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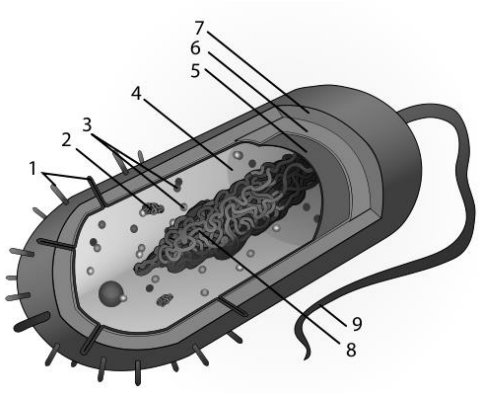
Unit 1 – Basic Biological Principles

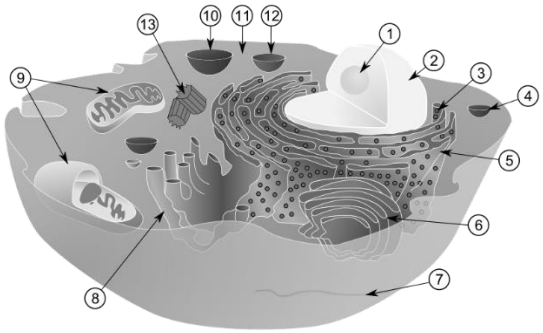
1. What are the 7 characteristics of life?
   a. _____
   b. _____
   c. _____
   d. _____
   e. _____
   f. _____
   g. _____

Eukaryotic cell parts you should be able to identify and label:

- Nucleus
- Nucleolus
- Rough/smooth ER
- Ribosomes
- Golgi apparatus
- Mitochondria
- Chloroplast
- Vacuole (temporary and central)
- Cell membrane
- Cell wall

2. What type of cell does not have a nucleus? _____
3. What type of cell has a nucleus? _____
4. Label the parts of the prokaryotic and eukaryotic cells:





Diagrams courtesy of Mariana Ruiz Villarreal and Messer Woland via Wikimedia Commons

5. What type of eukaryotic cell is pictured above? _____
6. What structure makes up the boundary of the cell? _____
7. Provide two examples of prokaryotes: _____ _____
8. Provide three types of eukaryotic cells: _____
9. Ribosome make _____.
10. Proteins that are destined to be excreted from the cell go to the _____ after the ribosomes.
11. The final destination for proteins being excreted from the cell is the _____.
12. What is an organelle? _____
13. Where is sugar turned into ATP? _____
14. Where is light energy converted to chemical energy (sugars)? _____

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Unit 2 – Chemical Basis for Life

1. What must be present for a compound to be organic? _____
2. A **polar / nonpolar** bond occurs when electrons are unevenly shared.
3. What are the three important properties of water that support life on Earth?
    a. _____
    b. _____
    c. _____
4. What two reasons allow carbon to create large, complex molecules?
    a. _____
    b. _____
5. Dehydration synthesis _____ a bond by _____ water. Hydrolysis _____ a bond by _____ water to the bond.
6. Describe the relationship between monomers and polymers.

7. Carbohydrates provide _____ for the cell.
8. Lipids make up the cell _____.
9. Amino acids are the monomer of _____. Amino acids are made up of the following three parts:
    a. _____
    b. _____
    c. _____
10. Nucleotides are the monomer of _____. The three parts of a nucleotide are:
    a. _____
    b. _____
    c. _____
11. What are the two properties of enzymes that allow them to act as biological catalysts?

12. List three things that affect the function of an enzyme? _____

Macromolecule	Elements	Monomer and polymer	Roles
	CHO	Monosaccharide/polysaccharide	
Lipids			Long-term energy source; cell membrane
Nucleic acids	CHOPN		
	CHON		Structure and enzymes

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Unit 3 – Bioenergetics

1. What is an autotroph? Provide 2 examples.

2. What is a heterotroph? Provide 2 examples.

3. In cellular respiration, glucose is converted to _____.
4. Where is the energy in an ATP molecule? _____
5. The equation for cellular respiration is the _____ of photosynthesis.
6. Describe the difference between aerobic and anaerobic respiration.

