

Middle School Science: Curriculum Map for Grade 8

Fourth Nine Weeks

State Standards	Embedded Standards	Learning Outcomes	Adopted Resources*	Core Ideas
Unit 4.1 Electromagnetism, 5 weeks				
<p>GLE 0807.12.3 Compare and contrast the earth's magnetic field to that of a magnet and an electromagnet.</p> <p>GLE 0807.12.1 Investigate the relationship between magnetism and electricity.</p> <p>GLE 0807.12.2 Design an investigation to change the strength of an electromagnet.</p>	<p>GLE 0807.Inq.1 Design and conduct open-ended scientific investigations.</p> <p>GLE 0807.Inq.2 Use appropriate tools and techniques to gather, organize, analyze, and interpret data.</p> <p>GLE 0807.T/E.2 Know that the engineering design process involves an ongoing series of events that incorporate design constraints, model building, testing, evaluating, modifying, and retesting.</p>	<p>Compare and contrast earth's magnetic field to that of a bar magnet.</p> <p>Create a model for Earth's magnetic field and use it to explain effects on Earth.</p> <p>Conduct inquiries to identify factors that determine the strength of an electromagnet.</p> <p>Test predictions of the performance of an electromagnet given construction criteria.</p> <p>Investigate how magnetism and electricity are related.</p>	<p><i>Tennessee Holt Science and Technology</i>, Chapter 16 Sections 1: Magnets and Magnetism Section 2: Magnetism from Electricity Section 3: Electricity from Magnetism p. 422-443.</p> <p>Gizmos: Circuits, Magnets and Electromagnetic Induction</p>	<p>NGSS Practice 2: Developing and using models</p> <p>NGSS Practice 3: Planning and carrying out investigations</p> <p>CCSS Writing: Support claims with logical reasoning and relevant, accurate data and evidence that demonstrate an understanding of the topic or text, using credible sources.</p> <p>CCSS Writing: Draw evidence from informational texts to support analysis, reflection, and research.</p> <p>CCSS Mathematics: Reason abstractly and quantitatively.</p>

*The TOOLBOX contains additional resources for each unit.

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State Standards	Embedded Standards	Learning Outcomes	Adopted Resources*	Core Ideas
Unit 4.2 Gravity, 4 weeks				
<p>GLE 0807.12.4 Identify factors that influence the amount of gravitational force between objects.</p> <p>GLE 0807.12.5 Recognize that gravity is the force that controls the motion of objects in the solar system.</p>	<p>GLE 0807.Inq.2 Use appropriate tools and techniques to gather, organize, analyze, and interpret data.</p> <p>GLE 0807.Inq.3 Synthesize information to determine cause and effect relationships between evidence and explanations.</p> <p>GLE 0807.Inq.5 Communicate scientific understanding using descriptions, explanations, and models.</p>	<p>Compare and describe the gravitational forces between two objects in terms of their masses and the distance between them.</p> <p>Summarize the relationship between mass and weight.</p> <p>Compare the role of gravity in determining the motion of objects, such as projectiles, satellites, moons, planets, and comets.</p> <p>Analyze patterns in the motion of objects in the universe.</p>	<p><i>Tennessee Holt Science and Technology TE</i>, Chapter 15 section 4: Planetary Motion p.410-413</p> <p>Gizmo: Weight and Mass; Orbital Motion-Kepler's Laws</p>	<p>NGSS Practice 4: Analyzing and interpreting data</p> <p>NGSS Practice 5: Using mathematics and computational thinking</p> <p>CCSS Writing: Use precise language and domain-specific vocabulary to inform about or explain the topic</p> <p>CCSS Mathematics: Draw, construct and describe geometrical figures and describe the relationship between them.</p> <p>CCSS Mathematics: Reason abstractly and quantitatively.</p>

