

**MOSCOW SCHOOL DISTRICT**  
**CURRICULUM GUIDE**  
**Subject/Course: Physical Science**  
**Grade 8**

Students are expected to know content and apply skills from previous grades.

**Standard 1: Nature of Science**

Students exercise the basic tenets of scientific investigation, make accurate observations, exercise critical thinking skills, apply proper scientific instruments of investigation and measurement tools, and communicate results in problem solving. Students evaluate the validity of information by utilizing the tools of scientific thinking and investigation. Students summarize their findings by creating lab reports using technical writing including graphs, charts, and diagrams to communicate the results of investigations.

<i>Goal – The student will:</i>	<i>Objectives (to be reached by the end of eighth grade)</i>	<i>Samples of Applications</i>	<i>Curriculum Materials (including technological resources)</i>	<i>Key Vocabulary for Standard 1</i>
<b>Goal 1.1: Understand Systems, Order, and Organization</b>	<ul style="list-style-type: none"> <li>• 8-9.PS.1.1.1 Explain the scientific meaning of system, order, and organization. (648.01a)</li> <li>• 8-9.PS.1.1.2 Apply the concepts of order and organization to a given system. (648.01a)</li> </ul>	<ul style="list-style-type: none"> <li>• Make a model of an atom and explain how it represents a system with internal forces (gravitational, electromagnetic, weak, and strong forces).</li> <li>• Make a Cartesian Diver, Hot Air Balloon, and/or a simple motor.</li> <li>• Demonstrations using the vacuum pump</li> </ul>	Inside the Atom (VHS)  Mechanical Universe: Models of the Atoms (VHS)  Atomic Structure and the Periodic Table (DVD)	<ul style="list-style-type: none"> <li>• alternative explanations</li> <li>• hypothesis</li> <li>• model</li> <li>• observation</li> <li>• system</li> <li>• theory</li> </ul>
<b>Goal 1.2: Understand Concepts and Processes of Evidence, Models, and Explanation</b>	<ul style="list-style-type: none"> <li>• 8-9.PS.1.2.1 Use observations and data as evidence on which to base scientific explanations. (648.02a)</li> <li>• 8-9.PS.1.2.2 Develop models to explain concepts or systems. (648.02b)</li> <li>• 8-9.PS.1.2.3 Develop scientific explanations based on knowledge, logic, and analysis. (648.02c)</li> </ul>	<ul style="list-style-type: none"> <li>• Make observations and inferences about what’s in a “black box” film can. Then make a model and explain how that model matches the evidence.</li> <li>• Make a 3-dimensional model of an atom of an element.</li> <li>• Make models of molecules and use the models to show how chemical bonds break and reform in a chemical reaction.</li> </ul>		
<b>Goal 1.3: Understand Constancy,</b>	<ul style="list-style-type: none"> <li>• 8-9.PS.1.3.1 Measure changes that can occur in and among systems.</li> </ul>	<ul style="list-style-type: none"> <li>• Measure temperature changes during a chemical reaction.</li> </ul>		

<p><b>Change, and Measurement</b></p>	<p>(648.03b)</p> <ul style="list-style-type: none"> <li>8-9.PS.1.3.2 Analyze changes that can occur in and among systems. (648.03b)</li> <li>8-9.PS.1.3.3 Measure and calculate using the metric system. (648.03c)</li> </ul>	<ul style="list-style-type: none"> <li>Describe the changes that occur in a Cartesian diver system when external force is applied.</li> <li>Measure mass with a balance and volume with a graduated cylinder.</li> <li>Calculate the density of a variety of objects. (“Could it be gold?” lab)</li> <li>Measure the mass of reactants and products in a chemical reaction to demonstrate the Law of Conservation of Matter</li> </ul>		
<p><b>Goal 1.4: Understand the Theory that Evolution is a Process that Relates to the Gradual</b> No objectives in Physical Science</p>				
<p><b>Goal 1.5: Understand Concepts of Form and Function</b> No objectives in Physical Science</p>				
<p><b>Goal 1.6: Understand Scientific Inquiry and Develop Critical Thinking Skills</b></p>	<ul style="list-style-type: none"> <li>8-9.PS.1.6.1 Identify questions and concepts that guide scientific investigations. (649.01a)</li> <li>8-9.PS.1.6.2 Utilize the components of scientific problem solving to design, conduct, and communicate results of investigations. (649.01b)</li> <li>8-9.PS.1.6.3 Use appropriate technology and mathematics to make investigations. (649.01c)</li> <li>8-9.PS.1.6.4 Formulate scientific explanations and models using logic and evidence. (649.01d)</li> <li>8-9.PS.1.6.5 Analyze alternative explanations and models. (649.01e)</li> <li>8-9.PS.1.6.6 Communicate and defend a scientific argument. (649.01f)</li> <li>8-9.PS.1.6.7 Explain the differences among observations, hypotheses, and</li> </ul>	<ul style="list-style-type: none"> <li>Create a testable question when comparing brands of paper towels. (“Bounty” lab). Then design an experiment to answer that question.</li> <li>Design a landing pad for an egg using 10 sheets of paper and 1 meter of masking tape (Egg Crash Experiment).</li> <li>Create a procedure to analyze the components of a mixture of contaminants found in water. Write a report or letter communicating results. (“Slime Gulch” lab)</li> <li>Calculate the speed of a ball rolling down a ramp. Determine if it is accelerating.</li> <li>Make a model of what could be in a “black box” and explain how</li> </ul>		

