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Unit Title: The Scientist's Expert: Sir Isaac Newton		Content Area: Science		Grade Level: 5	
Unit Summary:					
Unit Essential Questions: <ul style="list-style-type: none"> Who was Sir Isaac Newton? How can Newton's Laws be used to explain interactions on Earth? How do Newton's three laws affect our everyday lives? What is the relationship between net force, acceleration, and mass? 			Unit Enduring Understandings: <ul style="list-style-type: none"> The motion of an object can be hypothesize (conjectured), modeled and explained based on the fundamental laws of physical science. 		
Possible Student Misconceptions:					
NJCCCS: 5.2 Physical Science Forces and Motion - 5.2.6.E.1, 5.2.6.E.3					
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.					
3-PS2-2. Make observations and/or measurements of an object's motion to provide evidence that a pattern can be used to predict future motion.					
Teacher Notes: May refer to PDF file to review an example of a lap book.					
Primary CCSS ELA/Literacy Connections: W.5.9			Primary CCSS Mathematics Connections: 5.0A.A.2, 6.E.E.B.7		
Lesson #1					
Learning Cycle	Learning Activities	Resources/Materials	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<i>What lesson elements will support students' progress towards mastery of the learning objective(s)?</i> <i>*Elements do not have to be in conducted in sequence.</i>	<i>What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?</i>	<i>What curricular resources/materials are available to facilitate the implementation of the learning activities?</i>	<i>What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?</i>	<i>What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?</i>	<i>What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?</i>
Elicit: <i>How will you access students' prior knowledge?</i>	Prior knowledge will be activated through use of a KWL chart to engage students in the learning targets of unit.	<ul style="list-style-type: none"> KWL Chart: https://www.teachervision.com/tv/printables/KWL_Chart.pdf 			
Engage: <i>How will you capture students' interest and get students' minds focused on the concept/topic?</i>	Students' interest will be sparked by showing an image of Sir Isaac Newton and reading a brief text on his life and accomplishments.	Informational Texts: <ul style="list-style-type: none"> Who Was Sir Isaac Newton? http://www-tc.pbs.org/wgbh/nova/newton/media/lrk-whowasnewton.pdf A Complicated Man http://www.pbs.org/wgbh/nova/physics/complicated-man.html 			
Explore: <i>What hands-on/minds-on common experience(s) will you provide</i>	Students will highlight key information and take notes from text that may be used to draft	<ul style="list-style-type: none"> Highlighters Hard copy of selected informational text(s) and 	Asking Questions and Defining Problems		

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<p><i>for students?</i></p>	<p>biography of Sir Isaac Newton.</p>	<p>books</p>	<p>Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <p>•Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. •Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) •Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p>		
<p><i>Explain: How will you help students connect their exploration to the concept/topic under investigation?</i></p>	<p>Students will receive assistance with connecting their exploration to the accomplishments and principles of Sir Isaac Newton by completing the Biography Checklist which allows students to complete the biography component: introduction, childhood, talents and accomplishments and conclusion of the unit in increments. The website also provides a sample biography on Mae Jemison and graphic organizer (web) for planning purposes. The students have the option to print</p>	<ul style="list-style-type: none"> • Sample Biography Paper: http://www.timeforkids.com/files/homework_helper/aplus_papers/Biosampler.pdf • Biography Organizer: http://www.timeforkids.com/files/homework_helper/aplus_papers/Bioorganizer.pdf • Biography Checklist: http://www.timeforkids.com/homework-helper/a-plus-papers/biography 			

	and save work as it is automatically linked to a Microsoft Word document. Anchor questions are also provided for each section of the biography to help guide the writing summary.				
Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?	A more sophisticated understanding of the topic may arise by incorporating Think, Pair, Share strategy to encourage individual participation of the topic (essential question), who is Sir Isaac Newton?	<ul style="list-style-type: none"> Think, Pair, Share Cooperative Learning Strategy: https://www.teachervision.com/group-work/cooperative-learning/48547.html?for_printing=1 			
Evaluate: How will students demonstrate their mastery of the learning objective(s)?	Students will demonstrate mastery of this introductory lesson by highlighting key information and taking notes in science journal in preparation for drafting the biography that will be included in lapbook. Encourage students to add new findings to KWL charts.	<ul style="list-style-type: none"> Science journals Pencils Highlighters KWL chart 			
Extend: How will students deepen their conceptual understanding through use in new context?	Students will be encouraged to bring in additional reference materials: articles, books and internet sources. This can be initiated by bringing students to the computer lab, media center and/or suggesting visiting the local library to research and check out materials on Sir Isaac Newton.	<ul style="list-style-type: none"> Media Center, Computer Lab, Newark Public Library, classroom computer center or home computer resources 			

