NCHS Physical Science

Unit Overview and Pacing Guide

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| The Physical Science classes must focus on student mastery of the Performance Expectations listed below. The Units and Topic Overviews are provided solely as guidelines. If time permits, additional units and extensions to the topics listed may be introduced.  The following Engineering, Technology and Applications of Science Standards will be covered throughout the year: HS-ETS1-1, HS-ETS1-2, HS-ETS1-3 and HS-ETS1-4. | | |
| \***These topics will be covered and reviewed throughout the year as needed:**  Laboratory procedures Equipment  Safety Measurement | | |
| **Semester 1: Chemistry** | | |
| **Unit Title: Structure and Properties of Matter** | | |
| **Performance Expectations Covered** | **Topic**  **Overview** | **Resources**  NOTE: Links may not always be up to date; all efforts will be made to keep them current.  Additional resources listed at the end of the document. |
| HS-PS1-3  Weeks 1,2,3,4 | Units and Measurements in Science.  Scientific Method  Properties of Matter:   * Mixtures, and Chemical and Physical Changes | [Powers of Ten, 80’s IBM video](https://www.youtube.com/watch?v=0fKBhvDjuy0)  [Scale of the Universe](http://htwins.net/scale2/)  [Chemical and Physical Change virtual labs](http://vital.cs.ohiou.edu/steamwebsite/downloads/ChangeLab.swf)  [Separating mixtures virtual lab](http://www.harcourtschool.com/activity/mixture/mixture.html) |
| HS-PS1-3  Week 5 | States of Matter   * Kinetic Theory and Phases | [States of matter virtual lab](http://www.harcourtschool.com/activity/states_of_matter/)    [melting point techniques](http://www.wiredchemist.com/chemistry/instructional/laboratory-tutorials/determination-of-melting-point)  [labs and activities on the investigation of melting and freezing point](http://www.middleschoolchemistry.com/lessonplans/chapter2/lesson4)  [Inter and intramolecular forces](http://www.middleschoolchemistry.com/teacherbackground/chapter4/intramolecular_intermolecular.php) |
| HS-PS1-1  Week 6 | Atomic Structure   * Atomic theory and energy levels | [Building an atom](http://phet.colorado.edu/en/simulation/build-an-atom)  [Activities and resources to engage learners](http://www.middleschoolchemistry.com/lessonplans/chapter4/lesson1)  [Hands on group activities](http://www.middleschoolchemistry.com/lessonplans/chapter4/lesson2) |
| HS-PS1-1  Week 7 | Periodic Table   * Periodic Patterns | [Periodic Table of Videos - Each element has a short video including properties , demos & experiments](http://periodicvideos.com/)  [Interactive Periodic table with lots of features](http://www.rsc.org/periodic-table)    [A series of labs to model the periodic table](http://www.umanitoba.ca/outreach/crystal/Grade%209/Cluster%202/S1-2%20-%20Chemistry%20and%20Periodic%20Table%20Unit%20Plan.doc) |
| **Unit Title: Chemical Reactions** | | |
| HS-PS1-4  Weeks 8,9,10,11 | Chemical Bonds   * Ionic bonds and covalent bonds | [Gumdrop lab for modeling ionic and covalent bonds](http://images.pcmac.org/SiSFiles/Schools/GA/BryanCounty/RHMiddle/Uploads/DocumentsCategories/Documents/Gumdrop%20lab_2.pdf)  [Animation Explanation of Bonds](http://www.kentchemistry.com/links/bonding/bondingflashes/bond_types.swf)  [Change in energy lab](http://www.middleschoolchemistry.com/lessonplans/chapter6/lesson7) |
