Louisiana Believes

Distance Learning Support for OpenSciEd Grade 7
Unit 7.4 Matter Cycling and Phototsynthesis

This resource is designed to support teachers in implementing distance learning for OpenSciEd Grade 7 Unit 7.4, Unit 5 in the Louisiana Guide to Piloting OpenSciEd. It is intended as a supporting document and should be used in conjunction with the OpenSciEd Unit 7.4 Unit 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 October 15, 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, 7, 8

Lesson Set 1: Lessons 1-8		
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, L7, L8 **Thinking Deeper Documents for each lesson:** Lesson 1 TDD, Lesson 2 TDD, Lesson 3 TDD, Lesson 4 TDD, Lesson 5 TDD, Lesson 6 TDD, Lesson 7 TDD, Lesson 8 TDD **Additional Documents:** Lesson 4: Comparing and Critiquing arguments about Water in Plants Lesson 8: Individual Midpoint Assessment Optional: Sample Parent Letter	**Teacher Made Resources:** Lesson 1: • DQB assignment, Consensus Model, Driving Question Board Lesson 2: • Potential Candidates assignment, Potential Candidates chart - *made with student submissions* Lesson 3: • Consensus Model, Potential Candidates chart, Revising Potential Candidates Discussion Board Lesson 4: • Consensus Model, Potential Candidates chart Lesson 6: • Investigation B Data sharing assignment Lesson 7: • Chloroplast Consensus Model Lesson 8: • Initial Models from Lesson 1, Thinking Deeper Documents from previous Lessons **Home Investigation Materials:** Lesson 1: Maple syrup, Maple water *(see safety information and alternative assignment)* Lesson 5: Spinach leaves, Magnifying lenses *(see option for substituting live demonstration)*	**Prior to Lesson**: Lesson 1: Maple Tree Tapping video Lesson 2: Hydroponic System setup video Lesson 5: Chloroplasts in Action video Lesson 6: Chloroplast Simulation **After Lesson Completion:** Discussion Board (Lessons 3, 6) Virtual Class recordings (Lessons 1, 2, 4, 5, 6, 7, 8)

Students should ideally join VIRTUAL CLASS on the following days:

Day 2 - Lesson 1 | Day 5 - Lesson 2 | Day 7 - Lesson 4 | Day 9 - Lesson 5

Day 10 - Lesson 6 | Day 12 - Lesson 7 | Day 13 - Lesson 8

Formative and Summative Assessment Opportunities:

Lesson 2: Progress Tracker - TDD
Lesson 4: Comparing and Critiquing arguments about Water in Plants
Lesson 6: Progress Tracker - TDD
Lesson 8: Individual Midpoint Assessment

Lesson 1 (3 days) - Anchoring Phenomenon

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

- Lesson Slideshow
- Thinking Deeper Document
- Maple syrup and Maple sap [water} (these are not included in the kits and will need to be obtained by the school district and distributed to students prior to the lesson.) **Safety:** Be sure to check for any food allergies to maple syrup or sugar intolerance and that you are using 100% maple syrup and sap. Follow your school's policy for safe food handling. Wear gloves when packaging to send home. NOTE: If there are allergy concerns or distributing materials is not possible, consider providing videos like the examples provided: Kids Tasting Maple Syrup, Maple Water Review
- Maple Tree Tapping video
- DQB assignment - *teacher made*
- Consensus Model - *after completion*
- Driving Question Board - *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
- Maple syrup and Maple sap [water} (these are not included in the kits and will need to be obtained by the school district and distributed to students prior to the lesson.) **Safety:** Be sure to check for any food allergies to maple syrup or sugar intolerance and that you are using 100% maple syrup and sap. Follow your school's policy for safe food handling. Wear gloves when packaging to send home. NOTE: If there are allergy concerns or distributing materials is not possible, consider providing videos like the examples provided: Kids Tasting Maple Syrup, Maple Water Review
- Maple Tree Tapping video
- DQB assignment - *teacher made*
- Consensus Model - *after completion*
- Driving Question Board - *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 1 (3 days) - Anchoring Phenomenon

