

The study of physical science comprises the systematic study of the physical world as related to chemistry and space science. The topics presented in the Middle School Physical Science course address key concepts presented in Pennsylvania's Academic Standards and provide a foundation for further study in other sciences and advanced science disciplines.

Topics presented in this Middle School Physical Science course include:

- Matter and Its Interactions
- Force and Motion
- Energy and Heat
- Electricity, Magnetism, and The Electromagnetic Spectrum

MS Physical Science

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| Module I: Matter & Its Interactions | <p>This module will focus on three big ideas of physical science:</p> <ul style="list-style-type: none"> --Matter can be understood in terms of the types of atoms present and the interactions both between and within atoms. --Interactions of objects or systems of objects can be predicted and explained using the concept of transfer of energy from one object or system of objects to another. --Changes in both matter and energy occur during interactions of atoms and molecules. | | | | | |
| | <p>Students will focus on the following essential questions:</p> <ul style="list-style-type: none"> --How can one explain the structure, properties, and interactions of matter? --How can one explain and predict interactions between objects and within systems of objects? --How are matter and energy related and transferred? --How are atoms and molecules changed during chemical reactions? | | | | | |
| Properties and Structure of Matter | <p>In this lesson, you will explore the notion that all substances are made from approximately 100 different types of atoms, which combine with one another in various ways to form molecules.</p> <p>3.2.7.A1, 3.2.7.A2, 3.2.7.B1, 3.2.7.B2,</p> | | | | | |
| | | <p>EXPLORE the interactive periodic table as you WATCH Chapter 5: "Hunting Elements" video.</p> | <p>https:// itunes.apple.com/us/app/ nova- elements/ id512772649 ?mt=8</p> | | | |

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| | | IDENTIFY vocabulary associated with elements, compounds, and mixtures as you WATCH this podcast. | https:// itunes.apple. com/us/ podcast/ elements- compounds- mixtures/ id545716446 ? i=118230478 &mt=2 | | | |
| | | BUILD atoms and determine the number of atomic particles present in each atom as you INTERACT in this online simulation. | https:// phet.colorado .edu/sims/ html/build-an- atom/latest/ build-an- atom_en.html | | | |
| | | CONFIRM your understanding of atoms and molecules as you CREATE atoms in this app. | https:// itunes.apple. com/us/app/ nova- elements/ id512772649 ?mt=8 | | | |

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| | | <p>DEMONSTRATE how hydrogen and oxygen atoms make a molecule and EXPLAIN whether your molecule is an element or compound with Explain Everything app.</p> | <p>https://itunes.apple.com/us/app/explain-everything/id431493086?mt=8</p> | | | |
| | | <p>DISTINGUISH between movement of molecules and atoms in the solid, liquid, and gas state as you WATCH this podcast.</p> | <p>https://itunes.apple.com/us/podcast/explaining-thermal-energy/id558827492?i=120212551&m</p> | | | |
| | | <p>REVIEW properties of matter vocabulary as you USE the quizlet site.</p> | <p>https://quizlet.com/11946128/flashcards</p> | | | |

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| | | DEMONSTRATE knowledge of elements, compounds and mixtures through as you COMPLETE this short quiz. | http://www.mrwiggersci.com/chem/tutorials/ch3-rev-pract-classify-matter--blacksburg.htm | | | |
| | | DEMONSTRATE your understanding of characteristics of solids, liquids, and gases as you COMPLETE a venn diagram. | http://www.echalk.co.uk/Science/physics/states/VennDiagram/statesVenn.html | | | |
| | | DEMONSTRATE knowledge of the states of matter as you INTERACT with <i>Science 8</i> app. | https://itunes.apple.com/us/app/middle-school-science-8th/id504081579?mt=8 | | | |

