Course Name: SNC 2D1 Teacher: K. McAdam

Learning Goals

Unit 1: Biology - Tissues, Organs, and Systems of Living Things

☐ I can identify the parts of a microscope and explain what they do.

☐ I can use a microscope.

☐ I can use terms related to the microscope, including arm, base, body tube, coarse adjustment knob, diaphragm, fine adjustment knob, light source, objective lenses, ocular, revolving nosepiece, stage, and stage clips.

☐ I can identify the parts of plant and animal cells and explain what they do.

☐ I can use terms related to animal cells, including cell membrane, centriole, chromatin, cytoplasm, cytoskeleton, DNA, endoplasmic reticulum (rough and smooth), Golgi apparatus, lysosome, mitochondria, nucleolus, nucleus, organelle, ribosome, vacuole, and vesicle.

☐ I can use terms related to plant cells, including cell wall, central vacuole, and chloroplast.

☐ I can draw labelled biological diagrams of various plant and animal cells.

☐ I can discuss the importance of mitosis.

☐ I can use terms related to the importance of cell division, including asexual reproduction, multicellular organism, and sexual reproduction.

☐ I can describe the cell cycle in plants and animals.

☐ I can use terms related to the cell cycle, including anaphase, chromosomes, cytokinesis, first growth phase (G1), interphase, metaphase, mitosis, prophase, sister chromatids, second growth phase (G2), synthesis phase (S), and telophase.

☐ I can examine cells under a microscope and identify the various stages of mitosis in plants and animals.

☐ I can compare cancerous cells and non-cancerous cells and describe the impact of cancerous cells on the human body.

☐ I can use terms related to cancer, including benign tumour, carcinogen, malignant tumour, mutation, and tumour.

☐ I can describe the structure, function, and importance of specialized cells and tissues in multicellular organisms.

☐ I can discuss the importance of cell specialization in generating new tissues and organs.

☐ I can use terms related to cell specialization, including connective tissue, differentiation, epithelial tissue, meristematic tissue, mesophyll, muscle tissue, nervous tissue, phloem, red blood cell, specialized cell, stem cell, stomate, tissue, vascular tissue, and xylem.

☐ I can explain how plant and animal bodies are organized by describing the relationship between cells, tissues, organs, and systems in plants and animals.

☐ I can use terms related to cell organization, including cells, tissues, organs, and organ systems.

☐ I can name and describe the organs of a plant (flower, leaf, root, and stem).

☐ I can explain how the organs of a plant work together to ensure that the plant survives changes in the environment.

☐ I can explain how a plant’s two organ systems (root system and shoot system) work together.

☐ I can describe the basic functions of the following animal organ systems and list the organs involved: circulatory, digestive, endocrine, excretory, integumentary, lymphatic, muscular, nervous, respiratory, reproductive, and skeletal.

☐ I can explain the general function of the respiratory system in the human body.

☐ I can use terms related to the respiratory system, including bronchi, diaphragm, lungs, and trachea.

☐ I can explain the general function of the circulatory system in the human body.

☐ I can use terms related to the circulatory system, including artery, capillary, heart, plasma, platelet, red blood cell, white blood cell, and vein.

☐ I can explain the general function of the digestive system in the human body.

☐ I can use terms related to the digestive system, including absorption, anus, esophagus, large intestine, mouth, peristalsis, small intestine, and stomach.

☐ I can explain how the circulatory, digestive, and respiratory systems work together in the human body and why these interactions are necessary for our survival.

☐ I can name and describe different medical imaging technologies used to explore, diagnose, or treat the human body.

☐ I can describe the benefits and side-effects of different medical imaging technologies.

☐ I can use terms related to medical imaging technologies, including biophotonics, computed tomography (CT), fluoroscopy, magnetic resonance imaging (MRI), nuclear medicine, positron emission tomography (PET), radiotherapy, ultrasound, and X-ray.

☐ I can use research skills to learn about health problems related to tissues, organs, or systems in humans.

☐ I can use dissection skills to explore the organs and organ systems of a frog.

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Learning Goals

Unit 2: Chemistry - Chemical Reactions

☐ I can identify various pieces of lab equipment.

☐ I can state laboratory safety rules.

☐ I can identify the various WHMIS symbols and HHPS symbols.

☐ I can use terms related to basic chemistry, including atom, atomic mass, atomic number, Bohr diagram, chemical change, chemical property, compound, electron, element, family/group, heterogeneous mixture, homogeneous mixture, matter, mechanical mixture, metal, mixture, neutron, nonmetal, nucleus, period, physical change, physical property, property, proton, pure substance, shells, solution, subatomic particles, valence electrons, and valence shell.