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (10 min) EXPLORE THE FOOD WE ATE TODAY Slides A - D	1. Distribute maple syrup and maple water prior to lesson or provide video links for students in the lesson slideshow. 2. Share Lesson Slideshow with students. 3. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Identify foods eaten recently and sort them into categories. 2. Make observations about Maple syrup.
Part 2 (10 min) WHERE DOES MAPLE SYRUP COME FROM? Slides E-F		VIRTUAL CLASS PRE-WORK: 1. Record noticings and wonderings about the video showing where maple syrup comes from. 2. Identify patterns from tasting Maple syrup and watching the video.
Part 3 (5 min) TASTE MAPLE SAP Slide H		VIRTUAL CLASS PRE-WORK: 1. Record noticings and wonderings after tasting Maple sap.
Part 4 (7 min) RECALL WHAT HAPPENS TO THE FOOD WE EAT Slide I-J		VIRTUAL CLASS PRE-WORK: 1. Describe the process of food breaking down as it travels through our body. 2. Identify that food molecules are atoms of certain basic elements.

Part 5 (11 min) PREDICT WHICH FOOD MOLECULES ARE IN PLANTS	*Addressed in Day 2 Virtual Class*	
Part 6 (10 min) READ ABOUT BREAKFAST FOOD AROUND THE WORLD Slide K		VIRTUAL CLASS PRE-WORK: 1. Read about what kids eat for breakfast around the world. 2. Categorize the food and make predictions about what food molecules might be found in them.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 7-12 (50 min) NAVIGATION INVESTIGATE WHAT IS IN FOOD THAT COMES FROM PLANTS DEVELOP INITIAL MODELS OF HOW PLANTS GET FOOD MOLECULES COMPARE INITIAL MODELS OF HOW PLANTS GET FOOD MOLECULES DEVELOP A CONSENSUS MODEL OF HOW PLANTS GET FOOD MOLECULES Slides L-R	**Teachers build in reviewing norms and setting expectations as needed for Virtual Class.* Prior to Virtual Class, the teacher should: 1. Make arrangements for students to work in groups. (Group work can be performed in break-out rooms in Zoom or Meet, if available. Whiteboard apps like Jamboard or shared Google docs also can be used to allow sharing among groups.) VIRTUAL CLASS: 1. Categorize foods listed in day one and predict what food molecules are in foods that come from plants. 2. Discuss predictions of food molecules in plants. 3. Investigate what's in the foods we eat that come from plants. 4. Class discussion of related phenomena, students record ideas on Thinking Deeper Document. 5. Create and share initial models. Models may be shared in breakout rooms, through a sharing app such as Jamboard, or in the whole group. 6. Develop a consensus model. Draw electronically on a whiteboard app and screen share or draw on chart paper to display on camera. 7. Post/share consensus model with students to reference throughout the unit.	
Part 13 (2 min) NAVIGATION: RECORD NEW QUESTIONS Slide S		VIRTUAL CLASS POST-WORK: 1. Record new questions based on Consensus model work

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 14 (7 min) DEVELOP QUESTIONS FOR THE DRIVING QUESTION BOARD Slide T		VIRTUAL CLASS PRE-WORK: 1. Review models. 2. Review noticings and wonderings. 3. Review Related Phenomena. 4. Brainstorm how and why questions related to how food molecules and plants.
Part 15 (23 min) BUILD THE DRIVING QUESTION BOARD Slide T	1. Create and assign the DQB assignment for students to submit questions. 2. Review submitted questions and create DQB. 3. Post/share DQB with students to reference throughout the unit (Padlet, Jamboard, or similar tools will allow students to interact with the DQB in subsequent lessons).	VIRTUAL CLASS PRE-WORK: 1. Choose one question and submit it to the teacher.
Part 16 (15 min) DEVELOP IDEAS FOR INVESTIGATIONS Slide V		VIRTUAL CLASS POST-WORK: 1. Record the kind of investigations we could or would need to perform to collect data to answer the questions from the DQB.

