Louisiana Believes

Distance Learning Support for OpenSciEd Grade 6
Unit 8.3 Forces at a Distance Unit

This resource is designed to support teachers in implementing distance learning for OpenSciEd Grade 6 Unit 8.3, Unit 4 in the Louisiana Guide to Implementing OpenSciEd Grade 6. It is intended as a supporting document and should be used in conjunction with the OpenSciEd Unit 8.3 Resources. The resources contained in this document have been adapted from OpenSciEd with permission under Creative Commons 4.0 licensing.

The OpenSciEd Remote Learning Resources linked below contain detailed information about adapting specific routines to a remote learning environment and a wide variety of options including those for students who do not have internet access:

- Fostering Productive Norms
- Anchor Phenomenon Routine
- Navigation Routine
- Supporting Discourse
- Problematizing Routine

This guidance document is considered a "living" document as we believe that teachers and other educators will find ways to improve the document as they use it. Please send feedback to STEM@la.gov so that we may use your input when updating this guide.

Updated November 10, 2020

DEPARTMENT of EDUCATION
louisiana believes

Norming Language	
Term	**Description**
Virtual Class Pre-Work	Assignments that students should do prior to virtual class meetings in order to be prepared to engage in discussions, there may be multiple assignments throughout a given lesson
Virtual Class Post-Work	Assignments designed for students to apply learning from virtual class meetings, there may be multiple assignments throughout a given lesson
Virtual Class	Live sessions with students through any digital conferencing platform, teachers may choose to allow students without internet to call in during these sessions and record virtual class sessions to share with those who cannot join
Thinking Deeper Documents	Progress trackers for students to use throughout each lesson to record and revise their thinking about science concepts related to the phenomenon; contain assignments for students to complete before, during, and after virtual classes, discussion boards, and home investigations
Lesson Slideshows	Lesson progression specific to each lesson used to guide student work; used during pre-work, post-work, virtual classes, home investigations, and discussion boards; can be shared with students in their entirety at the beginning of the lesson or broken into small portions and shared as needed
Discussion Boards	Assignments designed for students to share ideas and engage in discussion with one another over time rather than a live environment; students will use their Thinking Deeper Documents to brainstorm prior to submitting; teachers may choose to allow students without internet to text in responses and may screenshot/download and share portions of or full discussions via text (ex. through apps like Remind)
Home Investigations	Investigations with readily available materials designed for students to perform at home; teachers may choose to substitute videos or photos of data collection for students who cannot complete investigations at home

Lesson Set Overview: Lessons 1, 2, 3, 4, 5, 6

Lesson Set 1: Lessons 1-6		
Provided Resources Students Will Need	**Additional Resources Students Will Need**	**Additional Materials for Students Without Internet Access**
Lesson Slideshows for each lesson: L1, L2, L3, L4, L5, L6 **Thinking Deeper Documents for each lesson:** Lesson 1 TDD, Lesson 2 TDD, Lesson 3 TDD, Lesson 4 TDD, Lesson 5 TDD, Lesson 6 TDD **Additional Documents:** Sample Parent Letter - optional Lesson 4 Reading - optional Lesson 6 Assessment	**Lesson 1:** • DBQ, Cause/Effect, Investigation Ideas Discussion Board **Lesson 3:** • Home Learning Assignment **Lesson 4:** • Compasses for home investigation • Exit Ticket Assignment **Lesson 6:** • Thinking Deeper Document from previous lessons	**Prior to Lesson**: Lesson 1: Speaker Slow Motion Video, Speaker Dissection Video, Building a Homemade Speaker, Test the Speaker Video Lesson 2: Magnet Investigation, Coil Investigation Lesson 3: Blocking Air Investigation , Vacuum Chamber Video Lesson 4: Magnet Video, Magnetic Field Video 1, Magnetic Field Video 2, Concord Magnets Simulation, Magnet with Compasses Lesson 5: Concord Magnets 2 Simulation **After Lesson Completion:** Representation of naming conventions - Lesson 2 Models shared using shared document - Lesson 6 Consensus Model - Lessons 1, 2, 5, 6 Driving Question Board - Lessons 1, 4, 6 Virtual Class Recordings - Lessons 1, 2, 4, 5, 6
Students should ideally join VIRTUAL CLASS on the following days: Days 1 & 3 - Lesson 1 Day 6 - Lesson 2 Days 8 & 10 - Lesson 4 Day 12 - Lesson 5 Day 14 - Lesson 6		

Formative and Summative Assessment Opportunities:

