Physical Science Curriculum Map

Six weeks	Unit	Unit Focus	Physical Science Essential Standards	Literacy in Science &Technical Subjects/ 8 Mathematical Practices
First	Scientific method	Scientific measurement, metric system, units of measure, density	Embedded in all standards	**Literacy:** RST11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. RST11-12.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically Attend to precision Look for and make use of structure Look for and express regularity in repeated reasoning. **WRITING:** WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes. WHST.11-12.9 Draw evidence from informational texts to support analysis, reflection, and research.

Physical Science Curriculum Map

First	Speed	speed, velocity, acceleration, graphing data	PSc.1.1.1, PSc.1.1.2	**Literacy:** RST11-12.2: Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. RST11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. RST11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. RST11-12.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. RST11-12.9: Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically Attend to precision Look for and make use of structure Look for and express regularity in repeated reasoning

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First	Forces, friction, Newton's laws	Forces, velocity of object in free fall, Newton's three laws of motion, projectiles	PS1.2.1, PS1.2.2, PS1.2.3	**Literacy:** RST11-12.2: Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. RST11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically Attend to precision Look for and make use of structure Look for and express regularity in repeated reasoning.

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First	Types of energy	Kinetic, potential, mechanical, thermal energies, specific heat, first & second laws of thermodynamics, work, simple machines	PS3.1.1, PS3.1.2, PS3.1.3, PS3.1.4	**Literacy:** RST11-12.2: Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. RST11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. RST11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically Attend to precision Look for and make use of structure Look for and express regularity in repeated reasoning.

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Second	Electricity, magnetism	Electric charge, electric current, resistance, Ohm's law, types of circuits, electromagnets, magnetic forces, transformers, AC/DC	PS3.3.1, PS3.3.2, PS3.3.3, PS3.3.4, PS3.3.5	**Literacy:** RST11-12.2: Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. RST11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. RST11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. RST11-12.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically

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Second	Wave characteristics	Sound, light wave characteristics, color, reflection, refraction, diffraction, electromagnetic radiation, uses	PS3.2.1, PS3.2.2, PS3.2.3, PS3.2.4	**Literacy:** RST11-12.2: Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but still accurate terms. RST11-12.3: Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text. **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically Attend to precision Look for and make use of structure

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Second/ third	States of matter	States of matter (solid, liquid, gas, plasma), kinetic theory, phase change, elements, compounds, mixtures, physical and chemical properties and changes	PS2.1.1, PS2.1.2, PS2.1.3,	**Literacy:** RST11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. RST11-12.5: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically Attend to precision Look for and make use of structure Look for and express regularity in repeated reasoning

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Third	Atomic structure, radioactive decay	atoms, elements, symbols, atomic structure, quarks, atomic mass, periodic table structure, scientists of atomic theory, radioactive decay, key properties of elements, Bohr models 1 - 18	PS2.1.4, PS2.2.1, PS2.3.1, PS2.3.2	**Literacy:** RST11-12.4: Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to *grades 11–12 texts and topics*. RST11-12.5: Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically Attend to precision Look for and make use of structure Look for and express regularity in repeated reasoning. **WRITING:** WHST.11-12.2 Write informative/explanatory texts, including the narration of historical events, scientific

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Third	Types of bonds, chemical formulas	Types of chemical bonds, naming compounds and writing chemical formulas for compounds, oxidation numbers	PS2.2.2, PS2.2.3	**Literacy:** RST11-12.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. RST11-12.9: Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible. **Mathematical Practices** Make sense of problems and persevere in solving them Reason abstractly and quantitatively Construct viable arguments and critique the reasoning of others Model with mathematics Use appropriate tools strategically Attend to precision Look for and make use of structure Look for and express regularity in repeated reasoning
Third	Chemical equations	balancing chemical equations, identify the types of chemical reactions	PS2.2.4, PS2.2.5	**Literacy:** RST11-12.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. RST11-12.9: Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a

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Third	Acids/bases	Characteristics of acids and bases, determining pH, neutralization, soaps, detergents	PS2.2.6	**Literacy:** RST11-12.8: Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information. RST11-12.9: Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.

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Unit: 1 (Scientific method, measurement)

Standard	Learning Target
Embedded in all standards.	I can.... ● read and measure using science tools with metrics. ● interpret and graph data gathered. ● calculate the density of a substance. ● convert temperatures from one scale to another. ● determine the difference between experimental

	variables, constants, and controls. ● graph the independent and dependent variables.

Unit: 2 (Speed and acceleration)

Standard	Learning Target
PSc.1.1.1 Explain motion in terms of frame of reference, distance, and displacement.	PS1.1.1 ● measure distance and determine displacement of an object. ● determine frame of reference.
PSc.1.1.2 Compare speed, velocity, acceleration and momentum using investigations, graphing, scalar quantities and vector quantities.	PS1.1.2 ● calculate speed and velocity of an object. ● calculate the acceleration of an object. ● graph distance and time and interpret its speed. ● can calculate the momentum of an object. ● explain the change in momentum for different objects.

