Louisiana Believes

Distance Learning Support for OpenSciEd Grade 6
Unit 8.1 Contact Forces Field Test Unit

This resource is designed to support teachers in implementing distance learning for OpenSciEd Grade Unit 8.1, Unit 2 on the Louisiana Guide to Piloting OpenSciEd Grade 6. It is intended as a supporting document and should be used in conjunction with the OpenSciEd Unit 8.1 Instructional Resources. The resources contained in this document have been adapted from OpenSciEd with permission under Creative Commons 4.0 licensing.

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

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

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

Updated September 8th, 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:** Optional: Parent Letter Lesson 8 Assessment	**Teacher Made Resources:** • Surveys: Lessons 1, 4 • Discussion Boards: Lessons 1 (2), 2, 5, 7 • DQB Assignment - Lesson 1 • Collision Patterns Assignment - Lesson 2 • Exit Tickets - Lesson 5 • Summary Assignment - Lesson 6 • Home Learning Assignment - Lesson 6 • Outcome Chart (made from student responses) - Lesson 8 **Other Resources:** Materials for home investigation - Lesson 2: *(other materials can be substituted)* • baseball/softball • pillow • book, • spaghetti noodles • tennis ball • golf ball • graham cracker/regular cracker	**Prior to Lesson**: • Lesson 1: Phone Hits Ground • Lesson 2: Car with CD, Car with Ring, Car with Stopper • Lesson 3: Slow Motion Car, Car Colliding with Wall, Slow Motion Baseball/Bat, Slow Motion Golf Ball/Club, Laser, Glass, Table Lab or Teacher Made Video • Lesson 5: Spring Scale Push Lab, Spring Scale Pull Lab, Forces Speed Lab, Forces Mass Lab • Lesson 6: Forces Slow-Motion w/quarter, • Forces Slow-Motion w/Cracker, Forces - Slow Motion w/Gummy Bear, Forces -Slow-Motion w/Plastic, Forces - Slow-Motion w/styrofoam ball • Lesson 7: Observing Spring Lab, Matter Up Close **After Lesson Completion:** • Discussion Boards - Lesson 1, 2, 5, 7 • Driving Question Board - Lesson 1 • Consensus Model - Lesson 1 • Virtual Class recordings - Lessons 1, 2, 4, 5, 8

Students should ideally join VIRTUAL CLASS on the following days: Day 3 - Lesson 1 Day 6 - Lesson 2 Days 8 & 9 - Lesson 4 Day 12 - Lesson 5 Day 15 - Lesson 8
Formative and Summative Assessment Opportunities: Lesson 3: CER Assignment - *teacher made* Lesson 4: CER Assignment - *teacher made* Lesson 5: Exit Ticket- *teacher made* (This lesson has 2 exit tickets) Lesson 6: Home Learning - *teacher made* Lesson 8: Lesson 8 Assessment

Lesson Set Overview: Lessons 9, 10, 11, 12, 13

Lesson Set 2: Lessons 9-13		
Provided Resources Students Will Need	**Additional Resources Students Will Need**	**Additional Materials for Students Without Internet Access**
Lesson Slideshows for each lesson: L9, L10, L11, L12, L13 **Thinking Deeper Documents for each lesson:** Lesson 9 TDD, Lesson 10 TDD, Lesson 11 TTD, Lesson 12 TTD, Lesson 13 TDD **Additional Documents:** Optional: Parent Letter Optional: teacher data - Lesson 9 Lesson 13 Assessment	**Teacher Made Resources:** • Discussion Boards: Lessons 9, 11 **Other Resources:** • Thinking Deeper Documents from previous lessons • Driving Question Board	**Prior to Lesson**: • Lesson 9: Video 1: Slow Push, Video 2: Medium Push, Video 3: Fast Push; Teacher Data • Lesson 13: Sticky Note Video **After Lesson Completion:** • Discussion Boards - Lessons 9, 11 • Virtual Class Recordings - Lessons 10, 12, 13
Students should ideally join VIRTUAL CLASS on the following days: Day 2 - Lesson 10	Day 4 - Lesson 12	Day 7 - Lesson 13
Formative and Summative Assessment Opportunities: Lesson 9: Exit Ticket (on Thinking Deeper Document) Lesson 10: Lesson Question on Slide G (option to convert to exit ticket rather than class discussion) Lesson 11: Discussion Board Lesson 12: Exit Ticket (on Thinking Deeper Document) Lesson 13: Cellphone Case Design Poster, Lesson 13 Assessment		

