>   | <p><b>Children's Role</b></p> <p>1. Children notice objects and people around them. They note the forces they think are acting on these.</p>                           |

## Student Talk Strategies

Adapted from *Avenues* (2007). Hampton Brown.

| Design  | Description   | Benefits and Purposes   |
|---|---|---|
| <p><b>Report to a partner</b></p>  | <ul style="list-style-type: none"> <li>Each student reports his/her own answer to a peer.</li> <li>The students listen to their partner's response. ("Turn to a partner on your left." "Now turn to a partner on your right" etc.)</li> </ul> | <ul style="list-style-type: none"> <li>This allows students to talk to different students in the class and gives each student an opportunity to share and listen to various answers and language structures.</li> <li>Talking one-on-one with a variety of partners gives risk free fluency practice.</li> <li>Students practice speaking and listening.</li> </ul> |

# Magnetic Pull

Use a red  crayon to mark the spot where the magnet pulls the object.

|       |   |  |
|-------|---|--|
| START | 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |  staple           |
| START | 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |  crayon           |
| START | 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |  paper clip       |
| START | 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |  nail             |
| START | 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |  cotton ball    |
| START | 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |  pin            |
| START | 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 |  paper fastener |



Song

Written by Terry Shanahan, 2005

### **Have You Ever Seen A Magnet?**

(To the tune of "Have you ever seen a lassie?")

Have you ever seen a magnet,

A magnet,

A magnet?

Have you ever seen a magnet?

It attracts and repels.

Its force can pick up things

That are made of metal.

But only if the metal

Has iron in it.