Lesson 3: Home Learning CER
Lesson 4: Exit Ticket
Lesson 6: Lesson 6 Assessment

Lesson Set Overview: Lessons 7, 8, 9, 10, 11, 12

Lesson Set 2: Lessons 7-12		
Provided Resources Students Will Need	**Additional Resources Students Will Need**	**Additional Materials for Students Without Internet Access**
Lesson Slideshows for each lesson: L7, L8, L9, L10, L11, L12 **Thinking Deeper Documents for each lesson:** Lesson 7 TDD, Lesson 8 TDD, Lesson 9 TDD, Lesson 10 TDD, Lesson 11 TDD, Lesson 12 TDD **Additional Documents:** Sample Parent Letter - optional Lesson 8: Electric Current Extension (Optional) Lesson 11: Reading: Weak or Strong - Earth's Magnetic Field (optional) Lesson 12 Assessment	Lesson 7: • Lesson 6 TDD, Discussion Board, Video of Investigation, Sample Data *(optional)* Lesson 8: • Discussion Board Lesson 9: • Exit Ticket Assignment Lesson 10: • Discussion Board Lesson 11: • Magnetic Field Interactive Website Lesson 12: • Driving Question Board, Discussion Board	**Prior to Lesson**: Lesson 8: • Investigation 4: Coil & Compass • Investigation 5: LED Lights Lesson 9: • Alternate method for adding to DQB Lesson 11: • Magnetic Field Interactive Website - video of exploration **After Lesson Completion:** Virtual Class Recordings (Lessons 8, 9, 10, 11, 12) Discussion Boards (Lessons 7, 8, 10, 12) Consensus Model (Lesson 9) Driving Question Board (Lessons 9, 12)
Students should ideally join VIRTUAL CLASS on the following days: Days 2 & 4 - Lesson 8 Day 6 - Lesson 9 Day 9 - Lesson 10 Day 12 - Lesson 11 Day 14- Lesson 12		

Formative and Summative Assessment Opportunities:

Lesson 8: Discussion Board
Lesson 9: Exit Ticket
Lesson 10: Discussion Board
Lesson 12: Lesson 12 Assessment

Lesson 1 (4 days) - Anchoring Phenomenon

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- DBQ, Cause/Effect, Investigation Ideas Discussion Board - *teacher made*

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Speaker Slow Motion Video
- Speaker Dissection Video
- Building a Homemade Speaker
- Test the Speaker Video
- DBQ, Cause/Effect, Investigation Ideas Discussion Board - *teacher made*
- Consensus Model - *after completion*
- Virtual Class Recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Days 1 & 3

Lesson 1 (4 days) - Anchoring Phenomenon

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-4 (45 min) INTRODUCE THE SPEAKER SPEAKER DISSECTION DEMO MODEL THE SPEAKER SYSTEM INDIVIDUALLY IDENTIFY THE MOST IMPORTANT PARTS OF THE SYSTEM Slides A-H	Prior to the Virtual Class, the teacher should: 1. Set up for partner or small group discussion in break-out rooms if available for Virtual Classes on Days 1 & 3 and modify slideshow directions for Virtual Classes as needed. 2. Determine how students will share their initial models in the Virtual Class on Day 3 and prepare. (ex. Students can take a screenshot of the models and load them into a shared document, turn in their TDD or separate assignment and the teacher can compile them, or screen-share during class if allowed.) 3. Share Lesson Slideshow and Thinking Deeper Document with students. VIRTUAL CLASS: 1. Reflect on the phenomenon from the sound unit and review the consensus model to discuss what students figured out about the speaker. 2. Reflect on how we could use the speaker to determine how it vibrates then share and discuss as a class. (If break-out rooms are available; students could talk with a partner. If not, students can reflect individually before sharing out.) 3. Watch the speaker in slow motion video and record notices and wonders. 4. Discuss new ideas about what causes the speaker to vibrate and how taking the speaker apart might help us determine this. 5. Watch the speaker dissection video and discuss. 6. Develop initial models to explain how the parts of the speaker work together to cause forces that vibrate the speaker. 7. Identify what parts of the system are important and why. 8. Instruct students on how to submit their initial models or just inform them that they will share them in the next Virtual Class (if student screen-sharing is allowed).	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 5 (10 min) NAVIGATION TO THE HOMEMADE SPEAKER Slide I		VIRTUAL CLASS PRE-WORK: 1. Reflect on how we could use a homemade speaker to investigate what forces are causing vibrations.
Part 6 (20 min) BUILDING A HOMEMADE SPEAKER Slides J & K		VIRTUAL CLASS PRE-WORK: 1. Watch the video of making a homemade speaker and testing the homemade speaker. 2. Create an initial model for the homemade speaker.
Part 7 (15 min) COMPARING SPEAKERS Slides L & M		VIRTUAL CLASS PRE-WORK: 1. Using the part list that was made, highlight in yellow the parts that both speakers have in common and highlight in red the parts they do not. 2. Answer questions comparing the speakers and reflecting on how

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 8-10 (44 min) DEVELOP AN INITIAL MODEL FOR THE SPEAKER BROADENING TO RELATED PHENOMENA NAVIGATION Slides N-S	Prior to the Virtual Class, the teacher should: 1. Compile and prepare initial models for sharing during the virtual class if students will not be able to screen share. VIRTUAL CLASS: 1. Review class norms. 2. Discuss what was done so far in Lesson 1. 3. Have students share their initial models. 4. Look for agreement and construct a class consensus model. 5. Have students record the consensus model in their progress tracker on the Thinking Deeper Document. 6. Students brainstorm related phenomena on their own then share. The teacher creates a chart for class phenomena as students share electronically or on chart paper. 7. Examine a close-up image of a store-bought speaker and discuss. 8. Discuss the unit question.	