Lesson 1 (4 days) - Anchoring Phenomenon

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

- Lesson Slideshow
- Thinking Deeper Document
- Breaking the Phone Survey - *teacher mad*
- Related Collisions with Damage Discussion Board - *teacher made*
- Related Collisions without Damage Discussion Board - *teacher made*
- Driving Question Board Assignment - *teacher made*

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

- Lesson Slideshow
- Thinking Deeper Document
- Breaking the Phone Survey- *teacher made*
- Phone Hits Ground Video
- Related Collisions with Damage Discussion Board - *teacher made*
- Related Collisions without Damage Discussion Board - *teacher made*
- Virtual Class Recording - *after completion*
- Driving Question Board assignment - *teacher made*
- Driving Question Boards - *after completion*
- Consensus Model - *after completion*

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

- Day 3

Lesson 1 (4 days) - Anchoring Phenomenon

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (15 min) SETTING THE STAGE FOR A NEW PHENOMENON Slides A, B, & C	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students. 3. Create a survey for the students to take. (May choose to link the survey on Slide B.) Review the results to share with the class.	VIRTUAL CLASS PREWORK: 1. Look at the picture and answer the question that follows on the thinking deeper document. 2. Answer the three questions on the survey. 3. Complete the notice and wonder chart on the deeper thinking document.
Part 2 (15 min) BRAINSTORMING RELATED PHENOMENA Slides D & E	1. Create a discussion board for the students to post their experiences with damage. 2. Create a discussion board for the students to post their experiences with NO damage. 3. Compile examples in of collisions with damage and without damage to use for the virtual class discussion (this will help us to create our class model)	DISCUSSION BOARD: 1. List 2-3 related experiences where damage occurred and identify which object came into contact with the other and which object was moving. 2. Pick one experience with damage to post to the discussion board. 3. List 2-3 related experiences where NO damage occurred and identify which object came into contact with the other and which object was moving 4.Pick one experience with no damage to post to the discussion board

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 3 (7 min) CREATE A RELATED PHENOMENON POSTER Slide F	1. Create a shared document with related phenomena from the previous day's Discussion Board and share with students. (Add link in slideshow or copy and paste into a new slide if slideshow is a shared document.)	VIRTUAL CLASS PRE-WORK: 1. Copy class list of collisions with and without damage. 2. Label each example as Type A, B, or C based on the chart provided.
Part 4 & 5 (20 min) NAVIGATION Slides G & H		VIRTUAL CLASS PRE-WORK: 1. Review the models provided on slides G & H to help draw the initial consensus model.
Part 6 (20 min) MAKE AND SHARE INITIAL MODELS Slide I	1. Remind students the Modeling Collisions section has two parts, with damage and without damage, and decide how students will create and share their models. (Students may insert a drawing in the table for each section and use the drawing tool to create their models or may do the models on paper and insert a photo.) Keep in mind that students will be asked to share models in the Virtual Class on Day 3. 2. You may choose to have students turn in their models to get an idea of what students may already know.	VIRTUAL CLASS PRE-WORK: 1. Complete the Modeling Collisions: Initial Model section on the thinking deeper document. This is two parts, collisions with damage and collisions without damage.
Part 7 DEVELOP SHARED NORMS	*Build out as needed in Virtual Class.*	

Part 8 (10 min) STOP AND JOT Slide J & K		VIRTUAL CLASS PRE-WORK: 1. Jot what questions you have about how and why some things get damaged and others don't when they collide with other objects on your thinking deeper document. 2. Jot down the factors that determine if damage will occur during a collision on your thinking deeper document.

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
PART 9 NAVIGATION	*Build norms review into Virtual Class as needed.*	
Part 10 & 11 (25 min) INITIAL CONSENSUS MODEL DISCUSSION MAKING PUBLIC RECORD OF FACTORS THAT DETERMINE DAMAGE Slide L	Prior to Virtual Class, the teacher should: 1. Decide how students will share models and ensure that students have access to a shared document if necessary. VIRTUAL CLASS: 1. Students will share their models with class. While sharing, students will put a ✓ by what is similar and a ? by what is different. Discuss models including similarities and differences. 2. After discussing and comparing models, the teacher will ask questions to identify key parts that should be included in their consensus model. The teacher will draw the model on paper/board or electronically by screen sharing. This model will need to be provided for students when done. 3. As the model is being constructed, the students will begin brainstorming questions for the DQB and add the questions to the thinking deeper document. 4. Compose a list of factors that may cause damage during a collision. While going through the list, the student should still be brainstorming questions they would like to see answered. 5. Teacher begins building Driving Question Board using the platform of their choice (examples include Google Jamboard, Pinup, etc.)	
Part 12 NAVIGATION	*Build norms reflection into Virtual Class as needed.*	

