Grade: 5 **Subject: Science**	**Unit 3: Levers and Pulleys**
Big Idea/Rationale:	• The Levers and Pulleys Module consists of four investigations that involve students in fundamental concepts of simple machines. Students are introduced to levers, pulleys, screws, inclined planes, and the wheel and axle.
Enduring Understanding (Mastery Objective):	• Levers and Pulleys are simple machines that people use to gain an advantage, such as making work easier. • Advantage is a gain in effort, distance, or change of direction resulting from the use of a simple machine. • Effort is the force needed to move a load or overcome a resistance. • Fulcrum is the point where a lever arm pivots. • Load is a mass lifted or a resistance overcome by a lever or pulley. • The type of lever is determined by the position of the fulcrum. • A single-pulley system can be set up in two ways, fixed or movable. • A two-pulley system can be made with one fixed and one movable pulley. • The amount of work put into a system is equal to the work output of the system
Essential Questions (Instructional Objectives):	• What are some different simple machines? • How can a lever and pulley make work easier and how much effort is needed to lift the load? • Which lever/pulley system gives the greatest advantage? • What are the parts of a lever system? • How can a lever system be changed? • What is effort and how does it apply to simple machines? How many ways can lever and pulley systems be assembled?
Content (Subject Matter & Lesson Objectives):	**Investigation 1- Part 1A Introduction to Levers** • Students are introduced to levers as simple machines that help lift weight and overcome resistance. **Investigation 1- Part 1B Introduction to Levers** • Students are introduced to levers as simple machines that help lift weight and overcome resistance. **Investigation 1- Part 2 - Lever Experiment A** • Students conduct a lever experiment to discover the relationship among the load, fulcrum, and effort. Students graph their results. **Investigation 1- Part 3 - Lever Experiment B** • Students conduct a lever experiment, applying effort in the same position each time. **Investigation 2- Part 1 Lever Classes** • Students explore the arrangements of the fulcrum, effort, and load.

	• Students label the arrangements as class-1, class-2, or class-3. **Investigation 2- Part 2 Lever Diagrams** • Students create a diagram that explains the relationship of the parts of a lever system. **Investigation 2- Part 3 Real- World Levers** • Students determine what class of levers various common tools fall under. **Investigation 2- Part 4 Lever Pictures** • Students analyze pictures of familiar tools and identify them by lever class. **Investigation 3- Part 1 One- Pulley Systems** • Students determine how to set up a single fixed pulley system and a single moveable pulley system. **Investigation 3- Part 2 Two- Pulley Systems** • Students investigate how two pulleys can be used together. Students diagram pulley systems. **Investigation 3- Part 3 Pulley Game** • Students play a game in which they set up different pulley systems. **Investigation 4- Part 1 Effort in Pulley Systems** • Students investigate four different pulley systems. Students record the load's force, load's required effort, and the number of support ropes. **Investigation 4- Part 2 Measuring Distance** • Students measure the distance over which effort must be applied to lift a load 5 cm.
Skills/Benchmarks: (Standards)	**5.1.A: Science Practices, Understanding Scientific Explanations** • 5.1.8.A.1: Demonstrate understanding and use interrelationships among central scientific concepts to revise explanations and to consider alternative explanations • 5.1.8.A.2: Use mathematical, physical and computational tools to build conceptual-based models and to pose theories • 5.1.8.A.3: Use scientific principles and models to frame and synthesize scientific arguments and pose theories **5.1.B: Science Practices, Generate Scientific Evidence Through Active Investigations** • 5.1.8.B.1: Design investigations and use scientific instrumentation to collect, analyze and evaluate evidence as part of building and revising models and explanations • 5.1.8.B.2: Gather, evaluate and represent evidence using scientific tools, technologies and computational strategies • 5.1.8.B.3: Use qualitative and quantitative evidence to develop evidence-based arguments **5.1.C: Science Practices, Reflect on Scientific Knowledge** • 5.1.8.C.1: Monitor one's own thinking as understanding of scientific concepts is refined • 5.1.8.C.2 Revise predictions or explanations on the basis of discovering

	new evidence, learning new information or using models • 5.1.8.C.3 Generate new and productive questions to evaluate and refine core explanations **5.1.C: Science Practices, Participate Productively in Science:** • 5.1.8.D.1: Engage in multiple forms of discussion in order to process, makes sense of and learn from others' ideas, observations and experiences. • 5.1.8.D.2: Engage in productive scientific discussion practices during conversations with peers, both face to face and virtually in the context of scientific investigations and model building • 5.1.8.D.3: Demonstrate how to safely use tools, instruments and supplies
Materials:	• FOSS Levers and Pulley Experiment Kit: Teacher's Guide, Prep Video, BrainPop, Discovery Kids, Bill Nye Video Snips, Magic School Bus, Meter Rulers, Binder Clips, Erasers, Dowels, Weights, Spring Scales, Duct Tape, Single/Double Pulleys, Rope, Lever and Pulley Science Story Books, Student Journals (copied)
Notes:	