Lesson 2

Learning Cycle	Learning Activities	Resources/Materials	Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><i>What lesson elements will support students' progress towards mastery of the learning objective(s)?</i></p> <p><i>*Elements do not have to be in</i></p>	<p><i>What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?</i></p>	<p><i>What curricular resources/materials are available to facilitate the implementation of the learning activities?</i></p>	<p><i>What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?</i></p>	<p><i>What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?</i></p>	<p><i>What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?</i></p>

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<i>conducted in sequence.</i>					
Elicit: How will you access students' prior knowledge?	Students will be encouraged to recall information on Sir Isaac Newton by referencing notes and printed text. Students may record responses on Post-It notes and as new information is learned throughout the unit, it can be added on this section of the KWL chart.	<ul style="list-style-type: none"> • Chart paper (or record responses board or post it notes) 			
Engage: How will you capture students' interest and get students' minds focused on the concept/topic?	Motivational Beginning - Matching Biography Elements. Today's target match is the introduction. This activity will provide a concrete model of an appropriate introduction. (Have the students work either as a whole group or small group to identify the introduction to the biography.)				
Explore: What hands-on/minds-on common experience(s) will you provide for students?	Matching the biography elements warm up. Have the students match the introduction example of the Sample Biography Template on Mae Jemison (which is provided on the <i>Time for Kids</i> website).	<ul style="list-style-type: none"> • Index cards • Markers 	<p>Asking Questions and Defining Problems</p> <p>Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <ul style="list-style-type: none"> • Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. • Ask questions that can be investigated based on patterns 		

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			such as cause and effect relationships. (3-PS2-3) •Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)		
<i>Explain: How will you help students connect their exploration to the concept/topic under investigation?</i>	Students will receive assistance with connecting their exploration to the accomplishments and principles of Sir Isaac Newton by completing the Biography Checklist which allows students to complete the biography component: introduction, childhood, talents and accomplishments and conclusion of the unit in increments. The website also provides a sample biography on Mae Jemison and graphic organizer (web) for planning purposes. The students have the option to print and save work as it is automatically linked to a Microsoft Word document. Anchor questions are also provided for each section of the biography to help guide the writing summary.	<ul style="list-style-type: none"> • Sample Biography Paper: http://www.timeforkids.com/files/homework_helper/aplus_papers/Biosampler.pdf • Biography Organizer: http://www.timeforkids.com/files/homework_helper/aplus_papers/Bioorganizer.pdf • Biography Checklist: http://www.timeforkids.com/homework-helper/a-plus-papers/biography 			
<i>Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?</i>	Students may engage in Think, Pair, Share strategy (shoulder buddy system) to share introduction for immediate feedback from both teacher and peer?	<ul style="list-style-type: none"> • Think, Pair, Share Cooperative Learning Strategy: https://www.teachervision.com/group-work/cooperative-learning/48547.html?for_printing=1 			

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<p>Evaluate: How will students demonstrate their mastery of the learning objective(s)?</p>	<p>Students will be evaluated by writing an introduction that grabs the reader's attention and explains whom you are writing about (Sir Isaac Newton). If the person you are writing about is well known for a particular reason, mention that here.</p>	<ul style="list-style-type: none"> • Science journals • Pencils • Highlighters • Introduction: http://www.timeforkids.com/homework-helper/a-plus-papers/biography 			
<p>Extend: How will students deepen their conceptual understanding through use in new context?</p>	<p>Students will be encouraged to bring in and utilize any additional reference materials: articles, books and internet sources. This can be initiated by bringing students to the computer lab, media center and/or suggesting visiting the local library to research and check out materials on Sir Isaac Newton.</p>	<ul style="list-style-type: none"> • Media Center, Computer Lab, Newark Public Library, classroom computer center or home computer resources 			

