

Student's Name _____

Course Name: **Science 3200**
Chemistry Unit
Physics Unit

R - retain, D - delete, C - changed
Outcomes

R D C Changed Outcome

CHEMISTRY UNIT				
provide examples of how science and technology are an integral part of their lives and their community by investigating common examples of combustion (117-5)				
define matter				
define chemistry				
identify examples of chemistry and technology around them in everyday life				
identify new questions and problems that arise from what was learned (210-16)				
identify and describe science and technology-based careers related to the study of chemistry (117-1)				
demonstrate a knowledge of WHMIS standards by selecting and applying proper techniques for handling and disposing of lab materials (213-9)				
describe the WHMIS information system and its use				
identify the eight WHMIS symbols				
identify the hazardous household product symbols				
distinguish between WHMIS symbols and hazardous household product symbols				
describe the MSDS sheet and its use				

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identify the nine categories on a MSDS sheet				
recognize the hazards associated with several consumer products. Include examples from:				
household cleaners				
automotive products				
paint products				
pesticides				
select examples of consumer products and compare hazardous household product symbols to their WHMIS symbols				
use previous examples and examine their MSDS's (Material Safety Data Sheets) to determine:				
safe storage				
safe handling				
first aid measures				
use a MSDS sheet to recognize the hazards associated with consumer products				
identify the nine categories on a MSDS sheet				
describe when WHMIS information or MSDS information would be best used				

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list several environmentally friendly alternatives to consumer products. Include examples from:				
household cleaners				
pesticides				
relate home, workplace and environmental attitudes to the information found on a MSDS				
state the government regulations regarding employers, employees and MSDS				
describe how environmental attitudes and practices have changed in Newfoundland and Labrador				
construct a classification system for matter (210-1)				
define and distinguish between the following terms:				
pure substances and mixtures				
compounds and elements				
atoms and molecules				
solutions (homogeneous mixtures) and heterogeneous mixtures				
compile and display information in a flow chart (214-3)				
graphically depict the classification of matter in an organizational chart				

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identify properties that allow substances to be distinguished from each other (300-10)				
distinguish between chemical and physical properties				
distinguish between chemical and physical changes				
list four pieces of evidence of chemical change. Include:				
color change				
solid (precipitate) formed				
bubbling (gas production)				
energy change (e.g., light, electricity, heat)				
use a classification system (210-1)				
describe the periodic table of elements as a means of organizing elements.				
identify vertical columns as groups or families which exhibit similar properties				
identify that elements are arranged in order of increasing number of protons (atomic number) on a periodic table				
identify metals, nonmetals, and non-reactive gases (Noble gases)				
distinguish between metals and nonmetals. Include:				
position on periodic table				

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physical properties				
describe alchemy and compare the alchemy of early civilizations and the Middle Ages to the practice of chemistry today. (NLS-1)				
explain the roles of evidence, theories, and paradigms in the development of Mendeleev's periodic table of elements (114-2)				
identify new questions and problems that arise from unexpected discoveries in chemistry history (210-16)				
provide examples of how chemistry is an integral part of our lives (117-5)				
use models in describing the structure and components of atoms and ions (307-14)				
describe the Bohr model of the atom. Include:				
location of protons, neutrons, and electrons				
the arrangement of electrons for the first 20 elements				
draw Bohr models for the first 20 elements				
define valence level				
recognize the first 3 non-reactive gases as having full valence levels				
define ions as atoms that have gained or lost electrons				
draw Bohr models of the ions that form from the first 20 atoms				

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recognize that ions have full valence levels				
recognize that metals lose electrons to form positive ions				
recognize that nonmetals gain electrons to form negative ions				
explain the relationship between the energy levels in Bohr's model and the production of a photon (329-3)				
define photon				
define the terms "ground state" and "excited state" for atoms				
describe a photon of light as being produced when an excited electron relaxes back to a lower energy level				
provide examples of how science and technology are an integral part of our lives, using the examples of light bulbs and fireworks (117-5)				
identify new questions and problems that arise from what was learned (210-16)				
describe the usefulness of IUPAC scientific nomenclature systems to convey chemical information (114-8)				
define attractive forces between atoms or ions as bonds				
describe compounds as substances that form when atoms/ions bond together				
define ionic compounds as combinations of metal ions (positive) and nonmetal ions (negative)				

