SCIENCE:

KINDERGARTEN–FORCE AND MOTION

Force and Motion

Magnets and Materials

TEKS

K (6) Force, motion, and energy. The student knows that energy, force, and motion are related and are a part of their everyday life.

(B) The student is expected to explore interactions between magnets and various materials.

Content Objective

I can explore how magnets interact with different materials.

Science

Science Process Skills

K (2) Scientific investigation and reasoning. The student develops abilities to ask questions and seek answers in classroom and outdoor investigations.

(E) The student is expected to communicate observations with others about simple descriptive investigations.

K (4) Scientific investigation and reasoning. The student uses age-appropriate tools and models to investigate the natural world.

(A) The student is expected to collect information using tools, including computers, hand lenses, primary balances, cups, bowls, magnets, collecting nets, and notebooks; timing devices, including clocks and timers; non-standard measuring items such as paper clips and clothespins; weather instruments such as demonstration thermometers and wind socks; and materials to support observations of habitats of organisms such as terrariums and aquariums.

(B) The student is expected to use senses as a tool of observation to identify properties and patterns of organisms, objects, and events in the environment.

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Mathematics

K (1) Number, operation, and quantitative reasoning. The student uses numbers to name quantities.

(C) The student is expected to use numbers to describe how many objects are in a set (through 20) using verbal and symbolic descriptions.

K (15) Underlying processes and mathematical tools. The student uses logical reasoning. The student is expected to justify his or her thinking using objects, words, pictures, numbers, and technology.

English Language Arts and Reading

K (15) Writing/expository and procedural texts. Students write expository and procedural or work-related texts to communicate ideas and information to specific audiences for specific purposes. Students are expected to dictate or write information for lists, captions, or invitations.

K (21) Listening and speaking/listening. Students use comprehension skills to listen attentively to others in formal and informal settings. Students continue to apply earlier standards with greater complexity.

(A) Students are expected to listen attentively by facing speakers and asking questions to clarify information.

K (22) Listening and speaking/speaking. Students speak clearly and to the point, using the conventions of language. Students continue to apply earlier standards with greater complexity. Students are expected to share information and ideas by speaking audibly and clearly using the conventions of language.

K (23) Listening and speaking/teamwork. Students work productively with others in teams. Students continue to apply earlier standards with greater complexity. Students are expected to follow agreed-upon rules for discussion, including taking turns and speaking one at a time.

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Figure 19.

Reading/Comprehension Skills. Students use a flexible range of metacognitive reading skills in both assigned and independent reading to understand an author's message. Students will continue to apply earlier standards with greater depth in increasingly more complex texts as they become self-directed, critical readers.

(B) The student is expected to ask and respond to questions about text.

(C) The student is expected to monitor and adjust comprehension (e.g., using background knowledge, creating sensory images, re-reading a portion aloud).

(F) The student is expected to make connections to own experiences, to ideas in other texts, and to the larger community and discuss textual evidence.

English Language Proficiency Standards

2 (I) Cross-curricular second language acquisition/listening. The student is expected to demonstrate listening comprehension of increasingly complex spoken English by following directions, retelling or summarizing spoken messages, responding to questions and requests, collaborating with peers, and taking notes commensurate with content and grade-level needs.

3 (D) Cross-curricular second language acquisition/speaking. The student is expected to speak using grade-level content area vocabulary in context to internalize new English words and build academic language proficiency.

Language Objective

I can speak about how magnets interact with other materials.

Response to Intervention/Tier 1 Differentiation

All science lessons support students in receiving quality Tier 1 instruction. Using the 5E model, knowledge is taught in a variety of contexts, integrating math, science, and ELA content, thus supporting the active engagement of students with the content. Lesson-specific differentiation strategies for addressing diverse student needs can be found throughout each lesson in sections titled "Differentiation Strategy."