	theories. (649.01g)	<p>that model matches the evidence. Present model to the class and include alternative explanations that could explain the observations.</p> <ul style="list-style-type: none"> <li>• Present a model of a “black box” to the class and defend it.</li> <li>• Communicate what was found in the water of Slime Gulch and defend arguments regarding who could have polluted the water.</li> <li>• Make observations and inferences during a demonstration, being careful not to confuse which is which.</li> </ul>		
<b>Goal 1.7: Understand That Interpersonal Relationships Are Important in Scientific Endeavors</b>	No objectives in Physical Science			
<b>Goal 1.8: Understand Technical Communication</b>	<ul style="list-style-type: none"> <li>• 8-9.PS.1.8.1 Analyze technical writing, graphs, charts, and diagrams. (658.02a)</li> </ul>	<ul style="list-style-type: none"> <li>• Analyze graphs of motion and speed to determine if an object is accelerating or maintaining a constant speed.</li> </ul>		

### **Standard 2: Physical Science**

Students explain the structure and properties of atoms, including isotopes. Students explain how chemical reactions, while requiring or releasing energy, can neither destroy nor create energy or matter. Students explain the differences between fission and fusion. Students explain the interactions of force and mass in describing motion using Newton’s Laws. Students explain how energy can be transformed from one form to another while the total amount of energy remains constant. Students classify energy as potential and/or kinetic, and as energy contained in a field.

<i>Goal – The student will:</i>	<i>Objectives (to be reached by the end of eighth grade)</i>	<i>Samples of Applications</i>	<i>Curriculum Materials (including technological resources)</i>	<i>Key Vocabulary for Standard 2</i>
<b>Goal 2.1: Understand the Structure and Function of Matter and Molecules and Their Interactions</b>	<p>No objectives in Physical Science</p> <p><b>(Why no objectives?)</b></p>		<p>Vernier equipment</p> <p>Forces at Work (Science Discovery) (DVD)</p>	<ul style="list-style-type: none"> <li>• characteristic</li> <li>• electron</li> <li>• fission</li> <li>• function</li> <li>• fusion</li> <li>• isotope</li> <li>• kinetic energy</li> </ul>

