February 12, 2019

MOTION AND MATTER—*Investigation 1, Part 1*

Investigation 1:
Forces

Part 1:
Two Forces

Teacher Notes

Overview

Complete Teacher Notes

Full Option Science System FOSS

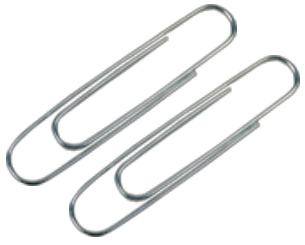
February 12, 2019

Investigation 1, Part 1

A Black Object

Full Option Science System FOSS

What is the black object?



Time

Teacher Notes

IG pg. 88, Steps 1–2

Investigation 1, Part 1

Magnetic Force

Full Option Science System FOSS

You **observed** magnets **push** and **pull**.
Scientists call a push or a pull a **force**.
The force exerted by a magnet is called **magnetic force**.

When two magnets interact, they can pull together, or **attract**, or they can push apart, or **repel**.

There's another force at work right now that pulls everything toward the center of the Earth.

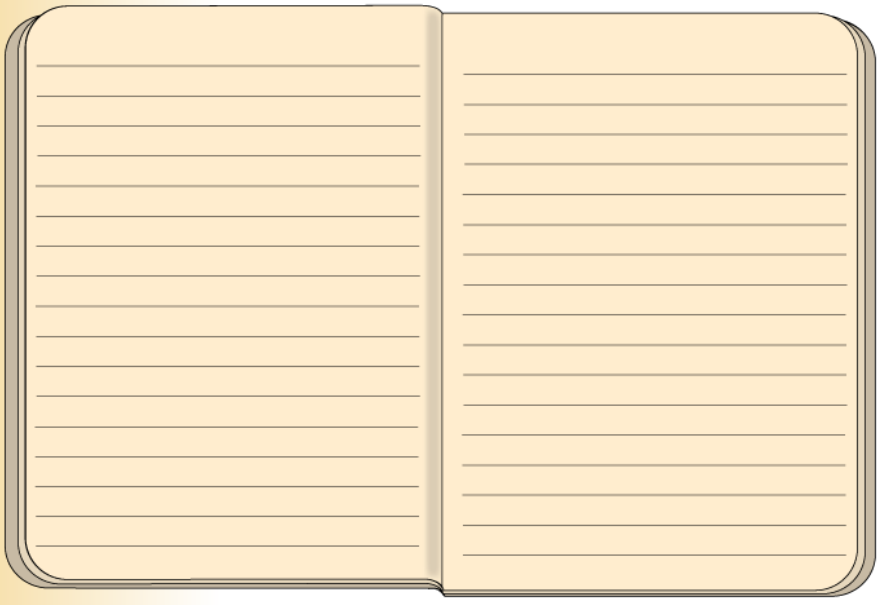
What is that force?

Teacher Notes

IG pg. 88, Step 2

Investigation 1, Part 1

Science Notebooks



Teacher Notes

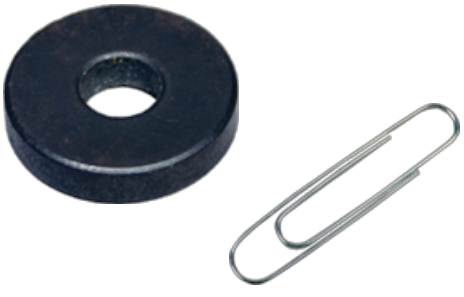
IG pg. 88–89, Step 3

Investigation 1, Part 1

Focus Question

Full Option Science System FOSS

- What happens when magnets interact with other magnets and with paper clips?



Teacher Notes

IG pg. 89, Step 4

Investigation 1, Part 1

Magnetic Force

Full Option Science System FOSS

Does the magnetic force only work when the magnet is touching something or can the force work at a distance?

Explore magnetic interactions:

a. Tie a magnet on a string. Hang the magnet over another magnet on the table and swing gently.
b. Tie a paper clip on the end of a string. Swing the paperclip over a magnet.
c. Put several magnets on a straw.
d. Put magnets on two sides of a stick.
e. Stretch a rubber band the length of a stick. Hang several paper clips from the rubber band. Move the stick over a magnet.
f . Set up a "talking magnet" with a partner.

