Wizards of Wright

Lesson: Magnets

Use WOW! Lesson Intro to begin.

Background Info for Wizards:	This lesson is for primary students (K-2). We assume all children have played with magnets at some point in time, but this will allow them to begin to understand why magnets react the way they do. This is merely an introduction and an opportunity to see different magnets in action.
Materials:	Exploring Boxes plastic rings with metal washers magnets for student use (bar magnets if available) 2 different magnets, with one being stronger paperclips wand magnets 2 donut magnets for each student 1 pencil for each student iron filings 1 film canister for each student - a donut magnet tied to a piece of dental floss compasses copper pipe and plastic pipe
Lesson Time: 60-80 minutes	Introduction: 5 minutes Student Activity #1: 10 minutes Guided Lesson #1: 5-7 minutes Student Activity #2: 5 minutes Wizard Demonstration #1: 2 minutes Student Activity #3: 5-10 minutes Student Activity #4: 5-10 minutes Student Activity #5: 5 minutes Guided Lesson #2: 2 minutes Guided Lesson #3: 5 minutes Student Activity #6: 5-7 minutes Wizard Demonstration #2: 5 minutes Conclusion: 5 minutes
Learning Targets:	Students will be able to explain that magnets create their own force. Students will recognize that Earth is a magnet, and explain the 2 poles.

	Students will understand that the magnet of a compass works with the Earth's magnet.
Introduction for Students: 5 minutes	Review with students…*What do you already know about Magnets?* Ask the students: *What is a magnet?* - A magnet is a special metal that attracts other kinds of metals. Show students an example of a magnet being attracted to something, and not being attracted to something. (Limit your examples because students will go around the room themselves in a little bit.) "Show" students the moment when two magnetic items begin to attract to each other, and explain to them that they will be able to feel that force. That force is the objects magnetic field, and although it is invisible, that field is what attracts other magnets and certain metals. The presence of a magnetic field is why you can cover a metal refrigerator door with magnets.
Student Activity #1: 10 minutes	Give student groups (3-4 students) the Exploring Box. Depending on the number of students, pass out the plastic rings of metal washers. If each student can have their own, that's great; if not give 2 to each group. Give each student a magnet. Give them time to test the items in the box and on the plastic rings to see which ones are magnetic. If they haven't yet, encourage students to test their magnet with another magnet. Collect materials.
Guided Lesson #1: 5-7 minutes	Review that magnetism is a force. Ask students if they were able to feel the force – the magnetic field. Explain that the magnetic field is strongest around the ends of magnets. These are called poles, and all magnets have a north pole and a south pole. What else do we know of that has a north pole and south pole? Yes, the Earth. (We'll go back to that in a minute.) Ask the students about when they tested their magnet to another magnet a few minutes ago. What happened? Did they attract? Did they repel? What do these words mean?

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<td>If you hold 2 magnets, with their opposite poles near each other, (north and south), you will feel a pull between the magnets. If the poles are the same (north and north or south and south), you will feel the magnets push away from each other.

Magnets come in many shapes and sizes, some are made in nature, like Lodestone – that's a rock that has a lot of iron in it. Certain metals, like iron and nickel can become magnetic.

Pull out a nickel and test it. Is it magnetic?
(Just because it is called a nickel, doesn't mean it is made from that metal. Most coins are made out of copper these days.)

Remember when we said the ends of magnets are called the north pole and the south pole? And you told me that was just like the Earth? Let's talk about why.

The very center of the Earth, what we call the core, is made mostly of iron. Iron is magnetic, so the Earth makes its own magnetic field. This makes the earth a giant magnet.

And where is the magnet strongest? At its ends. The poles. So, the Earth's magnetic field is strongest near the North and South Poles.</td>
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<td>Student Activity #2:
5 minutes</td>
<td>Ask the students: How do magnets work?
Ask the students to imagine two kids, trying to pull a wagon. One pulls from one side, and the other pulls from the exact opposite side.

– What happens? The wagon doesn't move!

