Louisiana Believes

Distance Learning Support for OpenSciEd Grade 7
Unit 6.3 Weather, Climate, Water Cycling: The Storms Unit

This resource is designed to support teachers in implementing distance learning for OpenSciEd Unit 6.3 Weather, Unit 2 in the Louisiana Guide to Piloting OpenSciEd Grade 7. It is intended as a supporting document and should be used in conjunction with the OpenSciEd Unit 6.3 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:

- Leading an Anchor Phenomenon Routine
- Navigation Routine
- 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.

Last Updated August 12, 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 1-6

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: Weather Data Case Study Explaining the Movement of Air in a Hailstorm Cloud Optional: Sample Parent Letter	Notice/Wonder assignment - *teacher made* (Lesson 1) Driving Question Board Question Assignment - *teacher made* (Lesson 1) Observing Hailstones Assignment - *teacher made* (Lesson 2) Home Investigation Materials: (Lesson 5) ● empty plastic bottle ● 2 large tubs ● soap bubble solution *(mix and give to students ahead of time - 8 parts water to 1 part each liquid dish soap and glycerin)*	**Prior to Lesson**: Anchor Phenomenon Videos: Video Clip 1, Video Clip 2, Video Clip 3 (Lesson 1) Soap Investigation Video (Lesson 5) Heated Balloon Investigation Video (Lesson 5) Cloud Growth Time Lapse Video (Lesson 6) **After Lesson Completion:** Driving Question Board (Lesson 1) Consensus Model (Lesson 1) Virtual Class recordings (Lessons 1-6) Discussion Board (Lessons 2, 4, 5)

Students should ideally join VIRTUAL CLASS on the following days:		
Days 1 & 2 - Lesson 1	Day 4 - Lesson 2	Day 6 - Lesson 3
Day 9 - Lesson 4	Days 11 & 12 - Lesson 5	Day 14 - Lesson 6

Formative and Summative Assessment Opportunities:
Lesson 1: Initial Anchor Phenomenon Model on Thinking Deeper Document *(pre-assessment)*
Lesson 2: "What are conditions like on days that it hails?" C.E.R on Thinking Deeper Document
Lesson 5: Think Through It C.E.R on Thinking Deeper Document
Lesson 6: Explaining the Movement of Air in a Hailstorm Cloud *(embedded summative assessment)*

Lesson Set Overview: Lessons 7-13

Lesson Set 2: Lessons 7-13		
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, L13 Thinking Deeper Documents for each lesson: Lesson 7 TDD, Lesson 8 TDD, Lesson 9 TDD, Lesson 10 TDD, Lesson 11 TDD, Lesson 12 TDD, Lesson 13 TDD Additional Documents: Hurricane Assessment Tasks Optional: Sample Parent Letter	Home Investigation materials (Lesson 8) ● plastic 2-L bottle ● plastic bag with seal closure ● ice ● wax paper ● pipette (or something to make water droplets) ● straw	**Prior to Lesson**: Marble Investigation Videos - C1, C2, C3, C4 (Lesson 8) Frost Demonstration Video (Lesson 9) Homemade Barometer Video (Lesson 11) Convection Demonstration Video (Lesson 12) **After Lesson Completion:** Virtual Class recordings (Lessons 7, 8, 10, 11, 13)

Students should ideally join VIRTUAL CLASS on the following days:

Day 2 - Lesson 7   Day 4 - Lesson 8   Day 6 - Lesson 10

Day 8 - Lesson 11   Day 11 - Lesson 13

Formative and Summative Assessment Opportunities:

Lesson 8: Navigation Questions *(end of Thinking Deeper Document)*

Lesson 10: "What can we explain?" *(end of Thinking Deeper Document)*

Lesson 12: Claim following Convection Investigation *(end of Thinking Deeper Document)*

Lesson 13: Hurricane Assessment Tasks - *Summative Assessment*

Lesson Set Overview: Lessons 14-18

Lesson Set 3: Lessons 14-18		
Provided Resources Students Will Need	**Additional Resources Students Will Need**	**Additional Materials for Students Without Internet Access**
Lesson Slideshows for **each** lesson: L14, L15, L16, L17, L18 Thinking Deeper Documents for each lesson: Lesson 14 TDD, Lesson 15 TDD, Lesson 16 TDD, Lesson 17 TDD, Lesson 18 TDD Optional: Sample Parent Letter	Question Submission Assignment - *teacher made* (Lesson 14)	**Prior to Lesson**: Weather Report Video (Lessons 14, 17) Front Videos: Simulation 1, Simulation 2 (Lesson 16) Three Storms Weather Forecast Video (Lesson 18) **After Lesson Completion:** Virtual Class recordings (Lessons 14, 15, 16, 18)

Students should ideally join VIRTUAL CLASS on the following days:

Day 2 - Lesson 14   Day 3 - Lesson 15   Day 6 - Lesson 16   Day 8 - Lesson 18

Formative and Summative Assessment Opportunities:

Lesson 15 - Claim *(end of Thinking Deeper Document)*

Lesson 16 - Relative Humidity Reflection Questions *(end of Thinking Deeper Document)*

Lesson 17 - Explaining Patterns and Predictions in the Forecast *(end of Thinking Deeper Document)*

Lesson Set Overview: Lessons 19-22

Lesson Set 4: Lessons 19-22	
Provided Resources Students Will Need	**Additional Materials for Students Without Internet Access**
Lesson Slideshows for **each** lesson: L19, L20, L21, L22 Thinking Deeper Documents for each lesson: Lesson 19 TDD, Lesson 20 TDD, Lesson 21 TDD Additional Documents: Rainforest Climate Assessment	**Prior to Lesson**: NASA Visualizations: Precipitation Rates, Atmospheric River, Global Precipitation Rates - 8 months (Lesson 19) NASA Animation Ocean Temperatures, NASA Rainfall Accumulation (Lesson 20) **After Lesson Completion:** Virtual Class recordings (Lessons 20, 21, 22)
Students should ideally join VIRTUAL CLASS on the following days: Day 2 - Lesson 20 Day 4 - Lesson 21 Day 6 - Lesson 22	
Formative and Summative Assessment Opportunities: Lessons 19 & 20: Exit Ticket *(students complete at the end of Lesson 19 and revisit after Day 1 in Lesson 20)* Lesson 21: Lesson Question *(end of Thinking Deeper Document)* Lesson 22: Rainforest Climate Assessment - *Summative 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
- Notice/Wonder assignment *(teacher made)*
- Driving Question Board Question 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:
- Anchor Phenomenon Videos: Video Clip 1, Video Clip 2, Video Clip 3
- Lesson Slideshow
- Thinking Deeper Document
- Notice/Wonder Assignment *(teacher made)*
- Virtual Class recordings - *after completion*
- Driving Question Board Question Assignment *(teacher made)*
- Driving Question Board - *after completion*
- Consensus Model - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1
- Day 2