Teacher Notes

IG pg. 89–90, Steps 5–6

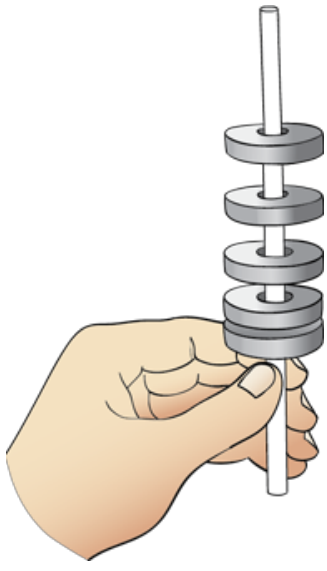
Investigation 1, Part 1

Magnets-on-a-Straw

Full Option Science System FOSS

What makes this so intriguing?

What do you usually expect to see?



Teacher Notes

IG pg. 90, Step 7

Investigation 1, Part 1

Magnet Interaction

Full Option Science System FOSS

What do you think will happen when I pull the chair away from the magnet?

Teacher Notes

IG pg. 91–92, Steps 8–9

Investigation 1, Part 1

Clean Up!

Full Option Science System FOSS

- Return all paper clips to the cups.
- Return all materials to the materials station.

Teacher Notes

Investigation 1, Part 1

Focus Question

Full Option Science System FOSS

What happens when magnets interact with other magnets and with paper clips?

Draw and label a **model** of the "floating" paper clip system.
Add arrows and labels for the forces.
Write a sentence or two to describe your model.

Teacher Notes

IG pg. 92, Steps 10–11

Investigation 1, Part 1

Forces of Magnetism and Gravity

Full Option Science System FOSS

What is happening that allows the paper clip to float in the air?

Teacher Notes

IG pg. 92–93, Step 12

Investigation 1, Part 1

Forces of Magnetism and Gravity

Full Option Science System FOSS

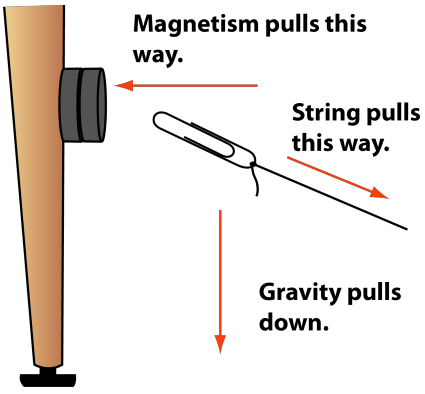
Forces are balanced when two or more forces are pulling or pushing on something with equal strength so that the object doesn't move.

The area of invisible force around a magnet is its **magnetic field**. You can't see it, but you can detect it.

What **evidence** do you have that the magnetic field is there?

What happens when the string is pulled a little farther?

What causes the paper clip to fall?



