

Living Environment Lesson Plans

Unit 1 – Days 1 – 3

Lesson Goals – Introduce them to class expectations and the concept of Biology.

EQ – What is biology and how have you used biology in your life or how has it affected you?

Topics

- discuss what is needed / required for the class
- how can everyone be successful in the class
- what my expectations are as a teacher
- what is biology
- when have they used biology in their decision making
- how have they learned about biology to date

Strategies

- list requirements and expectations
- discuss biology as it relates to them and their understanding

Unit 2 – Days 4 – 8

Lesson Goals – Teach the scientific method and how it works

- Theory
- General Biological Concepts

EQ –

- What is the scientific process?
- What is a theory?

Topics

- Hypothesis
- Control
- Variables
- Graphing
- Inferring
- Theory
- Cells
- Viruses
- Homeostasis
- Evolution

Strategies – How did they pick out what to wear this morning?
What is their understanding of these topics coming in?
Working in pairs to develop good examples of the topics.
Preview through homework
Lab

Assessment - quiz

Unit 3 – Days 9 – 16

Lesson Goals – Students will know the characteristics shared by all life on Earth.

Students will understand how chemistry relates to biology and the chemical processes that allow life to exist.

EQ –

- What makes something alive?
- What does chemistry look like in biology?
- What is the difference between an organic and an inorganic molecule?
- Why is water so unique and important to life?
- What are the relationships and outcomes when things get dissolved?

Topics –

- Characteristics of life – reproduction, cells, genetic information, homeostasis, metabolism, growth, nutrition
- Excretion
- Atom and the atomic structure
- Chemical bonds
- Organic and inorganic molecules
- Carbohydrates, lipids, proteins, nucleic acids
- Denaturing
- pH
- properties of water – polarity, adhesion, cohesion
- chemical reaction vs. phase change
- dissolution

Strategies –

- preview through homework
- question / answer
- demo
- kinesthetic activity for diffusion
- water throw
- relationship to foods
- reading for understanding
- review
- lab

Assessment – quiz

Unit 4 – Days 17 – 24

Lesson Goals – Students should understand what cells are, how the organelles function, how cells move materials, the differences between plant and animal cells, and active vs. passive transport.

EQ

- What is a cell?
- What led to the discovery of the cell?
- What is the cell theory and who is responsible for it?
- Why can't cells be large?
- What are the parts that make a cell a cell and what are the differences between plant and animal cells?
- How does the cell membrane work?
- What is active transport?

Topics –

- cells
- organelles
- theories
- diffusion
- passive, facilitated, and active transport
- sodium-potassium pump
- cell theory
- microscopes
- ATP

Strategies

- preview through homework
- question / answer
- reflex activity
- view animal and plant cells for differences
- lab

Assessment - quiz

Unit 5 - Day 25 – Day 28

Lesson Goals – Students will understand how molecules move through space.

Students will understand concentration gradients as they relate to diffusion and osmosis.

Students will be introduced to how cells communicate.

Students will be able to properly describe a solution relative to the amount of solute.

Students will know the differences between different types of membranes.

Students will understand how osmosis relates to turgor pressure and the effects of this on a cell.

EQ –

- How do molecules move through space?
- How do cells communicate?
- How do we describe solutions and membranes?
- What happens when water pressure rises or falls?

Topics

- Gradient
- Diffusion
- Osmosis
- Receptors
- Markers
- Hypertonic
- Hypotonic
- Isotonic
- Permeable
- Semi-permeable
- Selectively permeable
- Turgor pressure – plasmolysis & cytolysis

Strategies

- Review
- Draw, demonstrate, students try in groups
- Adrenaline rush for students to demonstrate markers and receptors
- Hose story
- Lab

Assessment – EXAM day 1 – 28

Unit 6 – day 29 – 32

Lesson Goals -

Students will know the monomeric units, uses, and sources of carbohydrates, proteins, lipids, and nucleic acids.