Lesson 1 (3 days) - Anchoring Phenomenon

	Day 1	
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (22 min) EXPLORE SOME STORM-RELATED PHENOMENA Slides A, B, C	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students 3. Create assignment for students to submit 1 notice and 1 wonder (example: Google Form) 4. Review Notice/Wonder responses from students in preparation to facilitate VIRTUAL CLASS discussions	VIRTUAL CLASS PRE-WORK: 1. Watch 3 videos and record noticings and wonderings on the chart: Video Clip 1, Video Clip 2, Video Clip 3 2. Turn in individual Notice/Wonder assignment to teacher
Parts 2 & 3 (15 min) CREATE INITIAL MODELS Slides D, E CONNECT TO PREVIOUS UNIT IDEAS Slide C	VIRTUAL CLASS 1. Discuss models from Thermal Energy Unit - how we represented particle in solids, liquids, gases and how we showed energy transferred into and out of the system 2. Students create initial model of what happened in the sky before, during, and after hailstorms 3. Share and discuss 3-5 student created models	
Part 4 (8 min) DEVELOP INITIAL MODELS Slide F	1. Have students turn in Thinking Deeper Document or create a separate assignment for revising models	VIRTUAL CLASS POST-WORK: 1. Revise model based on the VIRTUAL CLASS discussions, submit to the teacher

	Day 2	
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 5 (3 min) TARGET A NORM TO FOCUS ON	*Build out as needed for virtual learning and address in first virtual class*	
Part 6 (10 min) COMPARE MODELS	*Addressed in VIRTUAL CLASSES*	
Parts 7-9 (32 min) DEVELOP AN INITIAL CONSENSUS MODEL Slide G DEVELOP INITIAL QUESTIONS Slide I IDENTIFY RELATED PHENOMENA AND REFLECT ON NORMS Slide H	VIRTUAL CLASS 1. Develop initial consensus model 2. Discuss related phenomena in two categories: heavy precipitation in a short time and continuous precipitation over a long period 3. Develop initial questions and share them 4. Teacher begins building Driving Question Board using the platform of their choice (examples include Google Jamboard, Pinup, etc.)	

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 10 (13 min) SHARE RELATED PHENOMENA AND RECORD ADDITIONAL QUESTIONS		*Students begin this process during virtual class then follow up with post-work*
Part 11 (20 min) BUILD THE DRIVING QUESTION BOARD Slide J	1. Create and share assignment for students to submit new questions (examples: Google form, discussion thread on Google Classroom) 2. Compile and organize questions to complete Driving Question Board 3. Share completed Driving Question Board with students if they do not already have access	VIRTUAL CLASS POST-WORK: 1. Submit a new question for driving question board
Part 12 (12 min) DEVELOP IDEAS FOR FUTURE INVESTIGATIONS Slide K		VIRTUAL CLASS POST-WORK: 1. Record ideas for future investigations on

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Lesson 2 (1.5 days) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:
- Lesson Slideshow
- Thinking Deeper Document
- Observing Hailstones Assignment *(teacher made)*
- Weather Data Case Study

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
- Observing Hailstones Assignment *(teacher made)*
- Virtual Class recording - *after completion*
- Weather Data Case Study
- Discussion Board - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1 & 2 (11 min) NAVIGATION & OBSERVE HAILSTONES Slides A, B, C, D	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students 3. Create Hailstone Observations Assignment (ex. Google Form) 4. Review Hailstone Observations submissions in preparation to facilitate VIRTUAL CLASS discussion	VIRTUAL CLASS PRE-WORK: 1. Record ideas for data to collect before, during, and after a hail event 2. Observe hailstone images and record noticings and wonderings and describe patterns 3. Complete and submit Hailstone Observations assignment
Parts 3 & 4 (22 min) ANALYZE HAIL FREQUENCY MAP DATA & ANALYZE AN EXAMPLE HAILSTORM CASE Slides E, F, G, H, I, J	VIRTUAL CLASS 1. Discuss student ideas for data to collect and patterns in the hailstone images from Thinking Deeper Document 2. Analyze and discuss hailstorm map data 3. Group analysis of hailstorm case, students record and annotate on Thinking Deeper Document	
Part 5 (14 min) ANALYZE HAILSTORM CASES IN PARTNERS Slide K	1. Assign Weather Data Case Study and two locations to each student 2. If teachers choose to have students work with a partner, students will need to share editing rights to the document	VIRTUAL CLASS POST-WORK 1. Complete Weather Data Case Study for two different assigned locations

Lesson Components	Day 2	
	Distance Learning Plan	
	Teacher	**Student**
Part 6 (2 min) NAVIGATION	*Incorporated in Observing Patterns Discussion Board*	
Part 7 (15 min) CONDUCT A BUILDING UNDERSTANDINGS DISCUSSION ABOUT IDENTIFYING PATTERNS IN HAILSTORM CASES Slide L	1. Create Observing Patterns DISCUSSION BOARD (ex. Google slideshow shared whole class or Discussion Question on Google Stream) - may choose to provide sentence starters or examples for feedback if needed 2. Review DISCUSSION BOARD submissions and ensure that every student has feedback on their claims	VIRTUAL CLASS POST-WORK/DISCUSSION BOARD: 1. Share case study data and review posts from classmates 2. Make a claim based on evidence about patterns related to when hailstorms occur and post claim 3. Provide feedback on claims for classmates 4. Respond to feedback on their claim
Part 8 (5 min) ADD TO OUR PROGRESS TRACKERS	*Students track progress during all lessons with Thinking Deeper Documents*	
Part 9 (2 min) NAVIGATION (OPTIONAL) Slide M	1. Assign "What are conditions like on days that it hails?" C.E.R on Thinking Deeper Document 2. Review C.E.R. responses and provide feedback prior to the DISCUSSION BOARD in the next lesson	VIRTUAL CLASS POST-WORK: 1. Complete "What are conditions like on days that it hails?" C.E.R on Thinking Deeper Document and submit

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Lesson 3 (1.5 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
- Weather Balloon Video
- 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 2

Lesson 3 (1.5 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (10 min) NAVIGATION Slides A, B	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Complete Navigation and identify data we will need
Part 2 (10 min) INTRODUCE WEATHER BALLOONS Slides C, D		VIRTUAL CLASS PRE-WORK: 1. Watch Weather Balloon Video 2. Complete Weather Balloons and Making Predictions

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 3 (15min) ANALYZE AND INTERPRET WEATHER BALLOON DATA Slides E, F, G, H		VIRTUAL CLASS PRE-WORK: 1. Complete reflection questions and describe patterns observed on weather balloon data
Parts 4-6 (30 min) CONDUCT A BUILDING UNDERSTANDINGS DISCUSSION ABOUT THE RELATIONSHIP BETWEEN ALTITUDE AND AIR TEMPERATURE & REPRESENT TEMPERATURE DIFFERENCES IN AIR Slides I, J, K, L	VIRTUAL CLASS: 1. Share observations and predictions about weather balloon data (from pre-work on Thinking Deeper Document) 2. Discuss patterns noticed related to the data and claims about the relationship between air temperature and altitude (from pre-work on Thinking Deeper Document) 3. Quick Write and discussion about the relationship between temperature and kinetic energy of particles on Thinking Deeper Document 4. Develop a model for representing the motion of the molecules that make up air at different temperatures on Thinking Deeper Document	
Part 7 (3min) NAVIGATION Slide M		VIRTUAL CLASS POST-WORK: 1. Make some predictions about differences in air temperature different distances from the ground at different times of day