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define molecular compounds as combinations of nonmetallic elements				
distinguish between molecular and ionic compounds				
write names and formulae for some common ionic compounds (both binary and complex), using the periodic table, a list of ions, and appropriate nomenclature for metal and nonmetal ions (319-1)				
define chemical formula				
given the chemical formula of a simple ionic compound, determine its name using IUPAC rules				
using the Periodic table determine the chemical formula for simple ionic compounds				
recognize that ionic compounds have a net charge of zero				
define polyatomic ion (complex ion)				
define polyatomic ionic compounds (complex ionic compounds)				
given the chemical formula of a polyatomic ionic compound (complex ionic compound) determine its name using IUPAC rules				
using the Periodic table and Table of Complex Ions, determine the chemical formula for complex ionic compounds				
state a prediction and a hypothesis based on available evidence and background information (212-4)				
define precipitate				

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evaluate and select appropriate instruments for collecting evidence and appropriate processes for problem solving, inquiring, and decision making (212-8)				
interpret patterns and trends in data, and infer relationships among variables (214-5)				
represent chemical reactions and the conservation of mass, using symbolic equations (321-1 Part 1)				
describe a chemical reaction as a rearrangement of atoms or ions				
list several examples of important chemical reactions. Include:				
rusting of iron				
burning of fossil fuels				
photosynthesis (carbon dioxide + water → sugar + oxygen)				
describe the format for writing chemical reactions. Include reactants, products, plus sign, and arrow				
define in terms of the chemicals involved five types of chemical reactions. Include:				
simple composition (synthesis reactions)				
simple decomposition (decomposition reactions)				
single displacement (single replacement)				
double displacement (double replacement)				

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combustion				
given reactants and the reaction type, predict the products of chemical reactions using word equations and chemical symbol equations. Include:				
simple composition (synthesis reactions)				
simple decomposition (decomposition reactions)				
single displacement				
double displacement				
combustion				
use instruments effectively and accurately for collecting data (213-3)				
compile and organize data; using appropriate formats facilitate interpretation of the data (213-5)				
explain how data support or refute the Law of Conservation of Mass (214-12)				
state the law of conservation of mass				
represent chemical reactions and the conservation of mass, using balanced symbolic equations (321-1 Part 2)				
calculate the number of each type of atom represented by a chemical formula				
write and balance a variety of chemical reactions. Include:				

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simple composition (synthesis reactions)				
simple decomposition (decomposition reactions)				
single displacement				
combustion				
double displacement				
identify new questions and problems that arise from what was learned, such as the issues behind obtaining hydrogen gas (a possible fuel) from water (210-16)				
identify and describe science and technology-based careers related to the study of chemistry, namely thermite welder or underwater welder. (117-1)				
apply and assess theoretical models for interpreting chemical reaction rates. (214-6)				
define chemical reaction rate				
describe the conditions that must be met for a chemical reaction to occur (collision model). Include:				
collision of molecules				
minimum energy				
list the factors that affect reaction rate. Include:				
temperature				

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concentration				
surface area				
catalyst or inhibitor				
using the collision model, explain the effects of the following on reaction rate:				
increasing or decreasing the temperature of reactants				
increasing or decreasing the concentration of reactants				
increasing or decreasing the surface area of reactants				
adding a catalyst or an inhibitor				
design an experiment identifying and controlling major variables (212-3)				
select and use apparatus and materials safely (213-8)				
construct and test a prototype of a system and troubleshoot problems as they arise (214-14)				
identify and describe science- and technology-based careers related to the study of chemistry (117-1)				
identify new questions and problems that arise from what was learned: (210-16)				
list the commonly used methods of preserving foods				
categorize these methods into three main categories (methods):				

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temperature control				
chemical treatment (e.g., adding a preservative/inhibitor)				
separating reactants (i.e., decreasing the concentration of a reactant; e.g., oxygen and water)				
using the collision model, explain how various examples of food preservation work. Include:				
chilling milk				
pickling beef (e.g., salt beef)				
canned tuna				
salting and drying fish				
given a variety of fresh food choices, predict and justify an appropriate method of preservation				
identify and evaluate potential applications of natural indicators (214-18)				
define an indicator as any compound that changes color under different acidic conditions				
use instruments effectively and accurately for collecting data (213-3)				
compile and organize data, using appropriate formats and data treatments to facilitate interpretation of the data (213-5)				
select and use apparatus and materials safely (213-8)				

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classify substances as acids, bases, or salts, on the basis of their characteristic properties (319-2)				
define acids operationally as solutions that:				
conduct electricity				
turn blue litmus red				
are sour tasting				
react with metals				
react with bases				
define bases operationally as solutions that				
conduct electricity				
turn red litmus blue				
taste bitter				
react with acids				
feel slippery				
describe how neutralization involves tempering the effects of an acid with a base and vice versa (321-2)				
demonstrate a knowledge of WHMIS standards by selecting and applying proper techniques for handling and disposing of lab materials (213-9)				