Day 4		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 13 NAVIGATION	*Not addressed in distance learning since there is no synchronous class meeting on this day.*	
Part 14 (35 min) DRIVING QUESTION BOARD AND IDEAS FOR INVESTIGATIONS Slide M	(During the last virtual meeting, students began brainstorming how and why things may or may not get damaged during a collision and wrote questions to be investigated on the thinking deeper document. These questions will be used for the driving question board.) 1. Create and share an assignment for students to submit a question that was created for the Driving Question Board. (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. Continue to brainstorm and jot down questions that can be investigated about how/why collisions may or may not cause damage. Record these questions on the brainstorming section of the thinking deeper document. 2. Review questions from the brainstorming section of their thinking deeper document and pick one to submit for the Driving Question Board
Part 15 (2 min) NAVIGATE Slide N		VIRTUAL CLASS POST-WORK: 1. Record ideas for further investigation on the thinking deeper document. 2. Submit the deeper thinking document

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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
- Discussion Board - *teacher made*
- Items needed for home investigation: baseball/softball, pillow, book, spaghetti noodles, tennis ball, golf ball, graham cracker/regular cracker
- Collision Patterns Assignment - *teacher made*

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

- Lesson Slideshow
- Thinking Deeper Document
- Discussion Board - *teacher made*
- Items needed for home investigation: baseball/softball, pillow, book, spaghetti noodles, tennis ball, golf ball, graham cracker/regular cracker
- Videos: CD and Car, Car with Ring, Car with Stopper
- Collision Patterns Assignment - *teacher made*
- Discussion Board - *after completion*

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

- Day 2

Lesson 2 (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 PREWORK: 1.Explain what is thought to happen when a collision occurs.
Part 2 (10 min) INVESTIGATE DROPPING AND BREAKING Slide B		HOME INVESTIGATION: 1. Conduct lab by observing how objects (hard/soft, soft/soft, hard/hard) react to each other during a collision. Record observations in the chart on TDD.
Part 3 (5 min) DISCUSS DESIGN CHALLENGES: DROPPING AND BREAKING Slides C	1. Create a discussion board for the students to share what was noticed during the lab 2. Review student answers, summarize and share	DISCUSSION BOARD: 1.Reflect on the lab completed and answer 3 questions on the Thinking Deeper Document. 2.Share with you noticed on the discussion board. 3.Compare similarities and differences in the outcome of the labs and think about why the results could have varied.

Part 4, 5, & 7 (30 min) PART A EXPLORE COLLISIONS: SHAPE NAVIGATION Slides D, E, & F PART B EXPLORE COLLISIONS: MOTION NAVIGATION Slides G & H		VIRTUAL CLASS PREWORK: Part A: 1. Predict what happens to the shape during a collision. 2. Watch 3 slow-motion videos and record your observations in the chart. Video 1: Car and CD, Video 2: Car with Ring, Video 3: Car with Stopper 3. Answer the reflection question on your thinking deeper document. Part B: 1. Watch 3 slow-motion videos and record your observations in the chart. Video 1: Car and CD, Video 2: Car with Ring, Video 3: Car with Stopper 2. Answer the reflection questions on your thinking deeper document.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 8 (20 min) INTERPRET COLLISION DATA: SHAPE AND MOTION Slide I	VIRTUAL CLASS: 1. Analyze and discuss student data recorded from the 2 labs conducted. 2. Discuss patterns observed in relation to the shape of an object during a collision. 3. Discuss patterns observed in relation to the motion of an object during a collision.	
Part 9 (5 min) NAVIGATION Slides J, K, & L	1. Create an assignment for the students to answer the reflection questions on how the motion and shape of an object may change during a collision. 2. Review student submissions and provide feedback as needed.	VIRTUAL CLASS POST-WORK: 1. Answer and submit the reflection questions on how shape and motion change during a collision. 2. Answer the thought question to prepare you for the next lesson. 3. Turn in Thinking Deeper Document.

