CCPS Science Unit Plan

Grade	8th	**Subject**	Science	**Unit #**	4
Unit Name	Electricity and Magnetism		**Timeline**	3 Weeks	
How to use the Framework	This Framework should be used to implement daily science instruction. The resources and instructional strategies reflected in the Framework will provide a foundation for effective implementation and student mastery of standards. Please see the hyperlinked abbreviation document to ensure understanding of all abbreviations used with this framework.				
Unit Overview	In this middle school science unit on electricity, magnetism, and gravitational forces, students will explore the invisible forces that shape our world and the universe. They will investigate the principles of electric charge, electric fields, and current, learning how electricity powers our daily lives. Students will delve into the properties of magnets and the relationship between electricity and magnetism, discovering the fundamentals of electromagnetism through engaging experiments. Additionally, they will study gravitational forces, understanding how gravity governs the motion of planets, stars, and galaxies and affects objects on Earth. By the end of the unit, students will have a comprehensive understanding of these fundamental forces, providing a foundation for further exploration in physical science and engineering.				
Lesson Plan guidance document and template	CCPS Lesson Plan Template Day View Lesson Plan Template Week View Department of Science Guidance Document Science SBC Instructional Framework.pdf				

3Dimensional Instruction

GSE	Science and Engineering Practices	Crosscutting Concepts
S8P5. Obtain, evaluate, and communicate information about gravity, electricity, and magnetism as major forces acting in nature. **S8P5.A.** Construct an argument using evidence to support the claim that fields (i.e., magnetic fields, gravitational fields, and electric fields) exist between objects exerting forces on each other even when the objects are not in contact. **S8P5.B.** Plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators. (Clarification statement: Include conduction, induction, and friction.) **S8P5.C.** Plan and carry out investigations to identify the factors (e.g., distance between objects, magnetic force produced by an electromagnet with varying number of wire turns, varying number or size of dry cells, and varying size of iron core) that affect the strength of electric and magnetic forces. (Clarification	• Develop and use Models • Engage in Arguments from Evidence • Asking Questions and Defining Problems • Planning and Carrying Out Investigations • Analyzing and Interpreting Data • Using Mathematical and Computational Thinking • Constructing Explanations and Designing Solutions • Obtaining, Evaluating, and Communicating Information	• Patterns • Cause and effect • Scale, proportion, and quantity • Systems and system models • Energy and matter • Structure and function • Stability and change

	statement: Including, but not limited to, generators or motors.)		

NGSS Alignment	NGSS Alignment to Disciplinary Core Ideas • **MS-PS2-3.** Ask questions about data to determine the factors that affect the strength of electric and magnetic forces. • **MS-PS2-4.** Construct and present arguments using evidence to support the claim that gravitational interactions are attractive and depend on the masses of interacting objects. • **MS-PS2-5.** Conduct an investigation and evaluate the experimental design to provide evidence that fields exist between objects exerting forces on each other even though the objects are not in contact.

Weekly Lesson Tasks

Week 1

GSE: **S8P5.** Obtain, evaluate, and communicate information about gravity, electricity, and magnetism as major forces acting in nature. **S8P5.A.** Construct an argument using evidence to support the claim that fields (i.e., magnetic fields, gravitational fields, and electric fields) exist between objects exerting forces on each other even when the objects are not in contact.	**Focused Concept:** • The focus concept for this element is to understand how magnetic, gravitational, and electric fields exist between objects and exert forces on each other.
SEP: • Obtain, evaluate, and communicate information • Construct an argument using evidence	**CCC:** • Energy and Matter • Cause and Effect
Phenomenon: • How is a battery-powered fan similar to this hand-cranked flashlight? • Why doesn't the plant fall down? • Why does the balloon attract the water?	**DQ:** • How are electric and magnetic forces used to transfer energy? • How do magnetic fields interact? • How do electric charges attract and repel objects?