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Differentiation should

- focus on skills students did not understand and extend the lesson for advanced students;
- be conducted in small groups or embedded in whole-group instruction; and
- provide students with a variety of strategies to process the information, such as
  - allowing for additional opportunities for verbal brainstorming of words associated with a topic (with teacher taking dictation);
  - making clear connections of new and more complex concepts to foundational aspects and prior knowledge;
  - participating in more tangible experiences, such as experiments, investigations, and active exploration;
  - sorting academic vocabulary words into categories by common attributes—process words or science content vocabulary;
  - organizing brainstorming into semantic maps or creating graphic organizers;
  - discussing the meaning of a graphic organizer with a partner; and
  - creating a visual representation to demonstrate understanding.

See the handout in the Content Resources section that addresses instructional strategies.

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College and Career Readiness Standards

I.C1 Collaborative and safe working practices. Collaborate on joint projects.

I.E1 Effective communication of scientific information. Use several modes of expression to describe or characterize natural patterns and phenomena. These modes of expression include narrative, numerical, graphical, pictorial, symbolic, and kinesthetic.

Vocabulary Focus

magnets
magnetic
nonmagnetic

5E Lesson Summary

Engage
Students observe the effects of magnetism.

Explore
Students explore interactions between magnets and other materials.

Explain
Students explain interactions between magnets and other materials.

Elaborate
Students find everyday objects that are magnetic.

Evaluate
Students sort magnetic and nonmagnetic objects.

Force and Motion

Engage

Teacher Instruction

- Place the paper clips on a table in view of all students. Keep the centimeter cubes and the magnetic wand out of sight at this time.
- Ask: Do you think I can pick up these paper clips without touching them? *Answers will vary, but most students will answer no.*
- Reveal the magnetic wand and proceed to move it over the paper clips to pick them up.
- Remove the paper clips from the magnet.
- Place the centimeter cubes on the table in view of all students.
- Ask: Do you think I can pick up these centimeter cubes without touching them? *Answers will vary; some students may answer yes based on the previous demonstration, and others may answer no.*
- Move the magnetic wand over the centimeter cubes.

Materials

For teacher

- magnetic wand
- 5–10 metal paper clips
- 5–10 centimeter cubes

Facilitation Questions

- Why do you think I was able to pick up the paper clips but not the centimeter cubes? *Accept all reasonable answers.*
- What other items do you think I could pick up using a magnetic wand? *Answers will vary and may include safety pins, nails, tacks, and staples.*

Force and Motion

Explore

Materials

For teacher

- chart paper for each student group

For student groups

- magnetic wand
- T-chart
- 12 sealable plastic test tubes
- 6 groups of nonmagnetic items, such as
  - 8–10 beads
  - 8–10 toothpicks
  - 6–8 pennies
  - 4–6 marbles
  - 4–6 small pieces of paper
  - 4–6 small pieces of aluminum foil
- 6 groups of magnetic items, such as

continued . . .

Teacher Note

Model this activity for the class and then allow small groups to explore throughout the day at a work station, or display six test tubes for each group to explore during science time.

Content Builder

Using graphic organizers like T-charts will help all students see information in chunks, or smaller pieces, and aid in making connections between various concepts. In kindergarten, teachers should model appropriate use of graphic organizers in a class science notebook or on chart paper and instruct students to record examples in their own science notebooks.

Advance Preparation

Place magnetic items in six test tubes and nonmagnetic items in the remaining six test tubes. Create sets of six for each table or station, making sure to have a mix of magnetic and nonmagnetic test tubes in each set. Leave room in each test tube to move the contents up and down with the magnetic wand.

For each group, create a T-chart on chart paper as shown below. T-charts can also be created on tabletops using masking tape.

Magnetic	Nonmagnetic

Teacher Instruction

- Display a set of magnetic and nonmagnetic test tubes and a magnetic wand.

