Unit 1: Biological Diversity

2008
- Identify an advantage of asexual reproduction
- Identify where fertilization occurs during the stages of sexual reproduction
- Identify a trait that is influenced by environmental factors
- Identify the part of a cell that carries information about heritable factors
- Identify traits as examples of either discrete or continuous variation
- Determine the effect of a change in one population on another given a description of an ecosystem
- Analyze a graph to identify the niche of a species
- Differentiate between generalist and specialist species using two distribution maps
- Analyze a map of North and South America to determine which region contains the most biological diversity
- Determine the gene pair combinations of a father and mother based on the children's hair colours
- Analyze and determine the flawed biological process that results in a chromosome disorder

2009
- Identify an advantage of asexual reproduction
- Identify where fertilization occurs during the stages of sexual reproduction
- Recognize which biological process is responsible for determining the number of sperm cells in a chromosome
- Match four conservation strategies with the correct description
- Recall a heritable human trait that is not influenced by the environment
- Determine the effect of a change in one population on another given a description of an ecosystem (Wolves, Caribou, Willow --> O2)
- Evaluate physical adaptations observed in four organisms and determine which is a result of artificial selection
- Analyze the transmission of pea seed traits from parents to offspring and determine the pattern of inheritance
- Analyze a map of North and South America to determine which region contains the most biological diversity
- Analyze four examples of variation and determine which example demonstrates diversity within a species
- Using a chart, determine the number of chromosomes in a body, gamete, and zygote cell for three separate organisms

2010
- Determine which causes of extinction are related to human activities
- Recognize a benefit of asexual reproduction
- Recognize which biological process is responsible for determining the number of chromosomes in a sperm cell
- Recall a heritable human trait that is not influenced by the environment
- Match four conservation strategies with the correct descriptions
- Interpret the dependencies among three species
- Evaluate physical adaptations observed in four organisms and determine which is a result of artificial selection
- Analyze the transmission of pea seed traits from parents to offspring and determine the pattern of inheritance
- Analyze a graph of population size versus abundance of a food for four species to determine which has a broad niche
- Analyze four examples of variation and determine which example demonstrates diversity within a species
- Using a chart, determine the number of chromosomes in a body, gamete, and zygote cell for three separate organisms

**NOTE**

The 2008 & 2010 PAT's are available for you to write online. Google "Quest A+". Take both the 2008 & the 2010 released PAT to test your knowledge. The questions on this test correspond (in different order) to the 2008 and 2010 outcomes in this booklet.
2011 Determine which causes of extinction are related to human activities
Recognize a benefit of asexual reproduction
Identify which sexual reproduction stage will have half the number of chromosomes
Categorize four examples of animal variations as variation between species or within species
Identify an advantage to species diversity
Identify the types of asexual reproduction represented by three different images
Interpret the dependencies among three species
Analyze a graph and determine a predator/prey relationship
Analyze a graph of population size versus abundance of a food for four species to determine which has a broad niche
Identify the responding variable in a population study
Identify an example of discrete and continuous variation based on an evaluation of human characteristics

Unit 2: Matter and Chemical Change

2008 Recall that oxygen is a reactant in all corrosion and combustion reactions
Given a chemical formula, recognize the elements that are present and their quantities
Identify an example of a chemical change
Recognize the type of compound that is formed when two non-metallic elements are combined
Identify a substance that is a solution
Synthesize information from a table of properties to describe the conductivity of two elements
Using the IUPAC format, name a molecular compound
Use the periodic table to distinguish a common property of elements that are in the same group
Analyze data from a table to determine which substance reacts most readily with an acid
Infer the chemical formula of a molecular model by analyzing other molecular models
Apply knowledge of the law of conservation of mass to determine the mass of a reactant

2009 Recall that oxygen is a reactant in all corrosion and combustion reactions
Select the characteristic that is an example of a physical property
Identify the meaning of the Roman numeral in the IUPAC name of an ionic compound
Identify an example of a chemical change
Recognize the type of compound that is formed when two non-metallic elements are combined
Evaluate if a new substance has been produced in an experiment
Apply knowledge of the periodic table to identify the number of electrons in a particular element
Apply knowledge of the periodic table to identify a pair of elements that have common properties
Analyze data from a table to determine which substance reacts most readily with an acid (temperature of solution and mass of metal)
Infer the chemical formula of a molecular model by analyzing other molecular models