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Lesson 3 (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
- Slow-Motion Videos: Slow Motion Car, Car Colliding with Wall, Slow Motion Baseball/Bat, Slow Motion Golf Club/Ball
- Laser, Glass, Table Lab - NOTE: This video may not play on some devices unless downloaded first. The video should be tested ahead of time. Teachers may need to make their own video of this investigation to substitute or schedule a virtual class to perform the investigation live.

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

- None

Lesson 3 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slide A	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students	VIRTUAL CLASS PREWORK: 1.Answer questions that reflect on the previous lesson on the thinking deeper document.
Part 2 (20 min) ANALYZE VIDEO CASES Slides B, C, & D		VIRTUAL CLASS PREWORK: 1. Watch 4 videos (Slow Motion Car, Car Colliding with Wall, Slow Motion Baseball/Bat, Slow Motion Golf Club/Ball) and record observations for each video on their chart. 2. Reflect and answer the question from the slide on your deeper thinking document.
Part 3 (10 min) PREDICTIONS & TESTING Slide E & F	NOTE: The video may not play on some devices unless downloaded first. The video should be tested ahead of time. Teachers may need to make their own video of this investigation to substitute or schedule a virtual class to perform the investigation live.	VIRTUAL CLASS PREWORK: 1. Predict what you think will happen in the lab by answering 3 questions. 2. Watch the Laser, Glass, Table Lab and record observations.
Part 4 (10 min) WHAT YOU FIGURED OUT AND EXIT TICKET Slides G & H	1. Assign CER “Do all solid objects bend when a contact force is applied to them?”, on the thinking deeper document. 2. Review CER responses on TDD and provide feedback as needed.	VIRTUAL CLASS PREWORK: 1. Answer CER on TDD. 2. Exit ticket questions to be answered on the thinking deeper document. 3. Turn in lesson 3 thinking deeper document

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Lesson 4 (3 days) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Force Survey - *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
- Force Survey - *teacher made*

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

- Day 1
- Day 2

Lesson 4 (2 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (3 min) NAVIGATION Slide A	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students 3. Create a survey about how force affects solid objects. (google classroom, survey monkey, etc.)	VIRTUAL CLASS PREWORK: 1. Answer the survey question about applying force to solid objects.
Part 2 (15 min) ANALYZE CONCRETE LOAD TESTING PHOTOS Slides B, D, E, F, G, H, I, J, K,& L		VIRTUAL CLASS PREWORK: 1. Make predictions about forces on solid objects. 2. Analyze images of force on concrete and record observations in the chart. 3. Complete follow-up questions about the concrete investigation.
Parts 3 & 4 (5 min) PLAN THE INVESTIGATION & IDENTIFY THE VARIABLES Slide M		VIRTUAL CLASS PREWORK: 1. Identify and record the independent, dependent, and control variables for the lab. Record answers on thinking deeper documents.
Part 5 (30-40 min) CARRY OUT DEFORMATION LAB & DISCUSSION Slide N	VIRTUAL CLASS: 1. Share and discuss answers to Identify the Variables 2. Have students draw the setup of the lab. 3. The teacher demonstrates the Material Deformation Lab. Students will record data in the table on the thinking deeper document while observing the lab and drawing models of what they see. 4. Plot the data on a graph then analyze the data and discuss the results. 6. Share and discuss models.	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 6 CHOOSE A FOCAL NORM	*Build out as needed in the Virtual Class Meeting.*	
Part 7 (20min) ANALYZE GRAPHS & DEVELOP BEST LINES OF FIT Slides O, P, Q, R, & S	VIRTUAL CLASS: *(Option to group the following with the previous Virtual Class if time allows.)* 1. Explain how to read and interpret a graph. 2. Look at different graphs and analyze the data. 3. Students will take out their graphs, draw a line of best fit, and compare results. 4. Class discussion to see if you think a graph of the amount of force applied to the material vs. the amount of deformation for these materials will be similar in shape to the graphs you made for the materials you tested in the lab.	
Part 8 (10min) INFORMATION FROM OTHER ENGINEERS Slide (S)		VIRTUAL CLASS POST-WORK: 1. Read Results from Other Material Tests and answer the questions provided on the thinking deeper document.
Part 9 (10 min) ADD TO OUR PROGRESS TRACKER Slide T	1. Review student CERs and provide feedback as needed.	VIRTUAL CLASS POST-WORK: 1. Complete CER and turn in Lesson 4 Thinking Deeper Document.
Part 10 (3-5 min) REFLECT ON NORMS	*Build out as needed in the Virtual Class Meeting.*	