Students will know how to recognize an enzyme and sugar.

EQ

- What are the 4 major molecules that we use?
- How can you recognize an enzyme?

Topics

- Carbohydrates
- Proteins
- Lipids
- Nucleic acids
- Monomers
- Enzymes
- Receptor molecules
- Feedback mechanism

Strategies

- Preview through homework
- Review
- Discuss
- Examples
- Lab

Assessment – quiz

Unit 7 – Days 33 – 35

Lesson Goals

Students will know what photosynthesis is and the process in detail.

Students will know the parts and functions of a leaf as well as why the anatomy of a leaf is the way it is relative to water retention and photosynthesis.

Students will know the chemical equation for photosynthesis.

EQ

- What is photosynthesis?
- What are the parts and functions of a leaf?

Topics

- Photosynthesis
- Light energy
- Chemical energy
- Chloroplast
- Chlorophyll
- Thylakoid
- Light reaction
- Dark reaction
- Calvin cycle
- Carrier molecule NADP
- Pigments
- Cuticle
- Palisade layer
- Spongy layer
- Epidermis
- Guard cell
- Stoma
- Vein

Strategies

- Review
- Diagrams
- Discussion
- Party analogy
- Worksheet
- Lab

Assessment – quiz

Unit 8 – day 35

Lesson Goals – student will identify what type of learner they are and how to study accordingly.

EQ

What kind of learner are you and how can you study based on this?

Strategies

- Try to help students identify what kind of learner they are through examples.
- Help students recognize studying strategies that will help them.

Topics

- Interpersonal
- Intrapersonal
- Audio
- Visual
- Logical
- Kinesthetic

Unit 9 – Day 36 – 40

Lesson Goals

- Students should know what cellular respiration is.
- Students should know the chemical equation for respiration.
- Students should know the differences between aerobic and anaerobic respiration.
- Students should know why they need oxygen to stay alive.
- Students should know what the electron transport chain is.

EQ

- How does photosynthesis relate to respiration?
- What are the stages of respiration?
- Why do I really need oxygen?

Topics

- Respiration
- Chemical equation
- Glycolysis
- Pyruvic acid
- Aerobic
- Anaerobic
- ATP
- Mitochondria
- Krebs cycle
- Electron transport chain
- Glucose
- Fermentation – lactic acid and alcohol

Strategies

- Preview through homework
- Students are asked what they know.
- Asked what happens if they cannot get oxygen and then try to figure out why.
- Compare and contrast Photosynthesis to aerobic respiration
- Large muscle activity to create lactic acid.
- Review flow chart.
- Lab

Assessment – exam

Days 42 – 43 – review for the e10 week exam

Day 44 10 week exam

Day 45 – review the 10 week exam

Unit 10 – Day 46 – 60

Lesson Goals

Students will know the process of mitosis.

Students will know the process of meiosis.

Students will understand the difference between asexual and sexual reproduction.

Students will understand the process of cloning.

Students will recognize offspring that are genetically different from the parents and those that are not.

Students will recognize haploid cells from diploid cells.

Students will learn how to write a scientific position paper.

Students will be able to distinguish between a gene and an allele.

Students will know what a mutation is and the different kinds of mutations.

Students will know what mutations can lead to.

Students will understand what can lead to mutations.

Students will know what gene expression is and why it is important.

Students will know how to use a Punnett Square and what they predict.

EQ

How do cells reproduce?

What is meiosis?

What is cloning?

What did you inherit from your parents and how did you inherit these traits?

How can 2 green plants produce a yellow plant?

What is a mutation?

What causes a mutation?

How does a gene express itself?

Why is blood type so complicated?

Topics

- Cell reproduction
- Mitosis
- Meiosis
- Haploid
- Diploid
- Mutation
- Cloning
- Gene
- Allele
- Dominant
- Recessive
- Grafting
- Genetic recombination

Strategies

- Preview through homework
- Research paper
- Diagrams and visual aides
- Questions and answers
- Pair share
- Grill and drill with a partner
- Lab

Unit 11 – day 61 – 68

Lesson Goals

Students will know what DNA is and how it is replicated.

