Rogers Public Schools

Chemistry-Integrated

Pacing Guide

A suggested pacing to address each standard.

Units & Pacing	AR K-12 Science Standards
Unit 1: Forces (6 weeks)	**CI-PS2-1** Students will analyze data to support the claim that Newton's Second Law describes the relationship between mass, force and acceleration. **CI-PS2-2** Use mathematical representations to support the claim that the total momentum of a system of objects is conserved when there is no net force on the system **CI5-ETS1-2** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. **CI-PS2-4** Students will use mathematical representations of Newton's Law of Gravitation and Coulomb's Law to describe and predict the gravitational and electrostatic forces between objects. **CI-ESS1-4** Students will use mathematical or computational representations to predict the motion of orbiting objects **CI-PS3-5** Develop and use a model of two objects interacting through electric or magnetic fields to illustrate the forces between objects and the changes in energy of the objects due to the interaction.
Unit 2: Energy (3 weeks)	**CI-PS3-1** Students will create a computational model to calculate the change in the energy of one component in a system when the change in energy of the other component(s) and energy flows in and out of the system are known. **CI-ESS1-1** Develop a model based on evidence to illustrate the life span of the sun and the role of nuclear fusion in the sun's core to release energy that eventually reaches Earth in the form of radiation. **CI-ESS2-3** Develop a model based on evidence of Earth's interior to describe the cycling of matter by thermal convection. **CI2-ETS1-1** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Unit 3: Waves (3 weeks)	**CI-PS4-1** Use mathematical representations to support a claim regarding relationships among the frequency, wavelength, and speed of waves traveling in various media. **CI-PS4-3** Evaluate the claims, evidence, and reasoning behind the idea that electromagnetic radiation can be described either by a wave model or a particle model, and that for some situations one model is more useful than the other. **CI-PS4-4** Evaluate the validity and reliability of claims in published materials of the effects that different frequencies of electromagnetic radiation have when absorbed by matter. **CI-PS4-5** Communicate technical information about how some technological devices use the principles of wave behavior and wave interactions with matter to transmit and capture information and energy.* **CI4-ETS1-4** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between system relevant to the problem.
Unit 4: The Origin of the Universe (2 weeks)	**CI - ESS1-2** Construct an explanation of the Big Bang theory based on astronomical evidence of light spectra, motion of distant galaxies, and composition of matter in the universe. **CI-ESS1-3** Communicate scientific ideas about the way stars, over their life cycle, produce elements. **CI-ESS1-4** Use mathematical or computational representations to predict the motion of orbiting objects in the solar system.
Unit 5: Periodic Table and Bonding (8 weeks)	**CI-PS1-1** Use the periodic table as a model to predict the relative properties of elements based on the patterns of electrons in the outermost energy level of atoms. **CI-PS1-3** Plan and conduct an investigation to gather evidence to compare the structure of substances at the bulk scale to infer the strength of electrical forces between particles. **CI-ESS2-5** Plan and conduct an investigation of the properties of water and its effects on Earth materials and surface processes. **CI-ESS3-4** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*

Unit 6: Chemical Reactions (12 weeks)	**CI-PS1-2** Construct and revise an explanation for the outcome of a simple chemical reaction based on the outermost electron states of atoms, trendsetters in the periodic table, and knowledge of the patterns of chemical properties **CI-PS1-7** Use mathematical representations to support the claim that atoms, and therefore mass, are conserved during a chemical reaction. **CI-PS1-4** Develop a model to illustrate that the release or absorption of energy from a chemical reaction system depends upon the changes in total bond energy. **CI-PS1-5** Apply scientific principles and evidence to provide an explanation about the effects of changing the temperature or concentration of the reacting particles on the rate at which a reaction occurs. **CI-PS1-6** Refine the design of a chemical system by specifying a change in conditions that would produce increased amounts of products at equilibrium.* **CI1-ETS1-2** Design a solution to a complex real-world problem by breaking it down into smaller, more manageable problems that can be solved through engineering. **CI-ESS3-4** Evaluate or refine a technological solution that reduces impacts of human activities on natural systems.*
Unit 7: Nuclear Chemistry (2 weeks)	**CI-PS1-8.** Develop models to illustrate the changes in the composition of the nucleus of the atom and the energy released during the processes of fission, fusion, and radioactive decay. **CI2-ETS1-3** Evaluate a solution to a complex real-world problem based on prioritized criteria and trade-offs that account for a range of constraints, including cost, safety, reliability, and aesthetics, as well as possible social, cultural, and environmental impacts. **CI2-ETS1-1** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants. **CI2-ETS1-4** Use a computer simulation to model the impact of proposed solutions to a complex real-world problem with numerous criteria and constraints on interactions within and between systems relevant to the problem. **CI - ESS1-6** Apply scientific reasoning and evidence from ancient Earth materials, meteorites, and other planetary surfaces to construct an account of Earth's formation and early history.