	CURRICULUM *End Product of Learning, "What You Teach"*		INSTRUCTION *Means to the End Product of Learning, "What You Teach"*		TECHNOLOGY *Means to Engage Students and Provide Practice*	INTERVENTION and ASSESSMENT
	CONTENT **What we want students to "KNOW"**	**SKILL** **What we want students to "DO"**	**LEARNING RESOURCES**	**TEACHING STRATEGIES**	**SOFTWARE and ONLINE Sites**	**Varied Classroom Assessment Strategies**
Quarter 1	**CORE IDEAS** **PS2.A Forces and Motion** For any pair of interacting objects, the force exerted by the first object on the second object is equal in strength to the force that the second object exerts on the first, but in the opposite direction (Newton's Third Law). **SCIENCE and ENGINEERING PRACTICES** **Constructing Explanations and Designing Solutions** Apply scientific ideas or principles to design an object, tool, process, or system. **CROSSCUTTING CONCEPTS** **Systems and System Models** Models can be used to represent systems and their interactions – such as inputs, processes and outputs – and energy and matter flows within systems. **Influence of Science, Engineering and Technology on Society and the Natural World** The uses of technologies and any limitation on their use are driven by individual or societal needs, desires, and values by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions.	**PERFORMANCE EXPECTATION** **MS-PS2-1** Apply Newton's Third Law to design a solution to a problem involving the motion of two colliding objects.	**RESOURCES:** ***Smithsonian Science and Technology Concepts™* Working with Motors and Simple Machines Unit** **Lessons 1-8** **SUBCONCEPT 1–** Students have ideas, preconceptions, and misconceptions about motors, work, and machines. **Lesson 1** **SUBCONCEPT 2–** Motors can exert forces that can do work and lift objects. **Lessons 2-5** **SUBCONCEPT 3–** Machines make work easier by reducing the effort force needed to do a given amount of work. **Lessons 6-8** *-Inquiry Investigations* *-Science Notebooking* *-Student Guide* *-Hands-on Equipment* *-Creating Models* **TWIG** www.twigcarolina.com **Newton; Motors; Machines; Work; Levers, Wheels, Pulleys**	***Smithsonian Science and Technology Concepts™*** **Integrated FERA Cycle Instruction of** Crosscutting concepts and science and engineering practices with science core ideas **FOCUS Strategies include:** -pre-teaching activities such as brainstorming, KWL charts, anticipation guides, etc. -guiding/focus questions **EXPLORE Strategies include:** -inquiry-based discussions and investigations -classroom activities, inquiries and models to help students develop a further understanding of the concepts/core ideas being discussed **REFLECT Strategies include:** -Science Notebooking -Key Ideas -Academic Vocabulary **APPLY Strategies include:** -Venn diagrams, cause and effect charts, review games, engineering application lessons, etc. **COMMON CORE** **Reading Informational Text RI.1-9:** RI.1-3 Key Ideas and Details RI.4-6 Craft and Structure RI.7-9 Integration of Knowledge and Ideas **Writing W.1-9** W.1-3 Text Types and Purpose W.4-6 Production and Distribution of Writing W.7-9 Research to Build and Present Knowledge **GUIDING QUESTIONS** *How can we use everyday phenomenon to explain the concept of equal and opposite reactions?*	**RESOURCES:** www.carolinascienceonline.com • Interactive Whiteboard Activities www.tigtagcarolina.com • Video Sets related to Newton, Motion www.mysi.edu Smithsonian information website **DEVICES:** • iPads • Tablets • Chromebooks • ELMO • SMARTboard **SOFTWARE:** • Microsoft Powerpoint • Microsoft Word • SMARTboard activities	**INTERVENTIONS:** ***Smithsonian Science and Technology Concepts™*** • Science Notebooks • Extensions **ASSESSMENTS:** ***Smithsonian Science and Technology Concepts™*** Working with Motors and Simple Machines Unit **Lesson 1 Pre-Assessment** *Students complete a circuit of five inquiries that introduce them to the concepts they will study in the unit.* **Lesson 12 Assessment** *Students complete a performance assessment to demonstrate their knowledge of the concepts in the unit.* *-FORMATIVE* *-SUMMATIVE* **Science Notebooks** **Inquiry Data Sheets** **Investigation Follow-up Questions**
	CORE IDEAS **PS2.B Types of Interactions** Electric forces can be attractive or repulsive, and their sizes depend on the magnitudes of the charges, currents, or magnetic strengths involved and on the distances between the interacting objects. **SCIENCE and ENGINEERING PRACTICES** **Asking Questions and Defining Problems** Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources and, when appropriate, frame a hypothesis based on observations and scientific principles. **CROSSCUTTING CONCEPTS** **Cause and Effect** Cause and effect relationships may be used to predict phenomena in natural or designed systems.	**PERFORMANCE EXPECTATION** **MS-PS2-3** Ask questions about data to determine the factors that affect the strength of electric forces.	**RESOURCES:** ***Smithsonian Science and Technology Concepts™* Working with Motors and Simple Machines Unit** **Lessons 2-5** **SUBCONCEPT 2–** Motors can exert forces that can do work and lift objects. **Lessons 2-5** *-Inquiry Investigations* *-Science Notebooking* *-Student Guide* *-Hands-on Equipment* *-Creating Models* **TWIG** www.twigcarolina.com **Forces, Magnet; Electric; Motors**			

Quarter 2 cont...