Unit: 3 (Forces, friction, Newton's laws of motion)

Standard	Learning Target
PSc.1.2.1 Explain how gravitational force affects the weight of an object and the velocity of an object in free fall.	1.2.1 ● determine the weight of an object. ● calculate acceleration due to gravity for an object. ● explain how air resistance affects velocity.
PSc.1.2.2 Classify frictional forces into one of four types: static, sliding, rolling, and fluid.	1.2.2 ● show how friction is a force. ● give examples of the four types of frictional forces.

PSc.1.2.3 Explain forces using Newton's three laws of motion.	1.2.3 ● describe how mass of an object will influence its inertia. ● calculate how mass and acceleration influence the force of an object. ● determine the action and reaction force of equal but opposite forces acting on objects.

Unit: 4 (Types of Energy)

Standard	Learning Target
PSc.3.1.1 Explain thermal energy and its transfer.	PS 3.1.1 ● calculate the specific heat capacity of a substance. ● describe how thermal energy, heat, and temperature are related. ● how latent heat affect phase change. ● describe and give examples of conduction, convection, and radiation.
PSc.3.1.2 Explain the law of conservation of energy in a mechanical system in terms of kinetic energy, potential energy and heat.	PS3.1.2 ● identify examples of kinetic and potential energy. ● calculate the amount of kinetic or potential energy for a system. ● describe how friction changes mechanical energy to heat.

Physical Science Curriculum Map

PSc.3.1.3 Explain work in terms of the relationship among the applied force to an object, the resulting displacement of the object and the energy transferred to an object.	PS3.1.3 ● identify examples where work is done. ● calculate work based on force and distance (displacement). ● describe how energy can from one form to another.
PSc.3.1.4 Explain the relationship among work, power and simple machines both qualitatively and quantitatively.	PS3.1.4 ● calculate power based on work and time. ● identify and describe the types of simple machines. ● describe work input and work output. ● describe how the law of conservation of energy applies to machines. ● identify the difference between ideal and mechanical advantage. ● calculate ideal and mechanical advantage. ● explain and calculate the efficiency of machines. ● explain why no machine is 100% efficient.

Physical Science Curriculum Map

Unit: 5 (Electricity & Magnetism)

Standard	Learning Target
PSc.3.3.1 Summarize static and current electricity.	PS3.3.1 ● describe the interactions between charged objects. ● describe how conduction, friction, and induction cause object to become charged. ● describe how movement of charge and conservation of charge affect current and static electricity.
PSc.3.3.2 Explain simple series and parallel DC circuits in terms of Ohm's law.	PS3.3.2 ● read simple circuit diagrams using circuit symbols. ● describe and demonstrate an open and closed circuit. ● calculate voltage and/or resistance using Ohm's law. ● calculate electrical power. ● describe the difference between series and parallel circuits. (electron flow) ● describe how voltage and resistance affect the flow of electricity.
PSc.3.3.3 Explain how current is affected by changes in composition, length, temperature, and diameter of wire.	PS3.3.3 ● explain how the wire in a circuit can affect the current present. ● explain how changes in composition, length, temperature, and diameter of a wire would affect the current in a circuit.
PSc3.3.4 Explain magnetism in terms of domains, interactions of poles, and magnetic fields.	PS3.3.4 ● describe the characteristics and behaviors of magnetic

	domains. ● explain the attractions of unlike poles and the repulsion of like poles in terms of magnetic fields.
PSc.3.3.5 Explain the practical applications of magnetism.	PS3.3.5 ● explain how generators and motors use electromagnetic induction to convert mechanical energy and electrical energy. ● describe practical applications of magnetism such as transformers, batteries, and adapters.

Unit: 6 (Wave characteristics)

Standard	Learning Target
PSc.3.2.1 Explain the relationships among wave frequency, wave period, wave velocity and wavelength through calculation and investigation.	3.2.1 ● identify the basic characteristics of waves. (transverse and compressional) ● describe the relationship between wave period and wave frequency. ● describe the relationship between wave velocity, frequency, and wavelength. ● calculate wave velocity. ● describe how amplitude affects energy carried by a wave.
PSc.3.2.2 Compare waves (mechanical, electromagnetic, and surface) using their characteristics.	3.2.2 ● identify waves as mechanical, electromagnetic, or surface waves. ● describe how the different wave types are produced. ● describe how the type of material affects wave speed and particle motion.

PSc.3.2.3 Classify waves as transverse or compressional (longitudinal).	3.2.3 ● identify waves as compressional or transverse. ● describe particle motion in transverse and compressional waves.
PSc.3.2.4 Illustrate the wave interactions of reflection, refraction, diffraction, and interference.	3.2.4 ● describe the difference between reflection and refraction. ● describe the difference between diffraction and interference.