Teacher Notes

IG pg. 92–93, Step 12

Investigation 1, Part 1

Vocabulary Review

Teacher Notes

IG pg. 93, Steps 13–14

Investigation 1, Part 1

Vocabulary Review

Teacher Notes

IG pg. 93, Steps 13–14

Investigation 1, Part 1

Vocabulary Review

Teacher Notes

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February 12, 2019

Investigation 1, Part 1

Reading in Science Resources

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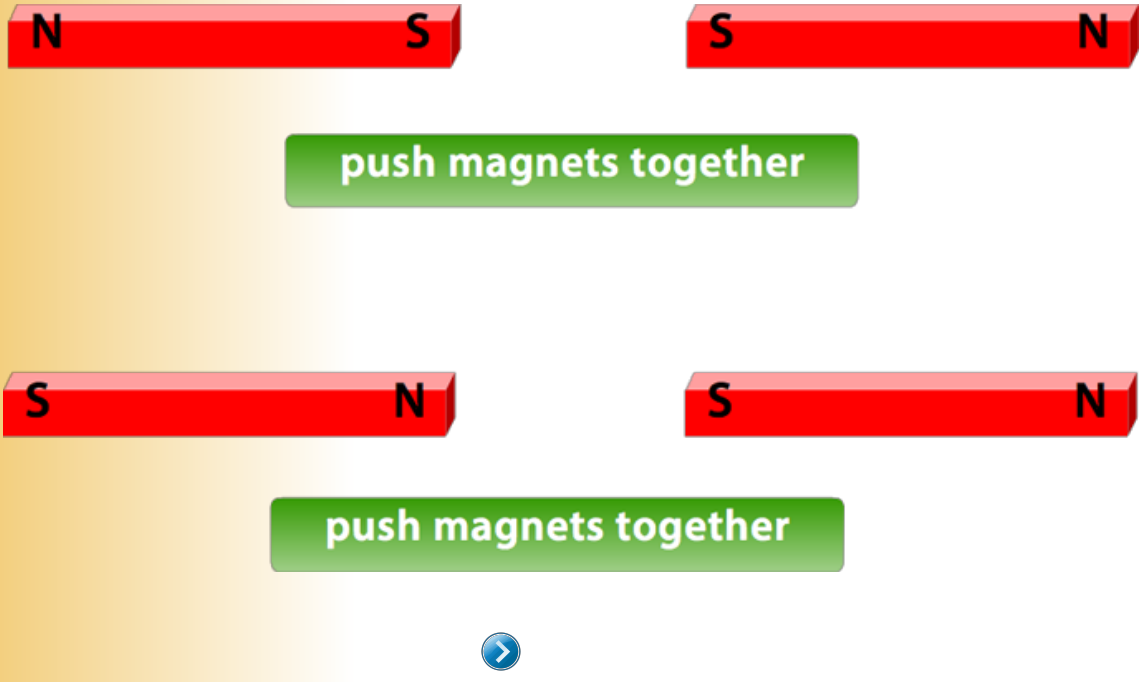
Energy and Electromagnetism: Magnetic Poles

Full Option Science System FOSS



IG pg. 95, Step 17

Investigation 1, Part 1

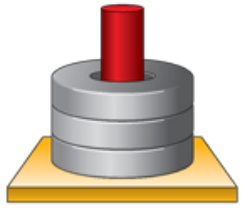
Wrap-Up/Warm-Up

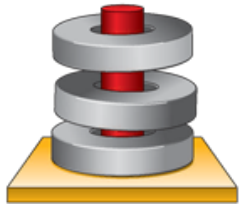
Full Option Science System FOSS

What happens when magnets interact with other magnets and with paper clips?

Pair up with a partner to

- share your models;
- discuss the effect of forces when they are balanced and when they are unbalanced;
- discuss how magnetism and gravity are alike and different.





What causes the magnets to be spaced on the straw?

Explain how balanced and unbalanced forces affect the motion of the paper clip.

Teacher Notes

IG pg. 95, Step 18

Investigation 1, Part 1

Motion and Matter

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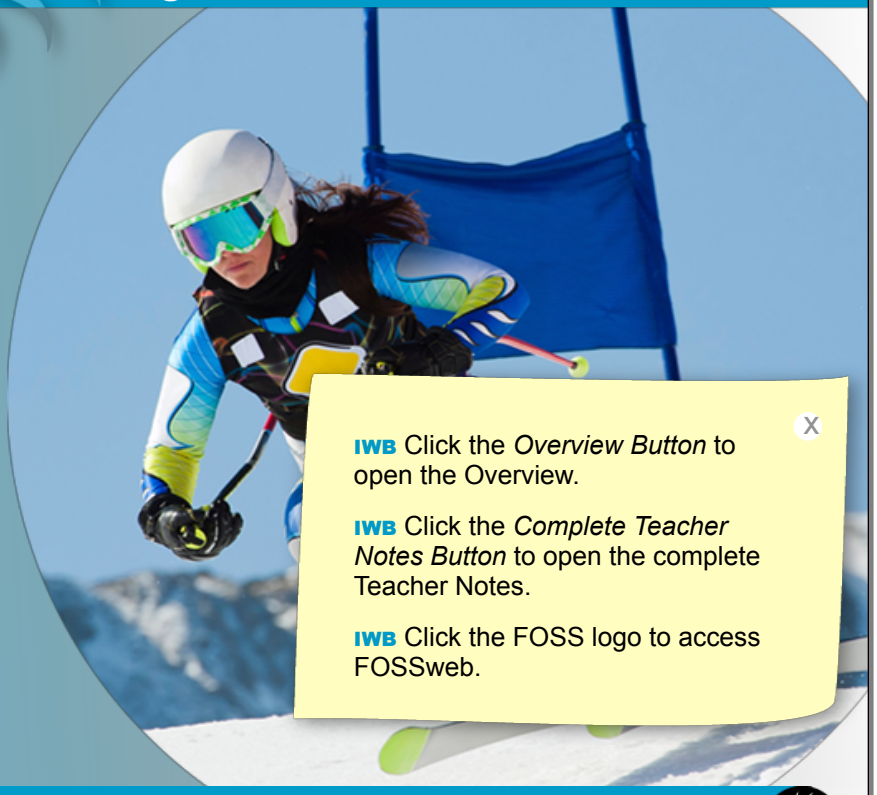


X

IWB Click the *Overview Button* to open the Overview.

