Louisiana Believes

Distance Learning Support for OpenSciEd Grade 6
Unit 6.1 Light & Matter Unit

This resource is designed to support teachers in implementing distance learning for OpenSciEd Unit 6.1, Unit 1 in the Louisiana Guide to Piloting OpenSciEd Grade 6. It is intended as a supporting document and should be used in conjunction with the OpenSciEd Unit 6.1 Instructional 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 August 5, 20201

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

Note: If enough materials are available, distributing materials to set up the box system at home would be beneficial for students. If choosing to do this, ensure students have someone who can assist in setting up and that both parent/guardian and student have access to relevant safety information. Lessons are designed assuming that this is not a possibility so will need to be adjusted if the teacher chooses to have students set up their own box systems at home.

<table>
<tr><th colspan="3">Lesson Set 1: Lessons 1-5</th></tr>
<tr><th>Provided Resources Students Will Need</th><th>Additional Resources Students Will Need</th><th>Additional Materials for Students Without Internet Access</th></tr>
<tr><td>Lesson Slideshows for each lesson:
L1, L2, L3, L4, L5

Thinking Deeper Documents for each lesson:
Lesson 1 TDD, Lesson 2 TDD, Lesson 3 TDD, Lesson 4 TDD, Lesson 5 TDD

Additional Documents:
Lesson 3: Asking Questions Tool</td><td>Consensus Model – Lessons 1, 2, 5
Driving Question Board – Lessons 1, 3
Word Wall – Lesson 3, 5

Lesson 1:
• Driving Question Board (DQB) and Ideas for Investigation Discussion Board
• Related Phenomena Class List
Lesson 2:
• Home Learning Discussion Board
Lesson 3:
• Box Model Observations Discussion Board</td><td>Prior to Lesson:
Lesson 1: Anchor Phenomenon Video

After Lesson Completion:
Virtual Class Recordings (Lessons 1, 2, 3, 5)
Discussion Board (Lessons 1, 2, 3)</td></tr>
<tr><td colspan="3">Students should ideally join VIRTUAL CLASS on the following days:
Days 1 & 3 - Lesson 1 Days 6 & 7- Lesson 2
Days 9 & 10 - Lesson 3 Day 12 - Lesson 5</td></tr>
<tr><td colspan="3">Formative and Summative Assessment Opportunities:
Lesson 1: Initial Anchor Phenomenon Model on Thinking Deeper Document (pre-assessment), Discussion Board on Day 4
Lesson 2: Testable Question Assignment
Lesson 3: Asking Questions Tool
Lesson 5: Individual Models</td></tr>
</table>

Lesson Set Overview: Lessons 6, 7, 8

Lesson Set 2: Lessons 6-9		
Provided Resources Students Will Need	**Additional Resources Students Will Need**	**Additional Materials for Students Without Internet Access**
Lesson Slideshows for **each** lesson: L6, L7, L8 Thinking Deeper Documents for each lesson: Lesson 6 TDD, Lesson 7 TDD, Lesson 8 TDD Additional Documents: Lesson 8: Portraits Through Glass: Individual Assessment	Consensus Model – Lessons 6 Driving Question Board – Lesson 8 Lesson 6: • Optional Home Investigation materials: flashlight, magnifying glass Lesson 8: • Light Differential Discussion Board • Reflection Discussion Board	**Prior to Lesson**: Lesson 6: The Visual System: How Your Eyes Work Video **After Lesson Completion:** Virtual Class recordings (Lessons 6, 7, 8) Discussion Boards (Lesson 8) Class explanation for why the adults see the music student (Lesson 7)
Students should ideally join VIRTUAL CLASS on the following days: Day 1 – Lesson 6 Day 3 – Lesson 7 Day 5 – Lesson 8		
Formative and Summative Assessment Opportunities: Lesson 7: Individual explanation, self-evaluation, peer feedback, and revision Lesson 8: Portraits Through Glass: Individual Assessment		

