

Date: _____

Your Name: _____

Name(s) of Partner(s): _____



**NEW ENGLAND
COMMON ASSESSMENT PROGRAM**

Released Science Inquiry Task

Testing Magnetic Strength

2016

Grade 4

Inquiry Booklet

Science

Directions:

You will read a story about students using science to solve a problem. You and your partner will do one of the same investigations as the students in the story.

Word Bank

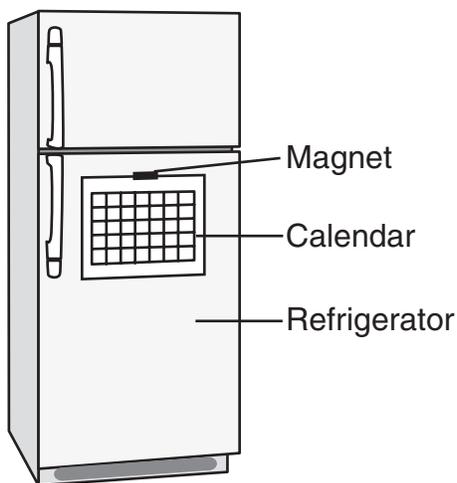
Magnet	an object that produces an area of magnetic force called a magnetic field
Magnetic attraction	the pull between some metals and a magnet
Median	the middle number in a list of numbers arranged from smallest to largest Example: With a data set of 4 cm, 2 cm, and 5 cm, arrange the measures from smallest to largest: 2 cm, 4 cm, 5 cm. The median for this data set is 4 cm.
Trial	each time a test is repeated

Testing Magnetic Strength

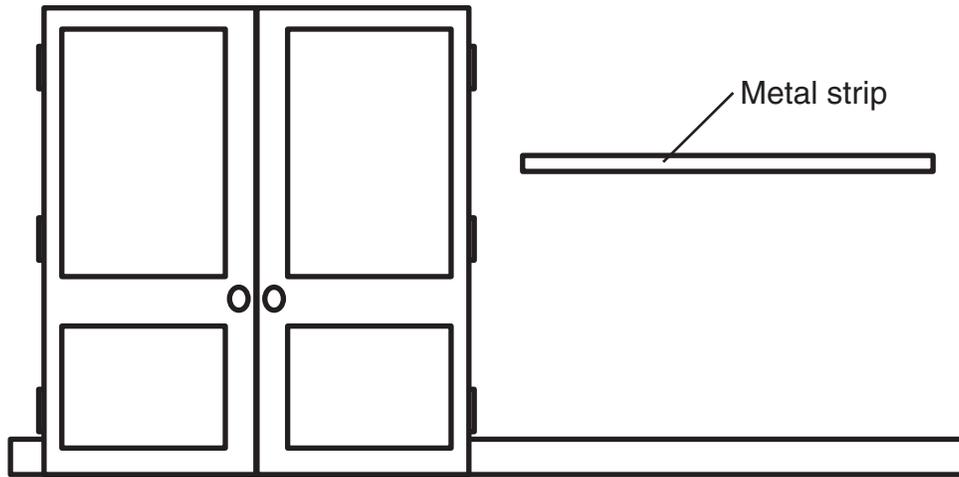
A fourth-grade art class is working on different types of wall art for a school art show. The winner of the art show will go to the Metropolitan Museum of Art in New York City.

For the judges to review the art pieces, the students need to hang them along the walls of the school hallways without damaging the walls. However, the art pieces are different sizes. Some pieces are large and will need a lot of support to hold them on a wall. The students want to use the same materials to hang all the art pieces so the art looks organized.

Ana observes a calendar hanging on a refrigerator in the cafeteria. The following picture shows the calendar attached to the refrigerator with a magnet.



Ana knows that magnets are attracted to some metals. As she walks back to the classroom, she notices a long, thin strip of metal that starts at one end of the hall and ends at the other end. The picture below shows part of the metal strip in the hallway.



Ana talks with her friend Finn, and they think that hanging the art pieces from the metal strip with magnets will be a good way to display the art for their show. They suggest this idea to the class. The students have seen other papers held up by magnets on the metal strip. The students think about the different sizes of artwork.