IWB Click the *Complete Teacher Notes Button* to open the complete Teacher Notes.

IWB Click the FOSS logo to access FOSSweb.

Teacher Notes

Overview

Complete Teacher Notes

Full Option Science System FOSS

Investigation 1, Part 1

A Black Object

What is the black object?

Time

Teacher Notes

Motion and Matter, IG pg 88, Steps 1–2

Introduce the materials, but do not identify the black object as a magnet. Distribute the materials as described in Step 1.

Allow students time to explore with the materials, then guide their discoveries by asking the questions in Step 2. You may need to ask students to stick their magnets to a chair leg to keep their attention.

IWB Use the *Pen Tool* to write when you want students to finish the activity.

IWB After asking the first question and confirming that the black object is a magnet, click the arrow to reveal the last two questions.

IWB You can use the *Pen Tool* to record students' responses.

New Word Introduce *magnet*.

magnet: an object that sticks to iron or steel

Add the new word to the word wall.

This activity continues on the next slide.

IG pg. 88, Steps 1–2

Investigation 1, Part 1

Magnetic

You **observed** mag
Scientists call a pu
The force exerted b
force.

When two magnets
or **attract**, or they

There's another fo
everything toward

What is that force?

Motion and Matter, IG pg 88, Step 2

Discuss magnetic force with students as described in Step 2.

Ask students about the force that is continually at work on Earth.

IWB Click the arrow to start a discussion comparing magnetism and gravity.

IWB You can use the *Pen Tool* to record students' responses.

New Word Introduce *push*.

push: when you make things move away from you. Pushing is a force.

New Word Introduce *pull*.

pull: when you make things move toward you. Pulling is a force.

New Word Introduce *force*.

force: a push or a pull

New Word Introduce *magnetic force*.

magnetic force: the force produced by a magnetic field

New Word Introduce *attract*.

attract: to pull toward

New Word Introduce *repel*.

repel: to push away from

New Word Introduce *magnetism*.

magnetism: a force that attracts iron and steel

New Word Introduce *gravity*.

gravity: a force that pulls objects toward each other. It is the force of gravity that pulls objects toward Earth's center.

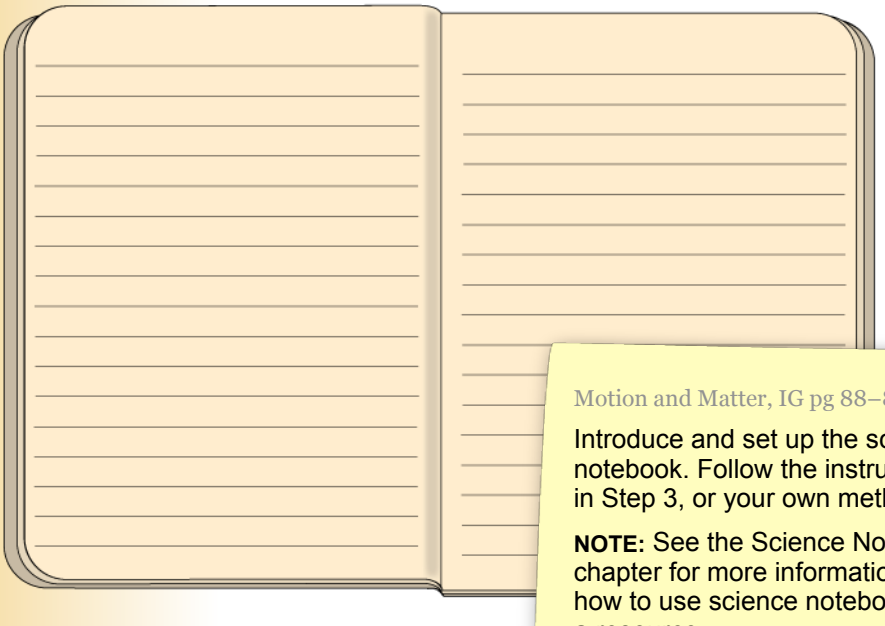
Add all new words to the word wall.