Lesson 1 (4 days) - Anchoring Phenomenon

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

- Lesson Slideshow – *works best as a shared document for which students have view only access that can be updated live if needed*
- Thinking Deeper Document - *students will need their own editable copy*
- Consensus Model – *works best as a shared electronic document for which students have view only access that can be updated live*
- Driving Question Board (DQB) and Ideas for Investigation Discussion Board – *teacher made*
- Driving Question Board - *works best as a shared electronic document that can be updated live, may choose to use Jamboard which gives students editing access or another platform with view only access for students if the teacher is compiling student questions that are submitted*
- Related Phenomena Class List - *after completion*

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
- Anchor Phenomenon Video
- Alternate method for sharing initial model and viewing other models (ex. taking photo and sharing through text with an assigned group)
- Consensus Model - *after completion*
- Alternate method for submitting questions to the DQB and ideas for investigation (ex. texting to teacher or another student)
- Virtual Class Recordings - *after completion*
- Discussion Board – *after completion*
- Driving Question Board - *after completion*
- Related Phenomena Class List - *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 1-5 (45 min) INTRODUCE A PUZZLING PHENOMENON SHARE NOTICINGS AND WONDERINGS FROM THE MIRROR/WINDOW VIDEO IDENTIFY THE MIRROR/WINDOW SYSTEM PARTS AND DEVELOP A DIAGRAM COMPARE DIAGRAMS WITH A PARTNER NAVIGATION Slides A-G	Prior to the virtual class meeting, the teacher should: 1. Determine and prepare for how students will share models (ex. in break-out groups if screen-share if enabled, by copying and pasting into a shared slideshow for a virtual gallery walk, etc.). Make adjustments to Slide F directions as needed. 2. Share Lesson Slideshow and Thinking Deeper Document with students. Note that the slideshow should be a shared document that all students can view and that each student will need to have their own editable copy of the Thinking Deeper Document (TDD). VIRTUAL CLASS: 1. Watch the anchoring phenomenon video and record noticings and wonderings on the chart. 2. Share notices and wonders and discuss what we think is happening. 3. Identify parts of the system that needs to be included in the initial model. 4. Independently create an initial model to develop an understanding about the phenomenon as a system. *NOTE: Students can draw the model electronically using the drawing feature on Google docs or another app. They may also choose to draw on paper. If drawing on paper, students can take a picture and insert it into their document.* *5.* Compare models in a group, with a partner, or in a whole-class virtual Gallery Walk. *NOTE: You will share three student models that represent different ideas about what is happening in the Day 3 virtual class. This may be a good time to decide which models to share and ensure those students are comfortable with their examples being referred to again later.* 6. Brainstorm ideas for making a scale model that represents the system in the video to investigate the phenomenon in the classroom.	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 6 (5 min) NAVIGATION Slide H		VIRTUAL CLASS POST-WORK: 1. Review previous ideas about which parts we would need to include on a scale model. 2. Reflect on experience with scale models.
Part 7 (10 min) MAP THE BOX MODEL TO THE VIDEO Slide I		VIRTUAL CLASS POST-WORK: 1. Examine the photos of the box set-up. 2. Map the parts of the box model to the important parts in the video.
Part 8 (15 min) INVESTIGATE USING THE BOX MODEL Slide J		VIRTUAL CLASS POST-WORK: 1. Explore the video of the box system investigation. 2. Make observations of what they see and wonder about in the box system.
Part 9 (12 min) SHARE OBSERVATIONS FROM THE BOX MODEL INVESTIGATION Slides L & M	*Follow up in Virtual Class on Day 3.*	VIRTUAL CLASS POST-WORK: 1. Reflect on similarities and differences in the video and box model. 2. Evaluate the box model system.
Part 10 (3 min) NAVIGATION/EXIT TICKET Slide N		VIRTUAL CLASS POST-WORK: 1. Identify an idea to bring to our virtual class to help explain the phenomenon.

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 10-14 (45 min) FORM A SCIENTISTS CIRCLE AND DISCUSS CLASSROOM NORMS DEVELOP AN INITIAL CLASS CONSENSUS MODEL BRAINSTORM RELATED PHENOMENA AND ASSIGN SELF-DOCUMENTATION Slides O-T	Prior to the Virtual Class, the teacher should: 1. Ensure that you have a few student models to share from the previous virtual class that represent a variety of ideas about the phenomenon. VIRTUAL CLASS: 1. Develop shared norms for the virtual classroom community. 2. Share reflections about the box system model. 3. Discuss the purpose of the consensus discussion. 4. Share three student models and conduct consensus discussion to create the class consensus model. (You may do this electronically or on paper, but you will need to ensure that students can get access to the completed model after it is complete.) 5. Reflect on norms. 6. Generate a class list of possible related phenomena and experiences. 7. Assign home learning for students to document related phenomena and preview post-work.	