7. Compare the energy transformations in photosynthesis with those in cellular respiration.

8. Describe the importance of chloroplasts and mitochondria in cellular respiration and photosynthesis.

Terminology Review (Unit 8)

_____1. Fact

_____2. Hypothesis

_____3. Inference

_____4. Law

_____5. Observation

_____6. Principle

_____7. Theory

A. Generalizes a body of observations; no exceptions have been found. Explains but does not describe. Basis of scientific principles
B. Explanation of observable phenomena based on available data; can change when new data contradicts observed phenomena
C. Something that can be perceived using one of the five senses
D. Something that is true
E. A logical conclusion based on known evidence
F. Concept based on scientific laws
G. A proposed, scientifically testable explanation for an observed phenomenon

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Unit 4 – Homeostasis and Transport

1. In diffusion, molecules move from an area of _____ concentration to an area of _____ concentration.
2. **True / False**: Molecules no longer move across the cell membrane once equilibrium is reached.
3. In a hypotonic solution, there is a _____ solute / _____ water concentration OUTSIDE the cell. Water moves _____ the cell.
4. In a hypertonic solution, there is _____ solute / _____ water concentration OUTSIDE the cell. Water moves _____ the cell.
5. In an isotonic solution, there is an _____ solute/water concentration outside AND inside the cell. Water moves _____ the cell _____.
6. Plant cells are healthiest in what type of solution? **Hypotonic isotonic hypertonic**
7. Animal cells are healthiest in what type of solution? **Hypotonic isotonic hypertonic**
8. Facilitated diffusion requires a _____ to move large or charged particles across the cell membrane.
9. What type of molecule is the "facilitator" in facilitated diffusion? _____
10. The type of transport that goes against the concentration gradient is _____
11. What is required for active transport to occur? _____
12. An example of an active transport protein pump in humans is the _____

Draw and label a plant and animal cell in each type of solution. Star the healthiest.

Cell type	Hypotonic	Hypertonic	Isotonic
Animal			
Plant			

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Unit 5 – Cell Growth and Reproduction

1. List the three reasons a cell divides:
    a. _____
    b. _____
    c. _____
2. The longest phase of the cell cycle is _____.
3. In G1, the cell _____.
4. The DNA is copied during _____.
5. The last stage of interphase is _____.
6. The goal of mitosis is to get cells that are genetically _____. The chromosome number goes 2N → 2N
    a. What does the "N" mean? _____
7. Write the stage of mitosis next to what is occurring in that stage.
    a. Nucleus reforms, DNA loosens, last stage _____
    b. Chromosomes line up in the middle of the cell _____
    c. DNA condenses; nuclear envelope breaks down _____
    d. Chromosomes move to opposite sides of the cell _____
8. What is the difference between plant and animal telophase/cytokinesis?

9. What cell part do animal cells have to help them complete cytokinesis?

10. The goal of meiosis is to get cells that are genetically _____. The chromosome number goes 2N → 1N
11. The cells at the end of mitosis are **diploid / haploid** and cells at the end of meiosis are **diploid / haploid**.
12. What is crossing over?

13. When does crossing over occur? _____
14. When chromosomes fail to separate, it is known as _____.

    _____ syndrome and Patau syndrome are results of this.

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Unit 6 – Genetics

1. Match the vocabulary terms to their definitions:

____ Dominant allele

____ Recessive allele

____ genotype

____ heterozygous

____ homozygous

____ phenotype

____ codominant

____ incomplete dominance

____ allele

____ gene

____chromosome

A. Organism with two different alleles for the same trait
B. Different versions of a gene
C. A relationship between two alleles in which both alleles are expressed equally
D. Genetic make up
E. Physical characteristics
F. Organism that has two identical alleles for a trait
G. Tool that can predict and compare genetic variation
H. Allele that can be masked
I. A relationship between two alleles in which neither is dominant and the resulting phenotype is a blend of each allele
J. A single piece of tightly packed DNA, we have 46
K. Basic unit of heredity that codes for a protein
L. Allele that can mask other alleles