| HS-PS1-2  HS-PS1-5  Weeks 12,13,14 | Chemical Reactions:   * Conservation of Mass * Reaction Rates * Types of Reactions (Synthesis, Decomposition, and Combustion) | [Chemical Reactions - awesome teacher resources](http://www.nclark.net/ChemicalReactions)    [Reactions, products and leftovers](http://phet.colorado.edu/en/simulation/reactants-products-and-leftovers)  [Using a chemical change to predict an unknown](http://www.middleschoolchemistry.com/lessonplans/chapter6/lesson6) |
| HS-PS1-6  Weeks 15,16 | Solutions, Acids and Bases:   * Solutions, acids, bases, pH | [If you’re not part of the solution, you’re part of the precipitate](https://www.teachengineering.org/view_activity.php?url=collection/mis_/activities/mis_pharma/mis_pharma_lesson01_activity1.xml) |

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| **Semester 2: Physics** | | |
| **Performance Expectations Covered** | **Topic**  **Overview** | **Resources**  NOTE: Links may not always be up to date; all efforts will be made to keep them current. |
| **Unit Title: Motion and Stability** | | |
| HS-PS2-1  HS-PS2-3  Weeks 1,2,3,4 | Motion:   * Motion and acceleration | [Walking Displacement Lab](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&cad=rja&uact=8&ved=0CB4QFjAA&url=http%3A%2F%2Fkawameeh.twpunionschools.org%2Fsubsites%2Fhbormann%2Fdocuments%2FDistance%2520and%2520Displacement%2520Lab-1.docx&ei=tNYSVd_jL5feoASC74CwDg&usg=AFQjCNHgtI5Tiv2i__hCMPGUiJoa29vg8w&sig2=ZpVCRFQOO5OWCKuewAPjAQ&bvm=bv.89184060,d.cGU)  [Speed and Velocity Lab](http://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=2&cad=rja&uact=8&ved=0CCMQFjAB&url=http%3A%2F%2Fwww.am.dodea.edu%2Flejeune%2Fbms%2FLion_Docs%2Fdocuments%2FSpeedandVelocityLab.doc&ei=NtkSVZiuJo7joAST74CQDg&usg=AFQjCNFnqLqyBJb7wNQgFEcPdoYelI5QQg&sig2=dteUQdvY0q43FUHjkVSXEg&bvm=bv.89184060,d.cGU)  [Vector Project](http://ciese.org/curriculum/vectorproj/) |
| HS-PS2-1  HS-PS2-3  Weeks 5,6,7 | Forces and Motion:   * Forces, mass, Newton’s Laws and gravity | [Newton’s laws interactive tutorial](http://www.google.com/url?q=http%3A%2F%2Fwww.sciencechannel.com%2Fgames-and-interactives%2Fnewtons-laws-of-motion-interactive%2F&sa=D&sntz=1&usg=AFQjCNHWmTR9NgAEtBu70ozz4vplsWgb8g)  [Newton's Laws Bundle](http://www.cpalms.org/Public/PreviewResource/Preview/46066)  [Is Friction Good or Bad?](https://docs.google.com/file/d/0B5vZUViZFtxaNXAzcllGRTRiSG8/edit)  [Accident Reconstruction](http://www.thephysicsfront.org/items/Load.cfm?ID=4941) |
| **Unit Title: Energy (Types of Interactions)** | | |
| HS-PS3-2  HS-PS3-3  Weeks 8,9 | Energy:   * Potential and Kinetic | [Build a cork launcher](http://www.instructables.com/id/Cork-Shooter/)  [Solar Projects](http://www.builditsolar.com/Projects/Educational/educational.htm)  [National Renewable Energy Lab - resource and project ideas](http://www.nrel.gov/education/educational_resources.html) |