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CORE IDEAS **PS2.A Forces and Motion** The motion of an object is determined by the sum of the forces acting on it; if the total force on the object is not zero, its motion will change. The greater the mass of the objects, the greater the force needed to achieve the same change in motion. For any given object, a larger force causes a larger change in motion. All positions of objects and the directions of forces and motions must be described in an arbitrarily chosen reference frame and arbitrarily chosen units of size. In order to share information with other people, these choices must also be shared. **SCIENCE and ENGINEERING PRACTICES** **Planning and Carrying Out Investigations** Plan an investigation individually and collaboratively, and in the design; identify independent and dependent variables and controls, what tools are needed to do the gathering how measurements will be recorded, and how many data are needed to support the claim. **Scientific Knowledge is Based on Empirical Evidence** Science knowledge is based upon logical and conceptual connections between evidence and explanations. **CROSSCUTTING CONCEPTS** **Stability and Change** Explanations of stability and change in natural or designed systems can be constructed by examining the changes over time and forces at different scales.	**PERFORMANCE EXPECTATION** **MS-PS2-2** Plan an investigation to provide evidence that the change in an object's motion depends on the sum of the forces on the object and the mass of the object.	**RESOURCES:** ***Smithsonian Science and Technology Concepts™* Working with Motors and Simple Machines Unit** **Lessons 1; 6-8** **SUBCONCEPT 1–** Students have ideas, preconceptions, and misconceptions about motors, work, and machines. **Lesson 1** **SUBCONCEPT 3–** Machines make work easier by reducing the effort force needed to do a given amount of work. **Lessons 6-8** *-Inquiry Investigations* *-Science Notebooking* *-Student Guide* *-Hands-on Equipment* *-Creating Models* **TWIG** www.twigcarolina.com **Motion; Force; Machines; Levers, Wheels, Pulleys**	***Smithsonian Science and Technology Concepts™*** **Integrated FERA Cycle Instruction of** Crosscutting concepts and science and engineering practices with science core ideas **FOCUS Strategies include:** -pre-teaching activities such as brainstorming, KWL charts, anticipation guides, etc. -guiding/focus questions **EXPLORE Strategies include:** -inquiry-based discussions and investigations -classroom activities, inquiries and models to help students develop a further understanding of the concepts/core ideas being discussed **REFLECT Strategies include:** -Science Notebooking -Key Ideas -Academic Vocabulary **APPLY Strategies include:** -Venn diagrams, cause and effect charts, review games, engineering application lessons, etc. **COMMON CORE** **Reading Informational Text RI.1-9:** RI.1-3 Key Ideas and Details RI.4-6 Craft and Structure RI.7-9 Integration of Knowledge and Ideas **Writing W.1-9** W.1-3 Text Types and Purpose W.4-6 Production and Distribution of Writing W.7-9 Research to Build and Present Knowledge **GUIDING QUESTIONS** *How can one predict an objects continued motion, changes in motion or stability?*	**RESOURCES:** www.carolinascienceonline.com • Interactive Whiteboard Activities www.tigtagcarolina.com • Video Sets related to Newton, Motion www.mysi.edu Smithsonian information website **DEVICES:** • iPads • Tablets • Chromebooks • ELMO • SMARTboard **SOFTWARE:** • Microsoft Powerpoint • Microsoft Word • SMARTboard activities	**INTERVENTIONS:** ***Smithsonian Science and Technology Concepts™*** • Science Notebooks • Extensions **ASSESSMENTS:** ***Smithsonian Science and Technology Concepts™*** Working with Motors and Simple Machines Unit **Lesson 1 Pre-Assessment** *Students complete a circuit of five inquiries that introduce them to the concepts they will study in the unit.* **Lesson 12 Assessment** *Students complete a performance assessment to demonstrate their knowledge of the concepts in the unit.* *-FORMATIVE* *-SUMMATIVE* **Science Notebooks** **Inquiry Data Sheets** **Investigation Follow-up Questions**