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TOOLBOX	
Unit 4.1 Electromagnetism, 5 weeks	
Plans	Electromagnetism for Middle School Students lesson plan with activities from Materials Research Science and Engineering Center of Northwestern University. "The lesson explores the magnetic field created by a current-carrying wire. Students map the magnetic field directions created by a single wire and a solenoid using compasses and create electromagnets." http://www.mrsec.org/education/resources/electromagnetism
Background for Teachers	<p>Online tutorial with graphics and sound from the Internet Plasma Physics Education Experience on Electricity and Magnetism : http://ippex.pppl.gov/interactive/electricity/</p> <p>Information and diagrams on magnets and electromagnetism for teachers can be found at http://hyperphysics.phy-astr.gsu.edu/hbase/magnetic/elemag.html#c2</p> <p>Online tutorial with graphics and sound from the Internet Plasma Physics Education Experience on Electricity and Magnetism: http://ippex.pppl.gov/interactive/electricity/</p>
Student Activities	<p>Simple Experiment for magnetic fields: http://www.galaxy.net/~k12/electric/fields.shtml</p> <p>Experiment demonstrating how electricity and magnetism are related: http://www.galaxy.net/~k12/electric/fields.shtml</p> <p>Magnets and Magnetism from Jefferson Labs, includes lab sheets, activity directions, and related activities: http://education.jlab.org/beamsactivity/6thgrade/magnetsandelectromagnets/</p>
Other Resources	<p>An excellent interactive on Earth's Magnetic field: http://www.windows2universe.org/physical_science/magnetism/earth_magnet_dipole_interactive.html</p> <p>Good tutorial with graphics and quiz for Earth's magnetic field: http://www.geography4kids.com/files/earth_magfield.html</p> <p>Another good, student-friendly tutorial, graphics, and online quizzes for electricity and magnetism: http://www.physics4kids.com/files/elec_intro.html</p>

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Unit 4.2 Gravity, 4 weeks	
Plans	<p>These lessons are designed to help middle school students understand that planets travel in nearly circular orbits around the sun, and that planetary motion obeys laws defined by Kepler and Newton. Students will explore interactive web sites demonstrating orbital motion and complete a series of modeling activities. Assessments are included http://btc.montana.edu/CERES/html/58Orbits/58orbits.html</p> <p><i>Great Gravity</i> Lesson Plan: http://sciencespot.net/Pages/classastro.html In this lesson, students explore the gravitational force on Earth and other planets. Includes a downloadable activity sheet. <i>Gravity Gets You Down</i> Lesson Plan from Discovery Education can be found at http://www.discoveryeducation.com/teachers/free-lesson-plans/gravity-gets-you-down.cfm This is a two day plan with activities, directions, assessment lessons, and a study guide.</p> <p><i>Understanding Newton's Law of Gravity</i> lesson plan is found at http://www.brighthubeducation.com/middle-school-science-lessons/36523-newtons-law-of-gravity/ This site includes an introduction to gravity, a plan for Newton's Law of Gravity and Planets,</p>
Unit 4.2 Gravity Background for Teachers	<p>A quick explanation of gravity and forces of attraction from another educator http://www.williamsclass.com/EighthScienceWork/Gravity.htm</p> <p><i>Windows to the Universe</i>, http://www.windows2universe.org/teacher_resources/main/teacher_resources.html&search_phrase=gravity&search_level=mid, is a website by the National Earth Science Teachers Association. This site contains extensive information and simulations about topics on gravity and the solar system, including - Gravity definition page: http://www.windows2universe.org/glossary/gravity_defn.html&edu=high Our Solar System: http://www.windows2universe.org/our_solar_system/solar_system.html&edu=high</p> <p>What is Gravity? http://spaceplace.nasa.gov/what-is-gravity/ Fundamental information on gravity and the forces of nature by NASA.</p>
Student Activities	<p>An activity from Discovery Education about gravity. Students will understand the following that without air resistance, all objects would fall with the same acceleration, regardless of mass; gravity is the force that causes objects to fall; and air resistance, a type of friction, works against gravity to decrease the acceleration of a falling object. http://www.discoveryeducation.com/teachers/free-lesson-plans/gravity-gets-you-down.cfm.</p> <p>During this activity, students explore the gravitational force of other planets and the moon. This activity is in two parts. In part one students calculate their weight on other planets. In part two students, calculate how far they can jump on other planets http://sciencespot.net/Media/gravlab.pdf.</p> <p>This is a gravity-force simulated activity from PhET. Students will use the simulation to relate gravitational force to masses of objects and distance between objects. http://phet.colorado.edu/en/simulation/gravity-force-lab.</p>
Other Resources	<p>This is a mass vs. weight activity with background information from NASA. Students are able to demonstrate the difference between mass and weight by integrating classroom activities with video filmed by astronauts in the microgravity environment on the International Space Station (ISS). This activity also allows students and teachers to explore careers in space exploration. http://education.ssc.nasa.gov/massvsweight.asp.</p>