Teacher Notes

Investigation 1, Part 1

Science Notebooks

Full Option Science System FOSS



Motion and Matter, IG pg 88–89, Step 3

Introduce and set up the science notebook. Follow the instructions in Step 3, or your own method.

NOTE: See the Science Notebooks chapter for more information on how to use science notebooks as a resource.

Teacher Notes

IG pg. 88–89, Step 3

Investigation 1, Part 1

Focus Question

Full Option Science System FOSS

What happens when magnets interact with other magnets and with paper clips?

Motion and Matter, IG pg 89, Step 4

Ask students to write the focus question in their notebooks.

Distribute notebook sheet 1, *Magnetic-Force Checklist*. Have students write the date at the top of page 4 of their notebooks, then glue or tape the notebook sheet onto the same page.

IWB Click the *Notebook Button* to open notebook sheet 1.

IG pg. 89, Step 4

Investigation 1, Part 1

Magnetic Force

Full Option Science System FOSS

Does the magnetic force only work when the magnet is touching something or can the force work at a distance?

Explore magnetic interactions:

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Motion and Matter, IG pg 89–90, Steps 5–6

Distribute teacher master 2, *Magnetic-Force Activities*, to each group and have students explore magnetic interactions.

If you are using the posters, hang them where students can refer to them as needed.

IWB Click the *Notebook Button* to open teacher master 2.

Have groups get the materials as described in Step 6. Visit students as they work, helping them set up a number of the systems that allow them to observe force acting at a distance.

Teacher Notes

IG pg. 89–90, Steps 5–6

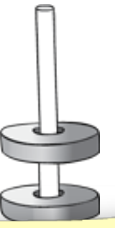
Investigation 1, Part 1

Magnets-on-a-Straw

Full Option Science System FOSS

What makes this so intriguing?

What do you usually expect to see?



Motion and Matter, IG pg 90, Step 7

After students have had enough time to explore magnetic interactions, set up three or four magnets on a straw so that you are demonstrating the interaction shown on the poster (magnets repel each other). Discuss the forces at work. Ask the questions in Step 7.

IWB You can use the *Pen Tool* to record students' responses.

See the Teaching Note in the margin next to Step 7.

Teacher Notes

IG pg. 90, Step 7

Investigation 1, Part 1

Magnet Interaction

What do you think will happen when I pull the chair away from the magn

Motion and Matter, IG pg 91–92, Steps 8–9

Set up the floating paper clip as described in Step 8.

Have students predict what they think will happen when you slowly pull the chair away from the magnet. Provide a sentence frame if students need help with their prediction.

Pull the string under the tape until the clip is suspended in air about 1 cm from the magnet.

Continue pulling the string until the paper clip falls to the table.

IWB Click the arrow to confirm what has happened.

Ask students to explain why the magnet fell down.

IWB You can use the *Pen Tool* to record students' responses.

Challenge students to make a floating paper clip of their own.

Teacher Notes

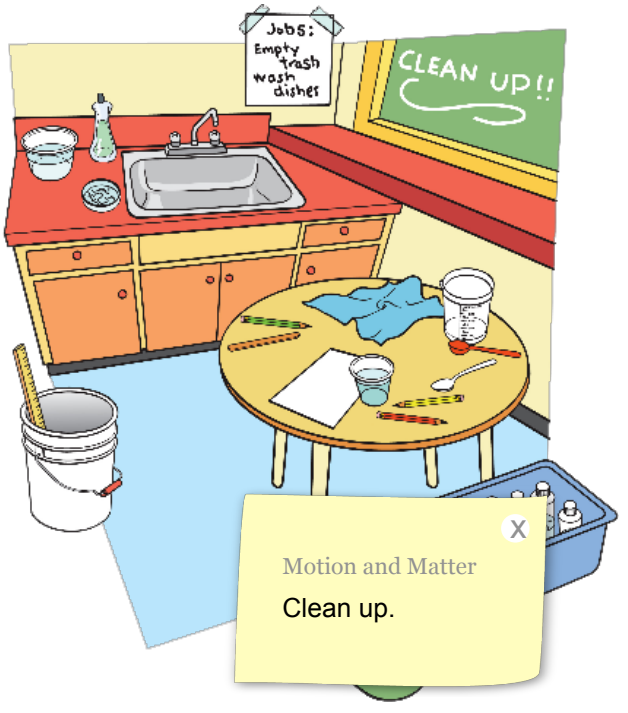
IG pg. 91–92, Steps 8–9

Investigation 1, Part 1

Clean Up!

