Name _____ Date _____

Electricity and Magnetism

How are electricity and magnetism related?

Before You Read

Before you read the chapter, think about what you know about electricity and magnetism. Record three things that you already know about electricity and magnetism in the first column. Then write three things that you would like to learn about in the second column. Complete the final column of the chart when you have finished this chapter.

K What I Know	W What I Want to Learn	L What I Learned

Chapter Vocabulary

Lesson 1	Lesson 2	Lesson 3
NEW electrically neutral electrically charged electric discharge electric insulator electric conductor electric force electric field **ACADEMIC** nucleus	**REVIEW** light **NEW** electric current electric circuit generator electric resistance voltage	**NEW** magnet magnetic materials magnetic force magnetic domain electromagnet

A Lesson Content Vocabulary page for each lesson is provided in the Chapter Resources Files.

Lesson 1 Electric Charges and Electric Forces

Scan *Lesson 1. Read the lesson titles and bold words. Look at the pictures. Identify three facts you discovered about electric charges and electric forces. Record your facts in your Science Journal.*

Main Idea

Electric Charges

I found this on page 487 .

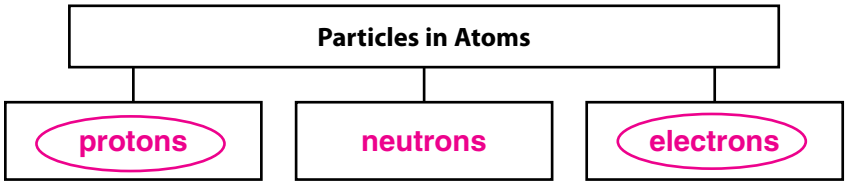
I found this on page 488 .

I found this on page 488 .

I found this on page 489 .

Details

Recall *the particles that make up atoms. Circle the particles that have electric charge.*



Differentiate electrically neutral *particles from* electrically charged *objects.*

Electrically Neutral	Electrically Charged
a particle with equal amounts of positive charge and negative charge	an object with an unbalanced amount of positive charge or negative charge

Contrast *positively and negatively charged objects.*

Positively Charged
an object that has given up electrons and has more protons than electrons

Negatively Charged
an object that has picked up electrons and has more electrons than protons

Order *the materials listed in the box according to how easily they lose electrons.*

paper	rubber	glass	wool

glass	wool	paper	rubber

more easily ↑ ↑ less easily

Main Idea

I found this on page 490.

Details

Define electric discharge. *Provide two examples.*

Electric Discharge

Definition: **the loss of an unbalanced electric charge**

Rapid: **a spark that jumps between your hand and a doorknob**

Gradual: **Static cling of clothing disappears on humid days.**

I found this on page 490.

Contrast insulators *and* conductors.

Electric Insulator

material in which electric charges cannot easily move

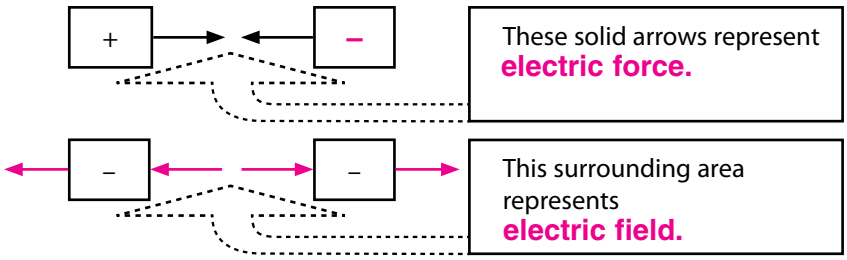
Electric Conductor

material in which electric charges easily move

Electric Fields and Electric Forces

I found this on page 491.

Model *the interaction between* electrically charged *objects. Add arrows and charges to complete the diagram.*



Connect It Summarize the electric charges you observe when you put on a sweatshirt from the clothes dryer and find a sock clinging to your sleeve.

Accept all reasonable responses. Sample answer: As the clothes rubbed together in the dryer, some of the material gave up electrons and other material picked up electrons. The materials became electrically charged. The sock and the sweatshirt have opposite unbalanced charges, so they attract each other.

Lesson 2 Electric Current and Electric Circuits

Skim *Lesson 2 in your book. Read the headings and look at the photos and illustrations. Identify three things you want to learn more about as you read the lesson. Record your ideas in your Science Journal.*

Main Idea

Electric Current—Moving Electrons

I found this on page 495 .