Students will know the base pairing of the nitrogen bases.

Students will know the basic structure of a DNA strand and the nucleic acids that build it.

Students will recognize that some errors are made during replication, but most are fixed.

Students will begin to tie DNA to proteins that make their bodies.

EQ

- How does DNA relate to me?
- What is this? (referencing a diagram of a DNA strand)
- What is replication?
- Do errors occur and what happens to them?
- How does DNA relate to genes / inheritance / and proteins?
- Why do we have extra DNA?

Topics

- Replication
- Helicase
- Polymerase
- Double helix
- Nucleotide
- Nitrogen base pairs
- Genes

Strategies

- Preview through homework
- Diagrams and visual aides
- Examples
- Discussion
- Lab

Assessment – quiz

Unit 12 – Day 69 – 74

Lesson Goals

Students will know what RNA is.

Students will understand the connection between DNA and RNA.

Students will know the differences between DNA and RNA.

Students will know the different kinds of RNA and their functions.

Students will know the protein synthesis process.

EQ

- What is RNA?
- What are codons and how do they affect us?
- What is this – in reference to protein synthesis (diagram)?

Topics

- RNA
- mRNA
- tRNA
- rRNA
- nucleotide
- uracil
- ribose
- ribosome
- transcription
- translation
- amino acid
- protein globule
- denatured

Strategies

- preview through homework
- diagrams
- discussion
- Lab

Assessment – Exam

Unit 13 – Day 75 – 79

Lesson Goals

Students will understand how genetic technology has benefited them.

Students will know the process of gene splicing.

Students will understand why bacteria are so important in the medical field in terms of genetic technology.

Students will know what the human genome project is and will be able to discuss where it could take humanity.

EQ

- How does genetic technology relate to you?
- What is the human genome project?
- How are bacteria a key player in genetic technology?
- Why are bacteria so important?

Topics

- Genome project
- Medical research
 - Drugs
 - Vaccines
 - Insulin
 - Organ transplants
- Agricultural benefits
 - Reduced fertilizer
 - Drought tolerant plants
 - Reduced pesticide
 - Increased productivity
 - Improved livestock
 - Protein genes
 - More appealing crops
- Bacteria
- Gene splicing

Strategies

- Preview through homework
- Discussion – class and pairs
- Personal experiences
- Conceptualization
- Diagrams and examples
- Lab

Assessment – quiz

Unit 14 – days 80 – 83

Review for and administer the 20 week exam

Days 84 – 88ish – review the 20 week exam and Regents week – use to catch up and preview for the 2nd half of the year.

Unit 15 – Days 89 – 95

Introduction of Evolution

Lesson Goals

Be able to relate evolution to household items such as computers, toothbrushes, cars, cooking appliances, etc...

Students should understand the theory of how life may have begun.

Students should understand how life likely started and changed to what it is today.

Students should understand how the fossil record plays a key role in the idea of evolution.

Students should be able to read and construct a phylogenic tree.

Students should be able to identify 4 supporting pieces of evidence for the theory of evolution.

Students should be able to explain the theory of spontaneous generation and biogenesis and the work people did to support biogenesis.

EQ

- What is the theory of evolution?
- Where did life start?
- How did life develop?
- What was the first life form?
- What do evolutionary changes look like?
- What supports the theory of evolution?
- How are fossils dated?

Topics

- Theory of evolution
- Origin of life
- Fossils
- First life forms – to present complex life forms
- Evolutionary changes
- Phylogenic tree
- Spontaneous generation
- Biogenesis

Strategies

- Preview through homework
- Map of an item that has changed
- Discussion
- Working with and creating a phylogenic tree
- Pair work
- Examples
- Diagrams
- Lab

Assessment – quiz

Unit 16 – days 96 – 106

Lesson Goals

Students should be able to relate evolution to life and death.