Day 4		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 11-12 (30 min) DEVELOP QUESTIONS FOR DRIVING QUESTION BOARD Slides T-W	1. Create and share assignments for students to submit their questions and cause and effect examples. (example: Google form, discussion thread on google classroom) 2. Compile and organize questions to make a Driving Question Board. 3. Share completed Driving Question Board with students if they do not already have access to it.	VIRTUAL CLASS POST WORK/DISCUSSION BOARD: 1. Come up with questions for Driving Question Board (Submit 1) 2. Think about cause and effect relationships in everyday life. 3. Come up with cause and effect relationships for the speaker system. (Submit 1) 4. Come up with questions for the cause and effect relationship (Submit 1).
Part 13 (13 min) PLAN IDEAS FOR INVESTIGATIONS Slide X		VIRTUAL CLASS POST WORK: 1. Create ideas for investigations that we could complete to help us answer our unit question. (Share 1)
Part 14 (2 min) NAVIGATION	*Not included in the distance learning plan.*	

Return to Lesson Set Overview

Lesson 2 (2 days) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Magnet Investigation
- Coil Investigation
- Representation of naming conventions - *after completion*
- Virtual Class Recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Day 2

Lesson 2 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (10 min) NAVIGATION Slides A & B	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Reflect on ideas about how the magnet could be responsible for pushing and pulling something in the speaker.
Part 2 (15 min) INVESTIGATION MAGNETS Slides C & D		VIRTUAL CLASS PRE-WORK: 1. Watch the Magnet Investigation video where materials are tested to determine which combinations produce pulls or a push and pull. 2. Record results from investigation. 3. Answer discussion questions.
Part 3 (15 min) BUILDING UNDERSTANDING Slides E-H		VIRTUAL CLASS PRE-WORK: 1. Reflect on the investigation. 2. Examine reference chart of composition of materials. 3. Answer questions about materials. 4. Reflect back on the compass needle. 5. Complete progress tracker.
Part 4 (5 min) NAVIGATION-EXIT TICKET Slide I		VIRTUAL CLASS PRE-WORK: 1. Complete exit ticket.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5-7 (35 min) NAVIGATION: MAKING PREDICTIONS CONNECT THE COIL OF WIRE TO THE BATTERY BUILDING UNDERSTANDINGS Slides J-Q	Prior to the Virtual Class, the teacher should: 1. Set up to demonstrate the coil investigation live or prepare to show students a video of the demonstration. VIRTUAL CLASS: 1. Navigate to the idea of connecting the coil to a battery and make predictions about what will happen. 2. Demonstrate coil investigation live or show a video (Sample Video: coil investigation) 3. Students record findings in the chart and answer discussion questions. Share and discuss. 4. Review what we know about forces. 5. Discuss what we have been up to. 6. Discussion representing forces and make a key to keep track of naming conventions. 7. Building understanding discussion about the coil investigation. 8. Record what was figured out in the progress tracker on the TDD. 9. Reflect on where the energy is coming from.	
Part 8 (10 min) NAVIGATION Slide R		VIRTUAL CLASS POST WORK: 1. Complete exit ticket.

Return to Lesson Set Overview

Lesson 3 (1 day) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Home Learning Assignment - *teacher made*

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Blocking Air Investigation
- Vacuum Chamber Video
- Home Learning Assignment - *teacher made*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- None

Lesson 3 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (15 min) NAVIGATION: MAKING PREDICTIONS Slides A-E	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Record ideas if they think the coil of wire is a magnet or not. 2. Jot down ideas to how energy is moving in the system. 3. Develop cause and effect relationships for predictions.
Part 2 (10 min) DEVELOP HYPOTHESES IN SCIENTISTS CIRCLE	*NOTE: Students develop hypotheses independently since work on this day is asynchronous.*	VIRTUAL CLASS PRE-WORK: 1. Develop hypotheses using the cause and effect chart.
Part 3 (10 min) TWO WHOLE-CLASS INVESTIGATIONS Slides F-J		VIRTUAL CLASS PRE-WORK: 1. Brainstorm ideas to investigate. 2. Identify variables for investigation. 3. Watch Blocking Air Investigation and make observations. 4. Interpret evidence from investigation. 5. Watch the investigation on Vacuum Chamber. 6. Record observations and answer questions.

Part 4 (5 min) MAKING SENSE AND HOME LEARNING Slides K & L	1. Create an assignment for students to submit their Home Learning CER. 2. Review submissions and provide feedback as needed individually or in the next Virtual Class.	VIRTUAL CLASS PRE-WORK: 1. Determine if our cause and effect relationships were supported by evidence from investigation. 2. Develop an explanation to explain why the magnets behaved the way they did in the vacuum chamber.
Part 5 (5 min) NAVIGATION Slide M		VIRTUAL CLASS PRE-WORK: 1. Reflect on how we can collect more evidence to explain how energy is moving.

