

JANUARY

Makugiton

FEBRUARY

Mahigugmaon

MARCH

Matinabangon

APRIL

Matinahuron

MAY

Mahapsay og Malimpyo

JUNE

*Maabtik og Masinod sa
Dihaultong Oras*

JULY

Maantigo og Maabilidad

AUGUST

*Maginhuhunahanon
para sa Uban*

SEPTEMBER

Madaginton

OCTOBER

Matinud-anon

NOVEMBER

Masaligan

DECEMBER

Maalampon



Republic of the Philippines
Department of Education
Regional Office IX, Zamboanga Peninsula



5



SCIENCE

Quarter 3 - Module 6

ELECTROMAGNETISM

(Factors that Affect the Strength of the Electromagnet)



Name of Learner: _____

Grade & Section: _____

Name of School: _____

ZAMBOANGA CITY
DIVISION

Support Material for Independent Learning Engagement (SMILE)
Quarter 3 – Module 6: Electromagnetism: Factors that Affect the Strength of the
Electromagnet
First Edition, 2021

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Lesson 6

Factors that Affect the Strength of the Electromagnet



What I Need to Know

This module was designed and written in a way that suits your understanding and needs. It is here to help you master **designing an experiment to determine the factors that affect the strength of the electromagnet (S5FE-IIIi-j-9)**. The scope of this module permits it to be used in many different learning situations. This module is about;

Lesson 1: Electromagnetism

Objective: Design an experiment to determine the factors that affect the strength of electromagnet



What's In

In the previous grade, you learned about magnets. Can you still recall them? Answer the activity below.

Directions: Read the paragraph carefully. Fill in the blanks from the word bank and write your answer on the space provided. (1 point each)

WORD BANK

attract

iron

electricity

magnets

electromagnet

dry cell

Electricity and magnets are closely related to each other. _____ can produce magnets while _____ can produce electricity. A magnet is usually made of _____. It can _____ objects such as pins, coins and other materials made of iron and steel. A nail is not a magnet, but it can be turned into one. This is done by coiling a wire around it and then letting electricity flow through it. Doing this turns the nail into an _____.



What's New



Hello! I'm Jose and I'm going to perform an experiment. Come and join me! These are the materials I'm going to use.

- 3 pcs. 1.5V dry cells/ batteries
- 4 large iron nails
- * electrical wire
- * metal paper clips
- * 1 small iron nails

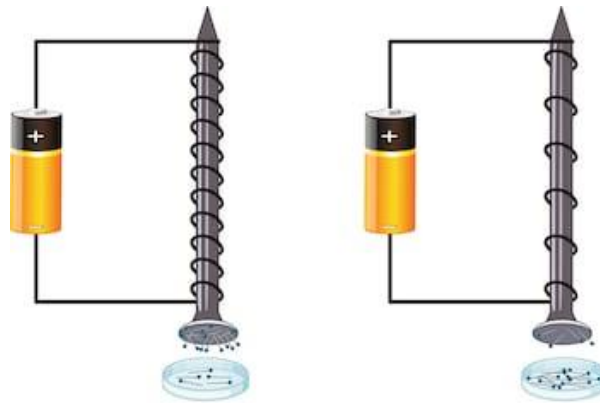
And I am going to:

1. Make an electromagnet by wrapping the electrical wire around the large nail.
2. Connect both ends of the wire to a dry cell/battery.
3. Place some of the metal paper clips on the table near the nail. Does it attract the metal paper clips?



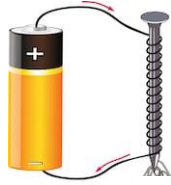
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4. I will make another electromagnet, this time with loose coil of wire. Which set up attract more metal paper clips?
5. Let us try more! How about if we wind up the wire 50 times and the other nail only 10. Which set up attract more metal paper clips?

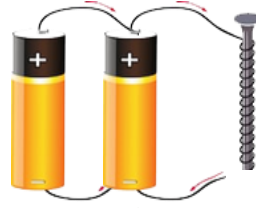


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6. I am getting more excited! Let us add more dry cells/batteries to the electromagnets. I will make sure to connect the dry cells/batteries properly. Which set up attract more metal paper clips?