☐ I can distinguish between physical and chemical changes by observing what happens when substances are mixed.

☐ I can draw Bohr-Rutherford diagrams.

☐ I can draw Lewis dot diagrams.

☐ I can use terms related to chemical bonding, including covalent bond, diatomic molecule, ion, ionic bond, ionic charge, ionic compound, molecular/covalent compound, molecule, octet rule, and polyatomic ion.

☐ I can show how bonding takes place between atoms using Lewis dot diagrams.

☐ I can identify simple ionic compounds using the periodic table.

☐ I can name and write the formulas for simple ionic compounds.

☐ I can identify simple compounds involving polyatomic ions using the periodic table and a list of the most common polyatomic ions.

☐ I can name and write the formulas for polyatomic compounds.

☐ I can identify covalent/molecular compounds using the periodic table.

☐ I can name and write the formulas for simple molecular/covalent compounds.

☐ I can describe the relationships between chemical formulas, composition, and names of simple compounds. That is, I know that a compound’s name usually indicates which elements it contains, and that the composition of a compound is given by its chemical formula.

☐ I can use terms related to acids and bases, including acid, acid-base indicator, antacid, base, neutral, neutralization, pH, and pH scale.

☐ I can describe how the pH scale is used to determine if a solution is acidic, basic, or neutral.

☐ I can identify acids, using the periodic table and a list of polyatomic ions, and write their formulas.

☐ I can identify bases, using the periodic table and a list of polyatomic ions, and write their formulas.

☐ I can classify some common substances as acidic, basic, or neutral using acid-base indicators or pH strips.

☐ I can describe the process of neutralization for simple acid-base reactions (i.e., an acid reacts with a base to form a salt and often water).

☐ I can investigate acid-base neutralization reactions.

☐ I can use terms related to chemical reactions including chemical equation, chemical reaction, coefficient, law of conservation of mass, product, reactant, skeleton equation, and word equation.

☐ I can construct molecular models of simple chemical reactions and produce diagrams of these models.

☐ I can investigate the law of conservation of mass in a chemical reaction by comparing the total mass of reactants with the total mass of products. I can account for any discrepancies.

☐ I can write word equations for simple chemical reactions.

☐ I can balance chemical equations for simple chemical reactions.

☐ I can explain how to balance chemical equations using the law of conservation of mass.

☐ I can use terms related to the different types of chemical reactions, including, decomposition reaction, double displacement reaction, neutralization reaction, single displacement reaction, and synthesis reaction.

☐ I can observe and compare the different types of chemical reactions and represent them using a variety of formats (e.g., word equations, balanced chemical equations, and molecular models).

☐ I can demonstrate safe behaviour in the lab by following proper procedure and handling equipment and materials correctly.

☐ I can discuss the importance of chemical reactions at home or in the workplace.

☐ I can explain how many useful products and processes related to various professions involve chemical reactions, and how these people must handle and dispose of chemicals.

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Learning Goals

Unit 3: Climate Change

☐ I can distinguish between the terms climate and weather, providing examples of each.

☐ I can construct and interpret a climatograph.

☐ I can describe evidence that has been gathered from the past that has led scientists to conclude that Earth’s climate has changed dramatically over long periods of time (i.e., ice ages, ice cores, tree rings, coral reefs, rocks, sediments, caves).

☐ I can describe evidence that has led scientists to conclude that Earth’s climate is presently changing.

☐ I can use terms related to climate change, including biome, climate, climate change, climatograph, global warming, and weather.

☐ I can explain what happens when solar energy enters Earth’s atmosphere.

☐ I can use terms related to Earth’s energy balance, including albedo, atmosphere, biosphere, heat sink, hydrosphere, lithosphere, solar energy, and thermal energy.

☐ I can describe the natural greenhouse effect and its importance.

☐ I can identify different greenhouse gases (e.g., carbon dioxide, methane, water vapour, nitrous oxide) and explain how they influence the trapping of heat in the atmosphere and hydrosphere.

☐ I can describe the principal natural sources of greenhouse gases.

☐ I can describe the principal anthropogenic sources of greenhouse gases.

☐ I can describe the principal natural sinks of greenhouse gases.

☐ I can describe the principal anthropogenic sinks of greenhouse gases.

☐ I can describe how energy is transferred and stored in air and water and how this affects air and water currents.

☐ I can explain how water in its various states influences climate patterns.

☐ I can explain the influence of ocean currents on local and global heat transfer and precipitation patterns.

☐ I can use terms related to energy transfer, including conduction, convection, Coriolis effect, and radiation.

☐ I can use simulations, diagrams, and models to demonstrate the natural greenhouse effect.