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Lesson 2 (2 days) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Potential Candidates assignment - *teacher made*
- Potential Candidates chart - *teacher made with student submissions*

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
- Hydroponic System setup video
- Potential Candidates assignment - *teacher made*
- Potential Candidates chart - *teacher made with student submissions*
- 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 (6 min) NAVIGATION Slides A-B	1. Share Lesson Slideshow with students. 2. Share Thinking Deeper Document with students.	VIRTUAL CLASS PRE-WORK: 1. Review what we agreed on in the last class from our consensus model using the Progress Tracker. 2. Reflect on how plants get food.
Part 2 (7 min) EXPLORE PLANTS GROWING IN CLASS Slides C-D		VIRTUAL CLASS PRE-WORK: 1. Examine pictures of plants growing in a hydroponic system and answer questions about them.
Part 3 (5 min) CREATE OUR LIST OF CANDIDATES Slide E	1. Create an assignment for students to submit their potential candidates. 2. Compile student submissions on a chart to share with students during the Virtual Class.	VIRTUAL CLASS PRE-WORK: 1. Create a list of candidates for the source of food molecules in plants. 2. Submit one candidate to the teacher for inclusion on the Potential Candidates chart.
Part 4 (10 min) ANALYZE THE HYDROPONIC SYSTEM Slide F	*Soil elimination is addressed in the Virtual Class*	VIRTUAL CLASS PRE-WORK: 1. Make observations of the hydroponic system in preparation for a discussion about eliminating soil as a candidate.

Part 5 (7 min) ANALYZE THE HYDROPONIC PLANT SET UP Slide G-H		VIRTUAL CLASS PRE-WORK: 1. Analyze the hydroponic plant system to consider adding plant food as a potential candidate.
Part 6 10 min) INVESTIGATE HYDROPONIC PLANT FOOD Slides I - K		VIRTUAL CLASS PRE-WORK: 1. Analyze food molecules to determine what they are made of. 2. Reflect on how we might determine if hydroponic plant food is the source of food molecules. 3. Examine the hydroponic plant food label to determine whether it is a source for food molecules.

<table>
<tr><th colspan="3">Day 2</th></tr>
<tr><th rowspan="2">Lesson Components</th><th colspan="2">Distance Learning Plan</th></tr>
<tr><th>Teacher</th><th>Student</th></tr>
<tr><td>Part 7 - 9 (45 min)

NAVIGATION
INVESTIGATE HYDROPONIC PLANT FOOD WITH FOOD INDICATORS
BUILDING UNDERSTANDINGS
DISCUSSION ABOUT WHETHER FOOD MOLECULES ARE FOUND IN HYDROPONIC PLANT FOOD SOLUTION

Slides L - Q</td><td colspan="2">*Teachers build in reviewing norms and setting expectations as needed for Virtual Class.
*The slide deck includes optional slides (20-23) that provide references for the results portion of the investigation.
Prior to Virtual Class, the teacher should:
1. Prepare for the class investigation prior to the lesson. Teachers may choose to conduct and record the investigation prior to the lesson.

VIRTUAL CLASS:
1. Discuss list of candidates for the source of food molecules in plants.
2. Share ideas about testing hydroponic plant food.
3. Design an investigation to determine if hydroponic plant food is the source of food molecules.
4. Carry out student designed investigations on live stream or recorded video.
5. Make sense as a class of what the results of the food indicator experiments.
6. Update our Progress Trackers with information about whether the below the surface inputs were the source of food molecules.</td></tr>
<tr><td>Part 10 (5 min)
EXIT TICKET: FOOD MOLECULES FROM BELOW SURFACE INPUTS
Slide R</td><td></td><td>VIRTUAL CLASS POST-WORK:
1. Identify other possible sources for food molecules in plants.</td></tr>
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Lesson 3 (1 day) - Problematizing

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

- Lesson Slideshow
- Thinking Deeper Document
- Consensus Model
- Potential Candidates chart from Lesson 2
- Revising Potential Candidates 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
- Consensus Model
- Potential Candidates chart from Lesson 2
- Revising Potential Candidates Discussion Board - *teacher made*
- Discussion Board - *after completion*
- Virtual Class Recording - *after completion*

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

- None

Lesson 3 (1 day) - Problematizing

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 Consensus model to find above surface inputs.
Part 2 (6 min) DISCUSS WHAT WE ALREADY KNOW ABOUT LIGHT Slide B		VIRTUAL CLASS PRE-WORK: 1. Students will review prior knowledge of light and list this information in their Thinking Deeper Document.
Part 3 (7 min) DISCUSS WHAT WE ALREADY KNOW ABOUT THE COMPOSITION OF AIR Slide C-D		VIRTUAL CLASS PRE-WORK: 1. Students will review prior knowledge of air and list this information in their Thinking Deeper Document. 2. Students will analyze the chemical composition of air to determine if food molecules are present.
Part 4 (9 min) PROBLEMATIZE CANDIDATE SOURCES FOR PLANT FOOD MOLECULES Slide E		VIRTUAL CLASS PRE-WORK: 1. Students will reflect upon the current question of study and identify possible sources for further investigation.

