



STEM: ELECTROMAGNETS WORKING PACKET





STEM: Electromagnets Vocabulary

Conductivity: the measure of the ease at which an electric charge or heat can pass through a material



Conductors: those substances through which electricity can flow

Conductor: a material that allows heat to flow through easily.



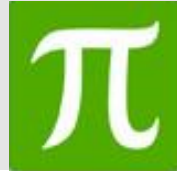
Copper
aluminum
iron
Steel
Gold
Silver

Insulators: those substances through which electricity CANNOT flow.



Magnetic attraction: attraction for iron; associated with electric currents as well as magnets; Characterized by fields of force





STEM- Electromagnets Project

Project

Working Packet

Directions: Watch “Junkyard Electromagnet” on Discovery Education. Predict what you think will happen, then watch “Breaking the Evidence: Magnet Myth”. Complete respond questions.

Predict

What do you think will happen? Will the giant electromagnet be able to knock over the shelves and move the objects?

Respond

1. Was your prediction correct? Why? Or why not?
2. Explain why the experiment failed/worked.



STEM- Electromagnets Project

Project

Working Packet

Group # _____

Section: _____

Student Name: _____

Partner's Name: _____

Challenge: "Design and construct an electromagnet which will attract 4, 5 or 6 paperclips."

Research

(Sources: **Science Notebook, Elevate Science Textbook, and/or Discovery Education.** Note the **sources** you used, including **page numbers, titles, and/or links** in the provided space below.)

Give a title to your Project:



Design the Prototype

(Create a labeled diagram of your electromagnet, within the circuit.)

Materials

- | | |
|--|---|
| <ul style="list-style-type: none">• 3 batteries• 3 battery sockets• 3 resistors ($R_1=5\Omega$, $R_2=10\Omega$ and $R_3=15\Omega$)• 1 switch | <ul style="list-style-type: none">• 1 electromagnet• paper clips• conductors• 1 post-it paper• 1 pencil |
|--|---|



Test your Prototype - Collect your Data

(Record the amount of paper clips the electromagnet attracted.)

Amount of Paper Clips attracted:

TAKE PICTURE 1 –Add the picture to the space below.

Tip: Take the picture while the paper clips are still hanging from your electromagnet!

Create a 2D-Shape, classify the shape and justify your choice, by straighten all the paperclips your electromagnet attracted.

(Straighten **all** the paper clips and arrange accordingly to create a 2D-shape. Identify the shape. Write the name of the shape and justify your choice on the post-it. Why do you classify your shape as such?)

TAKE PICTURE 2 – Add the picture to the space below.

Tip: Arrange the paper clips on the table and place the post-it next to your shape. Write the name of the shape and explain why you classified it as such.



Improve the Prototype

(If your Prototype **did not pass** the challenge, re-design your Prototype. Create a labeled diagram of your improved circuit including the electromagnet.)

Materials

- | | |
|---|---|
| <ul style="list-style-type: none">• 3 AA batteries 1.5V• 3 battery sockets• 3 resistors ($R_1=5\Omega$, $R_2=10\Omega$ and $R_3=15\Omega$) | <ul style="list-style-type: none">• 1 switch• 1 electromagnet• paper clips• conductors |
|---|---|



Reflection Questions

(If your Prototype **did not pass** the challenge, answer the following questions.)

1. In what way did you improve your prototype?

2. Do you expect the improved electromagnet to pass the challenge, which was to attract 4, 5, or 6 paperclips? Why?



Create a Keynote Slide Presentation – Use Keynote to create a slide presentation following the instructions below.

Instructions: Use Keynote to create a presentation with the following information and technology parameters.

1. What was the title of your project?
2. What were your findings during the research?
3. Which materials did you use from the available ones?
4. Did your prototype pass the challenge?
5. Why did your prototype pass or did not pass the challenge?
6. What changes did you make to your prototype? Did it pass the challenge after you improved it?

Your Keynote presentation must include the following technology features:

1. Pick a Keynote Theme for the presentation.
2. 1 Title Slide
3. 1 or more slides including pictures.
4. 2 or more animated slide transitions.
5. 1 or more videos