	Day 1	Day 2	Day 3	Day 4	Day 5
Learning Targets	SWBAT construct an argument using evidence to support the claim that fields (i.e.magnetic fields, gravitational fields, electric fields) exist between objects exerting	SWBAT construct an argument using evidence to support the claim that fields (i.e.magnetic fields, gravitational fields, electric fields) exist between objects exerting	SWBAT construct an argument using evidence to support the claim that fields (i.e.magnetic fields, gravitational fields, electric fields) exist between objects exerting	SWBAT construct an argument using evidence to support the claim that fields (i.e.magnetic fields, gravitational fields, electric fields) exist between objects exerting	SWBAT construct an argument using evidence to support the claim that fields (i.e.magnetic fields, gravitational fields, electric fields) exist between objects exerting forces on each other even

	forces on each other even when the objects are not in contact	forces on each other even when the objects are not in contact	forces on each other even when the objects are not in contact	forces on each other even when the objects are not in contact	when the objects are not in contact
Opening	The teacher will introduce the unit using the strategy List_Group_Label. Create a picture splash containing images for a new concept you will be teaching. It builds student background but also helps teachers gauge student vocabulary knowledge. **Electricity Pic Splas…** **List-Group-Label**	In the Inspire Science: Energy and Motion textbook, pg. 172 Have students study the photo of the levitating planter.	Science Probe: Electric Charge in the Inspire Science: Energy and Motion textbook pg. 197 Have Students study the photo of the water stream and balloon	Teacher will ask: What do you think will affect the strength of an electric field?	Teacher will introduce Gravity and Gravitational Force: You are a giant floating in Earth's Atmosphere. ● If you dropped a planet larger than Earth, what would happen? ● What if you dropped another planet the same size as Earth? ● Describe the interaction of gravitational forces between objects. Moon Landing and Walking on Moon **(Start video at 1:45 and end at 2:00)** Students will be prompted to imagine life if they lived on a different planet. Place students in groups. The teacher will then go over the writing prompt: " What would walking be like if you lived on the moon?"
Guided Practice/ Transition	Teachers will administer **Pre-Test: Unit 4:** Pre-test Teacher Version Pre-Test Student Version After the Pre-Test, In the teacher edition, the teacher will: Go online and watch the video Power On! Think about what you	Encounter the Phenomenon: Why doesn't the plant fall? Inspire Science: Energy and Motion **Activity is on pg. 173** ****Pre-prep before class: Tie a string to a paper clip for each group**. **Suggested Materials:** -Paper clip -String	Encounter the Phenomenon: Why does the balloon attract water? Inspire Science: Energy and MotionActivity is on pg. 199 Encounter the Phenomenon **Before activity:** Brainstorm familiar examples of static electricity, such as newly	Complete the C-E-R Activity from the previous day. **Phet: Balloon and Electricity/John Travoltage** **Introduce Gravitational Fields:** ● What would happen if you were to drop a book on the floor? ● What forces cause the	Students will write a narrative to answer the question, " What would it be like to walk if you lived on the moon? " Students must incorporate the following: gravitational force, the planet's mass, their weight on the planet, and a description of what it is like to perform simple tasks.

	know about how the fan and the flashlight work. Students will discuss his or her thoughts with a partner. Then, record what they would like to share with the class. Inspire Science: Energy and Motion textbook, Pg 169; complete the "Encounter the Phenomenon" activity. see_think_wonder_t…	-Tape -Bar magnet. **After the activity:** -Students will go online and watch the video provided by the teacher in the teacher's edition **Magnet Magic**. -Students will discuss what they see in the video and how it relates to the activity.	dried clothes Review what students learned about magnetic poles and magnetic forces.	book to fall? **Gravity is a force exerted between two objects.** ● What are the objects in the system?	
Independent Practice	Ask: How have you played with magnets? What can happen when you bring magnets together? Science Probe: Which pole is it? Pg. 171 textbook	C-E-R: Create a claim on how magnets can keep a plant from falling. Inspire Science: Energy and MotionTextbook pg 173-174	Static Electricity Phet Students will use the Balloons and Electricity PHet to illustrate how the charges are transferred. You can also assign John Travoltage Phet **https://phet.colorado.edu/en/simulations/john-travoltage/teaching-resources** **Static Electricity Vi…**	Students will conduct a mini lab in groups on the gravitational force by dropping different objects from the same height. Copy of Gravitation…	Students will continue to work on the narrative. Students will be assessed using the following rubric
Assessment Summary	What will happen if a magnet is broken?	How is Earth like a magnet?	How does the strength of a magnet's force change when it gets bigger or closer to an object?	Name one similarity between magnetic forces and electric forces	What factors affect the way the objects fall?
Small Group Tasks (TBA)					