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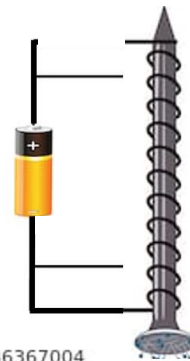


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7. This time I'm going to use a smaller nail. Applying the same number of coils around both nails. Which setup attract more metal paper clips?



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“Thank you for being with me throughout this experiment. See you next time!”



What is it

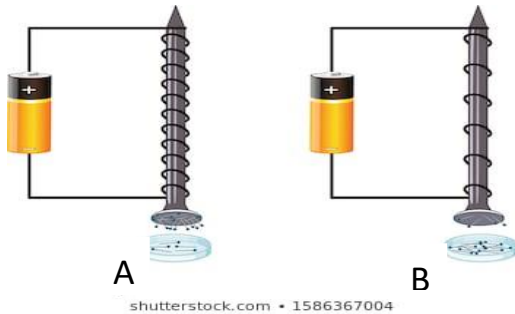
Electromagnetism is the study of the relationship of electricity to magnets. It means transforming electricity to create a magnetic force. Electromagnetism has a lot of application nowadays starting from doorbells, TVs to the advanced type of bullet trains.

An **electromagnet** is a magnet that is made by letting electricity pass through a simple electromagnet coil of wire wound around an iron core. It is a temporary magnet formed when electric current flows through a wire. Without electricity, it loses its magnetism.

The nail is the core. The wire is coiled around the core. The electric current is supplied by a dry cell. If you place some pins near the electromagnet, the pins will be attracted. When you disconnect one end of the wire from the dry cell, no current will flow, and the pins are not attracted. As long as the circuit is closed, pins will be attracted due to the magnetic force while there is a flow of current.

As shown in the experiment a while ago, the strength of an electromagnets depends on the following:

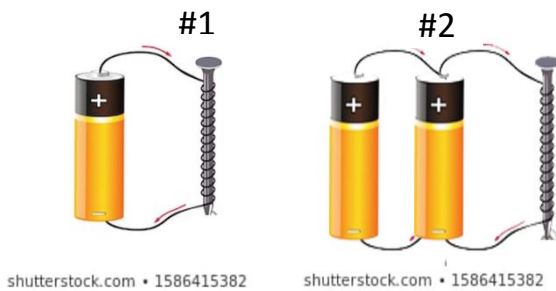
- Number of coils of wire – each turn of the wire adds more force to the electromagnet



In this setup, electromagnet A has more coils of wire compared to electromagnet B.

Therefore, electromagnet A attracts more pins because it has more coils of wire adding more force to its electromagnet.

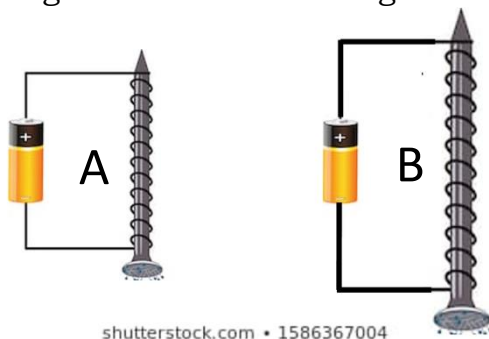
- Number of dry cells/batteries – more dry cells/batteries mean more electrons flowing in the electromagnet and, stronger magnetism is produced.



Electromagnet #1 has 1 dry cell/battery while electromagnet #2 has two dry cells/batteries.

In this setup, electromagnet #2 has more strength because of the two dry cells/batteries giving it more electrons flowing to produce stronger magnetism.

- Size of the iron core – the greater the size of the iron core, the stronger magnetism an electromagnet has.



Electromagnet A has a large nail that serves as its iron core while electromagnet B has small nail.

The electromagnet that has stronger magnetism is A because of its bigger iron core.



What's More

Directions: Identify what is being described in each sentence. Use the jumbled letters as your guide and write your answer on the space provided.