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Lesson 4 (2.5 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
- 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 3

Lesson 4 (2.5 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (10 min) NAVIGATION Slide A	1. Share Lesson Slideshow 2. Create and assign DISCUSSION BOARD Assignment (examples include a question thread on Google Stream or a Google Document that all students in the class can edit)	DISCUSSION BOARD: 1. Share predictions about the relationship between temperature and altitude at different times of day from Lesson 3 Thinking Deeper Document 2. Read and provide feedback on predictions from other students
Part 2 (25 min) PLANNING OUR INVESTIGATION Slides B, C, D	1. Share Thinking Deeper Document 2. Create and assign DISCUSSION BOARD (ex. Google Document that all students in the class can edit) - teachers may also consider giving students sentence stems for providing feedback to classmates	DISCUSSION BOARD: 1. Record investigation question and brainstorm ideas for data collection, tools, and measurement in our investigation 3. Share ideas for planning the investigation 4. Read and respond to ideas from other students
Part 3 (8 min) MAKE PREDICTIONS Slide E		VIRTUAL CLASS PRE-WORK: 1. Record temperature predictions with annotations

| Parts 4 & 5 (5 min)

NAVIGATION

Slide F | 1. Review student ideas from the discussion board, summarize and share with students | VIRTUAL CLASS PRE-WORK:
1. Think through questions based on summary of discussion board responses |

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 6 (25 min) CONDUCT THE TEMPERATURE AND SUNLIGHT INVESTIGATION Slides G, H, I, J		VIRTUAL CLASS PRE-WORK: 1. Read temperatures from the photos of data collection in each area
Part 7 (15 min) REPORT RESULTS AND MAKE SENSE OF DATA Slides K, L, M		VIRTUAL CLASS PRE-WORK: 1. Record temperatures on their data table and answer reflection questions

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 8-10 (25 min) NAVIGATION, DISCUSS HOW TO REPRESENT OUR IDEAS ABOUT THE EFFECT OF SUNLIGHT ON TEMPERATURE & DEVELOP A CONSENSUS MODEL IN A SCIENTISTS CIRCLE Slides N, O	VIRTUAL CLASS: 1. Share reflections based on the investigation data from their Thinking Deeper Document 2. Discuss how to represent the energy transfer from the light to the ground and from the ground to the air above it based on the model from the previous unit	
Part 11 (3 min) CONNECT TO THE ANCHORING PHENOMENON Slide P		VIRTUAL CLASS POST-WORK: 1. Answer reflection question "Where Next?"

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Lesson 5 (2.5 days) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:
- Lesson Slideshow
- Thinking Deeper Document
- Home Investigation Materials:
  - empty plastic bottle
  - 2 large tubs
  - soap bubble solution *(mix and give to students ahead of time - 8 parts water to 1 part each liquid dish soap and glycerin)*

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
- Soap Investigation Video
- Heated Balloon Investigation Video
- Discussion Board *(after completion)*
- Virtual Class Recordings *(after completion)*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Days 2 & 3

Lesson 5 (2.5 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slides A, B	1. Share Lesson Slideshow 2. Create and assign DISCUSSION BOARD for Navigation and Making Predictions (examples include Question thread on Google Stream or a Google Document that all students in the class can edit)	DISCUSSION BOARD: 1. Share ideas from reflection question on Lesson 4 Thinking Deeper Document 2. Share ideas for heating trapped air 3. Read and respond to other student ideas
Part 2 (5 min) MAKE PREDICTIONS ABOUT WHAT WILL HAPPEN TO AIR WHEN IT IS HEATED AND COOLED Slide C	1. Share Thinking Deeper Document	DISCUSSION BOARD: 1. Make and record predictions about what will happen to air trapped in a closed system when it is heated and when it is cooled 2. Share predictions and respond to predictions made by classmates
Part 3 (10 min) CONDUCT THE SOAP BUBBLE AND BOTTLE INVESTIGATION Slides D, E, F, G	1. Prepare and distribute soap bubble solution ahead of time to students (8 parts water to 1 part each liquid dish soaps and glycerin) 2. Record the investigation or share the video with students who are unable to perform the investigation at home	VIRTUAL CLASS PRE-WORK/HOME INVESTIGATION: 1. Gather materials and follow the procedure perform Soap Bubble Investigation 2. Answer questions based on observations and draw a model to demonstrate what is happening to air molecules

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 4-6 (45 min) BUILDING UNDERSTANDINGS DISCUSSION ABOUT THE EFFECT OF ADDING THERMAL ENERGY TO AIR IN A CLOSED SYSTEM, CONNECT TO THE ANCHORING PHENOMENON & TRACK THE FLOW OF ENERGY INTO AND OUT OF THE CLOSED BOTTLE SYSTEM Slides H, I, J, K, L, M, N	VIRTUAL CLASS: 1. Discuss how we will model changes behavior of the air molecules that made up the in the closed bottle system when cooled and warmed and model on Thinking Deeper Document. 2. Discuss connections between the bottle experiment and the way air heats up near the Earth's surface as well as the class's ideas about how hailstorms form. 3. Discuss the flow of energy into and out of the closed bottle system as the air is warmed up and cooled down in student models. Record class ideas and make revisions to model as needed on Thinking Deeper Document. 4. Discuss the relationship between temperature and density. Record class ideas on Thinking Deeper Document.	

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 7 (5 min) MAKE A PREDICTION Slide O		VIRTUAL CLASS POST-WORK: 1. Make predictions about the introduction of thermal energy to a helium-filled balloon
Part 8 (10 min) CONDUCT THE HEATED BALLOON INVESTIGATION Slide P		VIRTUAL CLASS POST-WORK: 1. Watch Heated Balloon Investigation Video and make observations
Part 9 (16 min) CONDUCT A BUILDING UNDERSTANDINGS DISCUSSION ABOUT THE EFFECT OF ADDING THERMAL ENERGY TO THE BALLOON Slides Q, R, S, T	VIRTUAL CLASS PRE-WORK: 1. Answer reflection questions about what happened to the balloon when heated and create initial model VIRTUAL CLASS: 1. Discuss observations made during the investigation from Thinking Deeper Document 2. Develop a consensus model of what is happening to the air molecules in the balloon as it is heated. 3. Revise model on Thinking Deeper Document based on class discussion. VIRTUAL CLASS POST-WORK: 1. Answer reflection questions about the relationship between temperature, density and the behavior of the balloon	