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Lesson 5 (2 days) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Navigation Discussion Boards - *teacher made*
- Exit Tickets - *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
- Navigation Discussion Boards - *teacher made*
- Spring Scale Push Lab, Spring Scale Pull Lab
- Exit Tickets - *teacher made*
- Forces Speed Lab
- Forces Mass Lab
- Navigation Discussion Boards - *after completion*

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

- Day 3

Lesson 5 (3 days) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slides A & B	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students 3. Create a discussion board for the navigation questions. 4. Check answers for accuracy.	DISCUSSION BOARD: 1. Answer the two navigation questions on the discussion board. 2. Answer introduction questions on the thinking deeper document.
Part 2 (15 min) EXPLORING FORCE INTERACTIONS: MINI INVESTIGATIONS. Slides C, D, E, & F		HOME INVESTIGATION: 1. Complete the finger pushes mini lab and record the data on the thinking deeper document for Parts 1, 2 and with the rubber band. 2. Answer summary questions to identify patterns and determine rules about force.
Part 3 (15 min) PUSH-PULL SPRING SCALE INVESTIGATION Slide G		VIRTUAL CLASS PREWORK: 1. Watch 2 short lab videos, Spring Scale Push Lab & Spring Scale Pull Lab and complete the Spring Scale Lab Chart on the TDD. 2. Analyze data to answer the reflection questions.
Part 4 (3 min) NAVIGATION/EXIT TICKET Slide H	1. Create and upload the exit ticket document.	VIRTUAL CLASS PREWORK: 1. Complete the exit ticket and submit your answers.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 5 (5 min) NAVIGATION Slide I	1. Create and assign the discussion board for Navigation questions. 2. Review answers on the discussion board.	DISCUSSION BOARD: 1. Answer the navigation question on the discussion board.
Part 6 (25 min) DIFFERENT SPEEDS AND MASSES Slides J, K, L, M		VIRTUAL CLASS PREWORK: 1. Identify the variables used for the comparing forces (speed) lab. 2. Watch the Forces Speed Lab and complete the chart. 3.Identify the variables used for comparing forces (masses) lab. 4. Watch the Forces Mass Lab and complete the chart on the thinking deeper document.
Part 7 (3 min) NAVIGATION Slide N		VIRTUAL CLASS PREWORK: 1. Answer the navigation question on the thinking deeper document.

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 8 & 9 (30 min) NAVIGATION & SCIENTIST CIRCLE (DISCUSSION) Slides O-S	VIRTUAL CLASS: 1. Share, discuss, and analyze the data from the two labs (different speeds & different masses) conducted the day before. 2. Discuss how different speeds and different masses affect the force on an object. 3. Watch slow-motion videos of similar mass and speed investigations to help clarify any confusion. 4. Review lesson guiding questions and discuss key points we have discovered so far. 5. Go over force "diagramming" rules.	
Part 10 (7min) UPDATE PROGRESS TRACKERS Slide T		VIRTUAL CLASS POST-WORK: 1. Complete the lesson question on the thinking deeper document.
Part 11 NAVIGATION	*Addressed in Virtual Class.*	
Part 12 (15 min) EXIT TICKET Slide U	1. Create and assign exit ticket assignment.	VIRTUAL CLASS POST-WORK: 1. Complete exit ticket and submit to teacher. 2. Turn in lesson 5 Thinking Deeper Document.

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Lesson 6 (1 day) - Investigation

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

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

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

- Lesson Slideshow
- Thinking Deeper Document
- Forces Slow-Motion w/quarter, Forces - Slow-Motion w/Cracker, Forces - Slow Motion w/Gummy Bear, Forces -Slow-Motion w/Plastic, Forces - Slow-Motion w/styrofoam ball
- Summary Assignment - *teacher made*
- Home Learning Assignment - *teacher made*