- _____ 1. (MAGTROELECNET)
It is an object that uses electricity to create magnet.
- _____ 2. (TYELECCITRI)
This is transformed to create a magnetic force.
- _____ 3. (TTEBARY)
This is the power source of the electromagnet.
- _____ 4. (TISMNETMAG)
It is the ability of the iron rod to attract metals objects with the use of battery.
- _____ 5. (NORI EROC)
The greater the size of this, the stronger the magnetism of the electromagnet.
- _____ 6. (TEDNECDISCON)
When this happens to the end of the wire and battery, no current will flow.
- _____ 7. (MAGELECNETISMTRO)
This is the study of the relationship of electricity and magnet.
- _____ 8. (RENGORTS)
This happens to the magnetic force of an electromagnet if you add more coils of wire to it.
- _____ 9. (TENMAG)
It is a thing that attracts metals and iron.
- _____ 10. (STCARTTA)
This is what electromagnets do to metals and irons.



What I Have Learned

Directions: Read each statement carefully. Write **T** if the statement is true, if it is false, change the underlined word to make the statement correct. Write the correct word on the space provided before the number.

- ___ 1. An electromagnet attracts like a real magnet.
- ___ 2. The number of batteries also affects the strength of an electromagnet.
- ___ 3. An electromagnet can be made weaker by using more coils of wire.
- ___ 4. The lesser the size of the iron core, the stronger magnetism an electromagnet has.
- ___ 5. Electromagnet cannot attract materials made of metals.
- ___ 6. Electromagnetism means transforming electricity to create a magnetic force.
- ___ 7. Pins and thumbtacks are examples of metals that can attracted by an electromagnet.
- ___ 8. Electromagnets are permanent magnets.
- ___ 9. Electricity and magnets are closely related to each other.
- ___ 10. More dry cells mean less electrons flowing in the electromagnet.

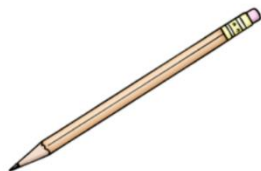


What I Can Do

Read the situation earnestly.

Jose's father bought a new motorcycle. He asked Jose to get the key of the motorcycle in the cabinet. Jose hurriedly went inside the house to get the key and as he rushed outside, the key fell into the manhole. How can you help Jose retrieve the key from the manhole?

Direction: Circle the things that you can use to make an electromagnet to help Jose retrieve the key from the manhole. Explain in 4 or more sentences how it works with correct grammar and spelling.



pencil



wire



eraser



tape



stick



penny



nail



battery



string

	Very Good	Good	Fair
Components	All components of an electromagnet are shown.	1 or two components of an electromagnet is missing.	More than two of the components of an electromagnet is missing.
Creativity	Shows very good creativity in making an electromagnet.	Shows good creativity in making an electromagnet.	Shows fair creativity in making an electromagnet.
Explanation	Explained how all the components of an electromagnet work together.	Explained how some of the components of an electromagnet work together.	Explained how few of the components of an electromagnet work together.



Assessment

Direction: Encircle the letter that best completes the sentence.

- An electric current in a wire coil produces _____.
 - another current
 - a magnetic field
 - a generator
 - a source of voltage
- To strengthen an electromagnet, _____.
 - decrease the voltage
 - increase the number of turns in a coil
 - put a non-magnetic substance in the coil
 - limit the battery to one
- Which is true about electromagnets?
 - they are permanent
 - they do not need a battery
 - increasing the number of coils makes the electromagnet stronger
 - increasing the battery makes the electromagnet weaker
- You can make an electromagnet stronger by _____.
 - having smaller current in the wire
 - having greener current in the wire
 - having larger current in the wire
 - having water current in the wire
- An electromagnet is _____.
 - a compass with magnet that tells direction
 - a magnet made when electric charges move through a coil of wire wrapped around an iron core or center
 - a device that produces electric current from energy stored in chemicals
 - a device that can prevent an electric shock

