3rd Grade Mystery Science Strand 3.3 Force affects Motion
Salt Lake City School District 2020-2021

Mystery Science Lesson Rationale:
Mystery Science Lessons seek to promote engagement and inspire excellence in students' mastery of science and engineering. The lessons support our vision and mission of equity and access in elementary science. The sequence of Mystery Science Full Lessons supports third grade students' sense making with respect to force affects motion using three- dimensional instruction. The sequenced Mystery Science Lessons support third grade teachers in implementing the new Utah SEEd Standards about "Force affects Motion" identified specifically in the Prioritized SEEd Pacing Guide. Lessons include a video focused on a phenomenon, a hands-on activity, and an assessment. The lessons are designed to take students approximately 60 minutes to complete. Most lessons use minimal materials, such as printouts and pencils. Additionally, most paper printouts can be downloaded individually from the Mystery Science Lessons website in the form of an editable document that can be assigned through Canvas. Some lessons suggest markers, group work, or demonstrations. Teachers can make easy modifications to these lessons based on students and teachers' resources.

Note: Use a Science Notebook or print the Mystery Science PDF Booklet for students to complete the lesson series below.
You can also print individual lesson materials by following the links in the ***Materials per student and Assessments***.

Strand 3.3 Force Affects Motion
Forces act on objects and have both a strength and a direction. An object at rest typically has multiple forces acting on it, but they are balanced, resulting in a zero-net force on the object. Forces that are unbalanced can cause changes in an object's speed or direction of motion. The patterns of an object's motion in various situations can be observed, measured, and used to predict future motion. Forces are exerted when objects come in contact with each other; however, some forces can act on objects that are not in contact. The gravitational force of Earth, acting on an object near Earth's surface, pulls that object toward the planet's center. Electric and magnetic forces between a pair of objects can act at a distance. The strength of these non-contact forces depends on the properties of the objects and the distance between the objects

Standard 3.3.1 Balanced and Unbalanced Forces
Plan and carry out investigations that provide evidence of the effects of balanced and unbalanced forces on the motion of an object. Emphasize investigations where only one variable is tested at a time. Examples could include an unbalanced force on one side of a ball causing it to move and balanced forces pushing on a box from both sides producing no movement. (PS2.A, PS2.B)

Standard 3.3.3 Gravitational Pull
Construct an explanation that the gravitational force exerted by Earth causes objects to be directed downward, toward the center of the spherical Earth. Emphasize that "downward" is a local description depending on one's position on Earth. (PS2.B)

Mystery Science Lesson	Suggested Date and SEEd Alignment	Materials and Assessments	Remote Learning Modifications

Anchor Phenomenon Lesson: Ice Board The anchor phenomenon for this unit is a skateboard that has been modified to work on ice and be powered by the wind.	**April 5** Before starting this lesson, review the **Teacher Guide** for a unit overview of the Anchor Layer. **Teachers note:** Make sure to turn on the Mystery Science anchoring phenomenon in the **Invisible Forces Unit** **Mystery Science Handouts Pdf** SLCSD 20/21 Prioritized Pacing Guide	**Materials per student:** **Ice Board** worksheet **See-Think-Wonder** worksheet **The Biggest Magnet in the World** worksheet (This will not be needed until Mystery 4)	**Ready to Teach** Make sure ALL students have copies of the handouts
Lesson 1: How could you win a tug of war against a bunch of adults? In this lesson, students will see that by learning to think about pushes and pulls — forces — they can accomplish extraordinary things! In the activity, Hopper Popper, students make a folded piece of cardboard jump high in the air, propelled by the pulling force of a rubber band. They discuss the forces involved in making this "Hopper Popper" jump.	**April 5** SEEd Standard 3.3.1 **Disciplinary Core Ideas**: PS2.A, PS2.B Balanced & Unbalanced Forces **Science and Engineering Practice:** Planning and carrying out an investigation & constructing an explanation **Crosscutting Concept:** Cause & effect	**Materials per Student:** **High Hop Scorecard** worksheet **Hopper Popper Teacher Tips** worksheet **Launch Pad** printout Pen Rulers Scissors Chipboard Rubber bands (#16) **Newsela Articles:** How could you win a tug of war against a bunch of adults? **Assessment:** Mystery 1 Assessment Answer Key	**Ready to Teach** ***Teaching in the classroom*** For students working solo: In Step 11, they need to hold down their Hopper Popper while simultaneously placing the ruler on top of it. ***Teaching Online*** **Send supplies home** Each student needs: 1 piece of chipboard (3"x6"), 2 rubber bands and the *Launch Pad* printout (printed). Students also need the *High Hop Scorecard* worksheet (printed or digital).
Anchor Phenomenon Lesson 1		**Materials per student:** **Ice Board** worksheet **See-Think-Wonder** worksheet	
Lesson 2: What makes bridges so strong?	**April 12** SEEd Standard 3.3.5	**Materials per Student:** **Bridge Challenge** worksheet **Bridge Designer's Notebook** worksheet	**Adjust Supplies** ***Teaching in the classroom*** ● How to adjust the supply list so students can work solo: Each student needs the *Bridge*