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

- None

Lesson 6 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (6 min) NAVIGATION Slides A, B, & C	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students 3. Answer any questions the students may have submitted.	VIRTUAL CLASS PRE-WORK: 1. Answer the navigation review questions to explain what we have learned about speed/force and mass/force. 2. Review the model and submit any questions. 3. Answer the navigation questions about what happens when we apply force to objects and what we still need to investigate.
Part 2 (30 min) COMPARING FORCES WITH DIFFERENT MATERIALS Slides D, E, F, G, & H	1. Create an assignment for students to submit their summaries of how the forces compare to each other in each scenario. 2. Review student submissions and provide feedback as needed. **Option for teacher to schedule an additional virtual class here and perform the investigations live if time allows.**	VIRTUAL CLASS PRE-WORK: 1. Answer introduction questions 2. Watch lab videos and jot down observations. 3. Answer the analysis questions. 4. Write a brief summary explaining how forces compare to each other for different scenarios and submit.
Part 3 (3 min) NAVIGATION	*Not addressed in the distance learning plan.*	
Part 4 (5min) HOME LEARNING Slide I	1. Create an assignment for home learning. 2. Review student submissions and provide feedback as needed.	VIRTUAL CLASS PRE-WORK: 1. Complete the home learning worksheet. Submit when completed.

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Lesson 7 (1 day) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Objects That Push 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
- Objects That Push Discussion Board - *teacher made*
- Observing Spring Lab
- Matter Up Close
- Discussion Board - *after completion*

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

- None

Lesson 7 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (8 min) NAVIGATION Slide A & B	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students 3. Create and assign a discussion board for students to jot down ideas about other objects that can push but aren't alive. 4. Compile and organize the submissions on the discussion board and share.	DISCUSSION BOARD: 1. Answer review questions about pushing in collisions (Needs to be completed before virtual meeting.) 2. Jot down other objects that can push but aren't alive. 3. Select 1-2 objects and post your answer on the discussion board.
Part 3 (22 min) BUILDING A MODEL OF MATTER Slides C & D		VIRTUAL CLASS PRE-WORK: 1. Watch the Observing Spring Lab video, record observations, and answer questions. 3. Watch the video of Matter Up Close, record observations, and answer questions.
Part 4 (7 min) UPDATE PROGRESS TRACKER Slide E		VIRTUAL CLASS POST-WORK: 1. Complete the lesson question. (This question will have a drawing to represent the arrows. Students may need to hand draw and upload their picture.)
Part 5 (7 min) NAVIGATION & EXIT TICKET Slide F		VIRTUAL CLASS POST-WORK: 1. Complete exit ticket 2. Turn in Lesson 7 Thinking Deeper Document

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Lesson 8 (3 days) - Putting Pieces Together

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

- Lesson Slideshow
- Thinking Deeper Document
- Outcome Chart - *teacher made*
- Lesson 8 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
- Outcome Chart - *teacher made*
- Virtual Class Recording - *after completion*
- Lesson 8 Assessment

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**
Parts 1-7 (40 min) NAVIGATION DEVELOP A GOTTA-HAVE-IT CHECKLIST DEVELOPING EXPLANATIONS CONSENSUS DISCUSSION PREPARING FOR THE ASSESSMENT Slides A, B, C, D, E	**Prior to the Virtual Class, the teacher should share the Lesson Slideshow and Thinking Deeper Document with the students.** VIRTUAL CLASS: 1. Have the students read the short scenario with the snake and discuss possible outcomes. 2. Display possible outcomes in Slide B and point out the table on the TDD where students will record their thoughts during the discussion and in the post-work. 3. Students answer the questions for outcome one on their own, then discuss as a class to come to an agreement. Students revise or add to their answers during the discussion. 4. Repeat this process for the other outcomes on the chart.	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 3 (30-45 min) ASSESSMENT		VIRTUAL CLASS POST-WORK: 1. Take the Lesson 8 Assessment
Part 4 (7 min) NAVIGATION Slide F		VIRTUAL CLASS POST-WORK: 1. Answer the navigation question to prepare for the next lesson. 2. Turn in Lesson 8 Thinking Deeper Document.