Day 4		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 14 (6 min) WRITE QUESTIONS FOR THE DRIVING QUESTION BOARD Slide U		VIRTUAL POST-WORK: 1. Generate questions about the phenomenon in preparation for building the DQB.
Part 15 (24 min) DEVELOP A DRIVING QUESTION BOARD Slide V	1. Create and assign a DISCUSSION BOARD for students to share their questions and ideas for future investigations. (ex. Jamboard, discussion thread, shared document) 2. Review and compile questions to create the DQB and ensure students have access to it.	DISCUSSION BOARD: 1. Share questions to build the DQB about what is causing the phenomenon observed in this lesson.
Part 16 (12 min) DEVELOP IDEAS FOR FUTURE INVESTIGATION Slides W		VIRTUAL CLASS POST-WORK: 1. Reflect on systems thinking. 2. Record ideas for investigations or data sources we need to answer our questions.
Part 17 (3 min) DECIDE WHERE TO GO NEXT Slide X	1. Review and compile ideas to create a class list and ensure students have access to it.	VIRTUAL CLASS POST-WORK/DISCUSSION BOARD: 1. Record and share ideas for future investigations.
Part 20 (5 min) DECIDE WHERE TO GO NEXT Slide Y		VIRTUAL CLASS POST-WORK: 1. Make a prediction about what will happen if we switch the light from Room A to Room B.

Return to Lesson Set Overview

Lesson 2 (3 days) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Home Learning Discussion Board - *teacher made*
- Testable Question Assignment - *teacher made*
- Consensus Model – *after revision*

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
- Alternative method for sharing Home Learning and Testable Question
- Discussion Board - *after completion*
- Virtual Class Recordings – *after completion*
- Consensus Model – *after revision*

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

- Days 2 & 3

Lesson 2 (3 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (7 min) NAVIGATION Slides A & B	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students. 3. Create and assign a DICUSSION BOARD where students can upload their home learning photos.	DISCUSSION BOARD/VIRTUAL CLASS PRE-WORK: 1. Upload home learning photos. 2. Predict what would happen if we remove the one-way mirror from the box model.
Part 2 (6 min) OBSERVE THE ONE-WAY MIRROR OUTSIDE THE BOX MODEL Slide C		VIRTUAL CLASS PRE-WORK: 1. Make observations of photos of the one-way mirror removed from the box model system.
Part 3 (10 min) SWAP THE LIGHT AND MAKE OBSERVATIONS OF THE BOX MODEL Slides D-G		VIRTUAL CLASS PRE-WORK: 1. Make and record observations of the light being moved in the box model from Room A to Room B.
Part 4 (10 min) IDENTIFY QUESTIONS ABOUT LIGHT THAT WE CAN INVESTIGATE Slide H		VIRTUAL CLASS PRE-WORK: 1. Identify related phenomena involving a light difference. 2. Identify new questions from the DQB about changing the light to test using the box model.
Part 5 (12 min) TEST DIFFERENT LIGHTING SCENARIOS IN THE BOX MODEL Slide I	*Addressed in Virtual Class*	