Unit: 7 (States of matter)

Standard	Learning Target
PSc.2.1.1 Classify matter as: homogeneous or heterogeneous; pure substance or mixture; element or compound; metals, nonmetals or metalloids; solution, colloid or suspension.	PS2.1.1 ● determine if a material is homogeneous or heterogeneous. ● determine if a sample is a pure substance or a mixture. ● determine characteristics of an element based on its location on the periodic table. ● classify a substance as an element or compound using its chemical formula. ● use characteristics to determine if a mixture is a solution, colloid, or suspension.
PSc.2.1.2 Explain the phases of matter and the physical changes that matter undergoes.	PS2.1.2 ● interpret a phase change graph to describe changes in kinetic and potential energy of a substance. ● locate melting, vaporization, condensation, freezing, boiling points on a phase change graph. ● describe the difference between evaporation and vaporization. ● describe how a solid solute will dissolve in a liquid

	solvent. ● use a solubility curve to determine amount of solute that will dissolve in a given solvent. ● describe the difference between saturated, unsaturated, and supersaturated, dilute or concentrated solutions.
PSc.2.1.3 Compare physical and chemical properties of various types of matter.	PS2.1.3 ● calculate the density of substances. ● use physical properties of to describe substances and separate mixtures. ● use physical and chemical properties to describe metals, nonmetals, and metalloids. ● use physical and chemical properties to describe everyday substances.

Unit: 8 (Atomic structure, radioactive decay)

Standard	Learning Target
PSc.2.1.4 Interpret data presented in Bohr model diagrams and dot diagrams for atoms and ions of elements 1 through 18.	PS2.1.4 ● identify the characteristics and location of protons, neutrons, and electrons in an atom. ● determine the number of protons, neutrons, and electrons in a neutral atom or ion. ● explain how isotopes of an element are different. ● write chemical symbols for various isotopes. ● explain and draw Bohr models for elements 1 – 18.
PSc.2.2.1 Infer valence electrons, oxidation number, and reactivity of an element based on its location in the Periodic Table.	PS2.2.1 ● determine the number of valence electrons for an element.

	● determine the oxidation number for an element. ● predict the reactivity for metals and nonmetals using the periodic table.
PSc.2.3.1 Compare nuclear reactions including alpha decay, beta decay and gamma decay; nuclear fusion and nuclear fission.	PS2.3.1 ● identify the characteristics of alpha and beta particles and gamma rays. ● determine if a nuclear reaction has given off alpha, beta, or gamma decay. ● describe the difference between nuclear fission and nuclear fusion.
PSc.2.3.2 Exemplify the radioactive decay of unstable nuclei using the concept of half-life.	PS2.3.2 ● demonstrate the half-life of a substance using models. ● calculate the half-life or amount of substance left or decayed.

Unit: 9 (Chemical formulas, chemical equations)

Standard	Learning Target
PSc.2.2.2 Infer the type of chemical bond that occurs, whether covalent, ionic or metallic, in a given substance.	PS2.2.2 ● describe how ionic, covalent, and metallic bonds form. ● provide examples of substances that have each type of bond. ● predict the type of bond based upon element location on the periodic table.
PSc.2.2.3 Predict chemical formulas and names for simple compounds based on knowledge of bond formation and naming conventions.	PS2.2.3 ● name and write formulas for ionic binary compounds. ● name and write formulas for compounds with polyatomic ions.

	● name and write formulas for covalent binary compounds.

Unit: 10 (Chemical equations)

Standard	Learning Target
PSc.2.2.4 Exemplify the law of conservation of mass by balancing chemical equations.	PS2.2.4 ● balance simple chemical equations. ● explain how a balanced chemical equation supports the law of conservation of mass.
PSc.2.2.5 Classify types of reactions such as synthesis, decomposition, single replacement or double replacement.	PS2.2.5 ● identify chemical reactions as single replacement, double replacement, synthesis, or decomposition. ● identify and describe combustion reactions.

Unit: 10 (Acid/bases)

Standard	Learning Target

Physical Science Curriculum Map

PSc.2.2.6 Summarize the characteristics and interactions of acids and bases.	PS2.2.6 ● recognize common inorganic acids such as hydrochloric, sulfuric, acetic, nitric, and citric acids. ● recognize common bases such as sodium bicarbonate, sodium, potassium, calcium, magnesium hydroxides and ammonia. ● use the Arrhenius theory to describe acids and bases. ● use the pH scale to classify substances as acids or bases. ● identify the common characteristics of acids and bases. ● describe how acids and bases are used for household purposes. ● describe what happens in a neutralization reaction. ● identify the components of a neutralization reaction.