2010 NR#2 Apply knowledge of the law of conservation of mass to determine the mass of a reactant
Determine the elements and number of atoms present in a molecular compound
Determine the classification of a compound and properties associated with that classification
Select the characteristic that is an example of a physical property
Compare the Rutherford model of the atom to a model of the solar system
Identify storage conditions that are less favourable to the corrosion of metal
Apply knowledge of the periodic table to determine whether specific elements are metals or non-metals
Evaluate if a new substance has been produced in an experiment
Apply knowledge of the periodic table to identify the number of electrons in a particular element
Apply knowledge of the periodic table to identify a pair of elements that have common properties
Examine a molecular model to determine the correct chemical formula
Determine the manipulated variable in an experiment

2011 Recognize that the melting of ice is an example of a physical change
Determine the elements and number of atoms present in a molecular compound
Compare the Rutherford model of the atom to a model of the solar system
Identify storage conditions that are less favourable to the corrosion of metal
Evaluate information to determine the type of reaction that is described
Apply knowledge of the periodic table to determine whether specific elements are metals or non-metals
Identify a correctly named chemical formula
Determine the manipulated variable in an experiment
Identify the structure of the periodic table
Evaluate information about an atom to determine the number of sub-atomic particles present
Examine a molecular model to determine the correct chemical formula

Unit 3: Environmental Chemistry

2008 Recognize an example of an inorganic substance
Identify the statement that best defines the term LD50
Recognize the manipulated variable in an experiment
Recognize a substance that can be synthesized by plants
Analyze a graph of two populations over time to predict which graph would represent dissolved oxygen concentrations over time
Formulate a conclusion by interpreting experimental results
Analyze a graph to make an inference regarding the effect of pesticides on a species over time
Analyze a graph to determine which species is most sensitive to changing pH levels
Analyze a graph and apply knowledge of the pH scale to determine the concentration of a species
Analyze a graph to determine the effects of acidity on four aquatic species
Use the results of an experiment involving indicators to classify substances as acidic, basic, or neutral
2009 Recognize an example of an inorganic substance
Identify the statement that best defines the term LD50
Conclude how the presence of aquatic organisms indicates water quality
Recognize the chemicals that are associated with increased algae growth in polluted lakes
Analyze a graph of two populations over time to predict which graph would represent dissolved oxygen concentrations over time
Analyze a pH curve to determine the amount of base that must be added to an acidic solution in order to neutralize it
Analyze an ecological event to provide a plausible reason for the death of an organism
Analyze a graph to determine which species is most sensitive to changing pH levels
Analyze a graph and apply knowledge of the pH scale to determine the concentration of a species
Analyze a graph to determine the effects of acidity on four aquatic species
NR#3 Arrange four species into a food chain based on a graph of toxin concentration versus species

2010 Evaluate a list of roles of nutrients to determine which is carbohydrates
Conclude how the presence of aquatic organisms indicates water quality
Recognize the chemicals that are associated with increased algae growth in polluted lakes
Identify a species role in determining water quality
Determine the substance that would change an acid-base indicator to a certain colour
Infer the resulting oxygen concentrations and variety of organisms in water with given characteristics
Analyze a pH curve to determine the amount of base that must be added to neutralize an acidic solution
Analyze an ecological event to provide a plausible reason for the death of an organism
Analyze two landfill designs and determine which site will prevent leaching
Apply knowledge of parts per million units

2011 Evaluate a list of roles of nutrients to determine which is carbohydrates
Identify an organic nutrient located in a concept map
Identify a species role in determining water quality
Determine the substance that would change an acid-base indicator to a certain colour
Infer the resulting oxygen concentrations and variety of organisms in water with given characteristics
Identify the reason for changes in the level of a pollutant in a river
Using data from a graph, determine the characteristics of a base and its reaction with litmus paper
Evaluate food chain information to identify the process of biomagnification
Analyze two landfill designs and determine which site will prevent leaching
Apply knowledge of parts per million units
Determine a LD50 value for a given chemical based on information in a graph

Unit 4: Electrical Principles and Technologies
2008 Recognize an example of an electrical discharge
Recognize a means by which the strength of an electromagnet can be increased
Recognize the reason that tungsten is used in light bulbs
Calculate electrical energy given power and time
Determine the correct circuit diagram based on given criteria
Construct an inference based on raw data from a table
Calculate the efficiency of a device given the heat energy produced and the electrical energy consumed.
Compare different configurations of electrodes and electrolytes to determine which one produces the greatest voltage
Predict the relative brightness of three light bulbs in a parallel circuit when a resistor is added to one part of the circuit
Determine the resistance in an illustrated series circuit
Interpret a circuit diagram to determine which component is protected by a circuit breaker

2009 Recognize an example of an electrical discharge
Recognize the correct sequence of energy transfer in hydro-electric generation (gravitational->mechanical->electrical)
Recognize a byproduct of low efficiency devices (heat)
Evaluate the construction of a wet cell and devise a strategy to increase the voltage produced
Determine a representation of a circuit diagram based on a description
Construct an inference based on raw data from a table. (Recognize renewable and non-renewable sources of energy)
Predict the relative brightness of three light bulbs in a parallel circuit when a resistor is added to one part of the circuit
Calculate the power consumed by a simple circuit (given Voltage and Current)
Describe a negative impact of hydroelectric power generation
Identify the part of a St. Louis motor that functions as an electromagnet
NR#4 Calculate the efficiency of a device given the heat energy produced and the electrical energy consumed.