Part 10 (5 min) MAKE CONNECTIONS TO THE LESSON QUESTION Slide U	1. Collect and review student C.E.R responses	VIRTUAL CLASS POST-WORK: 1. Use C.E.R. format and evidence from the soap bubble and balloon investigations to explain whether air close to the ground behaves the same way as helium in a balloon when heated.
Part 11 (5 min) UPDATE PROGRESS TRACKER		*Students track progress during all lessons with Thinking Deeper Documents*
Part 12 (4 min) NAVIGATION Slide U	*Incorporate ideas about how the behavior of the air near the ground when it is warmed up connects to our hail anchor phenomenon at next virtual class meeting as needed based on student C.E.R responses.*	

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Lesson 6 (2 days) - Putting Pieces Together

In this **Lesson**, students will need the following materials to appropriately engage in learning:
- Lesson Slideshow
- Thinking Deeper Document
- Explaining the Movement of Air in a Hailstorm Cloud - *Embedded Summative 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
- Cloud Growth Time Lapse
- Virtual Class Recording *(after completion)*
- Explaining the Movement of Air in a Hailstorm Cloud - *Embedded Summative Assessment*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 2

Lesson 6 (2 days) - Putting Pieces Together

Lesson Components	Distance Learning Plan	
	Day 1	
	Teacher	Student
Part 1 (3 min) NAVIGATION Slide A	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Predict behavior and motion of large parcels of air based on recent investigations
Part 2 (4 min) OBSERVE STRUCTURE OF HAIL-PRODUCING CLOUDS Slides B, C, D		VIRTUAL CLASS PRE-WORK: 1. Examine cloud photo 2. Describe observations about clouds that produce hail and compare them to other clouds
Part 3 (10 min) OBSERVE VIDEO OF CLOUDS FORMING Slide E		VIRTUAL CLASS PRE-WORK: 1. Watch Cloud Growth Time Lapse and track patterns in air movement as clouds form by annotating pictures
Part 4 (25 min) CONSTRUCT A SCIENTIFIC EXPLANATION FOR AIR MOVEMENT IN A HAIL CLOUD Slide F	*Embedded Summative Assessment originally scheduled at this point given after VIRTUAL CLASS*	VIRTUAL CLASS PRE-WORK: 1. Construct explanations about air movement in hail clouds

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5-7 (25 min) REVISE OUR INITIAL CLASS CONSENSUS MODEL, REVISIT THE DQB & IDENTIFY NEXT STEPS AND NEW QUESTIONS Slides G, H, I	VIRTUAL CLASS: 1. Discuss student explanations about air movement in hail clouds from questions on Thinking Deeper Document 2. Revise class consensus model based on learning from previous lessons about movement of air parcels 3. Discuss DBQ questions and annotate to show progress thus far 4. Discuss how air might be alike or different in three locations on a hail-producing cloud **Teachers assigns individual Embedded Summative Assessment - Explaining the Movement of Air in a Hailstorm Cloud**	
Part 8 (15 min) CONDUCT A CLOSE READING ON COMPOSITION OF AIR AND HUMIDITY Slide J		VIRTUAL CLASS POST-WORK: 1. Use close-reading strategy to annotate "What Is Air?" about the composition of air

Return to Lesson Set Overview

Lesson 7 (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
- Virtual Class recordings - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 2

Lesson 7 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Share Lesson Slideshow	VIRTUAL CLASS PRE-WORK: 1. Read through the summary of what air is made of, what humidity is and how it is measured from the previous close reading assignment.
Part 2 (8 min) EXPLORE THE USE OF HUMIDITY PROBES Slides B, C	1. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Make predictions about using a humidity probe to measure humidity in the air 2. Read through the description of an investigation to try to make the air inside more humid and answer the reflection questions
Part 3 (5 min) MAKE PREDICTIONS FOR THE INVESTIGATION Slide D		VIRTUAL CLASS PRE-WORK: 1. Make predictions about the sources of water in the air
Part 4 (10 min) PLAN OUR INVESTIGATION Slides E, F		VIRTUAL CLASS PRE-WORK: 1. Complete questions about planning an investigation to figure out where the water in the air comes from on Thinking Deeper Document

Part 5 (18 min) CONDUCT THE INVESTIGATION Slide G		*Students provided data from the investigation*

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 6-12 (45 min) NAVIGATION & INTERPRET INVESTIGATION DATA DEVELOP A MODEL TO EXPLAIN CHANGES IN HUMIDITY PROVIDE AND RECEIVE FEEDBACK & RESPOND TO FEEDBACK UPDATE PROGRESS TRACKER NAVIGATION Slides H, I, J, K	VIRTUAL CLASS: 1. Discuss data from bottle investigation data and its relationship to the lesson question "Where did all of the water in the air come from?" 2. Model how water gets into the air on Thinking Deeper Document 3. Students share their models and provide feedback to other students' models, make revisions as needed in response to feedback (teacher may choose to assign students to groups and have them share their models electronically) 4. Students answer the Navigation question on their Thinking Deeper Documents then discuss as a class	

Return to <u>Lesson Set Overview</u>

Lesson 8 (2 days) - Investigation

In this **Lesson**, students will need the following materials to appropriately engage in learning:
- Lesson Slideshow
- Thinking Deeper Document
- Home Investigation materials:
  - plastic 2-L bottle
  - plastic bag with seal closure
  - ice
  - wax paper
  - pipette (or something to make water droplets)
  - straw

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
- Marble Investigation Videos (C1, C2, C3, C4)
- Virtual Class recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 2

Lesson 8 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	
Part 2 (7 min) MAKE PREDICTIONS AND PREPARE TO INVESTIGATE OUR QUESTION Slide A		HOME INVESTIGATION: 1. Make predictions about what would happen if we cooled some of the humid air
Part 3 (8 min) CONDUCT INVESTIGATION A Slide B	1. Record the investigation and share with students who are unable to perform the investigation at home	HOME INVESTIGATION: 1. Follow the procedure to investigate what happens when we cover a 2-L bottle cover with a bag of ice on top as it is held over warmed water and record observations in the table
Part 4 (7 min) MAKE SENSE OF OUR DATA FROM INVESTIGATION A Slide C		HOME INVESTIGATION: 1. Record initial explanations of observations, define "condensation" and relate it to the investigation

Part 5 (7 min) CONDUCT INVESTIGATION B Slide D	1. Record the investigation and share with students who are unable to perform the investigation at home	HOME INVESTIGATION: 1. Follow the procedure to investigate what happens when water droplets get close to one another
Part 6 (10 min) MAKE SENSE OF OUR INVESTIGATION RESULTS Slides E, F		HOME INVESTIGATION: 1. Construct explanations about what happened when water drops got close or touched