Students should be able to link genetic change with structural, functional, or behavioral change.

Students should recognize an adaptive value and explain how it becomes a normal part of a population.

Students should recognize sources of genetic variation.

Students should understand how overproduction leads to evolution.

Students should understand that individuals cannot evolve.

Students should understand the conditions vital for evolution to take place.

Students will know who Darwin is and the theory of natural selection.

Students will be able to identify evidence of common ancestry.

EQ

- How does evolution relate to life?
- What does genetic variation cause?
- What is adaptive value?
- Where does variation come from?
- What leads to some individuals out competing others without an increase or decrease in the population over time?
- Who is Darwin and what did he do?
- How does natural selection work?
- Does natural selection occur in our society?
- What evidence is there for common ancestry?

Topics

- Evolution
- Extinction
- Extirpation
- Genetic variation
- Adaptive value
- Overproduction
- Natural Selection
- Common Ancestry

Strategies

- Preview through homework
- Discussions
- Examples
- Worksheet
- Video
- Lab

Assessment – exam

Unit 17 – Days 107 – 111

Lesson Goals

Students will understand what a species is.

Students will understand the two concepts that have led to the present definition of a species.

Students will understand how a species evolves.

Students will understand what a population is.

Students will understand the Hardy-Weinberg Principle.

Students will understand how geographic or reproductive isolation can lead to a new species.

Students will know the classification system K,P,C.O,F,G,S.

EQ

- What is a species?
- How do species evolve?
- What makes a population?
- What are the 7 levels of classification of living organisms?

Topics

- Speciation
- Species
- Morphological species concept
- Biological species concept
- Punctuated equilibrium
- Gradualism
- Population
- Genotype
- Phenotype
- Genetic drift
- Isolation – reproductive and geographical
- Classification

Strategies

- Preview through homework
- Examples through discussion
- Diagrams
- Lab

Assessment - Quiz

Unit 18 – Days 112 – 118

Lesson Goals

Students will know the parts and functions of a flower as they relate to reproduction in plants.

Students will know how fertilization leads to germination.

Students will know the parts and functions of a seed and embryonic plant.

Students will know the parts and functions of the female reproductive anatomy as it relates to reproduction.

Students will know the parts and functions of the male reproductive anatomy as it relates to reproduction.

EQ

- How do plants and animals reproduce?
- What is the role of each part of a flower?
- How are eggs produced?
- How are sperm produced?
- How does fertilization lead to germination?
- What are the differences between a monocot seed and a dicot seed?
- What are the male reproductive parts and the role of each?
- What are the female reproductive parts and the role of each?

Topics

- Flower parts and functions
- Sperm
- Eggs
- Self-pollination
- Cross-pollination
- Fertilization
- Germination
- Seed dispersal
- Male reproductive anatomy
- Female reproductive anatomy

Strategies

- Preview through homework
- Diagrams
- Discussion
- Fill in the blanks
- Lab

Assessment - Quiz

Unit 19 – Days 119 - 127

Lesson Goals

Students will know how and where fertilization takes place.

Students will know the roles of hormones in the process of fertilization.

Students will understand the process and purpose of the menstrual cycle.

Students will recognize feedback mechanisms involved in the menstrual cycle.

Students will know what differentiation is and how it relates to human development.

Students will understand what happens during each of the trimesters.

Students will know what abortion is and the different methods used at different stages of development.

Students will know different examples of reproductive technology and the benefits.

EQ

What is the pathway and result of fertilization?

What is the menstrual cycle and why must it occur?

How do hormones play a role in the female and male reproductive system?

How do we end up with so many types of cells and when do they first form?

What are trimesters and what happens in each?

What is an abortion and how do they occur?

What is reproductive technology and how is it used?