Part 5 (9 min) LOOK FOR PATTERNS BETWEEN CANDIDATES AND FOOD MOLECULES FOR PARTS OF FOOD MOLECULES Slide F		VIRTUAL CLASS PRE-WORK: 1. Students will analyze the chemical composition of food molecules with a goal of identifying patterns between candidates.
Part 6 (3 min) REVISE OUR CANDIDATES LIST TO "PARTS" OF FOOD MOLECULES Slide G	1. Ensure students have access to the potential candidates chart created in Lesson 2. 2. Create a Discussion Board assignment (question stream, shared document, ect.) for students to submit their ideas for revising the potential candidates chart. 3. Review student submission, facilitate discussion as needed, and revisit in Virtual Class if needed.	DISCUSSION BOARD: 1. Students will identify 2 candidates that could move to a different part of the Potential Candidates chart and share their ideas on the Discussion Board.
Part 7 (3 min) REVISE CONSENSUS MODEL TO INCLUDE CONFIRMED INPUTS Slide H		VIRTUAL CLASS PRE-WORK: 1. Students will identify inputs for confirmation. 2. Students will identify methods to represent inputs.
Part 8 (3 min) NAVIGATION: WHERE DO WE GO NEXT? Slide I		VIRTUAL CLASS POST-WORK: 1. Students will answer questions that facilitate the navigation to the next lesson.

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Lesson 4 (2 days) – Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Consensus Model
- Potential Candidates chart from Lesson 2
- Lesson 4 Assessment: Comparing and Critiquing arguments about Water in Plants

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
- Potential Candidates chart from Lesson 2
- Lesson 4 Assessment: Comparing and Critiquing arguments about Water in Plants
- Virtual Class Recording - *after completion*

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

- Day 1

Lesson 4 (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. Students develop reasons to investigate air around plants.
Part 2 -3 (30 min) PLANNING AND INVESTIGATING ABOVE THE SURFACE SOURCES MAKE SENSE OF RESULTS IN A WHOLE-CLASS BUILDING UNDERSTANDINGS DISCUSSION Slides B-K	**Teachers build in reviewing norms and setting expectations as needed for Virtual Class.* Prior to Virtual Class, the teacher should: 1. Prepare for the class investigation prior to the lesson. Teachers may choose to conduct and record the investigation prior to the lesson. 2. Make arrangements for students to work in groups. (Group work can be performed in break-out rooms in Zoom or Meet, if available. Whiteboard apps like Jamboard or shared Google docs also can be used to allow sharing among groups.) VIRTUAL CLASS: 1. Review consensus model to identify above surface inputs. 2. Review light and air knowledge from previous units. 3. Revise Potential Candidates list based on Discussion Board responses from Lesson 3. 4. Revise Consensus Model. 5. Brainstorm how to figure out if parts of food molecules are entering the plant through the air. 6. Monitor carbon dioxide and water levels within a closed system for 10–15 minutes and record patterns. 7. Discuss the “Making sense” questions from the previous activity. 8. Motivate a desire to see whether other gases are changing around the plant. 9. Provide feedback to student claims in a whole class discussion or in breakout rooms if possible. *(Students will complete the assessment as virtual class post-work)*	