Part 6 (5 min) NAVIGATION Slide J	1. Create and share an assignment for students to submit their testable question. 2. Review submitted questions and choose a few of the ones that came up repeatedly to investigate in the virtual class.	VIRTUAL CLASS PRE-WORK: 1. Share observations from home-learning activity.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5, 7-9 (45 min) TEST DIFFERENT LIGHTING SCENARIOS IN THE BOX MODEL MAKE SENSE OF THE TESTING LIGHT SCENARIOS INVESTIGATION BUILDING UNDERSTANDINGS DISCUSSION Slides O-R	Prior to the virtual class, the teacher should: 1. Select the questions you will test at the beginning of class and prepare to share the list of questions at the start of class. If your slideshow is shared, you can add it to Slide J or add a new slide. 2. Decide how you will conduct the Virtual Gallery Walk. Since time is limited, you may have students share models in groups or chose a few to share whole class. VIRTUAL CLASS: 1. Present the questions that will be tested and allow students time to choose one to record observations for on their TDD. 2. Record the answers to questions 1 &2 on Part A for chosen question. 3. Observe teacher demonstrations and record observations on Part a #3. 4. Discuss “Idea Pirating” as a class. 5. Conduct a Virtual Gallery Walk in small groups or view a model from each question as a whole class. 6. Come to agreement about the role of light in the phenomenon and how to use arrows to represent the path that light travels and revise Class Consensus Model. *NOTE: Since there were a few things moved from Day 1 into this Virtual Class, use the beginning of the Day 3 Virtual Class to complete the consensus model if needed.*	

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 10-12 (45 min) INTRODUCE AND ADD TO THE PROGRESS TRACKER CREATE A SELF-DOCUMENTATION COLLECTION NAVIGATION Slides S-V	Prior to the Virtual Class, the teacher should: 1. Determine how students will move and share their related phenomenon images (ex. Jamboard, shared document, etc.) and prepare. Students should have previously uploaded the photos on a Discussion Board on Day 1. VIRTUAL CLASS: 1. If needed, complete consensus model from the previous class. 2. Introduce and complete the Progress Tracker. 3. Share images from Lesson 1's home learning assignment to build a Self-Documentation Collection with related phenomena. 4. Consider how the music student phenomenon would change if we swapped the one-way mirror material for regular glass or a regular mirror. Brainstorm ways to investigate this.	

Return to Lesson Set Overview

Lesson 3 (3 days) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Asking Questions Tool
- Box Model Observations Discussion Board – *teacher made*
- Word Wall – *teacher made*
- Driving Question Board

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
- Asking Questions Tool
- Alternate method for submitting observations about box model
- Discussion Board – *after completion*
- Driving Question Board
- Virtual Class Recordings - *after completion*
- Word Wall – *teacher made*

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

- Days 2 & 3

Lesson 3 (3 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 & 2 (20 min) NAVIGATION AND OBSERVATIONS IN THE BOX MODEL OBSERVE AND COMPARE HOW LIGHT INTERACTS WITH THE MATERIALS Slides A-D	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Make observations from the box models with glass, a regular mirror, and a one-way mirror and briefly share some observations. 2. Observe and compare what happens to the light.
Part 3 (13 min) FACILITATE A BUILDING UNDERSTANDINGS DISCUSSION Slide E-G	1. Create and assign a DISCUSSION BOARD for students to share their observations about the way the light interacted with the materials.	VIRTUAL CLASS PRE-WORK/DISCUSSION BOARD: 1. Share observations and reflect on what we figured out and how we can represent it.
Part 4 (10 min) DEVELOP AN EXPERIMENTAL QUESTION Slide H	1. Assign Part A of the Asking Questions Tool. 2. Review student submissions to make decisions about next steps/navigation in the virtual class.	VIRTUAL CLASS PRE-WORK: 1. Using Part A of the Asking Questions Tool - Experimental Questions to develop an experimental question to determine the amount of light reflected and transmitted by the one-way mirror, glass, and regular mirror and submit.
Part 4 (13 min) MAKING SENSE OF THE FLASHLIGHT INVESTIGATION Slides E-H	1. Develop a Word Wall to share with students in the next day's virtual class.	VIRTUAL CLASS PRE-WORK 1. Review Word Wall terms. 2. Preview next steps to complete the experiment measuring light.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5-9 (45 min) NAVIGATION REFINE OUR EXPERIMENTAL QUESTION PLAN AND CONDUCT THE MEASURING LIGHT INVESTIGATION NAVIGATION Slides K-S	Prior to the virtual class, the teacher should: 1. Prepare to demonstrate the Measuring Light investigation. VIRTUAL CLASS: 1. Share the Word Wall with students and discuss the two new terms. 2. Introduce the light meter. 3. Work as a class using Part A of the Asking Questions Tool - Experimental Questions to further develop an experimental question to be used to determine the amount of light reflected and transmitted by the one-way mirror, glass, and regular mirror 4. Use the experimental question to plan and conduct the Measuring Light Investigation. 5. Use light meters to measure the amount of light reflected and transmitted by the one-way mirror, glass, and a regular mirror. Teacher will demonstrate and students will record data. 6. Summarize what we have accomplished today and share next steps.	