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Lesson 9 (1 day) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Patterns in Data 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
- Investigation Videos: Video 1: Slow Push, Video 2: Medium Push, Video 3: Fast Push (Option to record all three trials at each speed and have students observe damage in each trial rather than using teacher data supplied here for the last two trials)
- Patterns in Data Discussion Board - *teacher made*
- Discussion Board - *after completion*

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 (10 min) NAVIGATION Slides A-B	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students	VIRTUAL CLASS PRE-WORK: 1. Brainstorm some factors that we think will affect the size of the force in a type B collision, where a moving object collides with a fragile object that is not moving. Be prepared to share.
Part 2 (10 min) PLAN FOR OUR FIRST INVESTIGATION Slides C-D		VIRTUAL CLASS PRE-WORK: 1.Discuss what we will be testing to determine the variables and fill them in on the data table. 2.Decide what is considered small-large amounts of damage using slide D.
Part 3 (15 min) CARRY OUT OUR INVESTIGATION Slide E-F	NOTE: If students have access to rolling toys and graham crackers at home, you can encourage them to try their own speed experiments. 1. Set up a discussion board for patterns in data.	VIRTUAL CLASS PRE-WORK: 1. Watch the Investigation Videos: Slow Push, Medium Push, Fast Push and record data for the first Trial. 2. Record the rest of the teacher data for Trials 2 & 3.
Part 4 (2 min) EXIT TICKET Slide G		DISCUSSION BOARD: 1. Record patterns in the data in the chart provided, then share one idea on the discussion board.

Part 5 (8 min) NAVIGATION	*Not addressed in the distance learning plan.*	
Part 6 (20 min) DESIGN AND CARRY OUT A NEW INVESTIGATION Slides G-L	Sample completed data table - Option to provide this to students in order to compare with their observations	VIRTUAL CLASS PRE-WORK: 1. Record our new question for our investigation. 2. Come up with ideas about how we might test this question and fill in variables on the data table. 3. Observe the photos of each trial and record observations in the data table.
Part 7 (15 min) ANALYZING DATA FROM BOTH INVESTIGATIONS Slide M	Review responses to the lesson question and provide feedback as needed or discuss in the Lesson 10 Virtual Class meeting.	VIRTUAL CLASS PRE-WORK: 1. Complete Exit Ticket question about patterns in the mass investigation. 2. Use data from both investigations to answer the lesson question. 3. Turn in Lesson 9 Thinking Deeper Document.
Part 8 (10 min) NAVIGATION	*Addressed in Day 10*	

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Lesson 10 (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
- 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 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-4 (45 min) NAVIGATION PLAN OUR INVESTIGATION CARRY OUT THE CHANGE IN MOTION LAB ADD TO OUR PROGRESS TRACKER AND NAVIGATION Slides A-G	**Prior to Virtual Class, the teacher should share Lesson Slideshow and Thinking Deeper Document with students** VIRTUAL CLASS: 1. Answer the following navigation questions on the TDD then share and discuss answers. 2. Make predictions on how we can answer the lesson question with the spring scale launchers 3. Discuss variables for our new investigation and record them on the TDD. 4. Teacher will explain how to calibrate the two launchers and the class discusses how much force should be used and how many trials we need to perform. 5. The teacher demonstrates three scenarios and students complete the data table. (Sample Video & Data Table) 6. Discuss observations from the investigation. 7. Independently complete Lesson Question on Thinking Deeper Document, then share and discuss. *Could also be made into an exit ticket if teacher would like to use as a formative assessment* 8. Discuss navigation the question on Slide G. Students record on their TDD during discussion.	

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Lesson 11 (1 day) - Investigation

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

- Lesson Slideshow
- Thinking Deeper Document
- Patterns in Data 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
- Patterns in Data Discussion Board - *teacher made*
- Discussion Board - *after completion*

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

- None

Lesson 11 (1 day) - Investigation

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (5 min) NAVIGATION Slides A, B	1. Share Lesson Slideshow with students 2. Share Thinking Deeper Document with students	VIRTUAL CLASS PRE-WORK: 1. Answer the navigation questions to consider how mass impacts the effect that the force has on objects.
Part 2 (22 min) PLAN AND CARRY OUT AN INVESTIGATION Slides C		VIRTUAL CLASS PRE-WORK: 1. Brainstorm how to investigate the lesson question. 2. Identify the variables in the investigation. 3. Label the variables in the data table and record the sample data. 4. Record the data from the sample data table.
Part 3 (12 min) LOOKING FOR PATTERNS IN DATA Slide D	1. Create and assign a discussion board for students to share the patterns they saw in the data and their claims. 2. Review the discussion board and provide feedback as needed.	DISCUSSION BOARD: 1. Analyze the patterns in the data and make a claim about the relationship between force applied to an object, the mass of the object, and how the motion of the object changes. 2. Share ideas on the discussion board.
Part 4 (5 min) NAVIGATION Slide E		VIRTUAL CLASS PRE-WORK: 1. Answer the navigation question on TDD