2010 Identify two statements that describe static electricity
Recognize the correct sequence of energy transfer in hydro-electric generation
Identify a renewable source of electrical energy from a group of sources
Recognize a by-product of low efficiency devices
Evaluate the construction of a wet cell and devise a strategy to increase the voltage produced
Identify components in a series circuit that affect light bulb brightness
Using a city traffic model, relate the switch of a circuit to its applicable city traffic component
Calculate the power consumed by a simple circuit
Describe a negative impact of hydroelectric power generation
Identify the part of a St. Louis motor that functions as an electromagnet
Calculate the efficiency of four devices and order them according to their efficiencies

2011 Identify two statements that describe static electricity
Determine the most effective components of a wet cell
Determine a disadvantage to nuclear power production
Identify the energy transformation that occurs in a thermocouple
Identify components in a series circuit that affect light bulb brightness
Using a city traffic model, relate the switch of a circuit to its applicable city traffic component
Evaluate a design for a generator and determine which modification would have no effect on the current produced
Calculate the energy used by a flashlight for a given period of time
Indicate ways in which the resistance of a wire can be reduced
Determine the component that is protected by a circuit breaker in a schematic diagram
Calculate the efficiency of four devices and order them according to their efficiencies

Unit 5: Space Exploration

2008
Recognize a planet that is terrestrial
Determine the positions of celestial bodies that produce an eclipse of the sun
Identify the reason why a telescope positioned in a space environment produces clearer images than a surface telescope
Order the diameter of four celestial bodies from smallest to largest
Identify the type of information that astronomers obtain from spectral analysis
Evaluate water management needs and strategies on the International Space Station
Predict the most likely effect of a new technology used for satellite disposal
Describe the position of celestial bodies at a particular time of year
Describe how to use angular coordinates to locate the position of a star
Analyze a diagram of satellite orbits to determine which satellites can transmit signals over a greater area
Determine which two points combine to make the best baseline for triangulation

2009
Recognize the composition of galaxies and what they originate from (stars, planets, and dust, and are formed from a nebula)
Identify the reason why a telescope positioned in a space environment produces clearer images than a surface telescope
NR4 Order the diameter of four celestial bodies from smallest to largest (Earth, Milky Way, Solar System, Sun)
Identify the type of information that astronomers obtain from spectral analysis.
Identify an environmental perpective associated with the establishment of a base on the moon
Predict the most likely effect of a new technology used for satellite disposal (Missile = space junk)
Predict future conditions associated with the sun given data presented in a line graph
Determine the location of an object with the triangulation method using two angle measurements
Analyze a Hertzsprung-Russell diagram to determine the relative brightness and temperature of a white dwarf star
Describe how to use angular coordinates to locate the position of a star
Analyze a diagram of satellite orbits to determine which satellites can transmit signals over a greater area

2010
Recognize the composition of galaxies and what they originate from
Recognize the use of parallax and triangulation
Identify from a list a technology that has had the least impact on the study of space
Identify an environmental perspective associated with the establishment of a base on the moon
Classify space technologies according to their functions
Identify differences between the geocentric and heliocentric models of the universe
Predict future conditions associated with the sun given data presented in a line graph
Analyze a Hertzsprung-Russell diagram to determine the relative brightness and temperature of a white dwarf star
Analyze an illustration of an astrolabe experiment to determine what is being measured
Identify the characteristics of a reflecting telescope
Evaluate information about Jupiter and compare it to the characteristics of the Earth

2011
Identify the propulsion method used to launch the space shuttle into space
Recognize the use of parallax and triangulation
Identify from a list a technology that has had the least impact on the study of space
Recognize the relative size of the different parts of the universe
Classify space technologies according to their functions
Identify differences between the geocentric and heliocentric models of the universe
Identify a comet's size of orbit based on a chart
Evaluate a source to determine a correct assumption about sunspots
Determine which star shown in a diagram has a given altitude and azimuth
Identify the characteristics of a reflecting telescope
Evaluate information about Jupiter and compare it to the characteristics of the Earth