SRPSD Physical Science 20 Rubrics

Career Exploration

PS20 -CE1 Explore physical-science related career paths in Saskatchewan, Canada and the world.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can identify relevant and/or undersubscribed physical-science related career options locally, regionally, and/or nationally.	I have a logical understanding of a physical science related career and the possible paths I could take to achieve such a career. I completed most of the items on the criteria checklist.	I have a logical understanding of a physical science related career and the possible paths I could take to achieve such a career, as well as how suited I am to such a career. I completed all of the items on the criteria checklist.	I have a logical understanding of a physical science related career and the possible paths I could take to achieve such a career, as well as how suited I am to such a career. My research includes personal interviews/discussions with professionals. I completed all of the items on the criteria checklist.

Student-Directed Study

PS20-STS1 Create and carry out a plan to explore one or more topics of personal interest relevant to Physical Science 20 in depth.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can identify a personally relevant or interesting topic in physical science.	I can develop a proposal for a scientific investigation, or a plan for an experiment, using the scientific method.	I can assemble a product demonstrating an understanding of a physical-science related topic of interest. I can develop materials to support the arguments for my position on a physical-science related issue.	I can develop materials to support the arguments for and arguments against a position related to a physical-science issue.

Heat

PS20-HT1 Analyze, qualitatively and quantitatively, the effect of heat on matter during temperature changes and changes of state using kinetic molecular theory.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can recognize the difference between heat and temperature.	I can explain heat using the kinetic molecular theory. I can calculate the specific heat of water and other substances.	I can calculate latent heat during changes of state of water and other substances. I can construct a heating/cooling curve for water or other substances from given or experimental data. I can explore qualitatively and/or quantitatively, the expansion and contraction of matter during heat transfer or temperature change. I can analyze	I can calculate the heat exchange/final temperature involved in mixing two known quantities of known substances. I can compare, in quantitative terms, the heat capacities of some common materials, including water, and explain how heat capacity influences

		qualitatively and/or quantitatively, the transfer of heat through matter, using the concept of thermal conductivity	choices of materials used in the development of technologies related to clothing, food, and shelter

PS20-HT2 Determine experimentally the quantities of heat involved in chemical reactions.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can identify endothermic and exothermic chemical reactions, including those that occur in solutions. I can measure, using a thermometer or temperature probe, and record the temperature change in an exothermic and/or endothermic chemical reaction	I can compare the quantity of heat in different exothermic and endothermic reactions.	I can calculate the theoretical quantity of heat absorbed or released in specific exothermic and/or endothermic reactions, including combustion reactions, using various quantities of reactants given the heat of reaction. I can calculate the molar heat of reaction of dissolving ionic compounds in a solution.	I can explain why the actual heat of reaction differs from the theoretical heat of reaction by identifying sources of error and using percent error calculations.

Foundations of Chemistry

PS20-FC1 Predict products of the five basic types of chemical reactions and evaluate the impact of these reactions on society and the environment.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can recognize ionic and covalent compounds, acids and bases, and hydrocarbons.	I can name ionic & covalent compounds and acids & bases. I can balance all types of equations.	I can name hydrocarbons. I can identify synthesis, decomposition, combustion, single replacement, and double replacement reactions. I can predict products of synthesis and decomposition reactions given the reactants. I can distinguish between the products of complete and incomplete combustion reactions.	I can determine the feasibility of single replacement reactions based on activity series. I can predict products of double replacement reactions, including acid-base neutralization reactions, and precipitate formation using solubility rules. I can explain the importance of skeleton equations, balanced equations and IUPAC nomenclature in communicating understanding of chemical reactions.

PS20-FC2 Construct an understanding of the mole as a unit for measuring the amount of substance.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can recognize the mole as a unit of measurement. I can recognize Avogadro's number.	I can calculate the molar mass of molecular and ionic compounds.	I can calculate molar conversions, including mass to mole, number of particles to mole, volume to mole, and concentration of a solution to mole, and their inverse operations, using the correct number of significant figures. I can calculate molarity.	I can explain why the mole is used to represent the amount of a substance. I can do dilution calculations.

PS20-FC3 Use stoichiometry to determine the relative amounts of substances consumed and produced in chemical reactions.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can relate the use of the mole to the coefficients in a balanced chemical equation.	I can determine the relative numbers of moles in a variety of chemical reactions using balanced chemical equations. I can compare the coefficients in a balanced equation to mass and volume as measurable quantities.	I can perform stoichiometric calculations to predict the outcomes (e.g., concentration, mass, volume, particles, and energy) of chemical reactions.	I can determine the limiting and excess reagents in a variety of chemical reactions through stoichiometric calculations and experiments.

Properties of Waves

PS20-PW1 Investigate the properties and characteristics of one-, two-, and three-dimensional waves (e.g. mechanical, sound, and light) in at least three different media (e.g., springs, ropes, air, and water).

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can recognize transverse and longitudinal waves.	I can identify and label characteristics of longitudinal and transverse waves. I recognize that waves are a transmission of energy.	I understand that the vibrating source determines the frequency and amplitude of the wave. I can describe characteristics of the transmission of waves .I can describe properties and characteristics of waves. I can use the universal wave equation to determine speed, frequency and wavelength.	I can solve situational problems using the universal wave equation. I can pose questions about waves in a new context.

PS20-PW2 Examine, using physical materials, ray diagrams and mathematical equations, how waves reflect from a variety of barriers.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can provide examples of wave and/or particle reflections in everyday situations	I can apply the law of reflection when a wave strikes a straight barrier. I can construct a ray diagram and locate an image in a plane mirror.	I can describe the differences between regular, and diffuse reflection. I can construct a ray diagram for a concave and convex mirror. I can describe the effects when a wave encounters the boundary between two different media. I can use the magnification equation to find h_i, h_o, d_i or d_o.	I can apply the laws of reflection and magnification and curved mirror equations to solve problems. I can identify the characteristics of images formed in plane, concave and convex mirrors.

PS20-PW3 Analyze, using physical materials, ray diagrams and mathematical equations, how waves refract at boundaries between different media.

Beginning (1)	Approaching (2)	Proficiency (3)	Mastery (4)
I can identify the image formed by a lens. I can identify diverging and converging lenses.	I can investigate image formation in converging and diverging lenses. I can relate refraction, and the refractive index of a medium, to the change in the speed and direction of waves at a boundary between different media.	I can construct ray diagrams for lenses. I can use Snell's Law, magnification, and lens equations.	I can identify the characteristics, including type, attitude/orientation, magnification, and position of images formed in converging and diverging lenses. I can solve problems with applications of Snell's Law.