Week 2					
GSE: **S8P5.** Obtain, evaluate, and communicate information about gravity, electricity, and magnetism as major forces acting in nature. **S8P5.B.** Plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators. (Clarification statement: Include conduction, induction, and friction.)	**Focused Concept:** ● The focus concept for this element is to determine the distribution of charges in conductors and insulators.				
SEP: ● Obtain, evaluate, and communicate information ● Plan and carry out investigations			**CCC:** ● Energy and Matter ● Cause and Effect		
Phenomenon: Why doesn't the plant fall down?			**DQ:** ● How do different materials hold electric charges?		
	Day 6	**Day 7**	**Day 8**	**Day 9**	**Day 10**
Learning Targets	SWBAT construct an argument using evidence to support the claim that fields (i.e.magnetic fields, gravitational fields, electric fields) exist between objects exerting forces on each other even when the objects are not in contact.	SWBAT plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators.	SWBAT plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators.	SWBAT construct an argument using evidence to support the claim that fields (i.e.magnetic fields, gravitational fields, electric fields) exist between objects exerting forces on each other even when the objects are not in contact. SWBAT plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators.	SWBAT construct an argument using evidence to support the claim that fields (i.e.magnetic fields, gravitational fields, electric fields) exist between objects exerting forces on each other even when the objects are not in contact. SWBAT plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators.
Opening	The teacher will play the video Gravitational Force Have students complete a summary or STW: 3-2-1 Summary	Teachers will share the following: Based on the properties of different materials, they will hold different charges. **Teacher will ask:**	The teacher will use up to 5 Unit 4 Assessment Prep questions to gauge understanding. Then, students and the teacher will discuss some of the essential topics to ensure	Ask about progress on the choice board. Meet with small groups and clarify expectations.	Kahoot, Quizizz, or Blookit to review for Formative Assessment. ****Use previous exit ticket questions to review.**

	see_think_wonder_t… **Gravitational Force**	Would you expect a comb or aluminum foil to hold charge better? -Students will discuss answers as a class. Teacher will show the following video. Conductors and Insulators Students will answer questions (**whole group**).	there are no misconceptions and remediate most missed questions.		
Guided Practice/Transition	The teacher will provide additional notes on: -Gravitational Forces -Electric Forces -Magnetic Forces **Additional Notes:** Fields and Forces **Students will categorize information based on the different fields and forces on the graphic organizer.** **Cornell Notes Organizer** (Students can draw this organizer into their notebooks.)	The teacher will use PowerPoint and take notes to teach further about conductors and insulators. ConductorsandInsul… Copy of Conductors…	The teacher will introduce the Electricity Choice Board and explain expectations. -Students will select the activities they want to complete on the "Choice Board" to demonstrate mastery of the standard. **Differentiation:** Work in groups of 2-3 **-Beginner Learners:** complete at least **one** task **-Developing Learners:** complete at least **two** tasks. **-Proficient/Advanced:** complete at least **three** tasks.	ChoiceBoard. The teacher will check in and see progress. Copy of Electricity a…	Formative Assessment S8P5a/b **located in Illuminate**
Independent Practice	Continue reading notes and fill in a graphic organizer **Cornell Notes Organizer** (Students can draw this	Students will conduct a mini-investigation where they will predict whether each item is made from a conductor or insulator	Students will work on their ChoiceBoard. The teacher will check in and see progress.	Students will work on their ChoiceBoard. The teacher will check in and see progress.	Students will review their most missed questions using Illuminate data. Students will complete test corrections.

	organizer into their notebooks.)	material. Then, test each item to determine if it is made from a conductor or insulator. **Ask: What pattern are you noticing about certain materials?** Conductors and Insu…	Exemplar: Copy of Electricity a…	Students will present assignments to the teacher. The teacher will provide feedback and grade	**-Identify Missed Question** **-Why did you choose that answer?** (be honest, ex. I guessed or did not read the entire question.) **-Correct Answer** **-Why is it correct?** (ex. Where in your notes/interactive notebook did you find the correct answer.) Test Corrections .docx
Assessment/Summary	TOTD: Where is the most gravitational attraction between two football players, a football player and a toddler? Justify your answer.	Exit Ticket: What would happen if a positively charged conductor touches a neutral conductor?	What challenges are you having with the choice board activity? How can you turn these into successes?	Work on Lesson 2 Review in the McGraw Hill textbook if time permits. Pg. 214 questions 1-3	Students will record their scores on their Data Tracking Sheets and respond to the reflection questions.
Small Group Tasks (TBA)					