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| | | DEMONSTRATE the difference between solids, liquids, and gases as you CREATE an iMovie explanation. | https://itunes.apple.com/us/app/imovie/id377298193?mt=8 | | | |
| Matter & Energy | In this lesson, you will explore how changes in matter are accompanied by changes in energy and how chemical and physical properties of matter are affected through this energy transfer. 3.2.7.A3, 3.2.7.B3 | | | | | |
| | | DIFFERENTIATE between physical and chemical properties and changes as you WATCH this video. | https://www.youtube.com/watch?v=C4pQQQNW30 | | | |
| | | DIFFERENTIATE between reactions that release energy and those that store energy as you WATCH this podcast. | https://itunes.apple.com/us/podcast/exothermic-endothermic-reactions/id555728901?i=119725741&mt=2 | | | |

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| | | <p>UNDERSTAND how the number of atoms is conserved in a chemical reaction and the mass does not change as you WATCH this video.</p> | <p>https:// itunes.apple. com/us/ podcast/ conservation- mass-engery/ id399608858 ? i=90359532& mt=2 http:// www.neok12. com/video/ Law-of- Conservation / zX567d4e45 7d737d7566 7b0a.htm</p> | | | |
| | | <p>DEMONSTRATE understanding of physical and chemical properties as you COMPLETE this online quiz.</p> | <p>http:// www.proprofs .com/quiz- school/ story.php? title=Matter- Its- Properties-1</p> | | | |

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| Chemical Reactions | In this lesson, you will explore how elements, compounds, and mixtures interact with each other through different types of chemical reactions. 3.2.7.A4, 3.2.7.B4 | | | | | |
| | | DETERMINE how atoms react to create new substances as you WATCH Chapter 6: "Hunting Elements." | https://itunes.apple.com/us/app/nova-elements/id512772649?mt=8 | | | |
| | | EXPLAIN why sodium and chlorine atoms are reactive and neon atoms are not using the Explain Everything app. | https://itunes.apple.com/us/app/explain-everything/id431493086?mt=8 | | | |
| | | SIMULATE how reactions take place as you INTERACT with the "sandwich" simulator. | https://phet.colorado.edu/sims/html/reactants-products-and-leftovers/latest/reactants-products-and-leftovers_en.html | | | |

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| | | <p>PRACTICE performing chemical reactions as you INTERACT with the Goreact and Chemcrafter app</p> | <p>https:// itunes.apple. com/us/app/ goreact/ id649585694 ?mt=8 https:// itunes.apple. com/us/app/ chemcrafter/ id839552862 ?mt=8</p> | | | |

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| Module II: Force & Motion | <p>This module will focus on three big ideas of physical science: --Forces can cause changes in motion. --Motion can be described in terms of displacement, velocity, and acceleration. --Mass is related to an object's ability to change its motion.</p> | | | | | |
| | <p>Students will focus on the following essential questions: --What characteristic of forces must be present for an object to experience a change in motion? --How does the mass of an object affects its inertia? --How can the motion of an object be described in terms of its position and change in position?</p> | | | | | |
| Forces and Motion | <p>In this lesson, you will explore the interaction of forces on an object and be able to describe the motion of objects based on characteristics of the object's position and change in position. 3.2.7.B1, 3.2.7.B2</p> | | | | | |
| | | <p>DISCOVER how gravity plays a part in movement as you WATCH a video on gravity</p> | <p>http://www.pbslearningmedia.org/resource/wlvt07-arthur.gravity/gravity-of-the-situation/</p> | | | |

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| | | EXPLAIN Newton's Laws after watching podcasts as you WATCH this podcast. | https:// itunes.apple.com/us/podcast/ episode-1- newtons-1st- law/ id504844653? i=122864819& mt= | | | |
| | | IDENTIFY examples of Newton's 1st Law in everyday life and you WATCH a podcast | https:// itunes.apple.com/us/podcast/ episode-2- newtons-2nd- law/ id504844653? i=111180563& mt=2 | | | |
| | | IDENTIFY examples of Newton's 2nd Law in everyday life and you WATCH a podcast | https:// itunes.apple.com/us/podcast/ episode-3- newtons-3rd- law/ id504844653? i=111808119& mt=2 | | | |

