

PCSSD Physical Science Curriculum Guide

The purpose of this guide is to provide lesson planning resources for physical science instructions. The guide serves multiple purposes for the physical science teacher:

- It is a **correlation** of the student learning expectations from the ADE Physics frameworks with the text objectives for this edition of Physical Science Glencoe Science. The frameworks are based on the two foundational areas of physical science and the nature of science.
- It is a **pacing guide** to suggest time allotments to cover the topics presented.
 - **Pacing Summary**
 - 1st Nine Weeks Physics: Energy and Motion (Chapters 1, 2, 3, 4, & 6)
 - 2nd Nine Weeks Physics: Electricity, Energy Resources, Energy on the Move (Chapters 7, 8, 9, 10, & 11)
 - 3rd Nine Weeks Physics: Energy on the Move (Chapters 13, & 14)
 Chemistry: Nature of Matter (Chapters 15, 16 & 17)
 - 4th Nine Weeks Chemistry: Nature, Diversity, and Interactions of Matter (Chapters 18, 19, 20, 21 & 24)
- It is a listing of **suggested lab** topics for the course.
- It is a **resource listing** of materials to help supplement instruction
- It is a listing of **multicultural curriculum and instructional opportunities** to use in physical science.

Chapter MCO Items – Teacher Wraparound Edition

Differentiated Instruction Activities

- Differentiated Instruction
- Challenge
- Curriculum Connection
- Visual Learning
- Science Journal
- Cultural Diversity
- Active Reading

Educational Partnerships

- National Geographic
- Time

Internet Resources

Student Tools – www.gpscience.com

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PACING	Material to Cover	Frameworks	Suggested Resource / Activities to Stress	Teacher Notes or Comments
1 st 9 Wks	Chapter One – The Nature of Science Objectives – Students will: <ol style="list-style-type: none"> 1. Identify the steps scientists often use to solve problems. 2. Describe why scientists use variables. 3. Compare and contrast science and technology 4. Name the prefixes used in SI and indicate what multiple of ten each one represents. 5. Identify SI units and symbols for length, volume, mass, density, time, and temperature. 6. Convert related SI units 7. Identify three types of graphs and explain the ways they are used. 8. Distinguish between dependent and independent variables. 9. Analyze data using the various types of graphs. 	NS.9.PS.2 NS.9.PS.3 NS.9.PS.4 NS.10.PS.6 NS.12.PS.2	Measurements Lab Lab Procedures & Safety Activity (lab) MCO: Students work in pairs or triads to conduct lab	
1 st 9 Wks	Chapter Two – Motion Objectives – Students will: <ol style="list-style-type: none"> 1. Distinguish between distance and displacement. 2. Explain the difference between speed and velocity. 3. Interpret motion graphs. 4. Identify how acceleration, time, and velocity are related. 5. Explain how positive and negative acceleration affect motion. 6. Describe how to calculate the acceleration of an object. 7. Explain how force and motion are related. 8. Describe what inertia is and how it is related to Newton’s first law of motion. 9. Identify the forces and motion that are present during a car crash. 	P.6.PS.2 P.6.PS.3 P.6.PS.4 P.6.PS.5 P.6.PS.7	Graph Labs MCO: Students work in pairs or triads to conduct lab	

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1 st 9 Wks	Chapter Three – Force Objectives: Students will <ol style="list-style-type: none"> 1. Define Newton’s second law of motion. 2. Apply Newton’s second law of motion. 3. Describe the three different types of friction. 4. Observe the effects of air resistance of falling objects. 5. Describe gravitational force. 6. Distinguish between mass and weight. 7. Explain why objects that are thrown will follow a curved path. 8. Compare circular motion with motion in a straight line. 9. State Newton’s third law of motion. 10. Identify action and reaction forces. 11. Calculate momentum. 12. Recognize when momentum is conserved. 	P.6.PS.6 P.6.PS.8 P.6.PS.9 P.6.PS.10	Newton’s First Law Lab Newton’s Second Law Lab MCO: Discuss with students how Newton’s ideas were first rejected	
1 st 9 Wks	Chapter Four – Energy Objectives: Students will <ol style="list-style-type: none"> 1. Distinguish between kinetic and potential energy. 2. Calculate kinetic energy. 3. Describe different forms of potential energy. 4. Calculate gravitational potential energy. 5. Describe how energy can be transformed from one form to another. 6. Explain how the mechanical energy of a system is the sum of the kinetic and potential energy. 7. Discuss the law of conservation of energy. 	P.6.PS.14	Energy Conversion Lab MCO: Students work in pairs or triads to conduct lab. Discuss the historical connection of the development of the law of conservation to theory development in Life and Physical sciences.	