6. An electromagnet can be made stronger by _____.
 - a. adding more coils of wire to the iron core.
 - b. using a smaller battery
 - c. removing all the coils and iron core
 - d. reversing the pole of magnet
7. In increasing the strength of an electromagnet, you need to _____.
 - a. increase the amount of current flowing in the wire
 - b. change the position of the battery
 - c. insert a wooden core inside the coil
 - d. decrease the number of coils of wire
8. The strength of the magnetic field of an electromagnet can be increased by _____.
 - a. decrease the number of dry cell/batteries
 - b. decrease the current
 - c. increase the number of dry cell/batteries
 - d. increase the resistance
9. If you want to lessen the power of an electromagnet, you will have to _____.
 - a. increase the number of batteries
 - b. increase the size of the iron core
 - c. decrease the size of the iron core
 - d. lessen the time in making the electromagnet
10. An electromagnet with more coils wrapped around its iron core has more capacity in attracting metals and iron than the one with less coils because _____.
 - a. the electromagnet with more coils has a magnetic field
 - b. the one with more coils insulates the current of the magnet
 - c. it has less current in its magnetic field
 - d. the electromagnet with more coils provides more current to the magnetic field



Additional Activities

Make a diagram of an electromagnet. Label each part and explain how each component works.

	Very Good	Good	Fair
Components	All components of an electromagnet are shown in the drawing.	One or two components of an electromagnet is missing in the drawing.	More than two of the components of an electromagnet is missing in the drawing.
Content	Explanation of how all the components work is correct.	Explanation of 1 or two of the components works is incorrect.	Explanation of more than two of the components works is incorrect.
Label	All the components of an electromagnet are labelled correctly.	1 or two components of an electromagnet are labelled incorrectly.	More than two of the components of an electromagnet is incorrectly labelled.

Answer Key-Gr5Q3W6 Science

<p>What's In</p> <p>electricity magnet iron attract electromagnet</p> <p>What's More</p> <ol style="list-style-type: none">1. ELECTROMAGNET2. ELECTRICITY3. BATTERY4. MAGNETISM5. IRON CORE6. DISCONNECTED7. ELECTROMAGNETISM8. STRONGER9. MAGNET10. ATTRACTS <p>What I Have Learned</p> <ol style="list-style-type: none">1. T2. T3. stronger4. greater5. can6. T7. T8. temporary9. T10. more <p>What I Can Do</p> <p>Answers may vary</p>	<p>Assessment</p> <ol style="list-style-type: none">1. c2. a3. a4. c5. d <p>Additional Activities</p> <p>Answers may vary</p>
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References

Department of Education (2016). Science Beyond Borders 5 Textbook

RBS Science and Technology Series (2017). The New Science Links 5. Revised Edition

Region IX: Zamboanga Peninsula Hymn – Our Eden Land

Here the trees and flowers bloom
Here the breezes gently Blow,
Here the birds sing Merrily,
The liberty forever Stays,

Gallant men And Ladies fair
Linger with love and care
Golden beams of sunrise and sunset
Are visions you'll never forget
Oh! That's Region IX

Cebuanos, Ilocanos, Subanons, Boholanos, Ilongos,
All of them are proud and true
Region IX our Eden Land

Here the Badjaos roam the seas
Here the Samals live in peace
Here the Tausogs thrive so free

Hardworking people Abound,
Every valleys and Dale
Zamboangueños, Tagalogs, Bicolanos,

Region IX
Our..
Eden...
Land...

My Final Farewell

Farewell, dear Fatherland, clime of the sun caress'd
Pearl of the Orient seas, our Eden lost!,
Gladly now I go to give thee this faded life's best,
And were it brighter, fresher, or more blest
Still would I give it thee, nor count the cost.

On the field of battle, 'mid the frenzy of fight,
Others have given their lives, without doubt or heed;
The place matters not-cypress or laurel or lily white,
Scaffold or open plain, combat or martyrdom's plight,
T is ever the same, to serve our home and country's need.

I die just when I see the dawn break,
Through the gloom of night, to herald the day;
And if color is lacking my blood thou shalt take,
Pour'd out at need for thy dear sake
To dye with its crimson the waking ray.

My dreams, when life first opened to me,
My dreams, when the hopes of youth beat high,
Were to see thy lov'd face, O gem of the Orient sea
From gloom and grief, from care and sorrow free;
No blush on thy brow, no tear in thine eye.

Dream of my life, my living and burning desire,
All hail ! cries the soul that is now to take flight;
All hail ! And sweet it is for thee to expire ;
To die for thy sake, that thou mayst aspire;
And sleep in thy bosom eternity's long night.