Part 4 (10 min) COMPARE AND CRITIQUE ARGUMENTS ABOUT THE ROLE OF WATER Slides L-M	1. Assign Lesson 4 Assessment: Comparing and Critiquing arguments about Water in Plants	VIRTUAL CLASS POST-WORK: 1. Complete an assessment where they provide feedback to three different claims about what happens to water inside plants.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 5 (5 min) NAVIGATION Slide N		VIRTUAL CLASS POST-WORK: 1. Revisit the idea of wanting to know if other gases in the air are going into or out of the plant.
Part 6 (20 min) ANALYZE AND INTERPRET SECONDHAND DATA Slides O -R		VIRTUAL CLASS POST-WORK: 1. Evaluate second hand data produced by other students who measured carbon dioxide, water, oxygen, and light. 2. Analyze and interpret these data using the I2 strategy and discuss patterns.
Part 7 (15 min) CONSENSUS DISCUSSION ABOUT SECONDHAND DATA Slides S -T	*Addressed in Virtual Class.*	VIRTUAL CLASS POST-WORK: 1. Use evidence from both sessions to argue about which gases in the air we think are inputs and which we think are outputs.
Part 8 (5 min) NEXT STEPS Slide U		VIRTUAL CLASS POST-WORK: 1. Record ideas for how to investigate how gases are getting into and out of plants.

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
- Spinach Leaves and a magnifying glass - NOTE: Spinach leaves are not included in the consumable materials and will need to be purchased and provided to students along with a magnifying glass. As an alternative, the teacher may choose to demonstrate during the virtual class.

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
- Chloroplasts in Action video
- Spinach Leaves and a magnifying glass - NOTE: Spinach leaves are not included in the consumable materials and will need to be purchased and provided to students along with a magnifying glass. As an alternative, the teacher may choose to demonstrate during the virtual class.
- 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 (42 min) NAVIGATION OBSERVE THE OUTSIDE AND INSIDE OF LEAVES WATCH A VIDEO OF CHLOROPLASTS MOVING READ PLANT CELLS BUILDING UNDERSTANDINGS DISCUSSION ABOUT PLANT AND ANIMAL CELL STRUCTURES Slides A -J	**Teachers build in reviewing norms and setting expectations as needed for Virtual Class.* Prior to Virtual Class, the teacher should: 1. Share Lesson Slideshow and Thinking Deeper Document with students. 2. Make arrangements for students to work in groups. (Group work can be performed in break-out rooms in Zoom or Meet, if available. Whiteboard apps like Jamboard or shared Google docs also can be used to allow sharing among groups.) VIRTUAL CLASS: 1. Brainstorm additions to the Consensus Model 2. Observe spinach leaves with a magnifying lens and microscope images of different sections of leaves. 3. Record observations about possible functions for each source. 4. Watch a video of a plant cell and record observations and ideas about possible functions. 5. Discuss how the data sources help us understand how gases get into and out of leaves. 6. Read *Plant Cells* in pairs and answer questions comparing plant and animal cells. 7. Investigate chloroplasts and light. 8. Discuss what the class figured out about plant cells. 9. Revise the Consensus model.	
Part 6 (3 min) NAVIGATION: IDEAS FOR INVESTIGATION Slide K		VIRTUAL CLASS POST-WORK: 1. Brainstorm what to put in a simulation to figure out what's happening inside plant cells.

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
- Chloroplast Simulation
- Investigation B Data sharing assignment - *teacher made*
- Claims 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
- Chloroplast Simulation
- Investigation B Data sharing assignment - *teacher made*
- Claims Discussion Board - *teacher made*
- Discussion Board - *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 6 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 - 5 (44 min) NAVIGATION ORIENT STUDENTS TO THE SIMULATION CONDUCT INVESTIGATION A MAKE SENSE OF INVESTIGATION A PLAN INVESTIGATION B Slides A -K	**Teachers build in reviewing norms and setting expectations as needed for Virtual Class.* Prior to Virtual Class, the teacher should: 1. Share Lesson Slideshow and Thinking Deeper Document with students . 2. Make arrangements for students to work in groups. (Group work can be performed in break-out rooms in Zoom or Meet, if available. Whiteboard apps like Jamboard or shared Google docs also can be used to allow sharing among groups.) 3. Create Investigation B Data sharing assignment. VIRTUAL CLASS: 1. Review simulation desired components. 2. Orient students to the interface for the simulation. 3. Have students explore the simulation using the procedures for investigation A. 4. Make sense of investigation data. 5. Plan investigation B to explore how changing the inputs affects the outputs.	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 6 (15 min) CONDUCT INVESTIGATION B Slide L		VIRTUAL CLASS POST-WORK: 1. Conduct investigation and share results.
Part 7 (10 min) SHARE OUR CLAIMS WITH OUR GROUPS Slide M	1. Create a Discussion Board assignment (question stream, shared document, ect.) for students to submit their claims. 2. Review student submission, facilitate discussion as needed, and revisit in Virtual Class.	DISCUSSION BOARD: 1. Make claims based on simulation data and add it to the Discussion Board. 2. Review and respond to other student claims.
Part 8 (15 min) CONSENSUS DISCUSSION ABOUT INTERACTIONS Slides N, O	*Revisited in Virtual Class.*	VIRTUAL CLASS POST-WORK: 1. Create a model that demonstrates processes inside a chloroplast. 2. Update Progress Trackers.
Part 9 (5 min) NAVIGATION	*Not addressed in distance learning - option for teacher to build in during Virtual Class or Post-Work if time allows.*	