Week 3	
GSE: **S8P5.** Obtain, evaluate, and communicate information about gravity, electricity, and magnetism as major forces acting in nature. **S8P5.C.** Plan and carry out investigations to identify the factors (e.g., distance between objects, magnetic force produced by an electromagnet with varying number of wire turns, varying number or size of dry cells, and varying size of iron core) that affect the strength of electric and magnetic forces. (Clarification statement: Including, but not limited to, generators or motors.)	**Focused Concept:** • The focus concept for this element is to plan and carry out an investigation to identify the factors that affect electric and magnetic forces.
SEP: • Obtain, evaluate, and communicate information • Plan and carry out investigations	**CCC:** • Energy and Matter • Systems and System Models • Cause and Effect
Phenomenon:	**DQ:**

Electromagnet STW ADI Lab 10 Show students the slide with various technologies that utilize Electromagnetism. Have students complete the STW protocol.			• How do distance and force affect the strength of electric and magnetic forces?		
	Day 11	**Day 12**	**Day 13**	**Day 14**	**Day 15**
Learning Targets	SWBAT plan and carry out investigations to identify the factors that affect the strength of electric and magnetic forces.	SWBAT plan and carry out investigations to identify the factors that affect the strength of electric and magnetic forces.	SWBAT plan and carry out investigations to identify the factors that affect the strength of electric and magnetic forces.	SWBAT plan and carry out investigations to identify the factors that affect the strength of electric and magnetic forces.	SWBAT plan and carry out investigations to identify the factors that affect the strength of electric and magnetic forces.
Opening	Electromagnet STW… **ADI Lab Stage 1: Task** • Present phenomenon or problem for students to figure out • Students engage in STW protocol • Introduce the task to students and have them share ideas about the problem/phenomenon. • Ask students what they need to learn to figure out the problem. **Guiding Question:** How Is the Strength of an Electromagnet Affected by the Number of Turns of Wire in a Coil?	Have students review their proposals and gather materials to begin their investigations.	Have examples (pictures) of completed ADI Boards for students to view. Review the board's components: Guiding Question, Claim, Evidence, Justification. Facilitate a discussion on how to create strong arguments.	The teacher will ask students: "What thoughts and connections can you make about the images from the lesson phenomenon?" Students will discuss the images and how they may be related to the electromagnet they designed and tested.	The teacher will display the slide from the lesson phenomenon and lead a final discussion on the connection between the images and electromagnets.
Guided Practice/Transition	Student Lab Handout Teacher Lab Handout **ADI Lab Stage 2: Ideas** • Review the Anchor chart for annotating text • Close reading of the investigation and core ideas students might use to figure out the	**ADI Lab Stage 4: Do** • Student groups will follow their plans to collect data during their investigations. • Students will analyze their data and determine if they have enough data to answer the guiding question. • Groups will be allowed to collect additional	**ADI Lab Stage 5: Share** Copy of ADI Board • Student groups will create an evidence-based claim that answers the guiding question. • Review how to give feedback on an	**ADI Stage 6: Reflect** Lead a discussion on the core ideas, SEPs, and CCCs used in the investigation. Notes will be provided, and any misconceptions on electromagnets will be addressed.	**ADI Stage 7: Report** Students will construct a report to communicate what they did and what they figured out during the investigation. Rough drafts of papers will be created and exchanged. Students will give feedback

	problem. ● Students talk with their group and determine what ideas might be helpful. ● Lead discussion on group member roles and expectations for the lab. **ADI Lab Stage 3: Plan** ● Students will work with their group to create a plan for their investigation. ● Investigative proposal template ○ Review the proposal with students ○ Review available materials with students. ○ Lab Safety ○ Tool Talk ● Student groups will share their plans with another group and the teacher to receive feedback. ○ Review how to give feedback on a proposal.	data if needed. **Tips:** ● Make sure students have enough data to answer the guiding question.	argument. ● Student groups will share their findings with the class and receive feedback on their claim, evidence, and justification. Feedback Form Tips: ● Students can present arguments to the whole class or do it as a gallery walk. ● Gallery Walk: 2 students remain with the board, and two students visit other boards to give feedback and take notes on other groups' investigations.	Students will take notes using a graphic organizer. PPT for Notes Cornell Notes Graphic Organizer	to 2 classmates on their reports using the provided template. Peer Review Form
Independent Practice	Students will (group work) revise and improve their plans based on feedback from their peers.	Students will analyze the data collected during the investigation and create an initial claim that answers the guiding question.	Students will be given time to revise their arguments based on feedback.	Students will identify the strengths and weaknesses of their investigations and reflect on them in their notebooks/journals.	Students will use the peer feedback to create the final draft of their papers for evaluation by the teacher.
Assessment/Summary	Describe the successes and challenges your group experienced when planning your investigation.	What challenges did your group encounter during data collection?	How did your group use the feedback from the argumentation session?	How can the core ideas learned during the lab be used to make sense of the lesson phenomenon?	Why is communicating your findings and having them peer-reviewed an important part of science?
Small Group Tasks					

