3rd Grade

Unit 1: Physical Science **Duration: 5-10 weeks**

Invisible Forces- Forces & Motion, Magnetism

Desired Results

ESTABLISHED GOALS/ STANDARDS:

3-PS2-1

Plan and conduct an investigation to provide evidence of the effects of balanced and unbalanced forces on the motion of an object. [Clarification Statement: Examples could include an unbalanced force on one side of a ball can make it start moving; and, balanced forces pushing on a box from both sides will not produce any motion at all.] [*Assessment Boundary: Assessment is limited to one variable at a time: number, size, or direction of forces. Assessment does not include quantitative force size, only qualitative and relative. Assessment is limited to gravity being addressed as a force that pulls objects down.*]

3-PS2-2

**Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predictfuture motion. [Clarification Statement: Examples of motion with a predictable pattern could include a child swinging in a swing, a ball rolling back and forth in a bowl, and two children on a see-saw.] [*Assessment Boundary: Assessment does not include technical terms such as period and*

Transfer

Meaning

ENDURING UNDERSTANDINGS: Crosscutting Concepts

Students will understand that…

- ***Students recognize the cause and effect relationship between the forces acting on an object and the direction of its motion.***
- ***Students explore the relationship between the structure and function of different bridge designs.***
- ***Students consider the cause and effect relationship between a material's surface and the amount of friction it has.***
- ***Students consider the cause and effect relationship between this distance of a magnet and the strength of the force.***
- ***Students consider the cause and effect relationship between which direction two magnets are facing and if they will push or pull on one another.***
- ***Students consider the cause and effect relationship between two magnets as a way to so design solutions using the engineering process.***

Acquisition

Disciplinary Core Ideas

Students will know…

- Every action is either a push or a pull, or what we call a 'force'. Forces each have a strength and a direction. When objects are in contact, they exert a force on each other. When a force is

Students will be skilled at…

- **Students build a Hopper Popper to carry out an investigation about force and motion. They construct an explanation for which direction the forces act on the object, causing it to hop.**
- **Students define a problem -**

frequency.] **3-PS2-3** **Ask questions to determine cause and effect relationships of electric or magnetic interactions between two objects not in contact with each other. [Clarification Statement: Examples of an electric force could include the force on hair from an electrically charged balloon and the electrical forces between a charged rod and pieces of paper; examples of a magnetic force could include the force between two permanent magnets, the force between an electromagnet and steel paperclips, and the force exerted by one magnet versus the force exerted by two magnets. Examples of cause and effect relationships could include how the distance between objects affects strength of the force and how the orientation of magnets affects the direction of the magnetic force.] [*Assessment Boundary: Assessment is limited to forces produced by objects that can be manipulated by students, and electrical interactions are limited to static electricity.*]** **3-PS2-4** **Define a simple design problem that can be solved by applying scientific ideas about magnets.* [Clarification Statement: Examples of problems could include constructing a latch to keep a door shut and creating a device to keep two moving objects from touching each other.]** **3-ETS1-1** **Define a simple design problem reflecting**	greater than the opposite force, it causes the object to move in its direction. DCIs: PS2.A, PS2.B ● Engineers build bridges to join two pieces of land that are split by a body of water. Building a bridge is no easy task! Engineers had to try lots of different solutions, most that didn't work, and learn from them. Possible solutions to a problem can be limited by available resources and materials--we call these constraints. All engineers communicate with their peers, test their prototypes, learn from their failures, and improve their designs. Being an engineer is exciting and full of learning! DCIs: ETS1.A, ETS1.B, ETS1.C, Foundational PS2.A ● A special type of 'push' force is called friction. This force occurs when two objects are in contact and push against each other. When an object has less friction, it moves easier. If an object has more friction, it is moves slower. Objects with smooth surfaces have less friction, and objects with rougher surfaces have more friction. DCIs: PS2.A, PS2.B ● Forces Magnetism is another special kind of force. Magnets can pull on things without actually touching them--the force can even go right through a solid object. But not all objects are affected by magnetism, only objects that contain iron.	**designing a bridge that will hold the most weight - and its constraints, it can only be made of paper. They collaborate with peers to design multiple solutions. They carry out investigations to test each of their prototypes, determine how to improve their design.** ● **Students use a model of a slide to carry out an investigation. They ask questions about different materials and weights and test their ideas to explore which combinations move the fastest down the slide. Students then complete a fair test to determine which material has the least friction. They engage in argument from evidence to share their findings.** ● **Students ask questions about magnets and develop and carry out investigations to observe the different properties of them.** ● **Students design a solution for a magnetic lock by developing a model.** **Inquiry Questions:** **1. How could you win a tug-of-war against a bunch of adults?** **2. What makes bridges so strong?** **3. How can you go faster down a slide?** **4. What can magnets do?** **5. How can you unlock a door using a magnet?**

a need or a want that includes specified criteria for success and constraints on materials, time, or cost. **3-ETS1-2** **Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.** **3-ESS1-3** **Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.**	Magnets have a lot of interesting properties. The closer a magnet is to a magnetic object, the stronger its force will be.. Also, magnets have two sides. When two magnets line up at the same side, they will push away from each other. When they are lined up at different sides, they will pull toward each other. DCIs: PS2.B ● We've learned that magnets have a lot of interesting properties! One of them, is that magnets can push and pull on each other. In fact, they can do this even with space or another object between them! Since magnets have many useful properties, they can be used to design solutions to a variety of problems. DCIs: PS2.B, ETS1.A, ETS1.B, ETS1.C	
	Acquisition	

Evidence	
Evaluation Criteria	**Assessment Evidence**
	PERFORMANCE TASK(S):
	OTHER EVIDENCE: **Unit assessment**
Learning Plan	
Summary of Key Learning Events and Instruction	