Ana knows that artwork on a piece of paper could be held by one magnet, but Finn’s artwork has a cardboard frame that makes it much thicker on top. She is not sure if it could be held by one magnet.

The students are studying magnets in their science class.

Mr. Blagg, their science teacher, tells the class that there are different types of magnets with different strengths. However, for the investigation that they will be doing in today’s class, he has a box of identical magnets that the students will use. Ana asks Finn, “If we are going to test the strength of one magnet, how will we test for the different thicknesses of the artwork?”

Ana and Finn realize that if they learn about the strength of one magnet, they can figure out how many magnets the students will need to hold up their art pieces.

Conducting an Investigation

The class decides to investigate the answer to this research question:

How does a magnet’s attraction to a metal change as the distance from the metal increases?

Making a Prediction—What Do You Think?

Make a prediction **on your own** about the research question below.

Research Question:

How does a magnet's attraction to a metal change as the distance from the metal increases?

Use the information from the story about the students and what you know about magnets to make and explain your prediction.

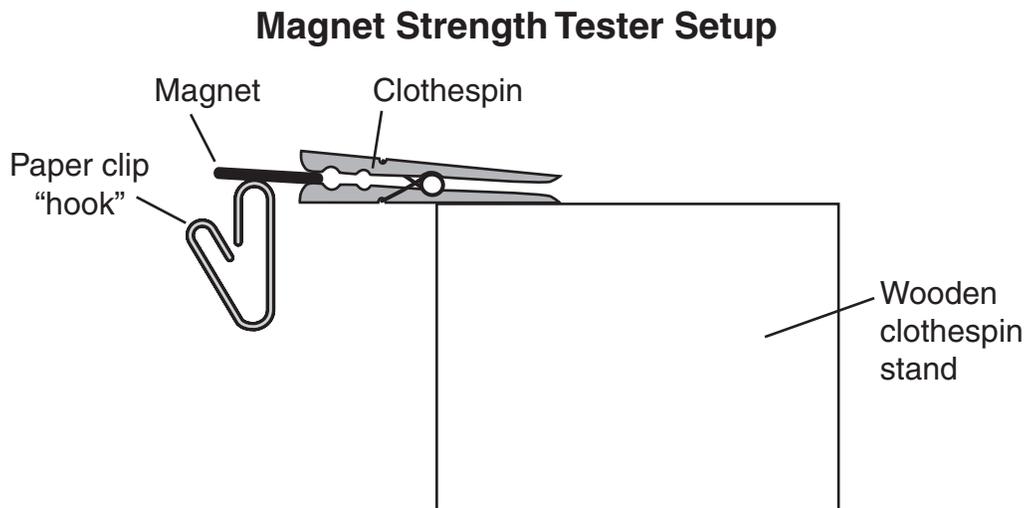
I predict

because

DO NOT GO ON.



The class designs an investigation to test the strength of one magnet. The students make a Magnet Strength Tester out of a magnet and a clothespin. The setup is shown below.



The students create a "hook" out of a paper clip and add paper clips to the hook one at a time. Eventually, the weight of the paper clips is more than the magnet can hold, and the paper clips fall.

The students record the number of paper clips the magnet held. They write their data in a data table. The students do this test for three trials. They then add two stickers to the bottom of the magnet and repeat the steps for three trials with the hook and paper clips.

The students repeat the steps in a third test with four stickers on the bottom of the magnet. They do three trials and then find the median number of paper clips the magnet held for each distance.

You will do the same investigation as the students in the story. You have the same materials the students used on the placemat in front of you.

Materials for Investigation 1:

1 magnet
1 paper clip for hook
4 stickers
14 paper clips
1 wooden clothespin stand

Safety: DO NOT put science materials in your mouth or nose or on any other body parts of yourself or your partner.