(TBA)					

Week 4

GSE:
S8P5. Obtain, evaluate, and communicate information about gravity, electricity, and magnetism as major forces acting in nature.
S8P5.A. Construct an argument using evidence to support the claim that fields exist between objects exerting forces on each other even when the objects are not in contact.
S8P5.B. Plan and carry out investigations to demonstrate the distribution of charge in conductors and insulators.
S8P5.C. Plan and carry out investigations to identify the factors that affect the strength of electric and magnetic forces.

Focused Concept:
- The focus concept for this element is to understand how magnetic, gravitational, and electric fields exist between objects and exert forces on each other.
- The focus concept for this element is to determine the distribution of charges in conductors and insulators.
- The focus concept for this element is to plan and carry out an investigation to identify the factors that affect electric and magnetic forces. Students will design and test an electromagnet to identify these factors.

SEP:
- Obtain, evaluate, and communicate information
- Construct an argument using evidence
- Plan and carry out investigations

CCC:
- Energy and Matter
- Systems and System Models
- Cause and Effect

Phenomenon:
Refer to the weekly lesson phenomenon for unit test review.

DQ:
- How are electric and magnetic forces used to transfer energy?
- How do magnetic fields interact?
- How do electric charges attract and repel objects?
- How do different materials hold electric charges?
- How do distance and force affect the strength of electric and magnetic forces?

	Day 16	Day 17	Day 18	Day 19	Day 20
Learning Targets	Unit Test Review - See Assessment Prep	Unit Test			
Opening	Unit Test Review - See Assessment Prep	Unit Test			
Guided Practice/Transition	Unit Test Review - See Assessment Prep	Unit Test			
Independent Practice	Unit Test Review - See	Unit Test			

	Assessment Prep				
Assessment/Summary	Unit Test Review - See Assessment Prep	Unit Test			
Small Group Tasks (TBA)					

Assessment Prep

- **Unit 4 Assessment_Teacher Edition.pdf**
- **Unit 4 Assessment Prep.pdf**

Prepare students for assessment by reviewing the following Assessment Prep Presentation.

Provide the following guidance:
Ask the students to use what they know about the tasks completed to answer the provided assessment prep question.

- What is the question asking you?
- What do you know about the vocabulary or concept in the question?
- Is this question similar to any investigations or tasks we've completed?
- How can what you've done help you answer this question?
- Just view the assessment question: What is the question asking you?

Guide students to think about how their experience connects to the question.
Using the answer choices provided, ask the students the following:

- Identify a wrong answer: How do I know this answer is incorrect?
- Identify the right answer: How do we know this answer is correct?

Allow the students time to discuss in collaborative groups.

TEACHER NOTE: If students struggle with the question, review it the next day. Do not rush to the next question; instructional time is the only time they have to prepare for the end-of-year assessment.

Following the Unit Test:

- Have students correct any missed test items using one of the test correction templates: Template Option 1 Template Option 2
- Have students create goals for review and remediation of material
- Have students set goals for the next unit

Labs / Investigations		
Mandatory Labs	**Explore Learning Gizmo**	**Pivot Interactives/Phet**
ADI: Physical Science Lab 10 and 11 Magnetic Force: How Is the Strength of an Electromagnet Affected by the Number of Wire in a Coil? pg. 180 Which electromagnet design is best for picking up 50 paper clips?	S8P5.A. ● Charge Launcher ● Magnetic Induction S8P5.C. ● Charge Launcher ● Electromagnetic Induction ● Magnetic Induction	● Circuit Construction Kit ● Charges and Fields ● John Travoltage ● Balloons and Static Electricity ● Magnets and Electromagnets ● Conductivity ● Semiconductors

Additional Resources/Tasks	
Supplemental Resources	**Textbook:** McGraw Hill Inspire Science - Physical Science - Unit 1: Energy and Motion S8P5.A. magnetism_ppt 2023.pptx Gravity Force Lab (Phet Simulation) S8P5.B. Electric Charge and Static Electricity PPT.pptx S8P5.C. Additional Test Prep