<b>Goal 2.2: Understand Concepts of Motion and Forces</b>	<ul style="list-style-type: none"> <li>8-9.PS.2.5.1 Explain how chemical reactions may release or consume energy while the quantity of matter remains constant. (650.03a)</li> </ul>	<ul style="list-style-type: none"> <li>Newton Day Lab with activities demonstrating Newton's Laws.</li> <li>Vernier Crash Dummies Lab</li> <li>Vernier Falling Object Lab</li> </ul>	Acceleration (Cambridge Educational) (DVD)  Standard Deviants Unbelievable World of Physics (VHS)	<ul style="list-style-type: none"> <li>neutron</li> <li>Newton's Laws</li> <li>potential energy</li> <li>property</li> <li>proton</li> <li>transformed</li> </ul>
<b>Goal 2.3: Understand the Total Energy in the Universe is Constant</b>	<ul style="list-style-type: none"> <li>8-9.PS.2.3.1 Explain that energy can be transformed but cannot be created nor destroyed. (650.05a)</li> <li>8-9.PS.2.3.2 Classify energy as potential and/or kinetic and as energy contained in a field. (650.05b)</li> </ul>	<ul style="list-style-type: none"> <li>Measure the mass of the reactants and products of a chemical reaction to show that mass is conserved. ("Conservation of Mass" lab)</li> <li>Observe phase changes in matter (changes of state) as heat energy is used to change ice to water and then water vapor.</li> <li>Observe how a pendulum's swing changes potential energy into kinetic energy.</li> <li>Demonstrate how the chemical energy stored in food is changed to heat energy (calories).</li> </ul>	Understanding Car Crashes (VHS)  Gravity is Attractive (VHS)	
<b>Goal 2.4: Understand the Structure of Atoms</b>	<ul style="list-style-type: none"> <li>8-9.PS.2.4.1 Describe the properties, function, and location of protons, neutrons, and electrons. (650.01a)</li> <li>8-9.PS.2.4.2 Explain the processes of fission and fusion. (650.01b)</li> <li>8-9.PS.2.4.3 Describe the characteristics of isotopes. (650.01c)</li> <li>8-9.PS.2.4.4 State the basic electrical properties of matter. (650.01d)</li> <li>8-9.PS.2.4.5 Describe the relationships between magnetism and electricity.</li> </ul>	<ul style="list-style-type: none"> <li>Create a 3-dimensional model of an atom, showing the location of subatomic particles.</li> <li>View the section of the video "Atoms" about nuclear energy.</li> <li>View the section of the video "Atoms" about isotopes.</li> <li>Understand the electromagnetic forces between protons and electrons.</li> <li>Build a simple motor and/or generator and explain how it works.</li> </ul>	Atoms (VHS)	
<b>Goal 2.5: Understand Chemical Reactions</b>	<ul style="list-style-type: none"> <li>8-9.PS.2.5.1 Explain how chemical reactions may release or consume energy while the quantity of matter remains constant. (650.03a)</li> </ul>	<ul style="list-style-type: none"> <li>Do the "Conservation of Mass" lab.</li> <li>Fuel Cell Car Lab</li> </ul>		

**Standard 3: Biology**

No goals or objectives in Physical Science.

**Standard 4: Earth and Space Systems**

No goals or objectives in Physical Science.

**Standard 5: Personal and Social Perspectives; Technology**

Students understand that science and technology interact and impact both society and the environment.

<i>Goal – The student will:</i>	<i>Objectives (to be reached by the end of eighth grade)</i>	<i>Samples of Applications</i>	<i>Curriculum Materials (including technological resources)</i>	<i>Key Vocabulary for Standard 5</i>
<p><b>Goal 5.1: Understand Common Environmental Quality Issues, Both Natural and Human Induced</b> No objectives in Physical Science</p>				<ul style="list-style-type: none"> <li>• hazardous waste</li> <li>• nonrenewable resources</li> <li>• renewable resources</li> <li>• technology</li> </ul>
<p><b>Goal 5.2: Understand the Relationship between Science and Technology</b></p>	<ul style="list-style-type: none"> <li>• 8-9.PS.5.2.1 Explain how science advances technology. (655.01a)</li> <li>• 8-9.PS.5.2.2 Explain how technology advances science. (655.01a)</li> <li>• 8-9.PS.5.2.3 Explain how science and technology are pursued for different purposes. (656.01b)</li> </ul>	<ul style="list-style-type: none"> <li>• Do a biographical report on an inventor who invented a device or product that is based on a scientific principle.</li> <li>• Do a report on how an invention or technology has made allowed scientists to discover something about the properties of matter.</li> </ul>		
<p><b>Goal 5.3: Understand the Importance of Natural Resources and the Need to Manage and Conserve Them</b> No objectives in Physical Science</p> <p><b>(Why no objectives?)</b></p>				

**Terms of significance that are not derived from a particular standard**

abiotic  
absorb  
absorption  
adaptation  
additives  
antibiotic  
atomic mass  
atomic number  
ATP  
autotroph  
average  
bacterium  
biotic  
blastocyst  
cell transport

cellular respiration  
centimeter  
chemical reactivity  
chloroplast  
competition  
concentration  
daughter cell  
decaying  
decline  
decomposer  
dilated  
differentiation  
dispersion  
distribute  
divergence

dominant  
durable  
ecosystem  
elements  
embryonic  
equivalent  
fossil fuels  
gene  
glucose  
habitat  
heterogeneous  
heterotroph  
homogenous  
hormone  
inherited  
isolation  
lipid  
mean  
meiosis  
meiotic  
metals  
micrometer  
mitochondria  
mitochondrion  
mitosis  
mitotic  
molecule  
mutations  
nanometer  
native  
non-metals  
non-native

nucleotide base  
nucleus  
organelle  
oxygenation  
percent  
phenotype  
plausible  
population  
predation  
primary consumer  
producer  
product  
protein  
protein synthesis  
pyruvate  
radioactive decay  
rate  
reactant  
recessive  
recombination  
replication  
resistant  
sediment  
selection  
silt  
starch  
stimuli  
turgor  
vacuole  
zygote