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 7-11 (40 min) NAVIGATION MAP THE ELEMENTS OF OUR MODEL ORCHESTRATE INVESTIGATIONS WITH MAGNETIC MARBLES UPDATE PROGRESS TRACKER & SHARE FINDINGS AND ADD TO PROGRESS TRACKER Slides G-M	VIRTUAL CLASS: 1. Discuss observations about water droplets when they get close to one another in investigations A and B 2. Compare water molecules to magnetic marbles and complete the analogy map for how magnetic marbles can be used to represent water molecules on Thinking Deeper Document 3. Watch the videos for marble investigations C1, C2, C3, C4: make observations on Thinking Deeper Document then discuss each one as a class 4. Students summarize what they learned about what happens to water vapor when it is cooled and why this happens on "What have you figured out?" on their Thinking Deeper Document, then discuss these ideas as a class	
Part 12 (5 min) NAVIGATION Slide N		VIRTUAL CLASS POST-WORK: 1. Answer questions about why we don't see clouds in the air all the time and what a cloud is and how we could use what we have learned to investigate

Return to Lesson Set Overview

Lesson 9 (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
- Frost Demonstration Video

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- None

Lesson 9 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Reflect on the questions about clouds answered at the end of the previous lesson's Thinking Deeper Document - questions listed again on Lesson 9 Thinking Deeper Document
Part 2 (25 min) USE CLOSE READING STRATEGIES TO LEAD INTO THE FROST DEMONSTRATION Slide B	*Close reading strategy used for reading on clouds after viewing the investigation demonstration and before constructing explanations*	VIRTUAL CLASS PRE-WORK: 1. Analyze the bottle and cold pack demonstration set-up and make a prediction about what they will observe on the cold pack
Part 3 (12 min) EXPLAIN THE RELATED PHENOMENON OF FROST FORMATION Slide C		VIRTUAL CLASS PRE-WORK: 1. View the Frost Demonstration Video and record observations on Thinking Deeper Document 2. Use close reading strategy to read and annotate "What are Clouds?" on Thinking Deeper Document 3. Construct an explanation about what happened on the surface of the cold pack and how that relates to clouds

Part 4 (3 min) EXPLAIN THE HOME-LEARNING OPPORTUNITY Slide D		VIRTUAL CLASS PRE-WORK: 1. Optional Reading on Thinking Deeper Document: "Can Other Gases in the Air Turn into Liquids or Solids?

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Lesson 10 (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
- Virtual Class recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1

Lesson 10 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1 & 2 (25 min) NAVIGATION Slides A, B CREATE THE GOTTA-HAVE-IT CHECKLIST	**Share Lesson Slideshow and Thinking Deeper Document prior to VIRTUAL CLASS.** VIRTUAL CLASS 1. Discuss what we were trying to learn about hailstorms and what we have learned so far (Use Thinking Deeper Document from Lesson 9 as a guide) 2. Review Thinking Deeper Documents from previous lessons and Initial Model 3. Discuss how we can use what we have learned from our investigations so far to explain why storms form at some times and not others and how we can apply that information to the model	
Part 3 (20 min) TRY IT OUT: MAKE A THUNDERSTORM Slide C		VIRTUAL CLASS POST-WORK: 1. Use the Make a Storm Simulation to test ideas about what causes a storm to form and record data
Part 4 (2 min) NAVIGATION	*Built into VIRTUAL CLASS discussion prior to student exploration with simulation*	

	Day 2	
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 5 (2 min) NAVIGATION	*Built into VIRTUAL CLASS discussion prior to student exploration with simulation*	
Part 6 (5 min) REVISIT THE CHECKLIST	*Not included in distance learning plan since students are exploring the simulation on their own*	
Part 7 (12 min) REVISE THE SIMULATION	*Not included in distance learning plan since students are exploring the simulation on their own*	
Part 8 (7 min) COMPARE REVISIONS IN A GALLERY WALK	*Not included in distance learning plan since students are exploring the simulation on their own*	
Part 9 (10 min) CONSENSUS DISCUSSION Slide D	1. Modified for independent student exploration and explanation - review student explanations at the end of their Thinking Deeper Document and provide feedback as needed	VIRTUAL CLASS POST-WORK: 1. Use data from Make a Storm simulation to construct an explanation about the relationship between air temperatures, humidity levels, and storm formation

Return to Lesson Set Overview

Lesson 11 (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
- Homemade Barometer Video
- Virtual Class Recording *(after completion)*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 2

Lesson 11 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (7 min) NAVIGATION Slides A, B	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Answer reflection questions about how clouds remain floating in the air 2. Record examples of air causing something to move or float
Part 2 (7 min) EXPLORE TISSUE PAPER AND AIR INTERACTIONS Slide C		VIRTUAL CLASS PRE-WORK/HOME INVESTIGATION: 1. Follow the procedure to explore how air affects a small piece of tissue paper and answer reflection questions
Part 3 (8 min) INVESTIGATE WEIGHT Slides D, E		VIRTUAL CLASS PRE-WORK/HOME INVESTIGATION: 1. Fill in observations about the masses of an egg and tissue paper
Part 4 (8 min) INVESTIGATE AIR FORCES Slides D, E		VIRTUAL CLASS PRE-WORK/HOME INVESTIGATION: 1. Fill in observations about the force of air on a scale

Part 5 (8 min) INVESTIGATE THE BEHAVIOR OF A PING-PONG BALL IN THE AIR FROM A HAIR DRYER	*Students make a prediction about this in their Thinking Deeper Document. Teachers may choose to share a video or encourage students to try this themselves at home.*	
Part 6 (7 min) DEVELOP PREDICTIONS AND EXPLANATIONS Slide F		VIRTUAL CLASS PRE-WORK/HOME INVESTIGATION: 1. Record predictions about how different objects would respond to updrafts 2. Use evidence to explain why water droplets and ice crystals don't fall out of the air all of the time

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 7-9 (45 min) UPDATE PROGRESS TRACKER BRAINSTORM CAUSES FOR FORCES OF DIFFERENT STRENGTHS INTRODUCE DEVICES TO MEASURE RISING OR FALLING AIR Slides G, H, I	VIRTUAL CLASS: 1.Discuss why water droplets and ice don't fall out of the air all of the time and evidence to support student ideas (students can refer to their answer on Thinking Deeper Document and use the graphic organizer to record class consensus) 2. Develop a consensus model to demonstrate these ideas on the graphic organizer on Thinking Deeper Document 3. Discuss what might cause the strength of updrafts to differ on different days 4. Watch the video of a homemade barometer 5. Discuss the device's structure and its relationship to the soap bubble experiment and record ideas on Thinking Deeper Document	
Part 10 (7 min) PREDICT AND RECORD DATA ON A WEATHER LOG Slide J	1. Have students submit their Thinking Deeper Documents and review their predictions	POST-WORK: 1. Make a prediction about what would happen to the pointer on the barometer when there is lower air pressure

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Lesson 12 (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
- Convection Demonstration Video

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- None

Lesson 12 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (3 min) NAVIGATION Slide A	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Review ideas about why updrafts might be differ in strength on different days and brainstorm ways to investigate them
Part 2 (5 min) INTRODUCE FLUID BEHAVIOR Slide B		VIRTUAL CLASS PRE-WORK: 1. Read through Introduction to Fluid Behavior on Lesson Slideshow
Part 3 (12 min) MAKE INITIAL OBSERVATIONS AND PREDICTIONS Slide C		VIRTUAL CLASS PRE-WORK: 1. Watch the convection demonstration video showing what happens to the dye before and after thermal energy is added 2. Compare parts of the demonstration to clouds and storm systems on the table
Part 4 (10 min) DESIGN THE INVESTIGATION	*Not addressed in distance learning plan*	