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CORE IDEAS **PS3.A Definitions of Energy** Motion energy is properly called kinetic energy; it is proportional to the mass of the moving object and grows with the square of its speed. A system of objects may be also contain store (potential) energy, depending on their relative positions. **PS3.C Relationships Between Energy and Forces** When two objects interact, each one exerts a force on the other that can cause energy to be transferred to or from the object. **SCIENCE and ENGINEERING PRACTICES** **Developing and Using Models** Develop a model to describe unobservable mechanisms. **CROSSCUTTING CONCEPTS** **Systems and System Models** Models can be used to represent systems and their interactions – such as inputs, processes, and outputs – and energy and matter flows within systems.	**PERFORMANCE EXPECTATION** **MS-PS3-2** Develop a model to describe that when the arrangement of objects interacting at a distance change, different amount of potential energy are stored in the system.	**RESOURCES:** ***Smithsonian Science and Technology Concepts™* Working with Motors and Simple Machines Unit** **Lessons 6-9** **SUBCONCEPT 3–** Machines make work easier by reducing the effort force needed to do a given amount of work. **Lessons 6-8** **SUBCONCEPT 4–** Technological design is a process to create solutions to meet human needs. **Lessons 9** *-Inquiry Investigations* *-Science Notebooking* *-Student Guide* *-Hands-on Equipment* *-Creating Models* **TWIG** www.twigcarolina.com **Kinetic Energy; Potential Energy; Machines; Force; Levers, Wheels, Pulleys; Work**	***Smithsonian Science and Technology Concepts™*** **Integrated FERA Cycle Instruction of** Crosscutting concepts and science and engineering practices with science core ideas **FOCUS Strategies include:** -pre-teaching activities such as brainstorming, KWL charts, anticipation guides, etc. -guiding/focus questions **EXPLORE Strategies include:** -inquiry-based discussions and investigations -classroom activities, inquiries and models to help students develop a further understanding of the concepts/core ideas being discussed **REFLECT Strategies include:** -Science Notebooking -Key Ideas -Academic Vocabulary **APPLY Strategies include:** -Venn diagrams, cause and effect charts, review games, engineering application lessons, etc. **COMMON CORE** **Reading Informational Text RI.1-9:** RI.1-3 Key Ideas and Details RI.4-6 Craft and Structure RI.7-9 Integration of Knowledge and Ideas **Writing W.1-9** W.1-3 Text Types and Purpose W.4-6 Production and Distribution of Writing W.7-9 Research to Build and Present Knowledge **GUIDING QUESTIONS** *How can one predict an objects continued motion, changes in motion or stability?*	**RESOURCES:** www.carolinascienceonline.com • Interactive Whiteboard Activities www.tigtagcarolina.com • Video Sets related to Newton, Motion www.mysi.edu Smithsonian information website **DEVICES:** • iPads • Tablets • Chromebooks • ELMO • SMARTboard **SOFTWARE:** • Microsoft Powerpoint • Microsoft Word • SMARTboard activities	**INTERVENTIONS:** ***Smithsonian Science and Technology Concepts™*** • Science Notebooks • Extensions **ASSESSMENTS:** ***Smithsonian Science and Technology Concepts™*** Working with Motors and Simple Machines Unit **Lesson 1 Pre-Assessment** *Students complete a circuit of five inquiries that introduce them to the concepts they will study in the unit.* **Lesson 12 Assessment** *Students complete a performance assessment to demonstrate their knowledge of the concepts in the unit.* *-FORMATIVE* *-SUMMATIVE* **Science Notebooks** **Inquiry Data Sheets** **Investigation Follow-up Questions**
CORE IDEAS **PS3.A Definitions of Energy** When the motion energy of an object changes, there is inevitably some other changes in energy at the same time. **SCIENCE and ENGINEERING PRACTICES** **Engaging in Argument from Evidence** Construct, use and present oral and written arguments supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon **CROSSCUTTING CONCEPTS** **Energy and Matter** Energy may take different forms (e.g. energy in fields, thermal energy, energy of motion).	**PERFORMANCE EXPECTATION** **MS-PS3-5** Construct, use, and present arguments to support the claim that when the motion energy of an object changes, energy is transferred to or from the object.	**RESOURCES:** ***Smithsonian Science and Technology Concepts™* Working with Motors and Simple Machines Unit** **Lessons 10-12** **SUBCONCEPT 5–** Mechanical advantage and efficiency are ways to describe the ability of a machine to do work. **Lessons 10-12** **TWIG** www.twigcarolina.com **Motion, Machines, Force; Work**			