Lesson #3

<p>Learning Cycle</p> <p><i>What lesson elements will support students' progress towards mastery of the learning objective(s)?</i></p> <p><i>*Elements do not have to be in conducted in sequence.</i></p>	<p>Learning Activities</p> <p><i>What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?</i></p>	<p>Resources/Materials</p> <p><i>What curricular resources/materials are available to facilitate the implementation of the learning activities?</i></p>	<p>Science and Engineering Practices</p> <p><i>What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?</i></p>	<p>Disciplinary Core Ideas</p> <p><i>What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?</i></p>	<p>Crosscutting Concepts</p> <p><i>What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?</i></p>
<p>Elicit: How will you access students' prior knowledge?</p>	<p>Have students review notes included on KWL chart and encourage them to add additional information found on Sir Isaac Newton.</p>	<ul style="list-style-type: none"> • Chart paper (or record responses board or post it notes and markers) 			
<p>Engage: How will you capture students' interest and get students' minds focused on the concept/topic?</p>	<p>Motivational Beginning - Matching Biography Elements. Today's target match is the paragraph #2. This activity will provide a concrete model of an appropriate</p>				

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	<p>2nd paragraph. (Have the students work either as a whole group or small group to identify the 2nd paragraph to the biography.)</p>				
<p><i>Explore: What hands-on/minds-on common experience(s) will you provide for students?</i></p>	<p>Matching the biography element warm up. Have the students match the paragraph example of the Sample Biography Template on Mae Jemison (which is provided on the <i>Time for Kids</i> website).</p>	<ul style="list-style-type: none"> • Index cards • Markers 	<p>Asking Questions and Defining Problems</p> <p>Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <ul style="list-style-type: none"> •Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. •Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) •Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) 		

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<p><i>Explain: How will you help students connect their exploration to the concept/topic under investigation?</i></p>	<p>Students will receive assistance with connecting their exploration to the accomplishments and principles of Sir Isaac Newton by completing the Biography Checklist which allows students to complete the biography component: introduction, childhood, talents and accomplishments and conclusion of the unit in increments. The website also provides a sample biography on Mae Jemison and graphic organizer (web) for planning purposes. The students have the option to print and save work as it is automatically linked to a Microsoft Word document. Anchor questions are also provided for each section of the biography to help guide the writing summary.</p>	<ul style="list-style-type: none"> • Sample Biography Paper: http://www.timeforkids.com/files/homework_helper/aplus_papers/Biosampler.pdf • Biography Organizer: http://www.timeforkids.com/files/homework_helper/aplus_papers/Bioorganizer.pdf • Biography Checklist: http://www.timeforkids.com/homework-helper/a-plus-papers/biography 			
<p><i>Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?</i></p>	<p>Students may engage in Think, Pair, Share strategy (shoulder buddy system) to share 2nd paragraph for immediate feedback from both teacher and peer?</p>				
<p><i>Evaluate: How will students demonstrate their mastery of the learning objective(s)?</i></p>	<p>Students will be evaluated by writing the second paragraph of biography that provides information about the Newton's childhood. When was he born? Where did he grow up? Whom did he look up to? Include the details that you think are most interesting and important.</p>	<ul style="list-style-type: none"> • Science journals • Pencils • Highlighters • Website • 2nd paragraph: http://www.timeforkids.com/homework-helper/a-plus-papers/biography 			
<p><i>Extend: How will students deepen their conceptual understanding through use in new context?</i></p>	<p>Students will be encouraged to bring in and utilize any additional reference materials: articles, books and internet sources. This can be initiated by bringing students to the computer lab,</p>	<ul style="list-style-type: none"> • Media Center, Computer Lab, Newark Public Library, classroom computer center or home computer resources. 			

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	media center and/or suggesting visiting the local library to research and check out materials on Sir Isaac Newton.				
Lesson #4					
<p align="center">Learning Cycle</p> <p align="center">What lesson elements will support students' progress towards mastery of the learning objective(s)?</p> <p align="center">*Elements do not have to be in conducted in sequence.</p>	<p align="center">Learning Activities</p> <p align="center">What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?</p>	<p align="center">Resources/Materials</p> <p align="center">What curricular resources/materials are available to facilitate the implementation of the learning activities?</p>	<p align="center">Science and Engineering Practices</p> <p align="center">What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?</p>	<p align="center">Disciplinary Core Ideas</p> <p align="center">What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?</p>	<p align="center">Crosscutting Concepts</p> <p align="center">What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?</p>
<p>Elicit: How will you access students' prior knowledge?</p>	<p>Have students review notes included on KWL chart and encourage them to add additional information found on Sir Isaac Newton.</p>	<ul style="list-style-type: none"> chart paper or record responses board or post it notes and markers 			
<p>Engage: How will you capture students' interest and get students' minds focused on the concept/topic?</p>	<p>Motivational Beginning - Matching Biography Elements. Today's target match is the paragraph#3. This activity will provide a concrete model of an appropriate 2nd paragraph.</p>	<ul style="list-style-type: none"> Have the students work either as a whole group or small group to identify the 3rd paragraph to the biography. 			