Details

Relate *electric charge to* electric current.

Electric current is the movement of electrically charged particles.

I found this on page 496 .

Contrast *two types of* electric current.

Direct Current	Alternating Current
a constant one-way flow of electrons	electric current that continually reversed direction

The Circuit—A Path for Electric Current

I found this on page 497 .

Characterize *an* electric circuit.

Electric Circuit

Definition: a closed or complete path in which an electric current flows

needs…

- electric energy — Example: battery
- device to transform electric energy — Example: light bulb
- an electric conductor — Example: wire

Main Idea

Details

I found this on page 498 .

Describe *three sources of electric energy.*

Battery	Generator	Solar Cell
a small, portable can of chemicals; chemical reactions move electrons from one end to the other.	a machine that transforms mechanical energy into electric energy	change sunlight directly into electric energy

I found this on page 499 .

Identify *the purpose of an electric device.*

Transforms electric energy to a specific form of useful energy

I found this on page 499 .

Generalize *the transformation of electric energy by different electric devices.*

Devices with higher resistance transform more energy.

Devices with lower resistance transform less energy.

I found this on page 499 .

Assess *the characteristic of copper wire that makes it a good conductor of an electric current.*

Copper has little electrical resistance.

I found this on page 499 .

Evaluate *why a good light cord should have low resistance.*

The cord should have low resistance in order to prevent the wasteful transformation of electric energy to thermal energy in the cord.

Main Idea

I found this on page 500 .

Details

Differentiate *types of* electric circuits.

Type	Description	Example
Simple	has a source of electric energy, a conductor path for current to flow through, and a single device	flashlight
Series	has multiple devices but a single path for current to flow through	a strand of holiday lights
Parallel	multiple devices, each connected to the electric source with a separate path for current	the electric circuits in a home

Voltage and Electric Energy

I found this on page 501 .

Relate *measurements of electric charge.*

A coulomb is 6,000,000,000,000,000,000 electric charges

Voltage
the amount of energy used to move one coulomb through the circuit

A Practical Electric Circuit

I found this on page 502 .

Identify *an additional component included for safety or convenience in a practical* electric circuit.

a switch to start and stop an electric device

Analyze It Infer why electric energy should be conserved.

Accept all reasonable answers. Sample answer: All processes which transform one form of energy to electric energy disturb the environment in some way. An example is the pollution produced when fossil fuels are burned. Less human impact on the environment will help maitain a healthier life for everyone.

Lesson 3 Magnets and Magnetism

Predict *three facts that will be discussed in Lesson 3 after reading the headings. Record your predictions in your Science Journal.*

Main Idea

Details

What is a magnet?

I found this on page 506 .

Relate magnets *and* magnetic materials.

Magnet	Magnetic Material
an object that attracts iron and other materials that have magnetic qualities similar to iron	any material that a magnet attracts

Magnetic Fields and Magnetic Forces

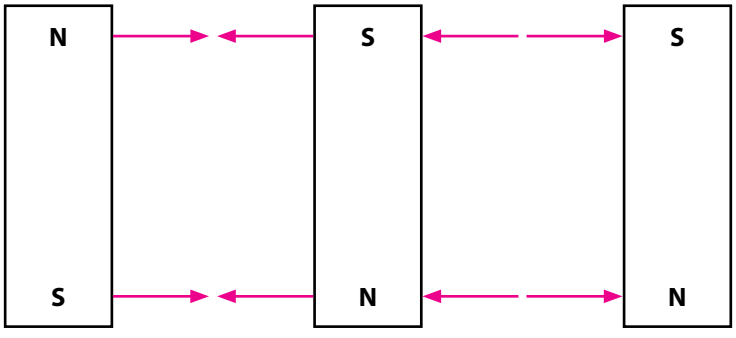
I found this on page 507 .

Compare and contrast *a magnetic field and an electric field.*

The electric field around a charged object exerts a force on other charged objects. The magnetic field around a magnet exerts a force on other magnets and magnetic materials. Both fields apply forces without objects actually touching.

I found this on page 508 .

Diagram magnetic force. *Draw arrows to represent forces exerted by magnetic poles.*



I found this on page 508 .

Explain *the general relationship shown in the diagram t hat you completed above.*

Similar poles repel; opposite poles attract.

Main Idea

I found this on page 508 .

Magnets

I found this on page 509 .