Physical Science Frameworks Correlation Pacing Guide

PACING	Material to Cover	Frameworks	Suggested Resource / Activities to Stress	Teacher Notes or Comments
1 st 9 Wks	Chapter Six – Thermal Energy Objectives: Students will <ol style="list-style-type: none"> 1. Define temperature. 2. Explain how thermal energy depends on temperature. 3. Explain how thermal energy and heat are related. 4. Calculate the change in thermal energy. 5. Compare and contrast the transfer of thermal energy by conduction, convection, and radiation. 6. Compare and Contrast thermal conductors and insulators. 7. Explain how insulators are used to control the transfer of thermal energy. 8. Describe common types of heating systems. 9. Describe the first and second laws of thermodynamics. 10. Explain how an internal combustion engine works. 11. Explain how a refrigerator transfers thermal energy from a cool to a warm temperature. 	P.5.PS.1 P.5.PS.2	Transfer of Thermal Energy Lab MCO: Students work in pairs or triads to conduct lab	

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2 nd 9 Wks	Chapter Seven – Electricity Objectives: Students will <ol style="list-style-type: none"> 1. Describe how electric charges exert forces on each other. 2. Compare the strengths of electric and gravitational forces. 3. Distinguish between conductors and insulators. 4. Explain how objects become electrically charged. 5. Describe how voltage difference causes current to flow. 6. Explain how batteries produce a voltage difference in a 		Ohm's Law Lab MCO: Students work in pairs or triads to conduct lab	

	<p>circuit.</p> <ol style="list-style-type: none"> 7. List the factors that affect an object's electrical resistance. 8. Define Ohm's law. 9. Describe the difference between series and parallel circuits. 10. Recognize the function of circuit breakers and fuses. 11. Calculate electrical power. 12. Calculate the electrical energy used by a device. 			
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2 nd 9 Wks	<p>Chapter Eight – Magnetism and Its Uses</p> <p>Objectives: Students will</p> <ol style="list-style-type: none"> 1. Explain how a magnet exerts a force on an object. 2. Describe the properties of temporary and permanent magnet. 3. Explain why some materials are magnetic and others are not. 4. Model magnet behavior using magnetic domains 5. Describe the magnetic field produced by an electric current. 6. Explain how an electromagnet produces a magnetic field. 7. Describe how electromagnets are used. 8. Explain how an electric motor operates. 9. Define electromagnetic induction. 10. Describe how a generator produces an electric current. 11. Distinguish between alternating current and direct current. 12. Explain how a transformer can change the voltage of an alternating current. 	<p>P.8.PS.4 P.8.PS.5</p>	<p>Transformer Electromagnets Lab MCO: Students work in pairs or triads to conduct lab</p>	
2 nd 9 Wks	<p>Chapter Nine – Energy Sources</p> <p>Objectives: Students will</p> <ol style="list-style-type: none"> 1. Explain how a nuclear reactor converts nuclear energy to thermal energy. 2. Describe advantages and disadvantages of using nuclear energy to produce electricity. 3. Discuss nuclear fusion as a possible energy source. 	<p>C.2.PS.6</p>	<p>Solar Heating Lab MCO: Students work in pairs or triads to conduct lab</p>	

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2 nd 9 Wks	<p>Chapter Ten – Waves</p> <p>Objectives: Students will</p> <ol style="list-style-type: none"> 1. Recognize that waves carry energy but not matter. 2. Define mechanical waves. 3. Compare and contrast transverse waves and compressional waves. 4. Define wavelength, frequency, period, and amplitude. 5. Describe the relationship between frequency and wavelength. 6. Explain how a wave’s energy and amplitude are related. 7. Calculate wave speed. 8. State the law of reflection. 9. Explain why waves change direction when they travel from one material to another. 10. Compare and contrast refraction and diffraction. 11. Describe how waves interfere with each other. 		<p>Wave Property Lab</p> <p>Waves In Different Mediums Lab MCO: Students work in pairs or triads to conduct lab</p>	
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2 nd 9 Wks	<p>Chapter Eleven – Sound</p> <p>Objectives: Student will</p> <ol style="list-style-type: none"> 1. Explain how sound travels through different mediums. 2. Identify what influences the speed of sound. 3. Describe how the ear enables you to hear. 4. Recognize how amplitude, intensity, and loudness are related. 5. Describe how sound intensity is measured and what levels can damage hearing. 6. Explain the relationship between frequency and pitch. 7. Discuss the Doppler effect. 8. Distinguish between noise and music. 9. Describe why different instruments have different sound qualities. 10. Explain how string, wind, and percussion instruments produce music. 11. Describe the formation of beats. 12. Recognize some of the factors that determine how a concert hall or theater is designed. 13. Describe how some animals use sound waves. 14. Discuss the uses of sonar. 15. Explain how ultrasound is useful in medicine. 	<p>P.7.PS.3 P.7.PS.5</p>	<p>Sound Labs MCO: Students work in pairs or triads to conduct lab</p>	