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<p>Explore: What hands-on/minds-on common experience(s) will you provide for students?</p>	<p>Matching the biography element warm up. Have the students match the paragraph example of the Sample Biography Template on Mae Jemison (which is provided on the <i>Time for Kids</i> website).</p>	<ul style="list-style-type: none"> • Index cards • Markers 	<p>Asking Questions and Defining Problems</p> <p>Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <ul style="list-style-type: none"> • Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. • Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) • Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) 		
<p>Explain: How will you help students connect their exploration to the concept/topic under investigation?</p>	<p>Students will receive assistance with connecting their exploration to the accomplishments and principles of Sir Isaac Newton by completing the Biography Checklist which allows students to complete the biography component: introduction, childhood, talents and accomplishments and conclusion of the unit in increments. The website also provides a sample biography on Mae Jemison and</p>	<ul style="list-style-type: none"> • Sample Biography Paper : http://www.timeforkids.com/files/homework_helper/aplus_papers/Biosampler.pdf • Biography Organizer: http://www.timeforkids.com/files/homework_helper/aplus_papers/Bioorganizer.pdf • Biography Checklist: http://www.timeforkids.com/homework-helper/a-plus- 			

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	<p>graphic organizer (web) for planning purposes. The students have the option to print and save work as it is automatically linked to a Microsoft Word document. Anchor questions are also provided for each section of the biography to help guide the writing summary.</p>	<p>papers/biography</p>			
<p>Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?</p>	<p>Students may engage in Think, Pair, Share strategy (shoulder buddy system) to share 3rd paragraph for immediate feedback from both teacher and peer?</p>				
<p>Evaluate: How will students demonstrate their mastery of the learning objective(s)?</p>	<p>Students will be evaluated by writing the third paragraph of a biography that provides information about the person's talents and accomplishments. What goals has this person achieved? Has this person ever faced a problem and overcome it?</p>	<ul style="list-style-type: none"> • Science journals • Pencils • Highlighters • Website • 3rd paragraph: http://www.timeforkids.com/homework-helper/a-plus-papers/biography 			
<p>Extend: How will students deepen their conceptual understanding through use in new context?</p>	<p>Students will be encouraged to bring in and utilize any additional reference materials: articles, books and internet sources. This can be initiated by bringing students to the computer lab, media center and/or suggesting visiting the local library to research and check out materials on Sir Isaac Newton.</p>	<ul style="list-style-type: none"> • Media Center, Computer Lab, Newark Public Library, classroom computer center or home computer resources 			

Lesson #5

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<p>Learning Cycle</p> <p><i>What lesson elements will support students' progress towards mastery of the learning objective(s)?</i></p> <p><i>*Elements do not have to be in conducted in sequence.</i></p>	<p>Learning Activities</p> <p><i>What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?</i></p>	<p>Resources/Materials</p> <p><i>What curricular resources/materials are available to facilitate the implementation of the learning activities?</i></p>	<p>Science and Engineering Practices</p> <p><i>What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?</i></p>	<p>Disciplinary Core Ideas</p> <p><i>What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?</i></p>	<p>Crosscutting Concepts</p> <p><i>What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?</i></p>
<p>Elicit: How will you access students' prior knowledge?</p>	<p>Have students review notes included on KWL chart and encourage them to add additional information found on Sir Isaac Newton.</p>	<ul style="list-style-type: none"> Chart paper (or record responses board or post it notes and markers) 			
<p>Engage: How will you capture students' interest and get students' minds focused on the concept/topic?</p>	<p>Motivational Beginning - Matching Biography Elements. Today's target match is the paragraph#4. This activity will provide a concrete model of an appropriate 2nd paragraph. (Have the students work either as a whole group or small group to identify the 4th paragraph to the biography.)</p>				