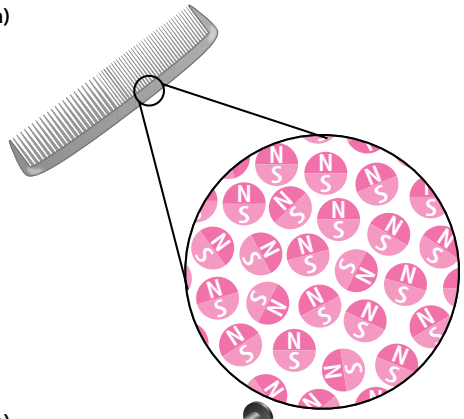
Details

Relate *Earth's geographic and magnetic poles.*

Magnetic north pole → **geographic south pole**

Illustrate *the concept of* magnetic domains. *Draw the domains for each type of material, and complete the descriptions to the right.*

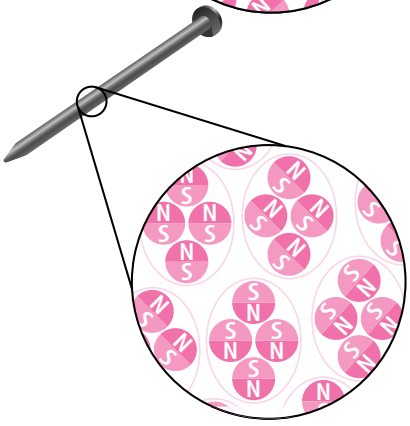
a)



Type of material: **nonmagnetic**

Description of atoms: **not grouped in magnetic domains**

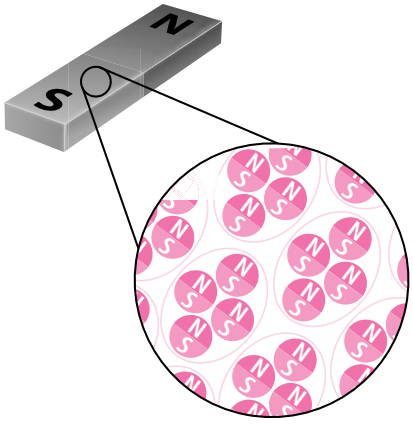
b)



Type of material: **magnetic**

Description of atoms: **grouped in domains but pointing in different directions**

c)



Type of material: **magnet**

Description of atoms: **grouped in domains, lined up in the same direction**

Main Idea

I found this on page 510.

Details

Differentiate *types of* magnets *and* magnetic materials.

Soft Magnetic Material	Hard Magnetic Material
quickly lose their magnetic fields	keep their magnetic fields for a long time
Temporary Magnet	**Permanent Magnet**
a magnetic material that becomes a magnet when it is in the magnetic field of a permanent magnet	a material with magnetic domains that stay locked in alignment

Combining Electricity and Magnetism

I found this on page 511.

Relate magnetic field and electric current.

Magnetic Field

produces electric current when it is moved over a wire coil.

Electric Current

produces a magnetic field in the wire it runs through.

I found this on page 512.

Describe *an* electromagnet.

a temporary magnet made with a current-carrying wire coli wrapped around a magnetic core

Analyze It Infer a characteristic that magnetic materials and good electrical conductors have in common.

Accept all reasonable responses. Sample answer: They are both typically metals.

Review Electricity and Magnetism

Chapter Wrap-Up

Now that you have read the chapter, think about what you have learned. Complete the final column in the chart on the first page of the chapter.

Use this checklist to help you study.

- ❏ Complete your Foldables® Chapter Project.
- ❏ Study your *Science Notebook* on this chapter.
- ❏ Study the definitions of vocabulary words.
- ❏ Reread the chapter, and review the charts, graphs, and illustrations.
- ❏ Review the Understanding Key Concepts at the end of each lesson.
- ❏ Look over the Chapter Review at the end of the chapter.

Summarize It Reread the chapter Big Idea and the lesson Key Concepts. Summarize how an electric current can be used to produce a magnetic field and a magnetic field can be used to produce an electric current.

Accept all reasonable responses. Sample answer: A wire that is carrying an electric current is surrounded by a magnetic field. Wrapping such a wire around a permanent magnet dramatically increases the strength of the magnetic field and produces an electromagnet. Passing a wire loop and a magnet past each other causes electric current to flow in the wire. Repeating this process in a continuous cycle is how generators work to produce an electric current.

Challenge *Do research to learn about how electric motors use magnets. Design a poster that shows and explains how electric motors and electric generators are the opposites of one another.*