Return to Lesson Set Overview

Lesson 4 (4 days) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Driving Question Board
- Compasses for students to take home
- Reading - Optional
- Exit Ticket Assignment - *teacher made*

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Magnet Video (LINK)
- Magnetic Field Video 1
- Magnetic Field Video 2
- Magnet with Compass
- Driving Question Board
- Compasses for students to take home
- Concord Magnets - *teachers may choose to screencast the exploration of the simulation to provide*
- Reading - Optional
- Exit Ticket Assignment - *teacher made*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Days 1 & 3

Lesson 4 (4 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-3 (40 min) NAVIGATION INVESTIGATE THE FIELD AROUND A MAGNET MAKING SENSE OF MAGNETIC FIELDS Slides A-H	Prior to Virtual Class, the teacher should: 1. Share Lesson Slideshow and Thinking Deeper Document with students. 2. Set up to demonstrate the magnetic field investigations if not using videos. 3. Distribute compasses to students for Home Investigation on Day 2. VIRTUAL CLASS: 1. Watch the video of magnets interacting and record thoughts. 2. Introduce the word magnetic field and reflect on what will happen in the investigation. 3. Teacher demonstrates the first Magnetic Field investigation with iron filings and bar magnet or plays a video. (Sample: Magnetic Field Video 1) 4. Students sketch observations and record questions. 5. Reflect on observations and discuss patterns. 6. Teacher demonstrates the second Magnetic Field investigation with a three-dimensional magnetic field or plays a video. (Sample: Magnetic Field Video 2) 7. Students record observations. 8. Discussion to make sense of observations. 9. Begin making a working definition for “magnetic field”.	
Part 4 (5 min) NAVIGATION Slide I	1. Review questions from the discussion board and to DQB. (option to have students add new questions directly to DQB if they have access and teacher would just re-organize DQB)	VIRTUAL CLASS PRE-WORK/DISCUSSION BOARD: 1. Decide on and record questions that they have on the discussion board.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 5 (5 min) NAVIGATION Slide J	1. Share the updated driving question board if students do not already have access.	VIRTUAL CLASS PRE-WORK: 1. Recall the questions that asked about direction of forces from the driving question board.
Part 6 (5 min) ORIENTATION AND PREDICATION Slides K-M		VIRTUAL CLASS PRE-WORK: 1. Answers questions about a compass. 2. Make predictions about how the orientation of a compass needle would compare at different locations.
Part 7 (20 min) TESTING THE FIELD Slides N & O		VIRTUAL CLASS PRE-WORK: 1. Watch the Magnet Compass Investigation . 2. Sketch the compass needles directions around the magnet.
Part 8 (10min) MAKING SENSE OF OBSERVATIONS Slides P & Q		VIRTUAL CLASS PRE-WORK: 1. Reflect and make sense of their observations. 2. Complete progress tracker.
Part 9 (10 min) NAVIGATION Slides R & S	Note: Students will need a compass for this home investigation.	HOME INVESTIGATION: 1. Answer questions about magnetic fields at home. 2. Look around the house for magnets that have fields and record findings.

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 10-12 (32 min) SHARING OUR HOME LEARNING TESTING THE ELECTROMAGNET REVISING OUR WORKING DEFINITION OF MAGNETIC FIELD Slides T-Y	Prior to the Virtual Class, the teacher should: 1. Gather materials to demonstrate the investigation set-up and electromagnet testing. VIRTUAL CLASS: 1. Discuss what we have been up to in Lesson 4 about magnetic fields. 2. Share home investigation findings. 3. Think about how to test an electromagnet. Teacher demonstrates the investigation set-up. 4. Predict how the compasses will respond to the electromagnet. 5. Demonstrate the electromagnet with compasses in each position and students illustrate observations on their TDD. 6. Discuss the findings. 7. Add to the working definition of a magnetic field individually and share in a class discussion.	
Part 13 (2 min) NAVIGATION Slide Z		VIRTUAL CLASS POST-WORK: 1. Think how we can explore more details to learn about how the field changes around a magnet or coil.

Day 4		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 14 (4 min) NAVIGATION Slide AA		VIRTUAL CLASS POST-WORK: 1. Reflect on how to research magnetic fields in more detail.
Part 15 (20 min) USE A COMPUTER INTERACTIVE TO MODEL Slides BB & CC		VIRTUAL CLASS POST-WORK: 1. Explore details of a magnetic field to learn about how a field changes around a bar magnet or a coil on the simulation Concord Magnets. 2. Make observations about the changes.
Part 16 (10 min) ADD TO PROGRESS TRACKER Slide DD		VIRTUAL CLASS POST-WORK: 1. Add to the progress tracker with new information from the interactive simulation.
Part 17 (10 min) NAVIGATION/EXIT TICKET Slides EE-II	1. Create an assignment for students to submit their exit tickets and assign. 2. Review exit ticket submissions and provide feedback as needed individually or in the next Virtual Class.	VIRTUAL CLASS POST-WORK: 1. Consider the magnetic field and how a compass would respond in different scenarios. 2. Read optional reading.