<p>Explore: What hands-on/minds-on common experience(s) will you provide for students?</p>	<p>Matching the biography element warm up. Have the students match the paragraph example of the Sample Biography Template on Mae Jemison (which is provided on the <i>Time for Kids</i> website).</p>	<ul style="list-style-type: none"> • Index cards • Markers 	<p>Asking Questions and Defining Problems</p> <p>Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <ul style="list-style-type: none"> • Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. • Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) • Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) 		
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<p><i>Explain: How will you help students connect their exploration to the concept/topic under investigation?</i></p>	<p>Students will receive assistance with connecting their exploration to the accomplishments and principles of Sir Isaac Newton by completing the Biography Checklist which allows students to complete the biography component: introduction, childhood, talents and accomplishments and conclusion of the unit in increments. The website also provides a sample biography on Mae Jemison and graphic organizer (web) for planning purposes. The students have the option to print and save work as it is automatically linked to a Microsoft Word document. Anchor questions are also provided for each section of the biography to help guide the writing summary.</p>	<ul style="list-style-type: none"> • Sample Biography Paper: http://www.timeforkids.com/files/homework_helper/plus_papers/Biosampler.pdf • Biography Organizer: http://www.timeforkids.com/files/homework_helper/plus_papers/Bioorganizer.pdf • Biography Checklist: http://www.timeforkids.com/homework-helper/a-plus-papers/biographyn 			
<p><i>Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?</i></p>	<p>Students may engage in Think, Pair, Share strategy (shoulder buddy system) to share 4th paragraph for immediate feedback from both teacher and peer?</p>				
<p><i>Evaluate: How will students demonstrate their mastery of the learning objective(s)?</i></p>	<p>Students will be evaluated by writing the fourth paragraph of biography that includes the student's opinion(s) about why it is important to learn about this person. What can be learned from this person's accomplishments? How can the example of this person's accomplishments help us to achieve our own dreams? And overcome it?</p>	<ul style="list-style-type: none"> • Science journals • Pencils • Highlighters • Website • 4th paragraph/conclusion: http://www.timeforkids.com/homework-helper/a-plus-papers/biography 			

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<p>Extend: How will students deepen their conceptual understanding through use in new context?</p>	<p>Students will be encouraged to bring in and utilize any additional reference materials: articles, books and internet sources. This can be initiated by bringing students to the computer lab, media center and/or suggesting visiting the local library to research and check out materials on Sir Isaac Newton.</p>	<ul style="list-style-type: none"> Media Center, Computer Lab, Newark Public Library, classroom computer center or home computer resources 			
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Lesson #6

<p>Learning Cycle</p> <p><i>What lesson elements will support students' progress towards mastery of the learning objective(s)?</i></p> <p><i>*Elements do not have to be in conducted in sequence.</i></p>	<p>Learning Activities</p> <p><i>What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?</i></p>	<p>Resources/Materials</p> <p><i>What curricular resources/materials are available to facilitate the implementation of the learning activities?</i></p>	<p>Science and Engineering Practices</p> <p><i>What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?</i></p>	<p>Disciplinary Core Ideas</p> <p><i>What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?</i></p>	<p>Crosscutting Concepts</p> <p><i>What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?</i></p>
<p>Elicit: How will you access students' prior knowledge?</p>	<p>Questions to Ask Students Before Watching the Video (motivational/beginning) What forces do you see in action? Why does the dog slide down the slide? What is happening when the dog jumps off of the man? What force does the dog feel? What force does the man feel?</p>	<ul style="list-style-type: none"> Chart paper to record questions or post questions on the board or overhead project/LCD projector 			