☐ I can describe the anthropogenic greenhouse effect, including its causes and effects.

☐ I can describe the difference between the natural greenhouse effect and the anthropogenic greenhouse effect.

☐ I can use terms related to the greenhouse effect, including anthropogenic, anthropogenic greenhouse effect, carbon footprint, carbon sink, carbon source, global warming potential, greenhouse gases, fossil fuel, insolation, natural greenhouse effect, net radiation budget, and persistence.

☐ I can identify and describe the natural causes of climate change.

☐ I can identify and describe the human causes of climate change.

☐ I can identify and describe indicators of global climate change (e.g., changes in: glacial and polar ice, sea levels, wind patterns).

☐ I can explain the effects of climate change in the atmosphere (e.g., heat waves, drought, wildfires, storms, floods).

☐ I can explain the effects of climate change in the hydrosphere (e.g., melting ice, ocean warming, ocean currents).

☐ I can explain the effects of climate change on wildlife (range shifts, threatened species).

☐ I can compare different perspectives and/or biases present in discussions of climate change in scientific and non-scientific sources.

☐ I can reflect on my carbon footprint and plan a course of action to reduce it.

☐ I can use research skills to analyze ways in which living things and natural systems have been affected by climate change.

☐ I can use research skills to assess the effectiveness of some current individual, regional, national, or international climate change initiatives.

☐ I can use terms related to climate change initiatives, including carbon offsets, carbon tax, emissions trading, mitigation, sequestered, and sustainable development.

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Learning Goals

Unit 4: Physics - Light and Geometric Optics

☐ I can identify and define the properties of a wave, including amplitude, crest, frequency, rest position, trough, and wavelength.

☐ I can identify and label the visible and invisible regions of the electromagnetic spectrum.

☐ I can describe the uses of the electromagnetic spectrum.

☐ I can use terms related to light and the electromagnetic spectrum, including electromagnetic radiation, electromagnetic spectrum, electromagnetic wave, wave, and wave model of light.

☐ I can identify the colours that make up visible white light.

☐ I can describe various sources of light and how they produce light.

☐ I can investigate how various objects or media (e.g., opaque, translucent, and transparent materials; black and white surfaces) reflect, transmit, or absorb light.

☐ I can use terms related to properties of light, including absorption, diffuse reflection, light transmission, opaque, ray model of light, reflection, regular reflection, translucent, and transparent.

☐ I can list the characteristics of images formed by plane mirrors (e.g., location, attitude, size, and type).

☐ I can use terms related to plane mirrors, including angle of incidence, angle of reflection, image, incident ray, law of reflection, normal, optical device, plane mirror, and virtual image.

☐ I can describe how the positions of a mirror, incident ray, reflected ray, and normal are related.

☐ I can compare the shapes of convex and concave mirrors and explain how they are similar and how they are different.

☐ I can list the characteristics of images formed by curved mirrors (e.g., location, attitude, size, and type).

☐ I can describe some uses for curved mirrors.

☐ I can use terms related to curved mirrors, including concave (or converging) mirror, convex (or diverging) mirror, focal length, focal point, law of reflection, real image, and vertex.

☐ I can demonstrate the laws of reflection, using plane and curved mirrors, and draw ray diagrams to summarize their findings.

☐ I can describe the conditions that can slow down light and then speed it up again.

☐ I can describe how light changes its direction when moving from one medium to another.

☐ I can calculate the index of refraction of a material.

☐ I can explain how I would calculate the changing speed of light using Snell’s law.

☐ I can show, using Snell’s law, how the indices of refraction of a medium are related to the angle of incidence and reflection; that is, I can describe how Snell’s law can be used to describe the bending of light toward and away from the normal.

☐ I can use an inquiry process to investigate the refraction of light as it passes through media of different refractive indices, and analyze the data.

☐ I can compare and contrast reflection and refraction.

☐ I can use terms related to the refraction of light, including dispersion, index of refraction, medium, mirage, refraction, Snell’s law, and total internal reflection.

☐ I can analyze technological devices that use properties of light.

☐ I can explain how the properties of light are applied in the operation of a technological device (e.g., camera, microscope) and explain how it has benefitted society.

☐ I can analyze technological devices and procedures related to human perception of light (e.g., contact lenses, eyeglasses, infrared or low-light vision sensors, laser surgery) and evaluate its effectiveness.

☐ I can use terms related to technologies that use light, including aperture, binoculars, camera, compound microscope, confocal microscope, diaphragm, laser, photonics, photons, pixels, shutter, reflecting telescope, refracting telescope, telephoto lens, telescope, wide-angle lens.