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3 rd 9 Wks	<p>Chapter Thirteen – Light Objectives: Students will</p> <ol style="list-style-type: none"> 1. Describe how light waves interact with matter. 2. Explain the difference between regular and diffuse reflection. 3. Define the index of refraction of a material 4. Explain why a prism separates white light into different colors. 5. Explain how you see color. 6. Describe the difference between light color and pigment color. 7. Predict what happens when different colors are mixed. 	<p>P.7.PS.7 P.7.PS.8</p>	<p>Light Diffraction Lab</p> <p>Interference Lab MCO: Students work in pairs or triads to conduct lab</p>	
3 rd 9 Wks	<p>Chapter Fourteen – Mirrors and Lenses Objectives: Students will</p> <ol style="list-style-type: none"> 1. Describe how an image is formed in three types of mirrors. 2. Explain the difference between real and virtual images. 3. Identify examples and uses of plane, concave, and convex mirrors. 4. Describe the shapes of convex and concave lenses. 5. Explain how convex and concave lenses form images. 6. Explain how lenses are used to correct vision problems. 	<p>P.7.PS.10 P.7.PS.11</p>	<p>Mirror Image Lab</p> <p>Concave and Convex Lenses Lab</p> <p>MCO: Students work in pairs or triads to conduct lab</p>	

	<ul style="list-style-type: none"> 7. Compare refracting and reflecting telescopes. 8. Explain why at telescope in space would be useful. 9. Describe how a microscope uses lenses to magnify small objects. 10. Explain how a camera creates an image. 			
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3 rd 9 Wks	Chapter Fifteen-Composition of Matter Objectives: Students will <ul style="list-style-type: none"> 1. Define substances and mixtures 2. Identify elements and compounds. 3. Compare and contrast solutions, colloids, and suspensions. 4. Identify substances using physical properties. 5. Compare and contrast physical and chemical changes. 6. Determine how the law of conservation of mass applies to chemical changes. 	C.1.PS.1 C.1.PS.2 C.1.PS.3	Elements, Compounds, and Mixtures Lab Properties of Matter Lab MCO: Students work in pairs or triads to conduct lab	
3 rd 9 Wks	Chapter 16-Solids, Liquids and Gases Objectives: Students will <ul style="list-style-type: none"> 1. Explain the kinetic theory of matter. 2. Describe the particle movement in the fur states of matter 3. Explain particle behavior at the melting and boiling points. 4. Explain Archimedes' principle. 5. Explain Pascal's principle. 6. Explain Bernoulli's principle and explain how we use it. 7. Explain how a gas exerts pressure on its container. 8. Explain how a gas is affected when pressure, temperature, or volume is changed. 	C.2.PS.1 P.6.PS.12 C.2.PS.4	Archimedes, Pascal, Bernoulli's Laws Lab Boyle's and Charles' Law Lab States of Matter Heating Curve Lab MCO: Students investigate the impact of scientific discoveries on the history of scientific knowledge.	

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3 rd 9 Wks	Chapter 17 Properties of Atoms and the Periodic Table Objectives: Students will <ol style="list-style-type: none"> 1. Identify the names and symbols of common elements. 2. Describe the electron cloud model of the atom. 3. Describe how electrons are arranged in an atom. 4. Compute the atomic mass and mass number of an atom. 5. Interpret the average atomic mass of an element. 	NS.11.PS.3 NS.11.PS.4	Chemical and Physical Properties Lab MCO: Students work in pairs or triads to conduct the lab. Students investigate cultural biases that delayed the acceptance of scientific theories dealing with atomic structure.	