<p>Engage: How will you capture students' interest and get students' minds focused on the concept/topic?</p>	<p>This video can be used to motivate the study of force, mass, and Newton's Laws of Motion. It can also serve as an extra illustration to reinforce previous lessons on these topics. If you watch the video in class, ask students to pause the video at points where they see one of the three laws of motion in action.</p>	<ul style="list-style-type: none"> Circus Physics: Newton's Laws of Motion Watch Luciano and his puppies jump, slide, and wrestle according to Newton's Laws of Motion: http://www.pbs.org/opb/circus/classroom/circus-physics/activity-guide-newtons-laws-motion/ 	<p>Planning and Carrying Out Investigations Planning and carrying out investigations to answer questions or test solutions to problems in 3–5 builds on K–2 experiences and progresses to include investigations that control variables and provide evidence to support explanations or design solutions. Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence, using fair tests in which variables are controlled and the number of trials considered. (3-PS2-1) Make observations and/or measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon or test a design solution. (3-PS2-2)</p>		
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<p>Explore: What hands-on/minds-on common experience(s) will you provide for students?</p>	<p>Students will engage in hands-on experiments that can be documented in a lapbook. The in classroom activities are listed on website.</p>		<p>Asking Questions and Defining Problems</p> <p>Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <ul style="list-style-type: none"> •Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. •Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) •Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) 	<p>PS2.A: Forces and Motion</p> <p>Each force acts on one particular object and has both strength and a direction. An object at rest typically has multiple forces acting on it, but they add to give zero net force on the object. Forces that do not sum to zero can cause changes in the object’s speed or direction of motion. (Boundary: Qualitative and conceptual, but not quantitative, addition of forces are used at this level.) (3-PS2-1) The patterns of an object’s motion in various situations can be observed and measured; when that past motion exhibits a regular pattern, future motion can be predicted from it. (Boundary: Technical terms, such as magnitude, velocity, momentum, and vector quantity, are not introduced at this level, but the concept that some quantities need both size and direction to be described is developed.) (3-PS2-2) PS2.B: Types of Interactions</p> <p>Objects in contact exert forces on each other. (3-PS2-1) Electric and magnetic forces between a pair of objects do not require that the objects be in contact. The sizes of the forces in each situation depend on the properties of the objects and their distances apart and, for forces between two magnets, on their orientation relative to each other. (3-PS2-3), (3-PS2-4)</p>	
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<p><i>Explain: How will you help students connect their exploration to the concept/topic under investigation?</i></p>	<p>Help students make real world connections. Most students will be familiar with acceleration from driving—stepping on the gas or slamming the brakes. Another common experience of acceleration is jumping off of the diving board. Look for local connections, such as skiing in northern states, and seismometers in earthquake-prone regions.</p>				
<p><i>Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?</i></p>	<p>Students will have the opportunity to develop their learning by elaborating on the mini activities in their lapbooks. In addition to summarizing the lap activities the learners will also extend understanding by apply Newton's Laws in the written commentary.</p>				
<p><i>Evaluate: How will students demonstrate their mastery of the learning objective(s)?</i></p>	<p>Students will be assessed based on the written commentary provided in the lapbook on the classroom activities involving Newton's Laws. Students will be access based on a rubric provided which will include the expectation of each component to the lesson activity/unit project.</p>				
<p>Lesson #7</p>					

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<p>Learning Cycle</p> <p><i>What lesson elements will support students' progress towards mastery of the learning objective(s)?</i></p> <p><i>*Elements do not have to be in conducted in sequence.</i></p>	<p>Learning Activities</p> <p><i>What specific learning experiences will support ALL students' progress towards mastery of the learning objective(s)?</i></p>	<p>Resources/Materials</p> <p><i>What curricular resources/materials are available to facilitate the implementation of the learning activities?</i></p>	<p>Science and Engineering Practices</p> <p><i>What specific practices do students need to use in order to progress towards mastery of the learning objective(s)?</i></p>	<p>Disciplinary Core Ideas</p> <p><i>What core ideas do students need to understand in order to progress towards mastery of the learning objective(s)?</i></p>	<p>Crosscutting Concepts</p> <p><i>What crosscutting concepts will enrich students' application of practices and their understanding of core ideas?</i></p>
<p>Elicit: How will you access students' prior knowledge?</p>	<p>Have students recall the unit activities they have engaged in all centered around Newton's Laws and the contribution made by Sir Isaac Newton. During this meeting, the students will put together all components on the lapbook highlighting the key concepts.</p>				
<p>Engage: How will you capture students' interest and get students' minds focused on the concept/topic?</p>	<p>Students' interest will be captured by showing sample lapbooks and clip (Newton's Laws) to summarize the Laws of Motion.</p>	<ul style="list-style-type: none"> Introduction to Newton's Three Laws – Video: http://www.nasa.gov/mov/192446main_016_intro_newton_laws.mov 			

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<p>Explore: What hands-on/minds-on common experience(s) will you provide for students?</p>	<p>Creation of lapbook.</p>		<p>Asking Questions and Defining Problems</p> <p>Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4)</p> <ul style="list-style-type: none"> •Asking questions and defining problems in grades 3–5 builds on grades K–2 experiences and progresses to specifying qualitative relationships. •Ask questions that can be investigated based on patterns such as cause and effect relationships. (3-PS2-3) •Define a simple problem that can be solved through the development of a new or improved object or tool. (3-PS2-4) 		
<p>Elaborate: How will students apply their learning and develop a more sophisticated understanding of the concept/topic?</p>	<p>Students will follow guidelines for completing the science lapbook.</p>				
<p>Evaluate: How will students demonstrate their mastery of the learning objective(s)?</p>	<p>Students will be evaluated on the completion of each section of the lapbook.</p>				

<i>Extend: How will students deepen their conceptual understanding through use in new context?</i>	Conceptual understanding is deepened by the active research and extension of the module: Motions and Designs.				
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