In this lesson, students will learn about real-life bridge design. In the activity, Paper Bridge Engineering, students will use their knowledge of forces to build a strong bridge that supports as many pennies as possible -- using only paper.	**Disciplinary Core Ideas**: ETS1.A, ETS1.B, ETS1.C, Foundational PS2.A Balanced Forces & Engineering **Science and Engineering Practice:** Asking questions and defining problems & Planning and carrying out an investigation **Crosscutting Concept:** Structure and function	**Building Bridges Teacher Tips** worksheet Blank paper Hardcover books Rulers Scissors Pennies **Newsela Articles:** What makes bridges so strong? **Assessment:** Mystery 2 assessment Answer Key	*Challenge* worksheet and 2x the number of books, sheets of paper and pennies as indicated in the supply list below. ***Teaching Online*** ● Students need the *Bridge Challenge* worksheet (printed or digital). Students can use pennies, paper clips, beans, rice or other items at home to serve as weights in the experiment.
Anchor Phenomenon Lesson 2		**Materials per student:** **Ice Board** worksheet **See-Think-Wonder** worksheet	
Lesson 3: How can you go faster down a slide? In this lesson, students will learn about friction (the force that slows you down on a playground slide). In the activity, The Great Slide Challenge, students work in groups of four to test which materials have the most friction and which materials have the least friction. Each group makes a model of a slide using a stack of books and a piece of cardboard and makes "sliders" out of different materials.	**April 19** SEEd Standard 3.3.1 **Disciplinary Core Ideas**: PS2.A, PS2.B Friction & Pattern of Motion **Science and Engineering Practice:** Planning and carrying out investigations **Crosscutting Concept:** Cause & effect	**Materials per student:** **Friction Investigation** worksheet Hardcover books Rulers Chipboard Craft foam Glue dots Large plastic buttons Sandpaper Stiff cardboard Pennies **Newsela Articles:** How can you go faster down a slide? **Assessment:** Mystery 3 assessment Answer Key	**Substitute Activity** ● Show students **this video** and discuss as a class. Ask students: Which block will slide first? Which will slide last? Why do you think that? To see what happens, play **this video**.
Anchor Phenomenon Lesson 3		**Materials per student:** **Ice Board** worksheet **See-Think-Wonder** worksheet	
Lesson 4:	**April 26**	**Materials per student:** **Ideas for Magnet Experiments** worksheet	**Demo Activity** ***Teaching in the classroom***

What can magnets do? In this lesson, students will explore the surprising properties of magnets and experiment with an invisible force that acts at a distance. In the activity, Magnet Discovery, students use ring magnets and common objects to discover the push and pull of magnets and how magnets attract certain types of metals.	SEEd Standards 3.3.3 & 3.3.4 **Disciplinary Core Ideas**: PS2.B Magnets & Forces **Science and Engineering Practice:** Asking questions and defining problems & Planning and carrying out an investigation **Crosscutting Concept:** Cause and effect	**Magnets Are Weird** worksheet Magnetic metal items Non-magnetic metal items Pencil Index cards (3 x 5) Paper clips Thread Ring magnets **Newsela Articles:** What can magnets do? **Assessment:** Mystery 4 assessment Answer Key	● Set up stations with the magnets, other materials, and the *Ideas for Magnet Experiments* worksheet. Give each student the *Magnets Are Weird* worksheet and let them explore a station. Sanitize stations after each use. ***Teaching Online*** ●. Set up the activity and demonstrate over video conference while students observe. Students need the *Magnets are Weird* worksheet (printed or digital) to record their observations. If students have a ring, bar, or horseshoe magnet, they can explore items at home. Note that refrigerator magnets may behave differently.
Anchor Phenomenon Lesson 4		**Materials per student:** **Ice Board** worksheet **See-Think-Wonder** worksheet **The Biggest Magnet in the World** worksheet	
Lesson 5: How can you unlock a door using a magnet? In this lesson, students investigate magnetic attraction and repulsion. In the activity, "Invent a Magnetic Lock", students apply their scientific ideas about magnets to create a useful product: a magnetic lock	**May 3** SEEd Standards 3.3.3 & 3.3.5 **Disciplinary Core Ideas**: PS2.B, ETS1.A, ETS1.B, ETS1.C Magnets & Engineering **Science and Engineering Practice:** Constructing explanations and designing solutions & Developing and using a model **Crosscutting Concept:** Cause and effect	**Materials per student:** Scissors Cardstock Dot stickers Index cards (3 x 5) Paperclips Paper fasteners Post its (3") Ring magnets **Newsela Articles:** How can you unlock a door using a magnet? **Assessment:** Mystery 5 assessment Answer Key	**Ready to Teach** ***Teaching in the classroom*** ● Adjust these supply quantities so students can work solo: ***Teaching Online*** ● Each student needs: 1 paper clip, 1 paper fastener, 1 Post-it, 2 index cards, 6 dot stickers, a sheet of cardstock and a magnet.

that can open a paper door. Students engage in the engineering design process to test and improve their designs.			
Anchor Phenomenon Lesson 5		**Materials per student:** **Ice Board** worksheet **See-Think-Wonder** worksheet **The Biggest Magnet in the World** worksheet	
Performance Task: Can you design a new ice board? In this performance task, students will design new versions of the ice board that have to meet a specific set of design constraints. They will then build models of the ice board based on their designs.	**May 10** SEEd Standard 3.3.5 **Disciplinary Core Ideas**: PS2.B, ETS1.A, ETS1.B, ETS1.C Magnets & Engineering **Science and Engineering Practice:** Constructing explanations and designing solutions **Crosscutting Concept:** Structure and function	**Materials per student:** **Ice Board Designer** worksheet **Ice Board Rider Cutouts** worksheet Each printout will be cut into three separate riders. *(You can have students trim the excess paper off if they need practice cutting or leave them as-is to save time.)* Scissors File folder labels (Stickers) Index cards (3 X 5) Paperclips **Assessment:** Unit Assessment Answer Key	**Ready to Teach** ***Teaching Online*** Send Supplies home with students to complete the activity.