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 10-14 (45 min) NAVIGATION ANALYZE DATA FROM THE MEASURING LIGHT INVESTIGATION CONDUCT A CONSENSUS DISCUSSION UPDATE PROGRESS TRACKER NAVIGATION Slides S-Z	VIRTUAL CLASS: 1. Reflect on where we are in terms of analyzing the Measuring Light Investigation and share next steps. 2. Analyze class data from the Measuring Light Investigation, looking for patterns in the data. Explain to students that you have supplied data since they were not able to conduct the investigation themselves. 3. Conduct a consensus discussion to share patterns noticed, what this helps us to determine about the way light interacts with the materials, and how we should represent the ideas. 4. Update Progress Trackers. 5. Revisit the Driving Question Board as a class to find and discuss questions about the properties of the one-way mirror, glass, and regular mirror.	

Return to Lesson Set Overview

Lesson 4 (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

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

- None

Lesson 4 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Review data from the Measuring Light Investigation and possible explanations for the patterns seen in the data.
Part 2 (22 min) READ MORE ABOUT ONE-WAY MIRRORS Slides B-F		VIRTUAL CLASS PRE-WORK: 1. Follow a close reading protocol to gather information about how one-way mirrors are made in comparison to regular mirrors.
Part 3 (15 min) FACILITATE A CONSENSUS DISCUSSION AND MODEL MICROSCALE STRUCTURES AND LIGHT Slides G, I	*Revisit these ideas in the Virtual Class when creating individual and consensus models.*	VIRTUAL CLASS PRE-WORK: 1. Revise models to explain how light transmits through and reflects off different structures of the materials.
Part 4 (3min) NAVIGATION Slides J, K		VIRTUAL CLASS PRE-WORK 1. Update Progress Tracker.

Return to Lesson Set Overview

Lesson 5 (1 day) – Putting Pieces Together, Problematizing

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

- Lesson Slideshow
- Thinking Deeper Document
- Word Wall
- Consensus Model

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
- Anchor Phenomenon Video
- Word Wall
- Virtual Class Recording - *after completion*
- Consensus Model - *after completion*

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

- Day 1

Lesson 5 (1 day) - Putting Pieces Together, Problematizing

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-6 (45 min) PREPARE TO EXPLAIN THE ANCHORING PHENOMENON CREATE INDIVIDUAL MODELS AND A CLASS CONSENSUS MODEL TO EXPLAIN WHAT IS SEEN PROBLEMATIZE WHY THE STUDENT CAN'T SEE THE ADULTS MODEL WHAT HAPPENS TO LIGHT THAT SHINES ON THE ADULTS NAVIGATION Slides A-J	Prior to the virtual class, the teacher should: 1. Share Lesson Slideshow and Thinking Deeper Document with students. *Note: Students read and revised models independently in Lesson 4; therefor, there was no consensus models discussion. Be sure to intentionally emphasize that learning in discussions to create the Gotta-Have-It Checklist and Class Consensus Model.* VIRTUAL CLASS: 1. Revisit the Music Lesson video and discuss. 2. Add the science term "model" to the Word Wall. 3. Individually model the path light travels to explain why the music student and adults can all see the student. 4. Share and discuss the way students represented the light path in the models and create a class consensus model to explain why the music student and adults can all see the student. 5. Rewatch the video as a class and prepare to model what happens when light from the Room A light source shines directly on the one-way mirror toward the adults. 6. In a class Consensus Discussion, model what happens to light as it reflects off the adults in Room B and travels back to the one-way mirror. 7. Problematize that the student cannot see the adults even though light from the adults enters the student's eyes. *Note: Ensure that students have access to the class consensus model.*	

Return to Lesson Set Overview

Lesson 6 (2 days) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Optional Home Investigation materials: flashlight, magnifying glass
- Consensus Model