Return to Lesson Set Overview

Lesson 5 (1 day) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Concord Magnets 2 Simulation
- Consensus Model - *after completion*
- Virtual Class Recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Day 1

Lesson 5 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Determine how students will share their models from the interactive in the Virtual Class, prepare and edit slideshow directions accordingly. 2. Share Lesson Slideshow and Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Record a cause and effect prediction for how the magnetic field changes when we add another magnet.
Part 2 (35 min) COMPUTER INTERACTIVE COMING TO CONSENSUS ABOUT THE FIELDS BETWEEN THE MAGNET AND THE COIL Slides B-I	VIRTUAL CLASS: 1. Use the simulation Concord Magnets 2 to explore the magnetic field between a magnet and a coil and sketch observations. 2. Discuss what we learned in Lesson 4. 3. Discuss our working definition of a magnetic field. 4. Student's share their models from interactive. 5. Discussion to develop a consensus model for the fields between the magnet and the coil for the large gap and small gap. (teacher draws model during discussion) 6. Students reflect and discuss the difference between the two magnetic fields.	
Part 4 (5 min) NAVIGATION Slide J		VIRTUAL CLASS POST-WORK: 1. Reflect in an exit ticket on the difference between attractive and repulsive forces.

Return to Lesson Set Overview

Lesson 6 (3 days) - Putting the Pieces Together, Problematizing

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Driving Question Board
- Thinking Deeper Document from previous lessons
- Lesson 6 Assessment

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Driving Question Board
- Thinking Deeper Document from previous lessons
- Lesson 6 Assessment
- Copy of models that were shared if using shared document
- Consensus Model - *after completion*
- Virtual Class Recording - *after completion*
- Updated Driving Question Board - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Day 2

Lesson 6 (3 days) - Putting Pieces Together, Problematizing

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slides A-B	1. Develop a plan for students to share models in the Virtual class meeting and edit slideshow as needed to incorporate instructions. 2. Share Lesson Slideshow and Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Answer questions to review what we have figured out in the most recent lessons.
Part 2 (20 min) TRACING CAUSE-EFFECT RELATIONSHIPS Slides C-D		VIRTUAL CLASS PRE-WORK: 1. Generate a list of cause and effect relationships that we have uncovered in the first lesson set.
Part 3 (17 min) MAKE MODELS IN GROUPS Slide E	1. Have students submit their models if needed so they can be compiled for sharing in the Virtual Class.	VIRTUAL CLASS PRE-WORK: 1. Create/refine models to explain how the magnets in the speaker work without touching.
Part 4 (3 min) NAVIGATION Slide F		VIRTUAL CLASS PRE-WORK: 1. Exit ticket: Complete exit ticket on what they think is missing in the model to explain how a speaker works.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5 & 6 (45 min) COMPARE MODELS IN A GALLERY WALK BUILD A CONSENSUS MODEL IN A SCIENTIST CIRCLE Slides G-K	Prior to the Virtual Class, the teacher should: 1. Prepare Gallery Walk for student models if screen sharing for students is not allowed or preferred. VIRTUAL CLASS: 1. Class discussion to summarize what we have learned so far. 2. Share and discuss the cause and effect relationships they came up with. 3. Share models in a gallery walk and look for one thing that would be useful for the class to use, and one difference where they feel their model represents a relationship or part of the system better. 4. Remind students of agreed upon norms. 5. Class discussion to determine what should go into the model of the speaker using progress tracker on TDD. 6. Class discussion to create a consensus model using the agreed upon ideas. Teacher creates the model electronically or on chart paper during the discussion. 7. Look back at the driving question board. • Record answers to questions that have been answered. • Add any new questions. 8. Explain Lesson 6 Assessment to be completed the next day independently.	

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 7 (20 min) ASSESSMENT Slides L & M	1. Share Lesson 6 Assessment with students. 2. Grade assessment and provide feedback.	VIRTUAL CLASS POST-WORK: 1. Students will complete Lesson 6 Assessment and submit to the teacher.
Part 8 (10 min) IDENTIFYING GAPS IN WHAT WE KNOW Slides N		VIRTUAL CLASS POST WORK: 1. Identify gaps in what we know.
Part 9 (5 min) NAVIGATION Slides O-Q		VIRTUAL CLASS POST-WORK: 1. Record ideas about where energy transfers in the system. 2. Identify what changes they need to make to the system.