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| | | EXPLORE how a net force is created and how motion is impacted by the net force as you INTERACT with this simulation | https://phet.colorado.edu/sims/html/forces-and-motion-basics/latest/forces-and-motion-basics_en.html | | | |
| | | ASSESS your understanding of forces as you complete a quiz. | https://itunes.apple.com/us/app/forces-motion-hd/id825460200?mt=8 | Cost: \$1.99 | | |
| | | CREATE a one-page "reference sheet" for Newton's Three Laws using the <i>Explain Everything</i> app. | https://itunes.apple.com/us/app/explain-everything/id431493086?mt=8 | | | |
| | | EXPLAIN how distance and mass affect each force using the as you CREATE a poster with the Glogster App. | https://itunes.apple.com/us/app/glogster/id907433564?mt=8 | | | |

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| | | LEARN about types of forces to determine which ones affect objects in various situations as you READ this article. | http://www.physicsclassroom.com/class/newtlaws/Lesson-2/Types-of-Forces | | | |
| | | TEST your knowledge of forces and their effect on motion as you CREATE free body diagrams using the interactive simulation. | http://www.physicsclassroom.com/Physics-Interactives/Newtons-Laws/Free-Body-Diagrams/Free-Body-Diagram-Interactive | | | |

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| Module III: Energy & Heat | <p>This module will focus on two big ideas of physical science: --Interactions of objects or systems of objects can be predicted and explained using the concept of energy transfer from one object or system of objects to another. --Heat is a type of energy transfer that occurs both between and within objects.</p> | | | | | |
| | <p>Students will focus on the following essential questions: --How is energy transferred and conserved? --What are the three types of energy transfer related to heat?</p> | | | | | |
| | | | | | | |
| Energy Transformation | <p>In this lesson, you will explore that energy can be transformed between various forms and will identify how energy of motion (kinetic energy) and energy of position (potential energy) changes as objects experience changes in motion. 3.2.7.B2, 3.2.8.B2</p> | | | | | |
| | | <p>IDENTIFY where forms of energy exist in everyday life as you READ an iBook</p> | <p>https:// itunes.apple.com/us/book/ forms-energy- rube-goldberg/ id964332735? mt=11</p> | | | |
| | | <p>SUMMARIZE the key characteristics of kinetic energy that moving objects exhibit as you WATCH this podcast.</p> | <p>https:// itunes.apple.com/us/podcast/ understanding- kinetic-energy/ id555728901? i=119725742& mt=2</p> | | | |

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| | | VISUALIZE how kinetic, potential, and thermal energy transform as the skater moves through the track as you CREATE various skatepark tracks | https://phet.colorado.edu/sims/html/energy-skate-park-basics/latest/energy-skate-park-basics_en.html | | | |
| | | EXPLORE potential & kinetic energy concepts through the <i>Forms of Energy</i> app. DEMONSTRATE knowledge through the end of app assessment. | https://itunes.apple.com/us/app/forms-of-energy-hd/id721350212?mt=8 | This app must be purchased for \$1.99. | | |
| Heat / Heat Transfer | In this lesson, you will explore that energy is transferred out of hotter regions or objects and into colder ones by the processes of conduction, convection, and radiation. 3.2.7.B3, 3.2.8.B3 | | | | | |

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| | | DIFFERENTIATE between conduction and convection as you WATCH this podcast. | https:// itunes.apple.co m/us/podcast/ heat-transfer- convection- conduction/ id491370565? i=108810240& mt=2 | | | |
| | | BUILD a game describing convection/ conduction/ radiation using the TinyTaps App. | https:// itunes.apple.co m/us/app/ tinytap-make- play- educational/ id493868874? mt=8 | | | |
| | | DISCOVER how energy used by friction changes the distance an object travels as you RECORD yourself sliding an object over three types of surfaces | https:// itunes.apple.co m/us/app/ icamera! id578144034? mt=8 | | | |