2. If a dominant allele does not completely mask the recessive allele, there is a blend of the two traits, it is called _____ dominance.
3. When both alleles are expressed equally in the phenotype, such as in human blood type, it is called _____.
4. Sex-linked traits are found on the _____ chromosomes. **Males / females** inherit these disorders more frequently. Sex chromosome genotype for males: _____ Females: _____
5. What is genetic engineering? Describe how it has impacted the fields of agriculture, medicine, and forensics.

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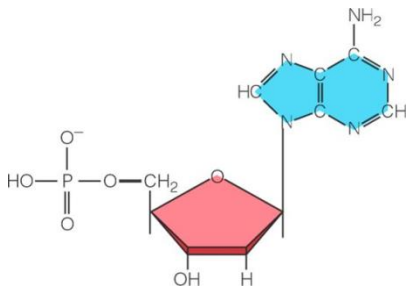
Unit 6 – Genetics (cont'd)

1. Label the parts of the nucleotide on the right.



2. DNA has ___ strands and the bases ___denine, ___hymine, ___ytosine, and ___uanine.
3. RNA has ___ strand and the base ___racil instead of _____.
4. What is the function of

   mRNA?

   tRNA?

5. Describe the base pairing rule for DNA and RNA.

6. What is replication?

7. What occurs during transcription? Where does it occur?

8. What occurs during translation? Where does it occur?

9. What is a codon? What does it "code" for? _____
10. What does AUG code for? _____ What do UGA, UAA, and UAG code for? _____
11. What is the biological definition of a mutation? _____
12. Describe each of the following types of mutations and whether or not there will be a change in phenotype.
    a. Substitution mutation
    b. Insertion point mutation
    c. Deletion point mutation
    d. Duplication chromosomal mutation
    e. Deletion chromosomal mutation
    f. Inversion chromosomal mutation
    g. Translocation chromosomal mutation

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Unit 7 – Ecology

1. Beginning with organism, write the levels of ecological organization from smallest to largest.

2. _____ make their own food, and _____ eat other organisms for food.
3. As you move up the energy pyramid, the amount of available energy **increases / decreases**.
4. What is the difference between a food chain and a food web?

5. What is the different between abiotic and biotic factors?

6. What abiotic factors determine plant growth in an area?

7. List some abiotic factors for an aquatic ecosystem.

8. Explain the following organism interactions:
    a. Competition

    b. Predation

    c. Mutualism

    d. Commensalism

    e. Parasitism

9. _____ species are naturally found in a specific area, while _____ species are accidentally or purposefully introduced to a new area.
10. Describe primary and secondary succession. Provide 2 examples of each.

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Unit 8 – Evolution

1. The process by which new species develop from pre-existing species is known as _____.
2. **TRUE / FALSE**. There are always enough resources to support all organisms in an area.
3. Species that have advantageous traits _____ and _____. Thus, passing on their traits to the next generation.
4. Species that do not have advantageous traits _____ and therefore are not able to pass on their traits to the next generation.
5. Which type of isolating mechanism MUST be present for a new species to develop?

6. A decrease in genetic variation caused by the formation of a new population by a small number of individuals from a larger population is known as _____.

7. Describe the following pieces of evolution and why they support the theory.
    a. Fossils

    b. Homologous structures

    c. Analogous structures

    d. Embryology

    e. Biochemistry

8. Species that undergo gradualism change _____ over a long period of time.
9. Species that undergo punctuated equilibrium change _____ over short periods of time.
10. Give an example of each of the following and describe the consequences.
    a. Artificial selection

    b. Inbreeding

    c. Hybridization