Full Option Science System FOSS

- Return all paper clips to the cups.
- Return all materials to the materials station.



Teacher Notes

Investigation 1, Part 1

Focus Question

Full Option Science System FOSS

What happens when ma
with other magnets and

Draw and label a **model** of the "float
Add arrows and labels for the forces
Write a sentence or two to describe

Motion and Matter, IG pg 92, Steps 10–11

Ask students to answer the focus question in their notebooks.

Have students draw and label a model of the "floating" paper clip system as described in Step 10.

After students have made their notebook entries, have them pair up with a partner to discuss their models as described in Step 11.

New Word Introduce *model*.

model: an explanation or representation of an object, system, or process that cannot be easily studied

Add the new word to the word wall.

Teacher Notes

IG pg. 92, Steps 10–11

Investigation 1, Part 1

Forces of Magnetism and Gravity

Full Option Science System FOSS

What is happening that allows the paper clip to float in the air?

Motion and Matter, IG pg 92–93, Step 12

Summarize forces. Start with the model drawings that are on the board. Ask the first two questions in Step 12 if they are not covered in the discussion.

IWB Click the arrow to reveal an image that shows the forces. Explain that when the forces are balanced, the paper clip floats; if the forces become unbalanced, the paper clip falls.

New Word Introduce *balanced*.

balanced: to be in a stable position

Add the new word to the word wall.

IWB You can use the *Pen Tool* to record students' responses.

This activity continues on the next slide.

Teacher Notes

IG pg. 92–93, Step 12

Investigation 1, Part 1

Forces of Magnetism and Gravity

Full Option Science System FOSS

Forces are balanced when two or mo
on something with equal strength so t

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What **evidence** do you have that the
magnetic field is there?

What happens when the string is pull
a little farther?

What causes the paper clip to fall?

Teacher Notes

Motion and Matter, IG pg 92–93, Step 12

Continue the discussion with the remaining questions in Step 12.

Discuss the forces at work including balanced and unbalanced forces.

New Word Introduce *magnetic field*.

magnetic field: an invisible field around a magnet

New Word Introduce *evidence*.

evidence: data used to support claims. Evidence is based on observation and scientific data.

New Word Introduce *motion*.

motion: the act of moving

New Word Introduce *change of motion*.

change of motion: change in direction of movement

Add all new words to the word wall.

IG pg. 92–93, Step 12

Investigation 1, Part 1

Vocabulary Review

Full Option Science System FOSS

Motion and Matter, IG pg 93, Steps 13–14

Review vocabulary.

IWB You can use the *Pen Tool* to write class definitions beside the words or use this slide as a vocabulary resource/reminder.

IWB Click each word to reveal its definition at the top of the page.

These words should find a permanent place on a word wall in your classroom so that they are always accessible to students.

The vocabulary review continues on the next slide.

Assess progress by using the "What to Look For" in Step 14.

Teacher Notes

IG pg. 93, Steps 13–14

Investigation 1, Part 1

Vocabulary Review

Full Option Science System FOSS

Motion and Matter, IG pg 93, Steps 13–14

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Teacher Notes

IG pg. 93, Steps 13–14

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Vocabulary Review

Full Option Science System FOSS

Motion and Matter, IG pg 93, Steps 13–14

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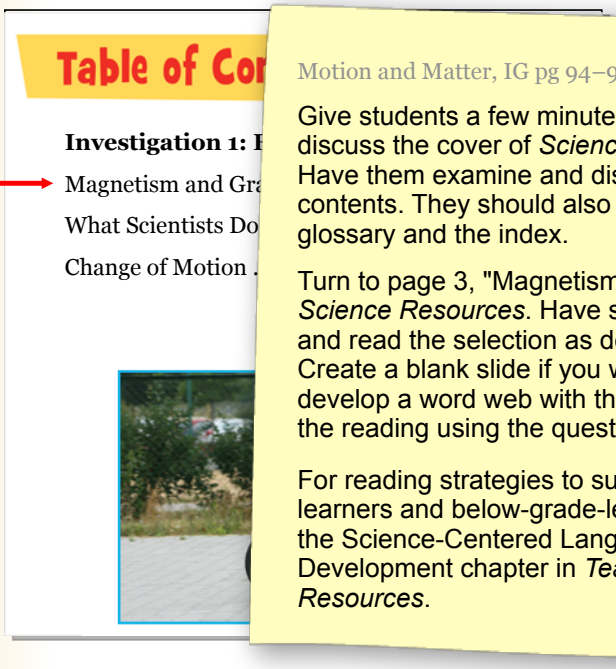
Teacher Notes

IG pg. 93, Steps 13–14

Investigation 1, Part 1

Reading in Science Resources



Motion and Matter, IG pg 94–95, Steps 15–16

Give students a few minutes to look at and discuss the cover of *Science Resources*. Have them examine and discuss the table of contents. They should also locate the glossary and the index.