Part 5 (15 min) CONDUCT THE INVESTIGATION Slide C		VIRTUAL CLASS PRE-WORK: 1. Watch the convection demonstration video 2. Record observations and make predictions about how we might increase thermal energy transfer in the system

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 6 (5 min) NAVIGATION Slide D	*Addressed in claim students make when making sense of data*	
Part 7 (15 min) REPORT RESULTS AND MAKE SENSE OF DATA Slide D		VIRTUAL CLASS PRE-WORK: 1. Make a claim about what causes more lift in one cloud over another
Part 8 (25 min) CONDUCT A BUILDING UNDERSTANDINGS DISCUSSION AND UPDATE THE PROGRESS TRACKER	*Students track progress on Thinking Deeper Document, apply results to explaining anchor phenomenon in next VIRTUAL CLASS*	

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Lesson 13 (2 days) - Putting Pieces Together

In this **Lesson**, students will need the following materials to appropriately engage in learning:
- Lesson Slideshow
- Thinking Deeper Document
- Hurricane Assessment Tasks - *Summative 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
- Anchor Phenomenon Video
- Hurricane Assessment Tasks - *Summative Assessment*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1

Lesson 13 (2 days) - Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1 & 2 (20 min) NAVIGATION & COMPLETE THE FIRST PART OF THE FINAL MODEL: CLOUD FORMATION Slides A & B	**Share Lesson Slideshow and Thinking Deeper Document prior to VIRTUAL CLASS.** VIRTUAL CLASS: 1. Watch initial anchor phenomenon video to frame modeling work in this lesson 2. Discuss questions that we can now answer about the anchor phenomenon 3. Revisit initial model from the beginning of the Unit (new version on Thinking Deeper Document) 4. Discuss mechanisms behind hail cloud formation and note on model on Thinking Deeper Document	
Part 3 (10 min) ADD TO THE GOTTA-HAVE-IT CHECKLIST	*Not addressed in distance learning plan*	
Part 4 (18 min) READ ABOUT THE PATH OF HAILSTONES Slide E		VIRTUAL CLASS POST-WORK 1. Use close reading strategy to read and annotate "Tracing Paths of Hailstones" in order to explain what is happening inside the cloud to form really big hail.

	Day 2	
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 5 (5 min) COMPLETE THE MODEL TO EXPLAIN HAILSTORMS Slide F	*Option to have students turn this in for additional feedback prior to the Hurricane Assessment Tasks*	VIRTUAL CLASS POST-WORK: 1. Revisit the model on hail-producing clouds and revise based on the reading
Part 6 (10 min) APPLY THE MODEL Slide F	*Option to have students turn this in for additional feedback prior to the Hurricane Assessment Tasks*	VIRTUAL CLASS POST-WORK: 1. Answer questions about storm-related weather events
Part 7 (30 min) INDIVIDUAL SUMMATIVE ASSESSMENT	Assign Hurricane Assessment Tasks Summative Assessment at the end of VIRTUAL CLASS	VIRTUAL CLASS POST-WORK: 1. Complete summative assessment
Part 8 (5 min) REVISIT THE DQB Slide G		VIRTUAL CLASS POST-WORK: 1. Revisit Driving Question Board and record questions we haven't answered yet

Return to Lesson Set Overview

Lesson 14 (2 days) - Anchoring Phenomenon

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
- Weather Report Video
- Question Submission Assignment - *teacher made*
- Virtual Class recordings - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 2

Lesson 14 (2 days) - Anchoring Phenomenon

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (3 min) NAVIGATION Slide A	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Answer reflection questions about precipitation-related phenomena
Part 2 (17 min) NOTICE AND WONDER Slides B, C, D, E		VIRTUAL CLASS PRE-WORK: 1. Watch videos of a weather report of a large-scale precipitation event in three parts and record what noticings and wonderings
Part 3 (10 min) DEVELOP AN INITIAL MODEL AND EXPLANATION Slide F		VIRTUAL CLASS PRE-WORK: 1. Use claims made in the weather forecast and guiding questions to create an initial model of what is happening during the three parts of the precipitation event

	Day 2	
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5-7 (40 min) COMPARE MODELS AND EXPLORE MORE OF THE FORECAST UPDATE MODEL ALIGNMENT COMPARE MECHANISMS AND DEVELOP A CONSENSUS RECORD DEVELOP QUESTIONS AND ADD TO THE DRIVING QUESTION BOARD Slides G, H, I	****Create the question submission assignment (ex. Google Form, discussion thread on Google stream, etc.) prior to VIRTUAL CLASS.**** VIRTUAL CLASS 1. Share and discuss noticings and wonderings from each part of the weather report from PRE-WORK. 2. Share models and discuss what ideas are needed to explain the large-scale precipitation event. 3. Revise initial model as needed based on class consensus 4. Generate initial questions about the large-scale precipitation event and share with the class 5. Assign question submission for students to complete after VIRTUAL CLASS VIRTUAL CLASS POST-WORK: 1. Submit one question to expand the DBQ that helps us to answer why rain, hail, and snow fall a lot at some times but not others **Compile student submissions, add them to the Driving Question Board and ensure students have access to the updated Driving Question Board**	
Part 8 (8 min) IDENTIFY ADDITIONAL SOURCES OF DATA NEEDED	*Teachers have the option to build out in VIRTUAL CLASS POST-WORK*	

Lesson 15 (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
- Virtual Class recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1

Lesson 15 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-3 (30 min) NAVIGATION REPRESENTING TEMPERATURE AND HUMIDITY DATA MAKE SENSE OF DATA TO DEFINE AIR MASSES Slides A, B, C, D, E, F	****Share Lesson Slideshow and Thinking Deeper Document prior to VIRTUAL CLASS.**** VIRTUAL CLASS: 1. Discuss question submissions and Driving Question Board, build in conversations about data collection as needed 2. Discuss color gradient on a weather map for showing temperature differences and explain how it helps us to see patterns in data 3. Recreate color temperature mapping for the start of a storm on Thinking Deeper Document 4. Discuss color gradient on a weather map for showing humidity differences and explain how it helps us to see patterns in data 5. Recreate color humidity mapping for the start of a storm on Thinking Deeper Document 6. Define air mass and answer questions about differences in air masses on Thinking Deeper Document	
Part 4 (15 min) CREATE A TIME SERIES GALLERY WALK OF TEMPERATURE AND HUMIDITY Slide G	*Option for dividing students into groups and having each student do a few of the maps and share with one another on a slideshow to view the "gallery"*	VIRTUAL CLASS POST-WORK: 1. Recreate temperature and humidity gradients on remaining weather maps for points 2-9 2. Answer reflection questions about the patterns that can be observed when viewing them all together

