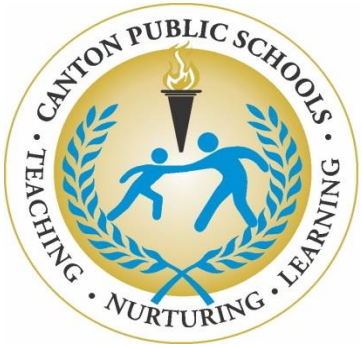
2017-2018
CPSD SCIENCE
PACING GUIDE



Chemistry

Canton Public Schools
Chemistry Pacing Guide 2017 - 2018

Chemistry 1st- 4th 9 Weeks		
	Competency 1 - Inquiry	**Mastery**
Apply inquiry-based and problem-solving processes and skills to scientific investigations.		
1a	Use current technologies such as CD-ROM, DVD, Internet, and on-line data search to explore current research related to a specific topic. (DOK 3)	1* 2* 3* 4*
1b	Clarify research questions and design laboratory investigations. (DOK 3)	1* 2* 3* 4*
1c	Demonstrate the use of scientific inquiry and methods to formulate, conduct, and evaluate laboratory investigations (e.g., hypotheses, experimental design, observations, data analyses, interpretations, theory development). (DOK 3)	1* 2* 3* 4*
1d	Organize data to construct graphs (e.g., plotting points, labeling x-and y-axis, creating appropriate titles and legends for circle, bar, and line graphs), draw conclusions, and make inferences. (DOK3)	1* 2* 3* 4*
1e	Evaluate procedures, data, and conclusions to critique the scientific validity of research. (DOK 3)	1* 2* 3* 4*
1f	Formulate and revise scientific explanations and models using logic and evidence (data analysis). (DOK 3)	1* 2* 3* 4*
1g	Collect, analyze, and draw conclusions from data to create a formal presentation using available technology (e.g.,computers, calculators, SmartBoard, CBL's, etc.) (DOK 3)	1* 2* 3* 4*
	Competency 2 – Physical Science	**Mastery**
Demonstrate an understanding of the atomic model of matter by explaining atomic structure and chemical bonding.		
2a	Describe and classify matter based on physical and chemical properties and interactions between molecules or atoms. (DOK 1) • Physical properties (e.g., melting points, densities, boiling points) of a variety of substances • Substances and mixtures • Three states of matter in terms of internal energy, molecular motion, and the phase transitions between them	1* 2 3 4
2b	Research and explain crucial contributions and critical experiments of Dalton, Thomson, Rutherford, Bohr, de Broglie, and Schrődinger and describe how each discovery contributed to the	1* 2 3 4

	current model of atomic and nuclear structure. (DOK 2)	
2c	Develop a model of atomic and nuclear structure based on theory and knowledge of fundamental particles. (DOK 2) • Properties and interactions of the three fundamental particles of the atom • Laws of conservation of mass, constant composition, definite proportions, and multiple proportions	1* 2 3 4
2d	Write appropriate equations for nuclear decay reactions, describe how the nucleus changes during these reactions, and compare the resulting radiation with regard to penetrating ability. (DOK 1) • Three major types of radioactive decay (e.g., alpha, beta, gamma) and the properties of the emissions (e.g., composition, mass, charge, penetrating power) • The concept of half-life for a radioactive isotope (e.g., carbon-14 dating) based on the principle that the decay of any individual atom is a random process	1* 2 3 4
2e	Compare the properties of compounds according to their type of bonding. (DOK 1) • Covalent, ionic, and metallic bonding • Polar and non-polar covalent bonding • Valence electrons and bonding atoms	1 2* 3 4
2f	Compare different types of intermolecular forces and explain the relationship between intermolecular forces, boiling points, and vapor pressure when comparing differences in properties of pure substances. (DOK 1)	
2g	Develop a three-dimensional model of molecular structure. (DOK 2) • Lewis dot structures for simple molecules and ionic compounds • Valence shell electron pair repulsion theory (VSEPR)	
Competency 3 – Life Science		**Mastery**
Develop an understanding of the periodic table.		
3a	Calculate the number of protons, neutrons, and electrons in individual isotopes using atomic numbers and mass numbers, write electron configurations of elements and ions following the Aufbau principle, and balance equations representing nuclear reactions. (DOK 1)	1 2* 3 4
3b	Analyze patterns and trends in the organization of elements in the periodic table and compare their relationship to position in the periodic table. (DOK 2) • Atomic number, atomic mass, mass number, and number of protons, electrons, and neutrons in isotopes of elements • Average atomic mass calculations	1 2* 3 4

	• Chemical characteristics of each region • Periodic properties (e.g., metal/nonmetal/metalloid behavior, electrical/heat conductivity, electronegativity, electron affinity, ionization energy, atomic/covalent/ionic radius)	
3c	Classify chemical reactions by type. (DOK 2) • Single displacement, double displacement, synthesis (combination), decomposition, disproportionation, combustion, or precipitation. • Products (given reactants) or reactants (given products) for each reaction type • Solubility rules for precipitation reactions and the activity series for single and double displacement reactions	1 2* 3 4
3d	Use stoichiometry to calculate the amount of reactants consumed and products formed. (DOK 3) • Difference between chemical reactions and chemical equations • Formulas and calculations of the molecular (molar) masses • Empirical formula given the percent composition of elements • Molecular formula given the empirical formula and molar mass	1 2 3* 4
Competency 4 - Life Science		**Mastery**
Analyze the relationship between microscopic and macroscopic models of matter.		
4a	Analyze the nature and behavior of gaseous, liquid, and solid substances using the kinetic molecular theory. (DOK 3)	1 2 3* 4
4b	Use the ideal gas laws to explain the relationships between volume, temperature, pressure, and quantity in moles. (DOK 2) • Difference between ideal and real gas • Assumptions made about an ideal gas • Conditions that favor an ideal gas	1 2 3* 4
4c	Use the gas laws of Boyles, Charles, Gay-Lussac, and Dalton to solve problems based on the laws. (DOK 2)	1 2 3* 4
4d	Explain the thermodynamics associated with physical and chemical concepts related to temperature, entropy, enthalpy, and heat energy. (DOK 2) • Specific heat as it relates to the conservation of energy • Amount of heat absorbed or released in a process, given mass, specific heat, and temperature change • Energy (in calories and joules) required to change the state of a sample of a given	1 2 3* 4

	substance, using its mass and its heat of vaporization or heat of fusion. • Endothermic or exothermic changes	
4e	Describe and identify factors affecting the solution process, rates of reaction, and equilibrium. (DOK 2) • Concentration of a solution in terms of its molarity, using stoichiometry to perform specified dilutions • Chemical reaction rates affected by temperature, concentration, surface area, pressure, mixing, and the presence of a catalyst • Relationship of solute character • LeChatelier's Principle	1 2 3 4*
Competency 5 – Life Science		**Mastery**
Compare factors associated with acid/base and oxidation/reduction reactions.		
5a	Analyze and explain acid/base reactions. (DOK 2) • Properties of acids and bases, including how they affect indicators and the relative pH of the solution • Formation of acidic and basic solutions • Definition of pH in terms of the hydronium ion concentration and the hydroxide ion concentration • The pH or pOH from the hydrogen ion or hydroxide ion concentrations of solution • How a buffer works and examples of buffer solutions	1 2 3 4*
5b	Classify species in aqueous solutions according to the Arrhenius and Bronsted-Lowry definitions, respectively and predict products for aqueous neutralization reactions. (DOK 2)	1 2 3 4*
5c	Analyze a reduction/oxidation reaction (REDOX) to assign oxidation numbers (states) to reaction species and identify the species oxidized and reduced, the oxidizing agent, and reducing agent. (DOK 2)	1 2 3 4*

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Pacing Guide Overview 2017 – 2018

Chemistry				
1st Term		2nd Term	3rd Term	4th Term
1a 1b 1c 1d 1e 1f 1g	2a 2b 2c 2d 3a	2e 3b 3c 3d 3e	3d 4a 4b 4c 4d	4e 5a 5b 5a