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Lesson 12 (2 days) - Putting Pieces Together

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

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

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

- Lesson Slideshow
- Thinking Deeper Document
- Thinking Deeper Documents from previous lessons
- Driving Question Board
- Virtual Class Recording - *after completion*

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

- Day 1

Lesson 12 (2 days) - Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Parts 1-3 (45 min) NAVIGATION SCIENTIST CIRCLE NAVIGATION Slides A- C	**Prior to Virtual Class, the teacher should share the Lesson Slideshow and Thinking Deeper Document with students. Ensure students have access to the most updated DQB and their previous TDD's. ** VIRTUAL CLASS: 1. Discuss the navigation question from the Lesson 11 Thinking Deeper Document. 2. Students answer the lesson question independently: How can we get a massive object moving as fast as possible? 3. Share answers to the Lesson Question and discuss what we agree/disagree on and any new ideas. 4. Students Look through their Thinking Deeper Document and Driving Question Board (Teacher can share on screen) and choose 3 questions you can answer with supporting evidence. 5. Share questions, answers and evidence and discuss. 6. Assign Post-Work: Exit Ticket, Navigation questions, and Independent Reading	

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 4 (10 min) EXIT TICKET Slide D	1. Review student Exit Tickets and provide feedback as needed.	VIRTUAL CLASS POST-WORK: 1. Complete the Lesson 12 Exit Ticket on the TDD.
Part 5 (20 min) NAVIGATION Slides E, F		VIRTUAL CLASS POST-WORK: 1. Answer navigation questions to reflect on the original object that they wanted to protect. 2. Complete the reading: *Anatomy of a Bike Helmet*

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Lesson 13 (3 days) - Putting Pieces Together

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

- Lesson Slideshow
- Thinking Deeper Document
- Lesson 13 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
- Sticky Note Video
- Lesson 13 Assessment

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

- Day 3

Lesson 13 (3 days) - Putting Pieces Together

Day 1		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 1 (7 min) NAVIGATION Slide A-B	1. Share Lesson Slideshow with students . 2. Share Thinking Deeper Document with students .	VIRTUAL CLASS PRE-WORK: 1. Complete “Anatomy of a bike helmet” reading. 2. Record what our heads and phones have in common and ideas about how we might protect them.
Part 2 (20 min) INVESTIGATE PADDING Slides C-G	.	VIRTUAL CLASS PRE-WORK: 1. Look at macroscopic and microscopic images of different types of padding 2. View the Video of the track with sticky notes and record thoughts about how they act as padding and how something with thin layers can protect something delicate.

Day 2		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 3 (30 min) DESIGN A PHONE PROTECTOR Slides H-I	1. Option to assign students to groups to complete the design. - This will require a digital collaborative assignment such as a shared google document or slideshow. 2. Create an assignment for students to submit their posters. 3. Create a document with students' designs to be shared in the next Virtual Class meeting - decide how students will provide feedback to designs.	VIRTUAL CLASS POST-WORK: 1. Design a phone protector using the materials reference sheet on the thinking deeper document including a sketch, cost estimate, and an explanation as to why the protector would work.
Part 4 (5 min) NAVIGATION Slide J	1. Create and assign a discussion board for student questions. 2. Monitor the discussion board and provide feedback as needed. 3. Plan to address common questions during the next Virtual Class meeting.	VIRTUAL CLASS POST-WORK: 1. Ask any other questions you need answered before the test on the discussion board

Day 3		
Lesson Components	**Distance Learning Plan**	
	Teacher	**Student**
Part 5 (30 min) NAVIGATION GALLERY WALK SCIENTISTS CIRCLE Slides K-M	Virtual Class: 1. Discuss questions shared on the discussion board. 2. Discuss design criteria for student designs and examples of constructive feedback. 3. Share student phone protector designs - option for a virtual Gallery Walk in the form of a slideshow or other document shared with students. - Comments could be added directly to the document using the comment feature or in a specific space within the document. 4. Discuss similarities and differences among designs, make predictions about which design features would be most effective and supply evidence to support predictions.	
Part 6 (min) ASSESSMENT Slide N	1. Assign Lesson 13 Assessment	1. Complete Assessment

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