Lesson Components	Day 2	
	Distance Learning Plan	
	Teacher	**Student**
Part 5 (15 min) AIR MASS BOUNDARIES Slide H		VIRTUAL CLASS POST-WORK: 1. Define the term "front" and examine the time-series weather maps to make predictions about where these between air masses are located and their relationship to precipitation events
Part 6 (8 min) CONSIDER ADDITIONAL RADAR DATA	*Not addressed in distance learning*	
Part 7 (20 min) CONSENSUS DISCUSSION Slide I	1. Review claims and provide feedback as needed - *option to build in an opportunity for students to provide feedback to one another about their claims here*	VIRTUAL CLASS POST-WORK: 1. Make a claim about how precipitation is related to temperature and humidity data before, during, and after the storm on Thinking Deeper Document and submit
NAVIGATION	*These ideas are built into navigation at the beginning of Lesson 16*	

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Lesson 16 (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
- Front Videos: Simulation 1, Simulation 2
- Virtual Class Recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 2

Lesson 16 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (8 min) NAVIGATION Slides A, B	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Review what we have learned in previous lessons 2. Answer reflection questions about warm and cold interactions and ideas for investigating air mass interactions
Part 2 (7 min) MAP THE COMPONENTS OF THE EXPERIMENTAL SYSTEMS TO THE CORRESPONDING COMPONENTS IN THE ATMOSPHERE Slide C, D		VIRTUAL CLASS PRE-WORK: 1. Analyze the investigation set-up 2. Apply previous learning to map the relationship of components of the set-up to components in the atmosphere
Part 3 (15 min) OBSERVE AND DOCUMENT INTERACTIONS BETWEEN WARM AND COLD WATER Slide E		VIRTUAL CLASS PRE-WORK: 1. Make predictions about the interactions between warm and cold water 2. View the two video simulations and record observations: Simulation 1, Simulation 2

Part 4 (15 min) BUILDING UNDERSTANDINGS DISCUSSION ABOUT INTERACTIONS BETWEEN WARM AND COLD FLUIDS Slide F		VIRTUAL CLASS PRE-WORK: 1. Answer reflection questions about the observed interactions between warm and cold water

	Day 2	
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5-7 (38 min) NAVIGATION MODEL WARM AND COLD AIR INTERACTIONS IN THE ATMOSPHERE ANALYZE RELATIVE HUMIDITY DATA Slides G, H, I, J, K	***Teacher may choose to conduct a demonstration or revisit the previous simulations as an introduction to the class discussion*** VIRTUAL CLASS: 1. Discuss connections made about how warm and cold air masses interact based on simulations 2. Draw models of warm and cold air masses on Thinking Deeper Document 3. Analyze and discuss the relationship between temperature and water vapor at 100% relative humidity and identify amount of water vapor in the air at specific temperatures using the graph - record on Thinking Deeper Document 4. Analyze and discuss the relationship between temperature and humidity at 50% relative humidity and make comparison to the same relationship when relative humidity is 100% - record on Thinking Deeper Document	
Part 8 (5 min) REVISIT THE WEATHER MODELS Slides L, M	1. Review student responses to reflection questions at the end of Thinking Deeper Document	VIRTUAL CLASS POST-WORK: 1. Describe the relationship of temperature and relative humidity to the amount of condensation when air is cooled on Thinking Deeper Document and submit
Part 9 (2 min) NAVIGATION	*Option to build into VIRTUAL CLASS discussion prior to POST-WORK*	

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Lesson 17 (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
- Weather Report Video

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- None

Lesson 17 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Share Lesson Slideshow 2. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Answer reflection questions about cold and warm front models
Part 2 (10 min) ANALYZING OUR WEATHER LOGS Slide B		VIRTUAL CLASS PRE-WORK: 1. Review how barometers detect changes in air pressure
Part 3 (12 min) MAKING PREDICTIONS AND ANALYZING DATA Slides C, D, E		VIRTUAL CLASS PRE-WORK: 1. Make predictions about where the lowest pressure would be located on storm maps 2. Analyze the time-series maps from Lesson 15 and describe patterns observed in areas of low pressure
Part 4 (15min) EXPLAINING PATTERNS IN THE ORIGINAL FORECAST Slide F		VIRTUAL CLASS PRE-WORK: 1. Rewatch the original weather forecast video 2. Answer reflection questions about the patterns in the low air pressure, precipitation, and interactions between air masses
Part 5 (3min) NAVIGATION	*Built into VIRTUAL CLASS of Lesson 18*	

Lesson 18 (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
- Three Storms Weather Forecast Video
- Virtual Class recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1

Lesson 18 (1 day) - Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-8 (45 min) NAVIGATION & COMPARE EXPLANATIONS DEVELOP A CONSENSUS MODEL AND MAKE PREDICTIONS PREPARE TO INVESTIGATE OUR PREDICTIONS RECORD OBSERVATIONS FOR STORM 1, 2, AND 3 SHARE OBSERVATIONS AND ESTABLISH LINES OF EVIDENCE FOR THE MODEL IDEAS SHARE WONDERINGS AND INITIAL EXPLANATIONS Slides A-L	****Share Lesson Slideshow and Thinking Deeper Document prior to VIRTUAL CLASS.**** VIRTUAL CLASS: 1. Revisit reflection question at the end of Lesson 17 and discuss the patterns in the low air pressure, precipitation, and interactions between air masses 2. Review previous ideas and discuss which of them are needed to explain the causal relationship between movement and interaction of air masses and areas of low pressure, location of fronts, and precipitation in our storm weather forecast 3. Add any new relevant ideas that help to explain the relationship and record on Thinking Deeper Document 5. Make and share predictions about which mechanisms we would expect to see in weather forecasts for other parts of the country and record on Thinking Deeper Document 6. Introduce and watch the weather forecast video of three different storms 7. View the forecast of the first storm again and record noticings and wonderings related to each mechanism. Repeat process for forecasts of second and third storms 8. Share and discuss noticings from each of the three storms and explain how they provide evidence for the new mechanisms 10. Make predictions about the path of storms in different parts of the country and discuss whether these places are more prone to precipitation and why 11. Discuss relationship between elevation and precipitation	

Part 9 (14 min) RECORD ADDITIONAL QUESTIONS AND EXPAND OUR DRIVING QUESTION BOARD	Ensure students have access to most recent Driving Question Board as they will examine it at the beginning of the next lesson	
Part 10 (3 min) IDENTIFY ADDITIONAL SOURCES OF DATA NEEDED	*Option to build into VIRTUAL CLASS conclusion*	

*Return to *

Lesson 19 (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
- NASA Visualizations: Precipitation Rates, Atmospheric River, Global Precipitation Rates - 8 months