Turn to page 3, "Magnetism and Gravity," in *Science Resources*. Have students preview and read the selection as described in Step 15. Create a blank slide if you would like to develop a word web with the class. Discuss the reading using the questions in Step 16.

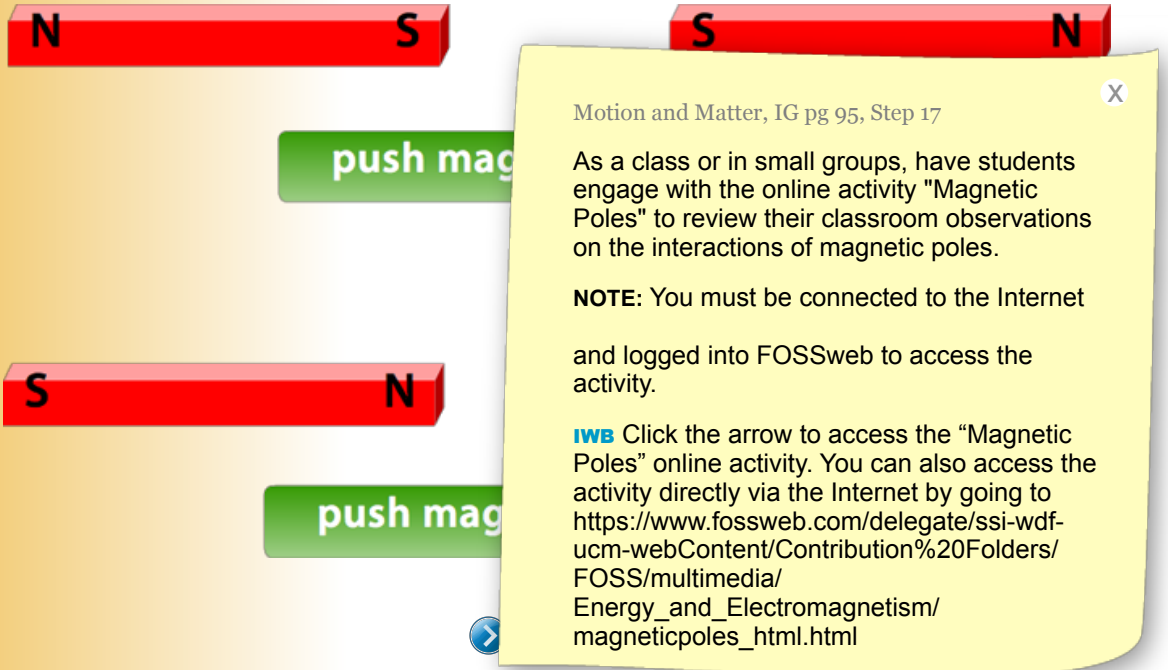
For reading strategies to support English learners and below-grade-level readers, see the Science-Centered Language Development chapter in *Teacher Resources*.

Teacher Notes

IG pg. 94–95, Steps 15–16

Investigation 1, Part 1

Energy and Electromagnetism: Magnetic Poles



Motion and Matter, IG pg 95, Step 17

As a class or in small groups, have students engage with the online activity "Magnetic Poles" to review their classroom observations on the interactions of magnetic poles.

NOTE: You must be connected to the Internet

and logged into FOSSweb to access the activity.

IWB Click the arrow to access the “Magnetic Poles” online activity. You can also access the activity directly via the Internet by going to https://www.fossweb.com/delegate/ssi-wdf-ucm-webContent/Contribution%20Folders/FOSS/multimedia/Energy_and_Electromagnetism/magneticpoles_html.html

Teacher Notes

Investigation 1, Part 1

Wrap-Up/Warm-Up

Full Option Science System FOSS

What happens when magnets interact with other magnets and with paper clips?

Pair up with a partner to

- share your models;
- discuss the effect of forces when balanced and when they are unba
- discuss how magnetism and grav alike and different.

