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STEM RESEARCH ACTIVITY: Magnet-Attraction Activity

Grade level and unit:

Target achievements:

(It will be added according to its own curriculum.)

Subject and/Concepts : Magnet, poles of the magnet, areas of use of the magnet

Method of Implementation of the Activity : Group Work

Research skills: Asking research questions, predicting, determining variables, conducting experiments, collecting data, recording data, interpreting data, drawing conclusions.

Required materials: Research form, four magnets for each group, a paper clip, a ruler drawn on paper.

Activity steps:

1. The teacher gives information to students about the stages of the scientific process in the classroom. "Scientists follow these steps when conducting research:
 - Step 1: They begin their research with a research question.
 - Step 2: They make a prediction about what the answer to their research question might be.
 - Step 3: Determine the things they will change, measure and keep constant in the experiment they will conduct to find the research result.
 - Step 4: They experiment.
 - Step 5: They record the data they obtained from the experiment. Sometimes drawing a table or graph to record the data helps them see the data better.
 - Step 6: They interpret the data they collect.
 - Step 7: They reach a conclusion for the research question they asked in the first step.The teacher said, "We will follow these steps in our research activities." says. Afterwards, I asked a few students, "What are the stages of the scientific process?" What steps do scientists follow when doing science? He asks the question and gets answers.
2. Students are divided into groups of four or five for the study. Student materials brought to the classroom are checked. Today, the experimental materials to be used in the experiment are said to be "four magnets, a paper ruler and a paper clip."
3. Then, the teacher sets up an experimental setup and shows it to the students. In the mechanism, first, the paper containing the ruler and a rectangular box is placed on the table. The teacher says that a bar magnet will be placed inside the rectangular box and demonstrates it by doing. He tells and shows that the paper clip will be on the ruler. A visual of the experimental setup is shown below:



4. A research form is distributed to each student.
5. The teacher asks the students what kind of experiment can be done with the experimental materials shown above, which are "four magnets, a paper clip, a ruler drawn on paper". Gets answers from students. "What do you think could be the research question in an experiment that can be done with these materials?" and asks them to think and write their research

questions on the form. (If no research activity has been done before, the research question can be stated directly.)

6. “Is the attraction power of the magnet affected by the number of magnets?” The result is reached and the students write it on the form. (**Annex 1**) They are asked to write their predictions depending on this research question. Each student writes their prediction.
7. In the research, they are asked what things they change, measure and keep constant.
(**What is changed: the number of magnets, what they measure: the length pulled by the magnet, things that are kept constant: magnet type, paper clip, ruler, environment, etc.**)
8. Before the activity begins, the teacher shows the students how to place the magnet and paper clip on the paper, how to stack the magnets **on top of each other , and how to measure the gravitational distance with a ruler.**
9. Research forms will be filled out individually during the event application.
10. The event starts. In the first step of the activity, when the number of magnets is one, the distance the magnet pulls the paper clip is measured and recorded in the data table. In the second step, when the number of magnets is two, the distance the magnet pulls the paper clip is measured and recorded in the data table. In the third step, when the number of magnets is three, the distance the magnet pulls the paper clip is measured and recorded in the data table. In the fourth step, when the number of bar magnets is four, the distance the magnet pulls the paper clip is measured and recorded in the data table.
11. The teacher checks whether the students have recorded their data correctly. Then, students transform the recorded data into a graph.
12. After the data is recorded and graphed, students write the results of the experiment in the research report.
13. Each group is asked to share how they found the outcome of the experiment. Students are also asked to verbally share the experimental results they wrote on their research forms with their friends in other groups. Experimental results are compared and discussed.
14. The accuracy of the results, the possible sources of error, and the purpose of this experiment are discussed and commented on by the class.
15. After the research activity is completed, students decide with the same groups which design they will make with a magnet in the next lesson. Groups will choose one of these.
 - I.) **A design that includes the use of magnets in household items**
 - II.) **Using magnets in making toys**
 - III.) **Use of magnets in clothes/personal belongings (such as dresses, shoes, bags)**
16. Groups take out their materials. They fill out the design sheet. (**Annex 2**)
17. They create their designs.
18. Each group makes its presentation. Explains the use of magnets.
19. The work done can be exhibited at school or in the classroom.
20. The design made by each group is added to the presentation of the relevant items (household items, toys, personal items) in the project.
21. Designs made by other schools are examined.

Safety Precautions to be Taken : Students are guided by circulating between groups.