Topics

- Hormones
- Menstrual cycle
- Testosterone
- Differentiation
- Gestation
- Trimesters
- Abortion
- Reproductive technology

Strategies

- Preview through homework
- Diagrams
- Discussion
- Examples
- Movie
- Lab

Assessment – exam

20 Week exam review, administration, and discussion Days 128 – 131

Unit 20 – Days 132 – 147

Lesson Goals

Students will know the basic bones of the human skeleton.

Students will know the cavities of the human body and the organs housed in each.

Students will know what connective tissue is and where it is found in the body.

Students will know the basic muscles of the human body.

Students will know the parts of a muscle.

Students will know how muscles move.

Students will know the parts and functions of the integumentary system.

Students will know the parts and functions of the excretory system.

Students will know the parts and functions of the nervous system.

Students will know the different parts and functions of the brain.

Students will know the parts and functions of the circulatory system.

Students will know the pathway of blood flow throughout the body.

Students will know the parts and functions of the digestive system.

Students will know how a typical meal gets digested.

Students will know what the differences between vitamins, minerals, and nutrients are and the importance of each.

Students will know the parts and functions of the respiratory system.

Students will know the parts and functions of the endocrine system.

Students will know what endocrine disruptors are.

Students will know what their immune system is and how it functions.

Topics

- Bones
- Cavities
- Muscles
- Muscle cell, muscle fiber, myofibril, myosin, actin, cross bridges
- Tendon
- Ligament
- Skin – epidermis, dermis, glands, hair, integumentary structures and functions
- Excretion
- Kidney
- Nephron tubules – ureter – bladder – urethra
- Lungs
- Nervous tissue
- Nerve cell
- Brain tissue
- Heart, valves, aorta, artery, vein, capillary, ventricle, atrium
- Esophagus, stomach, duodenum, gall bladder, small intestine, large intestine, villi, micro-villi, pancreas, liver, enzymes, acid, ulcer, heartburn, acid reflux
- Vitamin, mineral, nutrient
- Lungs, brachia, alveoli, diffusion
- Hormones
- Antibodies, antigens, markers, white blood cells, fever

Strategies

- Preview through homework
- Discussion
- Personal experiences
- Labs
- Models
- Diagrams

Assessments – quizzes and exams

Unit 21 – Days 148 – 156

Lesson Goals

Students will understand what an ecosystem is.

Students will understand energy flow through an ecosystem.

Students will understand how the environment limits population size.

Students will understand carrying capacity – both social and environmental.

Students will understand bioaccumulation.

Students will understand simple relationships that exist within ecosystems.

Students will understand the importance of biodiversity.

Students will understand environmental succession.

Students will understand what introduced species are and their impact on the environment as well as local examples.

EQ

- What is an ecosystem?
- What is carrying capacity?
- Why is biodiversity so important?
- What happens with a changing environment?

Topics

- Ecosystem
- Energy flow
- Ecology
- Competition
- Carrying capacity
- Dynamic equilibrium
- Bioaccumulation
- Parasite
- Symbiotic relationship
- Biodiversity
- Succession
- Introduced species

Strategies

- Preview through homework
- Diagrams
- Examples
- Discussion
- Outside observations
- Labs

Assessment – exam

Unit 22 – Days 157 – 160

Lesson goals

Students will understand how they impact the environment around them.

Students will understand how humans cumulatively impact the environment.

Students will understand the concepts of “Global Warming”, “Ozone Depletion”, “Habitat Loss / Destruction”, “Water Pollution”, and “Air Pollution”.

Students will understand what an ecological footprint is.

EQ

- How do you impact the environment?
- How do you disturb the environment?
- What is your ecological footprint?

Topics

- Air pollution
- Water pollution
- Global warming
- Ozone depletion
- Habitat destruction
- Ecological footprint

Strategies

- Preview through homework
- Examples
- Pictures
- Discussion
- Experiences
- Reflection
- Labs

Assessment – exam

Unit 23 – Review for and administer the 40 week exam and the Regents exam.