| HS-PS2-5  HS-PS3-5  Week 10 | Electricity and Magnetism:   * Electromagnets | [E & M Tutorial](http://www.google.com/url?q=http%3A%2F%2Fippex.pppl.gov%2Ftemp%2FE%2526M.swf&sa=D&sntz=1&usg=AFQjCNE0ENsCkNTNzhiHdik-Fg9gwyN_XA)  [Electricity Lessons](https://www.google.com/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=9&cad=rja&uact=8&ved=0CFcQFjAI&url=https%3A%2F%2Fwww.portlandgeneral.com%2Fcommunity_environment%2Fcommunity_involvement%2Four_programs%2Fdocs%2Fbasic_electricity_lessons_9-12.pdf&ei=m-jTVKr-D8yoogTS8YL4BA&usg=AFQjCNE3YbHCU_IQ7QIUAJyNYwc9fFmhDA&sig2=1S9J9ysaAJmMMbaZLf4A_Q&bvm=bv.85464276,d.cGU)  [Squishy Circuits](http://www.pbs.org/parents/adventures-in-learning/2014/02/electric-play-dough/)  [Salt Water Circuit](https://www.teachengineering.org/view_activity.php?url=collection/cub_/activities/cub_desal/cub_desal_lesson01_activity1.xml)  E[lectricity & Magnetism lab](http://www.doe.virginia.gov/testing/sol/standards_docs/science/2010/lesson_plans/physical_sci/energy/sess_PS-11bc.pdf)  [Magnetosphere 7min discovery movie](https://www.youtube.com/watch?v=yEYy_nVC4L0)  [Earth's Magnetic Field Reading](http://www.windows2universe.org/earth/Magnetosphere/earth_magnetic_poles.html)  [Space Weather (magnetic events)](http://www.spaceweatherlive.com/en/news)  [Quizlet Magnetism Vocab. Deck with Pictures](https://quizlet.com/84626214/magnetism-flash-cards/)  [Transformer Virtual Lab](http://www.glencoe.com/sites/common_assets/science/virtual_labs/E15/E15.html)  [Build a virtual electromagnet](http://www.fossweb.com/delegate/ssi-wdf-ucm-webContent/Contribution%20Folders/FOSS/multimedia/Magnetism_and_Electricity/electromagnet.html) |
| HS-PS2-4  Week 11 | Universal Forces:   * Gravity and electrostatic forces | [**phet universal forces simulation and labsheet**](http://phet.colorado.edu/en/simulation/legacy/gravity-force-lab)  [**Slideshow for section 12.4 universal forces**](http://www.slideshare.net/robtownsend/12-4-universal-forces-part-1) |
| HS-PS3-4  Week 12 | Energy Conversion and Conservation   * Thermal Energy * Heat | [Various simulations about heat and energy](http://phet.colorado.edu/en/simulations/category/physics/heat-and-thermodynamics)  [Power of the Sun](http://sciencenetlinks.com/lessons/star-power-discovering-the-power-of-sunlight/)  [Energy Transfer Practice](http://dev.physicslab.org/Document.aspx?doctype=5&filename=Compilations_CPworkbook_ConservationEnergy.xml)  [**Socks and Temperature Activity-Heat Transfer**](http://www.cpalms.org/Public/PreviewResource/Preview/46119) |
| **Unit Title: Nuclear Processes** | | |
| HS-PS1-8  Weeks 13,14 | Nuclear Chemistry:   * Radioactivity * Decay * Fission and Fusion | [M&M Radioactive Decay Lab](http://www.alexandria.k12.mn.us/cms/lib01/MN01000334/Centricity/Domain/202/Half-life%20M%20and%20M%20lab.doc)  <https://phet.colorado.edu/en/simulation/legacy/nuclear-fission>  [Radioactive Dating Game](http://phet.colorado.edu/en/simulation/radioactive-dating-game)  [half-life nuclear decay simulation](http://faculty.uncfsu.edu/jcastill/labs/Half.doc)  [Yucca mountain information](http://www.yuccamountain.org/) |
| **Unit Title: Waves** | | |
| HS-PS4-1  Week 15 | Mechanical Waves:   * Wave Properties | [Waves Lesson](http://www.physicsclassroom.com/class/waves/Lesson-1/Categories-of-Waves)  [Online High Frequency Hearing Test](http://www.noiseaddicts.com/2009/03/can-you-hear-this-hearing-test/)  [**Background information**](http://www.physicsclassroom.com/class/sound/Lesson-1/Sound-is-a-Mechanical-Wave)  [hippocampus - demos & videos](http://www.hippocampus.org/Chemistry)  [Fission Phet Simulation](https://phet.colorado.edu/en/simulation/legacy/nuclear-fission)  [**Simulations for sound waves**](http://phet.colorado.edu/en/simulations/category/physics/sound-and-waves) |