	6. Explain the composition of the periodic table 7. Use the periodic table to obtain information.			
4 th 9 Wks	Chapter 18 Radioactivity and Nuclear Reactions Objectives: Students will <ol style="list-style-type: none"> 1. Describe the structure of an atom and its nucleus. 2. Explain what radioactivity is. 3. Contrast properties of radioactive and stable nuclei. 4. Discuss the discovery of radioactivity. 5. Compare and Contrast alpha, beta, and gamma radiation. 6. Define the half life of radioactive material. 7. Describe the process of radioactive dating. 8. Explain nuclear fission and how it can begin a chain reaction. 9. Discuss how nuclear fusion occurs in the Sun. 	C.2.PS.6 C.2.PS7 NS.11.PS.5	Chain Reactions Lab Modeling Transmutation Lab MCO: Students work in pairs or triads to conduct lab. Students also investigate issues and impact of radiation on human activity and health.	
4 th 9 Wks	Chapter 19 Elements and Their Properties Objectives: Students will <ol style="list-style-type: none"> 1. Describe the properties of a typical metal. 2. Identify the alkali metals and alkaline earth metals. 3. Differentiate among three groups of transition elements. 4. Recognize hydrogen as a nonmetal. 5. Compare and contrast properties of the halogens. 	NS.11PS.4.	Elements Lab MCO: Students work in pairs or triads to conduct lab. Students analyze and compare properties of metals, nonmetals, and noble gases.	

	6. Describe properties and uses of the noble gases. 7. Distinguish among metals, nonmetals, and metalloids.			
4 th 9 Wks	Chapter 20 Chemical Bonds Objectives: Students will <ol style="list-style-type: none"> 1. Describe how a compound differs from its component of elements. 2. Explain what a chemical formula represents. 3. State a reason why chemical bonding occurs. 4. Describe ionic bonds and covalent bonds. 5. Identify the particles produced by ionic bonding and by covalent bonding. 6. Explain how to determine oxidation numbers. 7. Write formulas and names for ionic compounds. 8. Write formulas and names for covalent compounds. 	C.1.PS.9 C.1.PS.11.	Model of An Atom Lab MCO: Students work in pairs or triads to conduct lab/work cooperatively to create a classroom presentation using technology, role playing, or a proposed project to communicate bonding ideas.	
4 th 9 Wks	Chapter 21 Chemical Reactions Objectives: Students will <ol style="list-style-type: none"> 1. Identify the reactants and products in a chemical reaction. 2. Determine how a chemical reaction satisfies the law of conservation of mass. 3. Determine how chemists express chemical changes using equations. 4. Identify what is meant by a balanced chemical changes using equations. 5. Identify how to write balanced chemical equations 	C.3.PS.1 C.3.PS.2 C.3.PS.3 C.3.PS.4 C.3.PS.5 C.3.PS.6	Chemical and Physical Change Lab Chemical Reaction Evidence Lab Chemical Reaction Rate Factors Lab Combustion Lab Endothermic and Exothermic	

	<ol style="list-style-type: none"> 6. Identify the four general types of chemical reactions. 7. Predicts which metals will replace other metals in compounds. 8. Identify the source of energy changes in chemical reactions. 9. Examine the effects of catalysts and inhibitors on the speed of chemical reactions. 		<p>Lab</p> <p>MCO: Students work in pairs or triads to conduct lab</p>	
4 th 9 Wks	<p>Chapter 24 Organic Compounds Objectives: Students will</p> <ol style="list-style-type: none"> 1. Identify the difference between organic and inorganic carbon compounds. 2. Examine the structures of some organic compounds. 3. Differentiate between saturated and unsaturated hydrocarbons. 4. Identify isomers of organic compounds. 5. Define aromatic compounds. 6. Identify the nature of alcohols and acids 7. Identify the organic compounds you use in daily life. 8. Explain how carbon compounds are obtained from petroleum. 9. Compare and contrast differences among the various petroleum-based fuels. 10. Determine how carbon compounds can form long chains. 11. Identify some of the ways petroleum enriches your world. 12. Compare and contrast proteins, nucleic acids, carbohydrates, and lipids. 13. Identify the structure of polymers found in basic food groups. 14. Identify the structure of large biological polymers. 	<p>C.4.PS.1 C.4.PS.2 C.4.PS.3 C.4.PS.4</p>	<p>Carbon Bonding Lab</p> <p>Test for Presence of Organic Compounds Lab</p> <p>MCO: Students will investigate current issues affecting petroleum and public policy development.</p>	