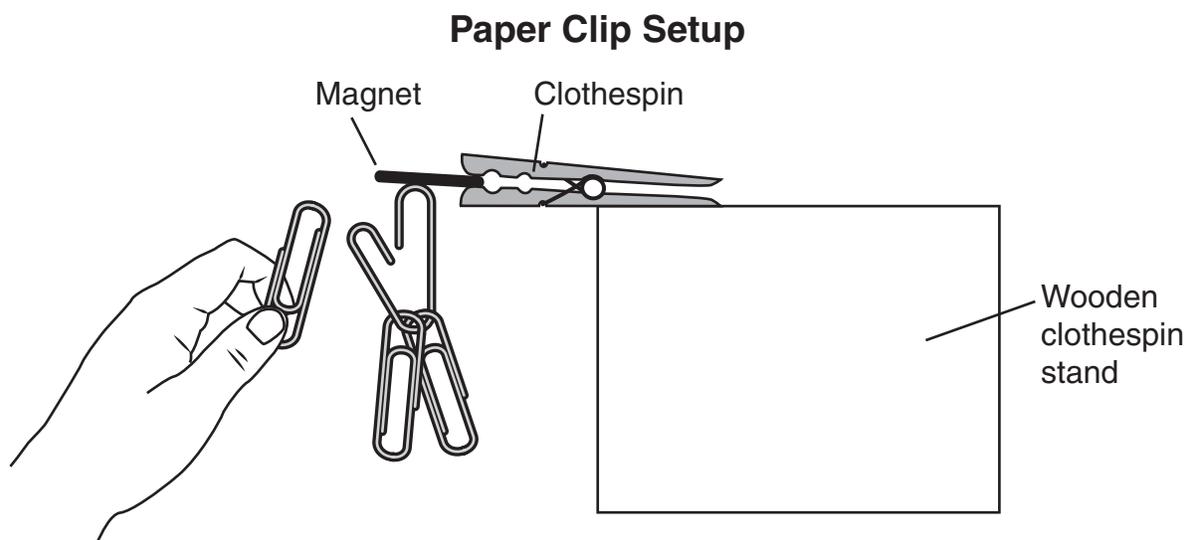
Procedure:

- You and your partner(s) will work together to do this investigation.
- You will test the strength of a magnet at three distances.
- You will each record all of the data in your own Inquiry Booklet.

Read Steps 1–12, which begin below. Then add labels to the rows and columns in Data Table 1 on page 6 to collect the data from your investigation. You will record your data in Data Table 1.

Test the strength of a magnet as distance increases and record your data in Data Table 1.

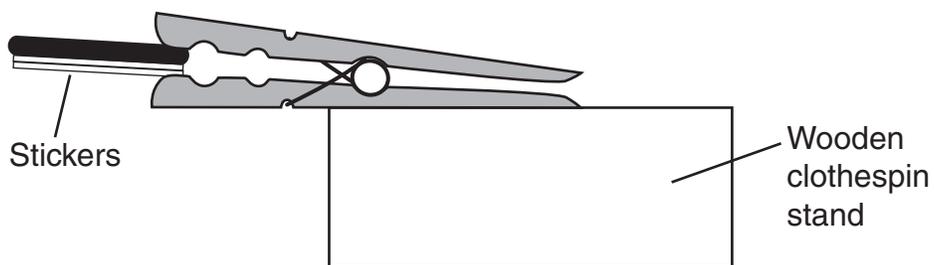
1. Place the magnet in the clothespin.
2. Make the hook by bending the paper clip as shown in the Magnet Strength Tester Setup on page 4.
3. Touch the top of the hook to the bottom of the magnet.
4. Add paper clips to the hook one by one as shown in the Paper Clip Setup below.



5. Count the number of paper clips that can hang from the hook before the paper clips fall.
6. Record the number of paper clips in Data Table 1 for Trial 1 for zero stickers.
7. Repeat steps 4 through 6 two more times for Trials 2 and 3.

8. Next, place two stickers on the bottom of your magnet, as shown below.

Strength of a Magnet



9. Repeat steps 4 through 7 with the two stickers to see how many paper clips can hang from the hook before the paper clips fall. (Make sure the hook touches the bottom sticker, not the magnet.)

10. Next, add two more stickers to the bottom of the magnet.

11. Repeat steps 4 through 7 with four stickers.

12. Record the median number of paper clips for each distance you recorded in Data Table 1.

Remember to add labels to the rows and columns.

Data Table 1: Strength of Magnet at Three Distances

	Number of Paper Clips Held at Three Distances			Median

After finishing the investigation, follow your teacher's instructions to clean up your area.

You will complete the rest of the task in your Student Answer Booklet **on your own**.