| HS-PS4-2  Week 16 | Digital transmission and storage |  |
| HS-PS4-4  HS-PS4-5  HS-PS4-3  Weeks 17,18, 19 | Electromagnetic Spectrum:   * Waves, wave vs. particle model of light | [Electromagnetic Spectrum](http://www.e-missions.net/elabs/?/electromagnetic_mission_description/)  [EM Spectrum Activities](http://chandra.harvard.edu/edu/formal/ems/ems_highContents.html)  [Nasa tour of the EM spectrum](http://missionscience.nasa.gov/ems/emsVideo_01intro.html)  [Cool Cosmos Web Exploration](http://coolcosmos.ipac.caltech.edu/cosmic_classroom/multiwavelength_astronomy/multiwavelength_astronomy/overview.html)  [**Exploring the EM**](https://www.teachengineering.org/view_lesson.php?url=collection/clem_/lessons/clem_waves_lessons/clem_waves_lesson04.xml)  [Optics hands-on activities](http://www.google.com/url?q=http%3A%2F%2Fwww.optics4kids.org%2Fhome%2Fcontent%2Fclassroom-activities%2Fadvanced%2F&sa=D&sntz=1&usg=AFQjCNF0gvHRUk8QeJClhX4yWiB9uzKo1Q)  [Physics Zone: Optics Lesson](http://www.sciencejoywagon.com/physicszone/09optics/)  [Warm up activities for mirrors](http://pedagoguepadawan.net/186/reflection-and-refraction-activities/) |

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| **General Resources for Activities:**  [**http://www.csun.edu/science/software/simulations/chemistry.html**](http://www.csun.edu/science/software/simulations/chemistry.html)  [**http://onlinelabs.in/physics**](http://onlinelabs.in/physics)  [**http://www.resa.net/curriculum/curriculum/science/professionaldevelopment/ngss-pd/lesson-plans-exploring-ngss/**](http://www.resa.net/curriculum/curriculum/science/professionaldevelopment/ngss-pd/lesson-plans-exploring-ngss/)  **Engaging YouTube channels for short videos relating to Chemistry & Physics:**  **Veritasium** -  [**https://www.youtube.com/user/1veritasium**](https://www.youtube.com/user/1veritasium)  Discovery Science News  [**Discovery Science News Stories in Physics**](https://www.youtube.com/user/DNewsChannel/search?query=physics)  **Sixty Symbols**  [**www.sixtysymbols.com**](http://www.sixtysymbols.com)  **Minute Physics**  [**https://www.youtube.com/user/minutephysics**](https://www.youtube.com/user/minutephysics)  **Annenberg Learner - Chemistry**  [**http://www.learner.org/resources/series218.html**](http://www.learner.org/resources/series218.html)  **Annenberg Learner - Physics**  [**http://www.learner.org/resources/series213.html**](http://www.learner.org/resources/series213.html)  **Quizlet**  [**www.quizlet.com**](http://www.quizlet.com)  **Excellent source of interactive vocabulary decks with picture and sound. Free as a non-teacher, $25.00 per year to subscribe.**  **Chemistry experiments**  [**http://www.middleschoolchemistry.com/lessonplans/**](http://www.middleschoolchemistry.com/lessonplans/)  **Teach engineering.org**  [**https://www.teachengineering.org/search\_standards.php?select\_state=Next%20Generation%20Science%20Standards**](https://www.teachengineering.org/search_standards.php?select_state=Next%20Generation%20Science%20Standards) |