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use instruments effectively and accurately for collecting data (213-3)				
identify and correct practical problems in the way a procedure is carried out (214-13)				
provide a statement that answers the question investigated in light of the link between data and the conclusion (214-11)				
classify simple acids, bases and salts on the basis of their names and formulas: (319-2)				
define strong and weak acids				
define acids as molecules that ionize in water to produce hydrogen ions (H^+)				
define bases as ionic compounds that contain the hydroxide ion (OH^-)				
define salts as ionic compounds				
define concentration as a measure of the amount of substance in a given volume				
describe dissociation as the process by which compounds separate into ions in water				
describe that an acid's reactivity is dependent upon:				
concentration				
strength (degree of dissociation)				

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define pH scale as a measurement of the acidity of a solution				
describe solutions that have:				
pH < 7 as acidic				
pH > 7 as basic				
pH = 7 as neutral				
provide examples of how chemistry is an integral part of their lives and their community (117-5)				
describe the importance of maintaining a pH balance. Include:				
food digestion and nutrient absorption				
soil				
use instruments effectively and accurately for collecting data (213-3)				
compile and organize data, using appropriate formats and data treatments to facilitate interpretation of the data (213-5)				
state a prediction based on available evidence and background information (212-4)				
select and use apparatus and materials safely (213-8)				
analyze the risks and benefits to society and the environment of applying knowledge of acids and bases to air pollution (118-2)				
describe how rainwater becomes acidic. Include:				

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naturally				
artificially				
describe some sources of chemicals that produce acid rain. Include:				
carbon dioxide sources				
nitrogen oxide(s) sources				
propose a course of action on reducing acid rain, taking into account human and environmental needs (118-9)				
evaluate the effectiveness of antacids and the way they function, using scientific principles (116-6)				
design an experiment identifying and controlling major variables (212-3)				
compile and organize data, using appropriate formats and data treatments to facilitate interpretation of the data (213-5)				
provide examples of how science and technology are an integral part of their lives and their community by investigating chemistry in the workplace. (117-5)				
identify and describe careers related to the chemistry they are studying (117-7)				
PHYSICS UNIT				
describe the relationship among speed, distance and time (NLS-2)				
define distance, time and speed qualitatively				

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demonstrate the proper use of SI units				
measure distances accurately				
relate personal activities to studying distance, speed and time (114-6)				
identify different factors affecting the distance an object travels. Include:				
design				
applied forces				
opposing forces				
construct arguments to support a decision, using examples and evidence and recognizing various perspectives (118-6)				
propose courses of action on social issues related to science and technology, taking into account an array of perspectives (118-10)				
analyze the benefits to society of applying scientific knowledge on motion and introduction of a particular technology (118-2).				
evaluate the relevance, reliability, and adequacy of data and data collection methods (214-8)				
distinguish between accuracy and precision of data				
round measured or calculated values				
convert measured or calculated values from one SI unit to another				

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solve three-variable equations, given any two values				
identify and explain sources of errors and uncertainty in measurement (214-10)				
calculate speed given distance traveled and time elapsed				
predict the change in speed when altering distance traveled at constant time				
predict the change in speed when altering time at constant distance traveled				
evaluate and select appropriate instruments for collecting evidence and appropriate processes for problem solving and inquiring (212-8)				
compile and display evidence and information, by hand or computer, in a formal laboratory report (214-3)				
construct arguments to support a decision or judgement, using examples and evidence and recognizing various perspectives (118-6)				
list the factors to be considered when purchasing an automobile. Include:				
owner needs				
engine size and efficiency				
vehicle size				
fuel type and consumption				

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cost				
safety				
durability/reliability				
style				
propose courses of action on social issues related to science and technology, taking into account an array of perspectives (118-10)				
propose a course of action on social issues related to science and technology, taking into account human and environmental needs (118-9)				
list factors which affect the speed of an object (NLS-2)				
relate hybrid electric vehicles to studying distance, speed and time (114-6)				
analyze the benefits of applying scientific knowledge on motion and introduction of hybrid electric vehicle technology (118-2)				
describe quantitatively, and analyze mathematically, the relationship among distance, time, and average speed of an object's linear motion (212-7, 325-1, 325-2)				
define average speed				
calculate any one of average speed, distance or time, given the two other variables				
relate thunder and lightning to studying distance, speed and time (114-6)				

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compare the average speed of freely falling objects with different masses				
describe and evaluate the design of a technological device and the way it functions, using scientific principles (116-6)				
list the factors that affect the performance of the student-designed vehicle. Include:				
mass of vehicle				
amount of propellant				
friction				
aerodynamics				
evaluate and select appropriate instruments for collecting evidence and appropriate processes for problem solving, inquiring, and decision making (212-8)				
develop, present, and defend a position or course of action, based on findings (215-5)				
describe quantitatively, and analyze both graphically and mathematically, the relationship among distance, time, and speed of an object's linear motion (212-7, 325-1, 325-2)				
explain what is meant by uniform motion (constant speed)				
explain what is meant by instantaneous speed				