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
- The Visual System: How Your Eyes Work Video
- Optional Home Investigation materials: flashlight, magnifying glass
- Consensus Model
- Virtual Class Recording - *after completion*

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

- Day 1

Lesson 6 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Revisit the light inputs entering the music student's eyes and ideas for why the student cannot see the adults.
Part 2 (15 min) TRACE THE PATH OF LIGHT AFTER IT ENTERS THE EYE Slides B, C		VIRTUAL CLASS PRE-WORK: 1. Watch a video about how eyes work and record notices and wonders.
Part 3 (23 min) INVESTIGATE HOW A LENS FOCUSES LIGHT Slides D-H	*Note: If you would like to have students conduct the investigation at home rather than observing photos, you will need to send materials home ahead of time and ensure students have the procedures, safety information, and parent supervision*	VIRTUAL CLASS PRE-WORK: 1. View photos of a magnifying glass and reflect on how it is similar and different from the eye. 2. View photos of two sample investigations and record observations. 3. Describe, based on observations, how light interacts with a lens.
Part 4 (2 min) NAVIGATION Slide I		VIRTUAL CLASS PRE-WORK 1. Update Progress Tracker.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5-8 (45 min) NAVIGATION USE EVERYDAY EXPERIENCES TO MAKE SENSE OF THE PHENOMENON CONDUCT A CONSENSUS DISCUSSION NAVIGATION Slides J-V	Prior to class teacher should: 1. Arrange for students to work in groups in break-outs rooms if available for building understandings discussion and modeling if the platform allows. If not, the discussion may be conducted whole-class. *Note: The consensus model was not completed in Day 1 due to asynchronous assignments. The model will need to be completed during the virtual class and added to slideshow and TDDs. Because students will have engaged with additional related phenomena, the first consensus model discussion may move forward into addressing the Day 2 revisions. If this occurs, allow the discussion to continue by combining steps and generate the revised consensus model during one discussion rather than two separate ones.* VIRTUAL CLASS: 1. Share observations and discuss comparisons of how light enters the eye and the flashlight and magnifying glass model. 2. As a group, discuss ideas about what happens when light enters the eye so the student sees themselves then discuss as a whole class. 3. Review what we have figured out and determine next steps. 4. Observe everyday experiences that illustrate how the brain focuses on some inputs and not others. Debrief in groups to discuss observations and explanations. 5. Generate a consensus model for how light enters the eye (revisited from Day 1). Add model to Slide S and TDD. *Note: If the consensus model discussion leads to addressing why the music student sees themselves but not the adults, combine steps 6 & 7 here and skip creating group models.* 6. Using the new consensus model, create models in groups to explain why the music student sees themselves but not the adults. 7. Share and discuss the group models to revise the class consensus model. 8. Summarize what we can now explain.	

Return to Lesson Set Overview

Lesson 7 (1 day) – Putting Pieces Together

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

1. Class explanation for why the adults see the music student – *after completion*
2. Alternative method for giving and receiving peer feedback

- Virtual Class recording – *after completion*

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

- Day 1

Lesson 7 (1 day) – Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-7 (45 min) NAVIGATION DRAFT AN EXPLANATION AS A CLASS INDIVIDUALLY DRAFT AN EXPLANATION INDIVIDUAL SELF-ASSESSMENT PROVIDE PEER FEEDBACK DRAFT A REVISED EXPLANATION NAVIGATION Slides A-K	Prior to the virtual class, the teacher should: 1. Share the Lesson Slideshow and Thinking Deeper Document with students. 2. Decide how peer feedback will be done (ex. sharing documents, in break-out groups, etc.) and make any necessary preparations. VIRTUAL CLASS: 1. Develop an explanation for the one-way mirror phenomenon. 2. Review ideas from Lessons 5 and 6 class models, the Science Ideas chart, and TDD entries. 3. Draft a written explanation as a class for why the adults see the music student. 4. Review ideas from class models, class Science Ideas chart, and entries in science notebooks. 5. Individually draft a written explanation for why the music student sees themselves but not the adults. 6. Review the process for revising explanations and key elements for individual self-assessment. Individually self-assess and make notes about what to revise. 7. Review peer feedback guidelines and the key elements to include in the explanation. Provide peer feedback. 8. Respond to peer feedback and individually draft a revised explanation. 9. Celebrate being able to explain the phenomenon.	