What causes the magnets to be spa the straw?

Explain how balanced and unbalanc affect the motion of the paper clip.

Motion and Matter, IG pg 95, Step 18

Wrap-Up/Warm-Up

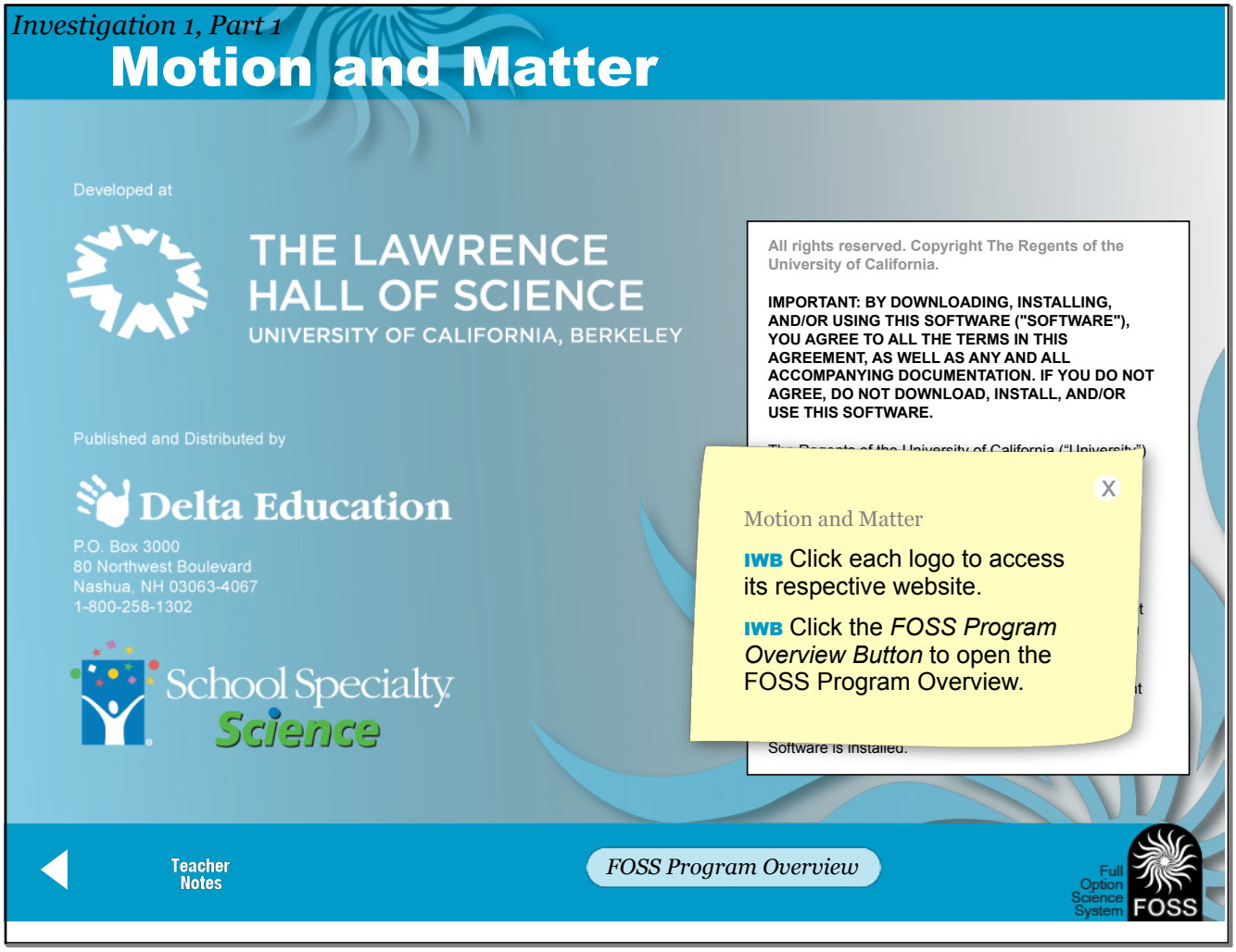
Conclude this part or start the next part by having students share their notebook entries with a partner.

Highlight the crosscutting concept of cause and effect. Have students discuss the questions in Step 18.

See the Science-Centered Language Development chapter in *Teacher Resources* for suggestions for how students can share responses.

Teacher Notes

IG pg. 95, Step 18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