Evaluation: Students' performance in asking questions, establishing hypotheses, determining variables, conducting experiments, recording data, interpreting data and drawing conclusions is measured by the prepared Analytical Rubric (Annex -3) . While these measurements are made, the aim is to give students the necessary feedback and improve their performance.

Source:

Altay, S. (2022). The Effect of Research-Based Teaching Supported by Nature of Science and Socioscientific Issues Activities on Fourth Graders' Science Learning.

Annex 1: Activity sheet

Annex2: Design paper

Annex 3: Student evaluation rubric

ÖRNEK

Annex 1:

Name and surname:

Magnet Research Activity

Write a Research Problem:

Write your prediction:

what we changed:

what we measure:

The things we hold steady:

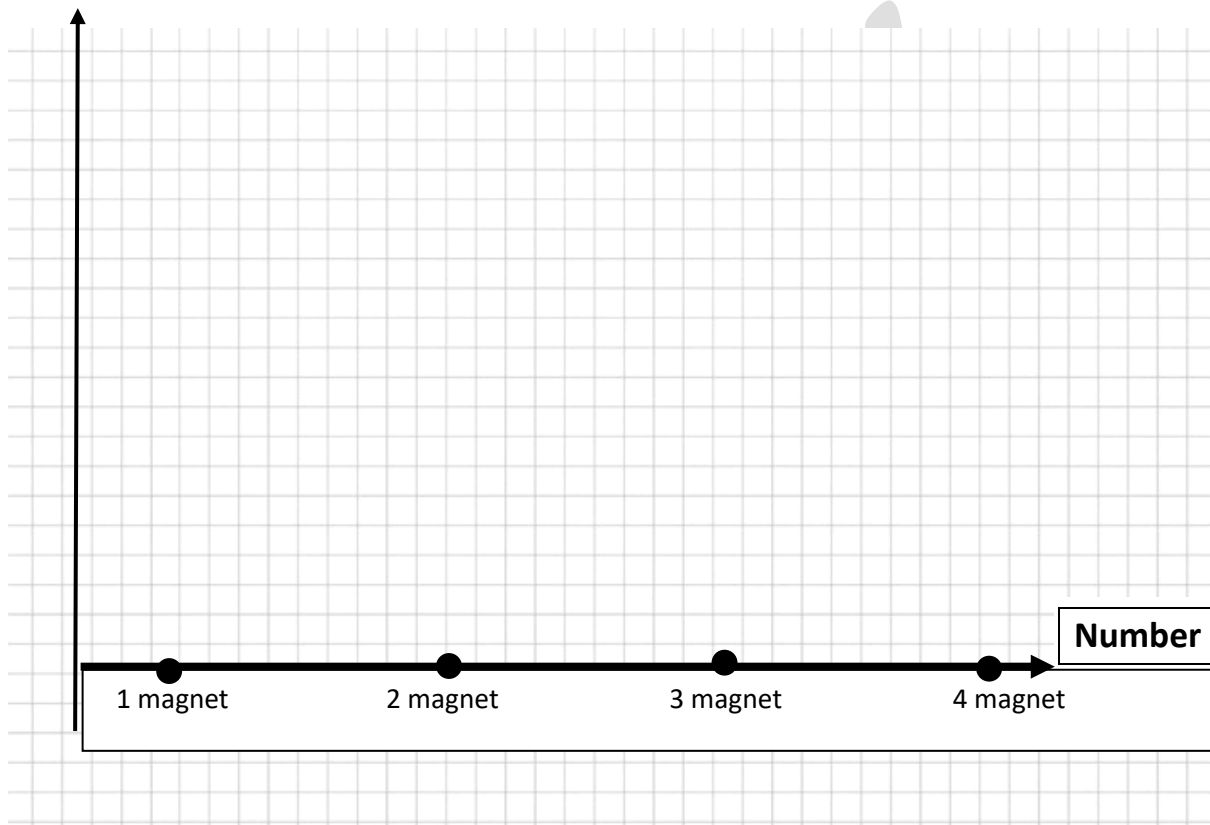
Write down your measurement results!

Number of magnets	Magnet's pulling distance on the paper clip
one	
2	
3	
4	

Show your results in the graph below:

GRAPHIC:

Attraction distance of magnet



Number of magnets

1 magnet

2 magnet

3 magnet

4 magnet

OUR CONCLUSION:

Annex 2: OUR DESIGN

Please tick which group your design falls into:

Household items

toys

personal items

Our Group Name:

Our names:

Name of our design:

YAPILIŞI:

Picture of our design:



