

## 2011 -12 Pacing Guide

### 9\_12 Science / Chemistry I 1st Term

| Term | Standard   |
|------|--|
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS6</b> - Students will communicate scientific investigations and information clearly.  |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS6.a</b> - Write clear, coherent laboratory reports related to scientific investigations.  |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS6.b</b> - Write clear, coherent accounts of current scientific issues, including possible alternative interpretations of the data.                      |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS6.c</b> - Use data as evidence to support scientific arguments and claims in written or oral presentations.   |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS6.d</b> - Participate in group discussions of scientific investigation and current scientific issues.   |
| 1    | <b>GPS.9_12.SC.CH.C.SC1.a</b> - Relate the role of nuclear fusion in producing essentially all elements heavier than hydrogen.   |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS2</b> - Students will use standard safety practices for all classroom laboratory and field investigations.  |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS2.a</b> - Follow correct procedures for use of scientific apparatus.  |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS2.b</b> - Demonstrate appropriate technique in all laboratory situations.   |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS2.c</b> - Follow correct protocol for identifying and reporting safety problems and violations.   |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS3.f</b> - Evaluate whether conclusions are reasonable by reviewing the process and checking against other available information.                        |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS4</b> - Students use tools and instruments for observing, measuring, and manipulating scientific equipment and materials.                               |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS4.a</b> - Develop and use systematic procedures for recording and organizing information.   |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS4.b</b> - Use technology to produce tables and graphs.  |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS4.c</b> - Use technology to develop, test, and revise experimental or mathematical models.  |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS5</b> - Students will demonstrate the computation and estimation skills necessary for analyzing data and developing reasonable scientific explanations. |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS5.a</b> - Trace the source on any large disparity between estimated and calculated answers to problems.   |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS5.b</b> - Consider possible effects of measurement errors on calculations.  |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS5.c</b> - Recognize the relationship between accuracy and precision.  |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS5.d</b> - Express appropriate numbers of significant figures for calculated data, using scientific notation where appropriate.                          |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS5.e</b> - Solve scientific problems by substituting quantitative values, using dimensional analysis and/or simple algebraic formulas as appropriate.    |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS3</b> - Students will identify and investigate problems scientifically.   |
| 1    | <b>GPS.9_12.SC.CH.CS.HM.SCS3.a</b> - Suggest reasonable hypotheses for identified problems.  |

|  |  |
|--|--|
| 1  | <b>GPS.9_12.SC.CH.CS.HM.SCSH3.b</b> - Develop procedures for solving scientific problems.  |
| 1  | <b>GPS.9_12.SC.CH.CS.HM.SCSH3.c</b> - Collect, organize and record appropriate data.   |
| 1  | <b>GPS.9_12.SC.CH.CS.HM.SCSH3.d</b> - Graphically compare and analyze data points and/or summary statistics.   |
| 1  | <b>GPS.9_12.SC.CH.CS.HM.SCSH3.e</b> - Develop reasonable conclusions based on data collected.  |
| 1  | <b>GPS.9_12.SC.CH.C.SC3</b> - Students will use the modern atomic theory to explain the characteristics of atoms.  |
| 1  | <b>GPS.9_12.SC.CH.C.SC3.a</b> - Discriminate between the relative size, charge, and position of protons, neutrons, and electrons in the atom.  |
| 1  | <b>GPS.9_12.SC.CH.C.SC3.b</b> - Use the orbital configuration of neutral atoms to explain its effect on the atom's chemical properties.  |
| 1  | <b>GPS.9_12.SC.CH.C.SC3.c</b> - Explain the relationship of the proton number to the element's identity.   |
| 1  | <b>GPS.9_12.SC.CH.C.SC3.d</b> - Explain the relationship of isotopes to the relative abundance of atoms of a particular element.   |
| 1  | <b>GPS.9_12.SC.CH.C.SC1.b</b> - Identify substances based on chemical and physical properties.   |
| 1  | <b>GPS.9_12.SC.CH.C.SC3.f</b> - Relate light emission and the movement of electrons to element identification.   |
| 1  | <b>GPS.9_12.SC.CH.C.SC4</b> - Students will use the organization of the Periodic Table to predict properties of elements.  |
| 1  | <b>GPS.9_12.SC.CH.C.SC4.a</b> - Use the Periodic Table to predict periodic trends including atomic radii, ionic radii, ionization energy, and electronegativity of various elements.         |
| 1  | <b>GPS.9_12.SC.CH.C.SC4.b</b> - Compare and contrast trends in the chemical and physical properties of elements and their placement on the Periodic Table.                                   |
| 1  | <b>GPS.9_12.SC.CH.C.SC1</b> - Students will analyze the nature of matter and its classifications.  |
| 1  | <b>GPS.9_12.SC.CH.C.SC3.e</b> - Compare and contrast types of chemical bonds (i.e. ionic, covalent).   |
| 1  | <b>GPS.9_12.SC.CH.C.SC1.c</b> - Predict formulas for stable ionic compounds (binary and tertiary) based on balance of charges.   |
| 1  | <b>GPS.9_12.SC.CH.C.SC1.d</b> - Use IUPAC nomenclature for both chemical names and formulas:   |
| 1  | <b>GPS.9_12.SC.CH.C.SC2.a</b> - Identify and balance the following types of chemical equations:  |
| 1  | <b>GPS.9_12.SC.CH.C.SC2.a.i</b> - Synthesis  |
| 1  | <b>GPS.9_12.SC.CH.C.SC2.a.ii</b> - Decomposition   |
| 1  | <b>GPS.9_12.SC.CH.C.SC2.a.iii</b> - Single Replacement   |
| 1  | <b>GPS.9_12.SC.CH.C.SC2.a.iv</b> - Double Replacement  |
| 1  | <b>GPS.9_12.SC.CH.C.SC2.a.v</b> - Combustion   |
| 1  | <b>GPS.9_12.SC.CH.C.SC2.b</b> - Experimentally determine indicators of a chemical reaction specifically precipitation, gas evolution, water production, and changes in energy to the system. |
| <b>9_12 Science / Chemistry I<br/>2nd Term</b> |  |
| <b>Term</b>                                    | <b>Standard</b>  |
| 2  | <b>GPS.9_12.SC.CH.C.SC2</b> - Students will relate how the Law of Conservation of Matter is used to determine chemical composition in compounds and chemical reactions.                      |

|   |   |
|---|---|
| 2 | <b>GPS.9_12.SC.CH.C.SC5</b> - Students will understand that the rate at which a chemical reaction occurs can be affected by changing concentration, temperature, or pressure and the addition of a catalyst.                        |
| 2 | <b>GPS.9_12.SC.CH.C.SC5.a</b> - Demonstrate the effects of changing concentration, temperature, and pressure on chemical reactions.   |
| 2 | <b>GPS.9_12.SC.CH.C.SC5.b</b> - Investigate the effects of a catalyst on chemical reactions and apply it to everyday examples.  |
| 2 | <b>GPS.9_12.SC.CH.C.SC5.c</b> - Explain the role of activation energy and degree of randomness in chemical reactions.   |
| 2 | <b>GPS.9_12.SC.CH.C.SC6</b> - Students will understand the effects motion of atoms and molecules in chemical and physical processes. (Teacher Note: The use of Gas Laws to achieve this standard is permissible, but not mandated.) |
| 2 | <b>GPS.9_12.SC.CH.C.SC6.a</b> - Compare and contrast atomic/molecular motion in solids, liquids, gases, and plasmas.  |
| 2 | <b>GPS.9_12.SC.CH.C.SC6.b</b> - Collect data and calculate the amount of heat given off or taken in by chemical or physical processes.  |
| 2 | <b>GPS.9_12.SC.CH.C.SC6.c</b> - Analyzing (both conceptually and quantitatively) flow of energy during change of state (phase).   |
| 2 | <b>GPS.9_12.SC.CH.C.SC7</b> - Students will characterize the properties that describe solutions and the nature of acids and bases.  |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.a</b> - Explain the process of dissolving in terms of solute/solvent interactions:  |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.a.i</b> - Observe factors that effect the rate at which a solute dissolves in a specific solvent  |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.a.ii</b> - Express concentrations as molarities   |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.a.iii</b> - Prepare and properly label solutions of specified molar concentration   |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.a.iv</b> - Relate molality to colligative properties  |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.b</b> - Compare, contrast, and evaluate the nature of acids and bases:  |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.b.i</b> - Arrhenius, Bronsted-Lowry Acid/Bases  |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.b.ii</b> - Strong vs. weak acids/bases in terms of percent dissociation   |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.b.iii</b> - Hydronium ion concentration   |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.b.iv</b> - pH   |
| 2 | <b>GPS.9_12.SC.CH.C.SC7.b.v</b> - Acid-Base neutralization  |
| 2 | <b>GPS.9_12.SC.CH.C.SC2.e</b> - Demonstrate the conceptual principle of limiting reactants.   |
| 2 | <b>GPS.9_12.SC.CH.C.SC2.f</b> - Explain the role of equilibrium in chemical reactions.  |
| 2 | <b>GPS.9_12.SC.CH.C.SC2.c</b> - Apply concepts of the mole and Avogadro's number to conceptualize and calculate:  |
| 2 | <b>GPS.9_12.SC.CH.C.SC2.c.i</b> - Empirical/molecular formulas  |
| 2 | <b>GPS.9_12.SC.CH.C.SC2.c.ii</b> - Mass, moles and molecules relationships  |
| 2 | <b>GPS.9_12.SC.CH.C.SC2.c.iii</b> - Molar volumes of gases  |
| 2 | <b>GPS.9_12.SC.CH.C.SC2.d</b> - Identify and solve different types of stoichiometry problems, specifically relating mass to moles and mass to mass.   |