– (Discuss that push is a force, just like pull. What if 2 students were pushing on the opposite sides of a table or desk? Have a few volunteers act this out if you want.)

– Now, imagine that the two kids realize that it isn't working and switch positions. They both pull (or push) from the same side.</td>
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	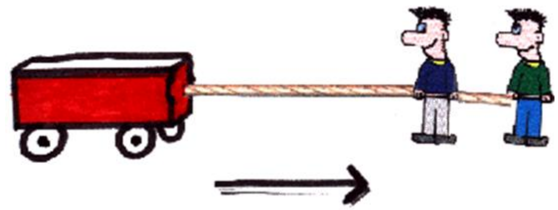 The wagon moves!
Wizard Demonstration #1: 2 minutes	Show students the 2 different small magnets. – Explain that some magnets are stronger than others. – You can test two different types of magnets by showing that one will hold more paperclips.
Student Activity #3: 5-10 minutes	Give each student a wand magnet. (Discuss this with teacher first!) Challenge them to find three materials in the room that are magnetic, and one that isn't. Can they find something different than what their classmates find? Collect the wands from the students.
Student Activity #4: 5-10 minutes	Give students 2 donut magnets and 1 pencil. Allow them to experiment with them. ○ When do they pull together? ○ When do they push apart? Ask students: *Why does this happen?*
Student Activity #5: 5 minutes	Remember when we said that iron is a magnetic material? Let's test that. Pass out boxes of iron filings and allow students to experiment. They still have 2 donut magnets. Does using 1 or 2 magnets effect how much iron they can move around? Collect iron filings, donut magnets, and pencils. Give the pencils to the teacher.
Guided Lesson #2: 2 minutes	As we said before, one end of a magnet is called the North Pole and the other is the South Pole. Just like a battery that you put into some of your games or controllers, each end has a different type of charge, one is positive and the other is negative.

	And as we've seen, if you put two negative poles together, they push apart. If you put two positive poles together, they push apart. But if they're different... They pull together! Just remember...Opposites attract, similar charges push back!
Guided Lesson #3: 5 minutes	As we talked about before, planet Earth is a big magnet, because of its iron core. – Part of the core is continuously spinning really fast, which creates its magnetic field and is the reason why the Earth has its' North and South Poles. – This is helpful for explorers and adventurers as they can use a compass to find out which way is north and which way is south. – Ever wonder why a compass always points north? The reason is that a compass needle is a magnet. Since opposite poles attract, the south pole of the compass needle is attracted to Earth's magnetic North Pole. Ask the students: *What is a compass?* – If you've ever gone hiking in the woods a compass can help you find your direction. – A compass works by showing you where north is. – Once you know where that is, then you can figure out where south, east, and west are as well. – A compass needle always turn to the north. – The compass needle itself is a magnet. – And it is attracted to another magnet - The Earth! – The south pole of the compass needle is attracted to the North Pole and will move towards it. Demonstrate this. Sometimes a compass won't work. Put a magnet very close to one and watch it go crazy. The pull of the magnet may be stronger than the pull of the Earth's magnetic force, so the needle is drawn to a closer stronger magnet.
Student Activity #6: 5-7 minutes	Give each student a film canister (included is a donut magnet tied to a piece of dental floss) and a compass. When holding the string in the air, the magnet should turn to face the north. If students move, the magnet should adjust.

	Compare these to a compass. Allow students to experiment. Ask the students to put the magnets back in their film canisters. Collect the canisters and the compasses.
Wizard Demonstration #2: 5 minutes	Show the students the 2 pipes (copper and plastic). Discuss what they are made of? Are they magnetic? Ask the students to predict how quickly the magnet will fall through the plastic pipe. Demonstrate this. Ask the students to predict how quickly the magnet will fall through the copper pipe. Demonstrate this. What happened? Why? The falling magnet is creating a current in the copper pipe, which then produced a magnetic field. The direction of the current is opposite of the magnet's field, so the magnet begins to repel the copper and fall more slowly.
Conclusion: 5 minutes	Do a quick review with the students on what they have learned.

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