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| | | <p>PRACTICE identifying real-life examples of conduction, convection, and radiation as you COMPLETE this online quiz.</p> | <p>http://study.com/academy/practice/quiz-worksheet-common-mechanisms-of-heat-transfer.html</p> | | | |

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| Module IV: Electricity, Magnetism & The Electromagnetic Spectrum | <p>This module will focus on three big ideas of physical science: --Magnetic and electric fields and charges interact with each other --Waves are a repeating pattern of motion that transfers energy from place to place without overall displacement of matter. --The electromagnetic spectrum arranges waves in terms of size and illustrates their applications in everyday life.</p> | | | | | |
| | <p>Students will focus on the following essential questions: --How is electricity produced? --How are magnetism and electricity related? --How are waves used to transfer energy and information?</p> | | | | | |
| Electricity and Magnetism | <p>Students will explore that an electric current is created by the movement of electrons and this electric current can produce a magnetic field. 3.2.7.B4, 3.2.8.B4</p> | | | | | |
| | | <p>LEARN about electricity and how it is created while you READ this iBook.</p> | <p>https://itunes.apple.com/us/book/electricity-in-everyday-life/id557725020?mt=11</p> | | | |
| | | <p>VISUALIZE the interaction of charges as static electric interactions take place as you ENGAGE in this simulation.</p> | <p>https://phet.colorado.edu/sims/html/balloons-and-static-electricity/latest/balloons-and-static-electricity_en.html</p> | | | |

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| | | REVIEW and ENGAGE in electricity production and safety while using the <i>Two Thirty Volts</i> app. | https://itunes.apple.com/us/app/twothirtyvolts-electricity/id502514595?mt=8 | | | |
| | | DIFFERENTIATE between the two types of objects as you WATCH this podcast about conductors and insulators. | https://itunes.apple.com/us/podcast/everyday-science/id335224398?mt=2 | | | |
| The Electromagnetic Spectrum | In this lesson, you will explore how the electromagnetic spectrum is arranged as well as the various types of waves, including sound and light. 3.2.7.B5, 3.2.8.B5 | | | | | |
| | | REVIEW wave properties such as wave length, frequency, and amplitude as you WATCH this podcast. | https://itunes.apple.com/us/podcast/properties-of-waves/id380230962?i=84486468&mt=2# | | | |

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| | | RECOGNIZE how altering the properties of waves causes the wave to change as you ENGAGE in this simulation. | https://phet.colorado.edu/sims/html/wave-on-a-string/latest/wave-on-a-string_en.html | | | |
| | | SUMMARIZE the different regions of the Electromagnetic Spectrum as you COMPLETE this reference sheet. | https://itunes.apple.com/us/course/em-spectrum-comparison/id917010226?i=331560174&mt=2# | | | |
| | | LEARN to identify the various regions of the electromagnetic spectrum as you WATCH this video. | http://youtube.com/watch?v=WABthlGTy74 | | | |
| | | LEARN about the electromagnetic spectrum as you TOUR this site. | http://missionscience.nasa.gov/ems/ | | | |
| | | VISUALIZE how primary colors interact to form secondary colors as you ENGAGE in this simulation. | https://phet.colorado.edu/sims/html/color-vision/latest/color-vision_en.html | | | |

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| | | LEARN how sound is produced as well as the various characteristics of sound as you WATCH this video. | https://www.youtube.com/watch?v=sgDh0xQ6DVY | broken | | |
| | | LEARN how radio waves are emitted and how a radio works as you COMPLETE this interactive tour. | http://www.pbslearningmedia.org/resource/phy03.sci.phys.energy.radiowv/how-is-a-radio-wave-emitted/ | | | |
| | | REENFORCE your knowledge of the electromagnetic spectrum as you REVIEW concepts and associated vocabulary. | https://quizlet.com/2069032/electromagnetic-spectrum-quiz-flash-cards/ | | | |
| | | DEMONSTRATE knowledge related to the Electromagnetic Spectrum as you COMPLETE this online test. | https://quizlet.com/2069032/test | | | |