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Lesson 7 (1 day) - Investigation and Problematizing

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

- Lesson Slideshow
- Thinking Deeper Document
- Chloroplast Consensus Model - *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
- Chloroplast 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 7 (1 day) - Investigation and Problematizing

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 -4 (42 min) NAVIGATION READ: HOW DO SCIENTISTS MEASURE ENERGY IN FOOD? EXAMINE FOOD LABELS FOR EVIDENCE THAT THE INPUTS TO THE PLANT SYSTEM PROVIDE ENERGY ARGUE FROM EVIDENCE IN A SCIENTIST CIRCLE ABOUT THE ROLE OF SUNLIGHT Slides A -E	**Teachers build in reviewing norms and setting expectations as needed for Virtual Class.* Prior to Virtual Class, the teacher should: 1. Share Lesson Slideshow and Thinking Deeper Document with students. 2. Make arrangements for students to work in groups. (Group work can be performed in break-out rooms in Zoom or Meet, if available. Whiteboard apps like Jamboard or shared Google docs also can be used to allow sharing among groups.) VIRTUAL CLASS: 1. Review student claims. 2. Develop a consensus model for chloroplast processes by discussing student-created models from Lesson 6. (Share model with students after completion.) 3. Discuss why plants need light with partners then the whole class. (If break out rooms are not possible, discuss whole-class.) 4. Read the article and complete the checklist and Making Sense questions. (You may choose to have students work with a partner or in a small group to complete the questions.) 5. Examine food labels for photosynthesis components in small groups. 6. Create arguments that sunlight provides energy to plants.	
Part 5 (5 min) UPDATE OUR PROGRESS TRACKERS Slide F		VIRTUAL CLASS POST-WORK: 1. Identify what we figured out so far about why plants need light.

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Lesson 8 (2 days) - Putting Pieces Together

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

- Lesson Slideshow
- Thinking Deeper Document
- Initial Models from Lesson 1
- Thinking Deeper Documents from previous Lessons
- Midpoint Assessment 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
- Initial Models from Lesson 1
- Thinking Deeper Documents from previous Lessons
- Midpoint Assessment document
- Virtual Class Recording - *after completion*

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

- Day 1

Lesson 8 (2 days) - Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 - 4 (45 min) NAVIGATION: LOOKING BACK CREATE A GOTTA-HAVE-IT CHECKLIST REVISE THE CLASS CONSENSUS MODEL UPDATE OUR PROGRESS TRACKERS (OPTIONAL) Slides A - F	**Teachers build in reviewing norms and setting expectations as needed for Virtual Class.* Prior to Virtual Class, the teacher should: 1. Share Lesson Slideshow and Thinking Deeper Document with students. 2. Make arrangements for students to work in groups. (Group work can be performed in break-out rooms in Zoom or Meet, if available. Whiteboard apps like Jamboard or shared Google docs also can be used to allow sharing among groups.) VIRTUAL CLASS: 1. Review Phenomena, related phenomena, and questions. 2. Create a Gotta-Have-It Checklist in groups. 3. Revise the Consensus model. 4. Update Progress Trackers.	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 4 (45 min) CHECK FOR UNDERSTANDING USING THE EMBEDDED MIDPOINT ASSESSMENT Slide G	1. Assign Midpoint Assessment.	VIRTUAL CLASS POST-WORK: 1. Work individually to revise initial models by creating a new model 2. Argue from evidence on how a scientist could survive in a container with just plants.

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