Force and Motion

- Model how to run the magnetic wand up and down the test tubes.
- Instruct students to observe the way the material in each test tube interacts with the magnetic wand.
- Instruct students to sort the test tubes into two groups, magnetic and nonmagnetic.
- Allow adequate time for students to explore.
- Debrief the activity by creating a T-chart in the class science notebook. Ask students to draw pictures of the items in the test tubes to place on the T-chart. Label the pictures.

Facilitation Questions

- Did the (material in the test tube) move when the magnet passed by it? *Answers will depend on the material in the test tube.*
- Why do you think the (magnetic item) moved with the magnet and the (nonmagnetic item) did not? *Some of the items are attracted, or stick, to the magnetic wand and therefore move with the magnet. Some of the items are not attracted, or do not stick, to the magnetic wand and therefore do not move with the magnet.*
- What would you call the items that are attracted, or stick, to the magnetic wand? *Items that are attracted, or stick, to the magnetic wand are magnetic.*
- What would you call the items that are not attracted, or do not stick, to the magnetic wand? *Items that are not attracted, or do not stick, to the magnetic wand are nonmagnetic.*
- Are all metals magnetic? *No, some metals such as nails and paper clips are magnetic, but some metals such as aluminum foil and coins are nonmagnetic.*
- What kinds of materials are not magnetic? *Plastic, glass, wood, foam, paper, cloth, and some metals are not magnetic.*
- Does the shape or the size of the materials determine whether the materials are magnetic? Why or why not? *No, several of the materials are similar in shape and size, and some of them are magnetic and some are not.*

. . . continued

- 10 chenille stem pieces, 2 cm–3 cm long
- 10–15 paper clips
- 6–8 small metal jingle bells
- 15–20 small nails
- 4–6 small metal nuts
- 8–10 safety pins

Download Kinder Explore_F&M from Drop Boxes in your Science Academies for Grades K–4 Project Share group to use on a SMART™ or Mimio® interactive whiteboard.

Force and Motion

Explain

Materials

For teacher

- *Magnets* book
- chart paper

Teacher Instruction

- Read and discuss *Magnets*.
- Use the T-chart from Explore to add magnetic and nonmagnetic items.
- Count and record the number of magnetic and nonmagnetic items in each column of the T-chart.

Facilitation Questions

- What do we call items that are attracted, or stick, to magnets? *Magnetic items are attracted, or stick, to magnets. Label the left side of the T-chart with the word* Magnetic.
- How many magnetic items can you name? *Answers will vary and may include nails, staples, bobby pins, paper clips, and safety pins. Allow students to draw and label magnetic items on the left side of the T-chart.*
- What do we call items that are not attracted, or do not stick, to magnets? *Nonmagnetic items are not attracted, or do not stick, to magnets. Label the right side the T-chart with the word* Nonmagnetic.
- How many nonmagnetic items can you name? *Answers will vary and may include plastic, glass, foam, and wooden items. Allow students to draw and label nonmagnetic items on the right side of the T-chart.*
- How do you know if something is magnetic? *Something is magnetic if it is attracted to a magnet.*
- How do you know if something is nonmagnetic? *Something is nonmagnetic if it is not attracted to a magnet.*

Elaborate

Advance Preparation

Students may work in groups of 2–3 or work independently to complete this activity. Students should move around the room testing whether a magnet will stick to each item shown on page 1 of *RM 1: Is It Magnetic?* You may add or remove items on *RM 1* or use page 2 to create a page according to the magnetic and nonmagnetic items that are available in your classroom.

Differentiation Strategy

G/T: Provide students with only page 2 of *RM 1*. Ask them to find and record their own magnetic and nonmagnetic items in the classroom.

Content Builder

Magnetic metals include iron, nickel, and cobalt. Other metals are not attracted to magnets.

Safety Alert

Keep magnets away from all computers and electronic equipment. Magnets can alter how some computer monitors or televisions display images. Magnets also can damage VHS tapes and credit cards.