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- None

Lesson 19 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Share Lesson Slideshow 2. Create ASSIGNMENT for submitting new questions and assign (ex. Google form, question on Google Stream). 3. Add new student questions to Driving Question Board and ensure students have access to it	VIRTUAL CLASS PRE-WORK: 1. Review Driving Question Board and annotate for questions we have answered 2. Submit new questions
Part 2 (20 min) OBSERVE AIR AND PRECIPITATION PATTERNS IN THE U.S. Slides B, C, D	1. Share Thinking Deeper Document	VIRTUAL CLASS PRE-WORK: 1. Watch NASA visualizations that show the movement of precipitation and air across the US 2. Record noticings and wonderings, annotate map 3. Answer reflection questions related to the data
Part 3 (15 min) GLOBAL VIEW WITH A BUILDING UNDERSTANDINGS DISCUSSION Slides E, F, G, H		VIRTUAL CLASS PRE-WORK: 1. Watch NASA visualization showing 8 months of air and precipitation movement 2. Add to notice and wonder table and annotate world map 3. Answer reflection questions about patterns of winds in the US and around the world 4. Review learning summary statements

Part 4 (5 min) NAVIGATION Slide I		VIRTUAL CLASS PRE-WORK: 1. Complete Exit Ticket with reflection questions about how proximity to the ocean could impact precipitation 2. Use close-reading strategy to read and annotate "Why does air and water spin in different directions on Earth?"

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Lesson 20 (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
- NASA Animation Ocean Temperatures
- NASA Rainfall Accumulation
- Virtual Class recording - *after completion*

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1

Lesson 20 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-3 (25 min) NAVIGATION CREATE A CONSENSUS MAP FOR AIR MASS TEMPERATURE AND DIRECTION OBSERVATION OF OCEAN TEMPERATURES Slides, A, B, C, D	Teacher should share Lesson Slideshow and Thinking Deeper Document prior to VIRTUAL CLASS VIRTUAL CLASS 1. Discuss what we know from Lesson 19 about air masses and how prevailing winds impact their movement 2. Discuss where air masses of different temperatures come from, how they move, and where they often collide and annotate air mass map on Thinking Deeper Document based on discussion 3. Watch the NASA animation of ocean temperatures and record noticings and wonderings on Thinking Deeper Document 4. Discuss noticings and wonderings and reflection questions on Thinking Deeper Document	
Part 4 (17 min) OBTAIN INFORMATION ABOUT OCEAN CURRENTS Slide E		VIRTUAL CLASS POST-WORK: 1. Use close-reading strategy to read and annotate "How the Ocean Changes Our Weather"
Part 5 (3 min) NAVIGATION AND EXIT TICKET Slide F	1. Review student exit ticket submissions and provide feedback as needed	VIRTUAL CLASS POST-WORK: 1. Revisit the Exit Ticket questions from Lesson 19

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 6 (8 min) SUMMARIZE KEY IDEAS FROM THE READING		*Students use evidence from the reading to support their answers on the exit ticket*
Part 7 (8 min) ANALYZE THE PRECIPITATION DATA FOR COASTAL CITIES Slides G, H	*Option to assign groups for this assignment and have students collaborate around comparing the data to information from the reading.*	VIRTUAL CLASS POST-WORK: 1. Examine precipitation data for coastal cities and answer the analysis questions
Part 8 (5 min) CONSENSUS DISCUSSION TO REVISE THE AIR MASS MAP	*Not addressed in distance learning, option to build into POST-WORK or address as needed in next VIRTUAL CLASS*	
Part 9 (5 min) UPDATE PROGRESS TRACKER	*Students track progress throughout the unit on Thinking Deeper Document*	
Part 10 (7 min) NAVIGATION Slide I		VIRTUAL CLASS POST-WORK: 1. Watch the NASA Rainfall Accumulation visualization 2. Answer reflection questions about what they can already explain, what they still wonder about concerning patterns of precipitation in the east compared to the west

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Lesson 21 (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

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1

Lesson 21 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1 & 2 (30 min) NAVIGATION & ANALYZE PACIFIC NORTHWEST AND GULF COAST DATA Slides A, B, C, D	Teacher should share Lesson Slideshow and Thinking Deeper Document prior to VIRTUAL CLASS. 1. Review initial student ideas about differences in precipitation in the Pacific Northwest vs the Gulf Coast (reflection questions on Lesson 20 Thinking Deeper Document) 2. Students use the I2 sensemaking strategy (Identify and Interpret) to analyze data along wind pathways in the Pacific Northwest and the Gulf Coast. and make notes on their Thinking Deeper Document 3. Share and discuss analysis and interpretations of the patterns students observed in the data 4. Summarize patterns and interpretations	
Part 3 (10 min) MODEL WHAT IS HAPPENING TO THE AIR AS IT MOVES ALONG THE PATHWAY Slides E, F		VIRTUAL CLASS POST-WORK: 1. Use the maps on the Thinking Deeper Document to answer questions about what happens to air masses as they move inland in the Pacific Northwest and the Gulf Coast.
Part 4 (2 min) NAVIGATION	*Not addressed in distance learning plan – option to build reflection questions into POST-WORK*	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 5 & 6 (15 min) NAVIGATION BUILDING UNDERSTANDINGS DISCUSSION	*Option to have students compare answers to questions about what happens to air masses as they move inland in the Pacific Northwest and the Gulf Coast with a partner or small group prior to answering the lesson question on Thinking Deeper Document.*	
Part 7 (7 min) UPDATE OUR PROGRESS TRACKERS	*Students track progress throughout the unit on Thinking Deeper Document*	
Part 8 (17 min) DEVELOP A KEY IDEAS LIST Slide G	1. Review student submissions and provide feedback as needed or address misconceptions during Lesson 22 VIRTUAL CLASS	VIRTUAL CLASS POST-WORK: 1. Answer lesson question on Thinking Deeper Document providing evidence from map analysis and key ideas and submit

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Lesson 22 (1 day) - Putting Pieces Together

In this **Lesson**, students will need the following materials to appropriately engage in learning:
- Lesson Slideshow
- [Rainforest Climate 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
- [Rainforest Climate Assessment](#)

In this **Lesson**, students should join virtual classes on the following days to engage in learning:
- Day 1

Lesson 22 (1 day) - Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1 & 3 (25 min) PREPARE FOR FINAL ASSESSMENT: SOUTH AMERICAN RAINFORESTS Slides A, B, C, D, E, F EVALUATE OUR DQB QUESTIONS Slide G	VIRTUAL CLASS: 1. Share Lesson Slideshow 2. Review findings from Lesson 21 Post-Work 3. Introduce rainforests of South America and view images of the organisms that live there 4. View a map showing the location of South America and discuss differences between the locations of North and South America 5. Compare temperate and tropical rainforest climates 6. Discuss the data and key ideas that would help explain why the rainforests are located where they are and why they have different climates 7. Review Driving Question Board and discuss which questions we have made the most progress on	
Part 2 (28 min) INDIVIDUAL SUMMATIVE ASSESSMENT Slide H	1. Assign individual assessment: Rainforest Climate Assessment	VIRTUAL CLASS POST-WORK: 1. Complete assessment and submit to teacher

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