Return to Lesson Set Overview

Lesson 7 (1 day) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Lesson 6 Thinking Deeper Document
- Changes to the System Discussion Board - *teacher made*
- Video of Investigation *(teacher made)* and Sample Data *(optional)*

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Lesson 6 Thinking Deeper Document
- Changes to the System Discussion Board - *teacher made*
- Discussion Board - *after completion*
- Video of Investigation *(teacher made)* and Sample Data *(optional)*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- None

Lesson 7 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (8 min) NAVIGATION Slides A & B	1. Film a demonstration of the magnet and brick investigation and add the link to the slideshow. Either make the data clear in the demonstration so students can record and calculate speed or supply sample data. Make any needed changes to instructions in slideshow and/or TDD. 2. Share Lesson Slideshow and Thinking Deeper Document with students. 3. Create and assign a discussion board for students to share ideas about changes to the system. (examples include a question thread on google classroom stream, google document all students can edit, or jamboard.)	DISCUSSION BOARD: 1. Share your answers to your exit ticket from the previous lesson on the discussion board. VIRTUAL CLASS PRE-WORK: 2. Answer the navigation question.
Part 2 (12 min) PLAN THE INVESTIGATION Slides C-E		VIRTUAL CLASS PRE-WORK: 1. Develop a hypothesis for the investigation. 2. Identify the independent, dependent, and control variables. 3. Analyze data, and check hypothesis to see if it was correct.
Part 3 (10 min) DEVELOP EXPLANATIONS Slide F		VIRTUAL CLASS PRE-WORK: 1. Complete Making Sense of the Results on TDD.

Return to Lesson Set Overview

Lesson 8 (3 days) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Navigation Discussion Board - *teacher made*
- Investigation 4: Coil & Compass
- Investigation 5: LED Lights
- Electric Current Extension (Optional)

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Navigation Discussion Board - *teacher made*
- Discussion Board - *after completion*
- Investigation 4: Coil & Compass
- Investigation 5: LED Lights
- Electric Current Extension (Optional)

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Days 1 & 3

Lesson 8 (3 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-5 (45 min) NAVIGATION & PREPARING TO INVESTIGATE TWO SYSTEMS EXPLORE CONNECTING THE LIGHTBULB TO A BATTERY MAKING SENSE OF RESULTS DEMONSTRATION OF VOLUME EFFECTS ON SPEAKER AND LIGHTBULB EXPLORE HOW TO GET THE LIGHTBULB TO SHINE BRIGHTER Slides A-I	Prior to the Virtual Class the teacher should: 1. Share Lesson Slideshow and Thinking Deeper Document with students. 2. Set up to demonstrate the investigations. VIRTUAL CLASS: 1. Discuss and summarize the previous lessons ideas. 2. Introduce the lesson question and data table. Introduce Investigation 1 and demonstrate. 3. Draw label a diagram of the solution or explain what was done to make energy flow after watching the investigation. Share out and discuss. 4. Make predictions about whether this form of energy transfer is happening from the computer to the speaker. Share out and discuss. 5. Introduce Investigation 2 and demonstrate. After watching the investigation, jot down an explanation as to what happened in the investigation. Share out and discuss. 6. Introduce Investigation 3 and demonstrate. After watching the investigation, jot down an explanation on how to change the amount of energy that flows. Share out and discuss. 9. Preview exit ticket post-work.	
Part 6 (7 min) MAKING PREDICTIONS OF FREQUENCY EFFECTS ON THE LIGHTBULB Slides J & K		VIRTUAL PRE-WORK: 1. Exit Ticket: Answer the questions to reflect on what was learned today.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 7 (5 min) NAVIGATION Slides L & M		VIRTUAL CLASS PRE-WORK: 1. Reflect on previous lesson investigations and answer questions.
Part 8 (15 min) CHANGING FREQUENCY ON LIGHT SOURCE DEMONSTRATION Slides N & O	1. Create and assign a Discussion Board for navigation questions. 2. Review responses and provide feedback/facilitate discussion as needed.	VIRTUAL CLASS PRE-WORK: 1. Investigation 4: Watch the investigation, then jot down an explanation on how electric currents compare for different frequencies. DISCUSSION BOARD: 2. Answer the navigation question to check for understanding of patterns and frequency.
Parts 9 & 10 (20 min) EXPLORING HOW THE GET THE LED LIGHT TO LIGHT UP FORMING A HYPOTHESIS & CHANGING FREQUENCY WITH LED LIGHTS Slide P		VIRTUAL CLASS PRE-WORK: 1. Develop two hypotheses on changing of electric current when the pitch changes. 2. Watch Investigation 5 and make observations. 3. Look back at hypotheses and make note if the investigation supported or did not support the hypothesis.

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 12-14 (45 min) NAVIGATION READING: MUSIC TO MY EARS BUILDING UNDERSTANDING DISCUSSION Slides Q -T	VIRTUAL CLASS: 1. Look over the data collected from the investigations completed over the past 2 days. 2. Share and discuss hypotheses from the previous day. 3. Jot down what you have figured out and what questions they still have. Share out and discuss. (Option for the teacher to create a class chart here during the class discussion.) 4. Have students read Music to My Ears. Students will read a section jot down their answers, then pause. A discussion will occur. This process will continue until all sections have been read and discussed. 5. Refer back to the chart about what we have figured out and what questions we still have and add or change as needed.	
Part 15 (2 min) NAVIGATION		VIRTUAL CLASS POST-WORK: (OPTIONAL) 1. Read the passage about Electric Current as an extension.