Return to Lesson Set Overview

Lesson 8 (3 days) – Investigation, Putting Pieces Together

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

- Lesson Slideshow
- Thinking Deeper Document
- Light Differential Discussion Board – *teacher made*
- Portraits Through Glass: Individual Assessment
- Driving Question Board
- Reflection 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
- Light Differential Discussion Board – *teacher made*
- Alternate method for contributing to and viewing home learning photos
- Portraits Through Glass: Individual Assessment
- Virtual Class Recording - *after completion*
- Driving Question Board
- Reflection Discussion Board – *teacher made*
- Discussion Boards – *after completion*

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

- Day 2

Lesson 8 (2 day) - Investigation, Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Determine whether you will have students complete the optional extension activities and adjust slideshow as needed. 2. Share Lesson Slideshow with students. 3. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Revisit our final model and identify that the difference in light on both sides of the material is important. Brainstorm ways to test light differences in the box model.
Part 2 (8 min) INVESTIGATION TO STRENGTHEN OR WEAKEN THE PHENOMENON Slide B		VIRTUAL CLASS PRE-WORK: 1. Make observations of the one-way mirror when there is a greater or lesser difference in light on both sides of the material.
Part 3 (15 min) FACILITATE A DISCUSSION ABOUT LIGHT DIFFERENTIAL Slides C-E	1. Create and assign a DISCUSSION BOARD for students to share observations, connections, and home learning. 2. Review responses and facilitate discussion as needed. 3. Point out common ideas and patterns across responses that student can connect to related phenomena.	VIRTUAL CLASS PRE-WORK/DISCUSSION BOARD: 1. Share observations and conclusions about light differential and the relationship to how it affects the way light interacts with our eye and brain system. 2. Examine and describe related phenomena.
Part 4 (14 min) CLOSER EXAMINATION OF GLASS IN THE BOX MODEL Slides F, G	*Revisit in virtual class.*	VIRTUAL CLASS PRE-WORK: 1. Use the box model to analyze how the glass can act like a one-way mirror in certain light conditions.

Part 5 (3 min) NAVIGATION Slide H	1. Review and compile photos from home learning.	VIRTUAL CLASS PRE-WORK: 1. Gather additional evidence at home by observing a window in your house under different light conditions.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 6-9 (45 min) NAVIGATION DEVELOP A MODEL TO EXPLAIN SETUP 1 DEVELOP CONSENSUS MODEL TO EXPLAIN BOX SYSTEM SETUP 1 AND 2 FLASHLIGHT DEMONSTATION Slides I-O	Prior to the virtual class, the teacher should: 1. Prepare to demonstrate the investigation of glass in the box system since students were not able to test at home. 2. Review the photos and discussion about the home learning to prepare for class discussion. VIRTUAL CLASS: 1. Share observations from home learning. 2. Teacher demonstrates testing glass in the box model. Students make observations, then share and discuss. 3. Draw conclusions about how light interacting with objects and materials causes us to see different things. 4. Introduce the assessment. 5. Individually complete the assessment. Note: If short on virtual class time, the assessment can be completed as post-work.	

Return to Lesson Set Overview

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 8 (10 min) REVIEW DQB QUESTIONS Slide Q	1. Ensure students have access to the DQB. 2. Determine how they will evaluate the questions and make any needed adjustments to instructions on Slide Q.	VIRTUAL CLASS PRE-WORK: 1. Evaluate questions from the DQB and decide if the class made progress on the questions.
Part 9 (25 min) REVISIT OUR DRIVING QUESTION BOARD (DQB) Slide R		VIRTUAL CLASS PRE-WORK: 1. Revisit the DQB and take stock of all the questions we've now answered.
Part 10 (10 min) CELEBRATE AND REFLECT ON OUR EXPERIENCES Slide S	1. Create and assign a discussion board for students to share their end-of-unit reflections.	VIRTUAL CLASS PRE-WORK/DISCUSSION BOARD: 1. Reflect on and then share what was challenging and rewarding about their learning experience in this unit.
Slides T-AC	OPTIONAL LESSONS FOR EXTENSION	

Return to Lesson Set Overview