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calculate any one of constant speed, distance or time, given the two other values				
compile and display evidence and information, by hand or computer, in graphical format (214-3)				
given distance-time data, draw and label a proper distance vs. time graph				
determine that a straight-line distance vs. time graph represents a constant speed (uniform motion)				
define independent and dependent variables				
identify independent and dependent variables when collecting data necessary to determine an object's speed				
relate the slope of a distance vs. time graph to an object's speed				
calculate an object's speed (slope) using a distance vs. time graph				
interpret patterns and trends in data, and infer or calculate linear relationships among variables (214-5)				
list the factors that affect the speed of a moving object on an inclined plane. Include:				
angle of the inclined plane				
friction				
aerodynamics				

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compile and display evidence and information, by hand or computer, in a variety of formats, including tables and graphs (214-3)				
distinguish between the speed-time graph for uniform motion versus an object moving down an inclined plane (non-uniform motion)				
determine that a curve-line distance vs. time graph represents a non-uniform motion				
use instruments effectively and accurately for collecting data (213-3)				
relate the Olympics to studying distance, speed and time (114-6)				
explain what is meant by uniform motion (214-3)				
describe quantitatively, and analyze mathematically, the relationship among displacement and time of an object's uniform motion (212-7, 325-1, 325-2)				
distinguish between scalar and vector quantities, using distance and displacement as an example				
define a vector				
use an appropriate measurement (unit) to indicate the direction of a vector using:				
compass method				
degree method				
draw an appropriate vector to represent a given displacement				

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use appropriate symbols to distinguish between distance and displacement				
draw an appropriate vector diagram				
use an appropriate sign convention to indicate the direction of a vector				
determine the resultant displacement using the math method				
determine the resultant displacement using the scale diagram method				
compare the scale diagram method to the math method of vector addition. Include:				
ease of use				
accuracy				
types of problems				
analyze graphically the relationship among displacements (325-2)				
determine that the resultant displacement is independent of the order in which vectors are added				
display and analyze information, by hand or computer, in diagrams (214-3)				
analyze the benefits to society of applying scientific knowledge on motion and introduction of animal tracking technology (118-2)				

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relate animal tracking to studying distance, speed and time (114-6)				
describe quantitatively, and analyze mathematically, the relationship among displacement, time, and velocity of an object's uniform motion (212-7, 325-1, 325-2)				
distinguish between speed and velocity				
use appropriate symbols to represent speed and velocity				
distinguish between instantaneous and average velocity (325-3)				
determine that a straight-line displacement vs. time graph represents a constant velocity				
determine that a curve-line displacement vs. time graph represents a changing velocity				
calculate any one of velocity, displacement or time given the two other values				
use vectors to represent velocity (325-5)				
illustrate how science attempts to understand the migration of birds (115-2)				
identify examples where scientific understanding was enhanced or revised as a result of the invention of a technology (116-1)				
display and analyze position and time information, by hand or computer in a properly labeled position-time graph (214-3, 325-2)				

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given displacement-time data, draw and label a proper position vs. time graph				
relate the slope of a position vs. time graph to an object's velocity				
calculate an object's velocity using a position vs. time graph				
compare, in terms of information conveyed, distance vs. time and position vs. time graphs				
identify and describe science- and technology-based careers related to the study of motion (117-7)				
analyze the benefits to society of applying scientific knowledge on motion and introduction of a particular technology (118-2)				
describe quantitatively the relationship among velocity, time, and acceleration (212-7, 214-5, 325-4)				
distinguish between acceleration and deceleration				
explain what is meant by constant or uniform acceleration				
recognize how different units can be used to express acceleration. Include:				
or m/s^2				
calculate any one of acceleration, final speed, initial speed or time given the three other values				
apply and interpret sign conventions when solving acceleration problems				

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describe the motion of domestic and industrial technologies, using scientific principles (116-5)				
classify the motion of an object, given its velocity data in terms of:				
constant velocity				
instantaneous velocity				
acceleration				
deceleration				
propose a course of action on social issues related to the Space Shuttle taking into account human and environmental needs (118-9)				
propose courses of action on social issues related to the Space Shuttle taking into account an array of perspectives (118-10)				
describe graphically the relationship among velocity, time and acceleration (212-7, 214-5, 325-1)				
use appropriate graphical modes of representation to communicate results (215-2)				
design an experiment identifying and controlling major variables (212-3)				
interpret patterns and trends in data, and infer linear relationships among variables (214-5)				