Return to Lesson Set Overview

Lesson 9 (3 days) - Putting Pieces Together

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Driving Question Board
- Consensus Model - *after completion*
- Exit Ticket Assignment - *teacher made*

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Consensus Model - *after completion*
- Alternative method for adding a question to the DQB
- Driving Question Board - *after updates*
- Exit Ticket Assignment - *teacher made*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Day 2

Lesson 9 (3 days) - Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (8 min) NAVIGATION Slides A & B	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Reflect back on the previous lesson and answer two questions.
Part 2 (20 min) TRACING CAUSE-EFFECT RELATIONSHIPS Slides C & D		VIRTUAL CLASS PRE-WORK: 1.Reflect back to investigations observed and write cause and effect relationships to explain what happened in the different investigations. 2. Explain which cause and effect relationship explains how a speaker makes sound.
Part 3 (15 min) MAKE MODELS Slide E		VIRTUAL CLASS PRE-WORK: 1. Revise the system model.
Part 4 (2 min) HOME LEARNING ASSIGNMENT Slide F		HOME INVESTIGATION: 1. Look around and/or ask friends/family where else they have electromagnets and explain what they do and how they work.

Day 2		
Lesson Components	**Distance Learning an**	
	Teacher	**Student**
Part 5 & 6 (45 min) BUILD CONSENSUS MODELS SHARE RESEARCH FROM HOME LEARNING Slides G - L	VIRTUAL CLASS: 1. Discuss what ideas should be included in the consensus model, what could be used to represent it, and what evidence do we have to support our ideas. Create a consensus model based on discussion, have students record their own version in their Progress Tracker on the TDD. 2. Discuss how are forces related to energy in the magnetic field and what determines how much energy is stored in the magnetic field. 3. Update the DQB by placing answers on the questions we have answers for and grouping those under a section titled Answered Questions. 4. Share and discuss findings from the home learning assignment.	

Day 3		
Lesson Components	**Distance Learning an**	
	Teacher	**Student**
Part 7 (20 min) READING ABOUT BIG MAGNETS Slides M-O	1. Create and assign an exit ticket to check for understanding of how to make electromagnets stronger. (google forms, google docs, etc.)	VIRTUAL CLASS POST-WORK: 1. Read Electric Motors then complete the following: draw a diagram of how the device works, explain why electromagnets are important, and compare/contrast the device to a speaker. 2. Read Junkyard Magnets then complete the following: draw a diagram of how the device works, explain why electromagnets are important, and compare/contrast the device to a speaker. 3. Read Magnetic Levitation Trains then complete the following: draw a diagram of how the device works, explain why electromagnets are important, and compare/contrast the device to a speaker. 4. Complete the exit ticket explaining how to make electromagnets stronger.
Part 8 (25 min) ADD QUESTIONS TO DQB Slides Q	1. Ensure students have access to the DQB. 2. Organize DQB after students submit new questions.	VIRTUAL CLASS POST-WORK: 1. Create and add a question to the DQB about changing the strength of magnetic forces.

Return to Lesson Set Overview

Lesson 10 (3 days) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Building Understanding Discussion Board - *teacher made*

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Building Understanding Discussion Board - *teacher made*
- Discussion Board - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Day 2

Lesson 10 (3 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (15 min) NAVIGATION: REVIEW QUESTIONS ON THE DQB Slides A	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL PRE-WORK: 1. Reflect back on what you know about measuring forces.
Part 2 (30 min) DESIGNING AN INVESTIGATION Slides B - F		VIRTUAL PRE-WORK: 1. Develop a hypothesis for an investigation used to determine the relationship between distance and magnetic forces. 2. Read through the procedure and identify the independent, dependent, and control variables. 3. Jot down some ways you could organize and analyze the data that would be collected from the investigation.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 3 & 4 (40 min) NAVIGATION CONDUCT AN INVESTIGATION Slide G -K	Prior to the Virtual Class, the teacher should: 1. Set up to demonstrate the investigation for students. VIRTUAL CLASS: 1.Discuss ways to collect, organize, and analyze data. 2. Discuss how to record data in a data table and transfer it to a graph. 3. Students will make two predictions. One will show what the data on a graph will look like to support the hypothesis and the other will show what the data would look like if it did not support the hypothesis. 4. Discuss students' predictions of what the graph should like for both scenarios. 5. Conduct the investigation. Students will record data throughout. 6. Discuss and analyze the data.	
Part 5 (5 min) NAVIGATION & EXIT TICKET Slide L		VIRTUAL POST WORK: 1. Complete the exit ticket.

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 6 (30 min) ANALYZE & INTERPRET DATA Slide M & N		VIRTUAL POST-WORK: 1. Analyze and graph the data on the chart. 2. Interpret the graph, then complete the I² strategy questions.
Part 7 (15 min) MAKE SENSE OF THE RELATIONSHIP BETWEEN DISTANCE AND MAGNETIC FORCES Slides O-P	1. Create and assign a Discussion Board for students to share their answers to the Building Understandings questions. 2. Review submissions and provide feedback or facilitate discussion as needed.	DISCUSSION BOARD: 1. Answer the questions to check for understanding of the investigation.