If over my grave some day thou seest grow,
In the grassy sod, a humble flower,
Draw it to thy lips and kiss my soul so,
While I may feel on my brow in the cold tomb below
The touch of thy tenderness, thy breath's warm power.

Let the moon beam over me soft and serene,
Let the dawn shed over me its radiant flashes,
Let the wind with sad lament over me keen ;
And if on my cross a bird should be seen,
Let it trill there its hymn of peace to my ashes.

Let the sun draw the vapors up to the sky,
And heavenward in purity bear my tardy protest
Let some kind soul o'er my untimely fate sigh,
And in the still evening a prayer be lifted on high
From thee, O my country, that in God I may rest.

Pray for all those that hapless have died,
For all who have suffered the unmeasur'd pain;
For our mothers that bitterly their woes have cried,
For widows and orphans, for captives by torture tried
And then for thyself that redemption thou mayst gain

And when the dark night wraps the graveyard around
With only the dead in their vigil to see
Break not my repose or the mystery profound
And perchance thou mayst hear a sad hymn resound
'T is I, O my country, raising a song unto thee.

And even my grave is remembered no more
Unmark'd by never a cross nor a stone
Let the plow sweep through it, the spade turn it o'er
That my ashes may carpet earthly floor,
Before into nothingness at last they are blown.

Then will oblivion bring to me no care
As over thy vales and plains I sweep;
Throbbing and cleansed in thy space and air
With color and light, with song and lament I fare,
Ever repeating the faith that I keep.

My Fatherland ador'd, that sadness to my sorrow lends
Beloved Filipinas, hear now my last good-by!
I give thee all: parents and kindred and friends
For I go where no slave before the oppressor bends,
Where faith can never kill, and God reigns e'er on high!

Farewell to you all, from my soul torn away,
Friends of my childhood in the home dispossessed!
Give thanks that I rest from the wearisome day!
Farewell to thee, too, sweet friend that lightened my way;
Beloved creatures all, farewell! In death there is rest!

I Am a Filipino, by Carlos P. Romulo

I am a Filipino—inheritor of a glorious past, hostage to the uncertain future. As such I must prove equal to a two-fold task—the task of meeting my responsibility to the past, and the task of performing my obligation to the future.

I sprung from a hardy race, child many generations removed of ancient Malayan pioneers. Across the centuries the memory comes rushing back to me: of brown-skinned men putting out to sea in ships that were as frail as their hearts were stout. Over the sea I see them come, borne upon the billowing wave and the whistling wind, carried upon the mighty swell of hope—hope in the free abundance of new land that was to be their home and their children's forever.

I am a Filipino. In my blood runs the immortal seed of heroes—seed that flowered down the centuries in deeds of courage and defiance. In my veins yet pulses the same hot blood that sent Lapulapu to battle against the first invader of this land, that nerved Lakandula in the combat against the alien foe, that drove Diego Silang and Dagohoy into rebellion against the foreign oppressor.

The seed I bear within me is an immortal seed. It is the mark of my manhood, the symbol of dignity as a human being. Like the seeds that were once buried in the tomb of Tutankhamen many thousand years ago, it shall grow and flower and bear fruit again. It is the insignia of my race, and my generation is but a stage in the unending search of my people for freedom and happiness.

I am a Filipino, child of the marriage of the East and the West. The East, with its languor and mysticism, its passivity and endurance, was my mother, and my sire was the West that came thundering across the seas with the Cross and Sword and the Machine. I am of the East, an eager participant in its spirit, and in its struggles for liberation from the imperialist yoke. But I also know that the East must awake from its centuries sleep, shake off the lethargy that has bound his limbs, and start moving where destiny awaits.

I am a Filipino, and this is my inheritance. What pledge shall I give that I may prove worthy of my inheritance? I shall give the pledge that has come ringing down the corridors of the centuries, and it shall be compounded of the joyous cries of my Malayan forebears when first they saw the contours of this land loom before their eyes, of the battle cries that have resounded in every field of combat from Mactan to Tirad Pass, of the voices of my people when they sing:

"I am a Filipino born to freedom, and I shall not rest until freedom shall have been added unto my inheritance—for myself and my children and my children's children—forever."