

Material Preparation

MATERIALS

- three strong ring magnets
- plastic toy car (do not use a metal car)
- two bar magnets that indicate North (N) and South (S) ends

NOTE: If the bar magnets do not indicate North (N) and South (S), use a permanent marker to write N on one end and S on the other end. Use the large horseshoe magnet to determine which end is North. Remember, North is attracted to South.

- masking tape
- rubber band

For each child:

- toy train car with magnets built into one or both ends
- bar magnet that indicates North (N) and South (S) ends
- 12" length of masking tape
- Ask Me About Magnets sticker

PREPARE IN ADVANCE

- Place one ring magnet on top of a plastic toy car and wrap a rubber band around them.
- Test the two bar magnets to determine which end (N or S) repels the toy car (it depends on which side of the round magnet on top of the toy car is facing up).



SET UP THE LESSON AREA

- Use a hard floor area or tabletop for this lesson to allow the wheels of the toy car to move easily.
- Create pretend train tracks by taping 12" lengths of tape (one per child) from the edge toward the center of the table. (See below.)
- Gather two ring magnets, the car with the ring magnet and the bar magnet.
- Set aside one train car and one bar magnet for each child.



For each child



OBJECTIVE

Children will learn about the push and pull of magnetic force.

EXCITE

Gather the children in the ECHOS lesson area. Reveal the toy car with the magnet attached to it. **I can do a trick with this little toy car. I can use a *bar magnet* to push the car without directly touching it. Watch carefully.** Hold the bar magnet close to the magnet on top of the car, do not touch the car. (If it doesn't work, use the other end of the bar magnet.) The car should begin to move. Repeat if needed until it is obvious that the car moved away from the bar magnet, without the bar magnet touching it. **What do you see happening?**



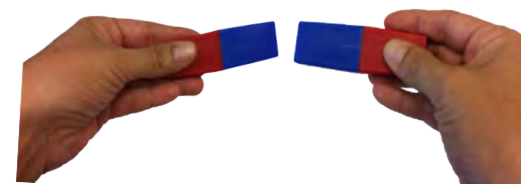
INTRODUCE

1. Hold up the car in one hand and the bar magnet in the other. **I attached a ring magnet to this car, then I used this bar magnet to push the car. When two magnets *push* away from each other, we say that they *repelled* each other. Let's repeat that word again as you do what I do.** Model for the children a gesture with two flat hands pushing away from one another to indicate the motion of repel and say, *repel*.



2. **Let's move the car again.** Hold the bar magnet close to the magnet on the car. The car should begin to move. **Watch closely. What did you see happen?** Listen to the children's responses. **Yes, the magnets *pushed* each other away, or repelled each other. The two magnets did not touch each other.**

- Put away the toy car and bar magnet. Reveal two ring magnets. **I have two ring magnets here. When I hold them close together I can feel them pushing away from each other. Let's try it!** Give each child a turn at holding the two ring magnets.
- Here is another type of magnet.** Reveal the two bar magnets and hold them up end to end. **The opposite ends create a pushing feeling when you try to push them together. Can you see these bar magnets repelling each other? I will give you each a turn to feel the magnets repel each other.** Pass around the two bar magnets. Give each child a turn to explore the push of the two magnets as they try to touch them together. Collect the two magnets after everyone has had a turn.



EXPLORE

- Today we will explore how magnets can push something magnetic without directly touching it.**
- Reveal one toy train car. **This is a toy train car. Did you notice that it has something shiny on the end?** Point to the magnet on the end of the train car. **What do you think this is?** Prompt children to say the word magnet. **Yes, it's a magnet.**



3. **I will give you each a train car and a bar magnet.** Give one train car and one bar magnet to each child in the group. Point to the masking tape train tracks. **There is a pretend train track in front of you. Use the bar magnet to try to push the train car along the track.** Assist as needed.
4. Remind them to push the train car along the pretend train tracks from one end to the other without using their hands. Talk through the exploration as children investigate: **Do you see how your magnet repels the train?**
5. After 5-10 minutes collect the trains and magnets. **You were great magnet explorers today!**




INTERACT

Interact to accommodate children's individual needs and strengths. Use these suggested strategies as needed:

- Assist the children in taking turns as they pass around the two ring magnets. Remind them to be patient – they will each get a turn!
- Some children will need help to notice that they should try using the other end of the bar magnet.
- If time permits, ask children: **Can you think of another way to move the train? Try it with two cars.**

OUTCOMES

1. Regroup the children in the ECHOS lesson area. **What did we discover today?**
Listen to the children's responses. If needed, use suggested prompts to elicit key concepts and vocabulary. Encourage responses from everyone.
 - **What did we learn about magnets?**
 - **What did it feel like when you held two ring magnets together?**
 - **What did you notice when you explored using the bar magnet and the toy train car?**
2. Give each child an *Ask Me About Magnets* sticker.
A circular sticker with a green border. Inside, there is a green horseshoe magnet icon. The text "Ask Me About Magnets" is written around the magnet.
Remind the children to tell their family something they have learned about magnets.
3. After you have completed *Lesson #3: Push and Pull* with all the children in your classroom, add the ECHOS materials suggested below to your science area to encourage exploration.

VOCABULARY

- bar magnet
- push/pushed
- repel/repelled



toy car with ring magnet



toy train cars



bar magnets