Return to Lesson Set Overview

Lesson 11 (3 days) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Reading: Weak or Strong - Earth's Magnetic Field (optional)

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Reading: Weak or Strong - Earth's Magnetic Field (optional)
- Magnetic Field Interactive Website - video of expiration *(teacher made)*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Day 2

Lesson 11 (3 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (15 min) NAVIGATION Slides A & B	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL PRE-WORK: 1. Reflect back and answer the lesson question. 2. Predict what can be done to change the strength of 2 magnets and/or a magnet and electromagnet.
Part 2(15 min) PLANNING INVESTIGATIONS Slides C-F		VIRTUAL PRE-WORK: 1. Select an investigation to plan from the list provided and create an investigation question. 2. Develop a hypothesis, identify independent, dependent, and control variables. Create an investigation plan using the chart provided. 3. Determine labels for x/y axes.
Part 3 (15 min) PEER FEEDBACK ON INVESTIGATION PLANS	*Not addressed in distance learning since there is not a Virtual Class meeting on this day.*	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 4 (8min) NAVIGATION Slide G		VIRTUAL PRE-WORK: 1. Review investigation plan from the previous day.
Part 5 -7 (40 min) CARRYING OUT THE INVESTIGATION MAKING SENSE OF THE DATA SHARE FINDINGS Slides H-M	VIRTUAL CLASS: 1. Have students share investigation questions and plans and discuss similarities and differences among investigations. 2. The teacher will conduct multiple investigations. The student will jot down observations for each and record the data for the investigation the plan was made for. 3. The students will create a graph with the data recorded from their investigation. 4. Have students share graphs and compare similarities and differences. Discuss if the data supports or refute the hypothesis. 5. Discuss the investigation findings and how the forces are affected. 6. Share what was learned about the magnetic field around a magnet. Optional: Home Learning Reading: Weak or Strong - Earth's Magnetic Field (There are no questions assigned to this assignment. If you would like the student to answer questions about the reading, you will need to create some.)	

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 8 (5min) NAVIGATION Slide	*Addressed in previous Virtual Class.*	
Part 9 (9 min) SHARE FINDINGS SLIDE N		VIRTUAL POST-WORK: 1. Record ideas to investigate how changes made impact the magnetic field.
PART 10 (22min) COMPUTER INTERACTIVE SLIDES O & P		VIRTUAL POST-WORK: 1. Make predictions about what would happen to the magnetic field under different scenarios. 2. Record observations as to what happened to the magnetic field during the different scenarios.
PART 11 (2 min) NAVIGATION & HOME LEARNING SLIDE Q		VIRTUAL POST-WORK: 1. Complete the home learning assignment to explain how we hear music using cause and effect.

Return to Lesson Set Overview

Lesson 12 (2 days) - Putting Pieces Together

In this **Lesson**, students will need the following materials to appropriately engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Driving Question Board
- Framing the Assessment Discussion Board - *teacher made*
- Lesson 12 Assessment

In this **Lesson**, students who don't have home internet need the following print-outs or files to best engage in learning:

- Lesson Slideshow
- Thinking Deeper Document
- Driving Question Board
- Driving Question Board - *after completion*
- Framing the Assessment Discussion Board - *teacher made*
- Discussion Board - *after completion*
- Lesson 12 Assessment

In this **Lesson**, students should join virtual classes on the following days to engage in learning:

- Day 1

Lesson 12 (2 days) - Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 - 3 (45 min) REVIEWING CAUSE & EFFECT APPLYING OUR IDEAS REVISIT THE DRIVING QUESTION BOARD Slides A-G	Prior to the Virtual Class Meeting, the teacher should: 1. Share Lesson Slideshow and Thinking Deeper Document with students. VIRTUAL CLASS: 1. Have students summarize how magnetic forces at a distance make things work on their thinking deeper document. After, students are to place answers on the driving question board. These answers will be used for discussion. 2. Discuss the cause and effect relationship between turning on the music and actually hearing the music. 3. Discuss how electromagnets work in each item picture. (Maglev Train, Motor, and Junkyard Magnet) Also discuss how to make an electromagnet stronger or weaker. 4. Discuss how the speaker works. 5. Discuss and answer the main question: What is the relationship between forces, energy, and magnetic fields. 6. Pull up the DQB board and check off questions that can now be answered. 7. Discuss unanswered questions and what can be done to investigate those. 8. Explain post-work activities and assessment.	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 4 (5 min) CELEBRATE AND REFLECT ON OUR EXPERIENCES Slide H		VIRTUAL POST-WORK: 1. Reflect back on the unit and share your thoughts/experiences of the unit.
Part 5 (40 min) DEMONSTRATE UNDERSTANDING Slide I	1. Create and assign a Discussion Board for students to post their answers to the Framing the Assessment question. 2. Review submissions and facilitate discussion as needed.	DISCUSSION BOARD: 1. Answer the reflection question and post to the discussion board. 2. Lesson 12 Assessment

Return to Lesson Set Overview