Teacher Instruction

- Pass a magnet and a copy of *RM 1* to each student group.
- Instruct students to complete *RM 1* by placing the magnet on or near the objects in the classroom that are pictured.
- Instruct students to place an *X* in the "Magnetic" column if the magnet is attracted, or sticks, to the object.
- Instruct students to place an *X* in the "Nonmagnetic" column if the magnet is not attracted, or does not stick, to the object.
- Allow adequate time for students to complete the activity.

Materials

For each student

- access to the following:
  - books
  - chair
  - coins
  - desk
  - filing cabinet
  - glue bottles
  - pencils
  - plastic buttons
  - shoes
  - wooden blocks

For student groups

- RM 1
- magnet

Download Kinder_Elaborate_F&M from Drop Boxes in your Science Academies for Grades K–4 Project Share group to use on a SMART™ or Mimio® interactive whiteboard.

Force and Motion

Facilitation Questions

- What do we call items or materials that are attracted, or stick, to magnets? *Items or materials that stick to magnets are called magnetic.*
- Which objects on the page are magnetic? *In most cases, the filing cabinet and metal parts of the desk and chair will be magnetic.*
- What do we call items or materials that do not stick to magnets? *Items or materials that do not stick to magnets are called nonmagnetic.*
- Which objects on the page are nonmagnetic? *The wooden blocks, plastic buttons, coins, books, pencils, and shoes are nonmagnetic.*
- What other items in our classroom are magnetic? Nonmagnetic? *Answers will vary depending on the items available in the classroom.*
- How many objects were magnetic? Nonmagnetic? *Answers will vary depending on the items available in the classroom.*
- Were there more magnetic or nonmagnetic items? *Answers will vary depending on the items available in the classroom.*

Evaluate

Teacher Instruction

- Work with students individually or in small groups to observe and assess student understanding.
- Display the items in a group.
- Instruct each student to sort the items into two groups: magnetic and nonmagnetic.
- Instruct students to create a T-chart in their science notebooks and record their findings.
- Students should be able to identify an object as magnetic or nonmagnetic by touching a magnet to it. Possible science notebook entry:

Magnetic	Nonmagnetic
	

Materials

For teacher

- magnet
- magnetic items, such as screws, binder clips, magnetic letters, nail clippers, scissors
- nonmagnetic items, such as highlighters, plastic forks, craft sticks, plastic animals, small sticky notes

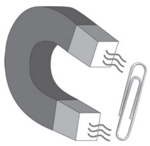
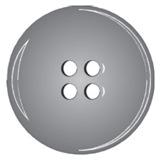
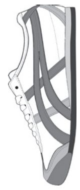
For each student

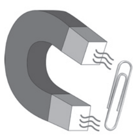
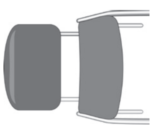
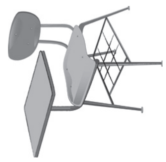
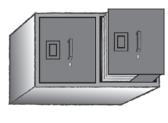
- science notebook

Use a video-enabled device for students to take videos and/or pictures of student responses.

Kindergarten

RM 1: Is It Magnetic?

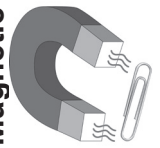
	Magnetic 	Nonmagnetic 
 glue bottle		
 scissors		
 button		
 shoe		
 block		

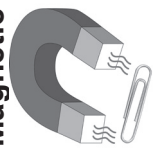
	Magnetic 	Nonmagnetic 
 book		
 chair		
 coins		
 desk		
 filing cabinet		

- How many objects are magnetic? ______
- How many objects are nonmagnetic? ______

Kindergarten

RM 1: Is It Magnetic? continued

Nonmagnetic 					
Magnetic 					

Nonmagnetic 					
Magnetic 					

- How many objects are magnetic? _____
- How many objects are nonmagnetic? _____

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