

Unit 1

- **Observations & Inferences:** Make observations and inferences about the photo below:



Observations	Inferences
<i>Quantitative:</i>	
<i>Qualitative:</i>	

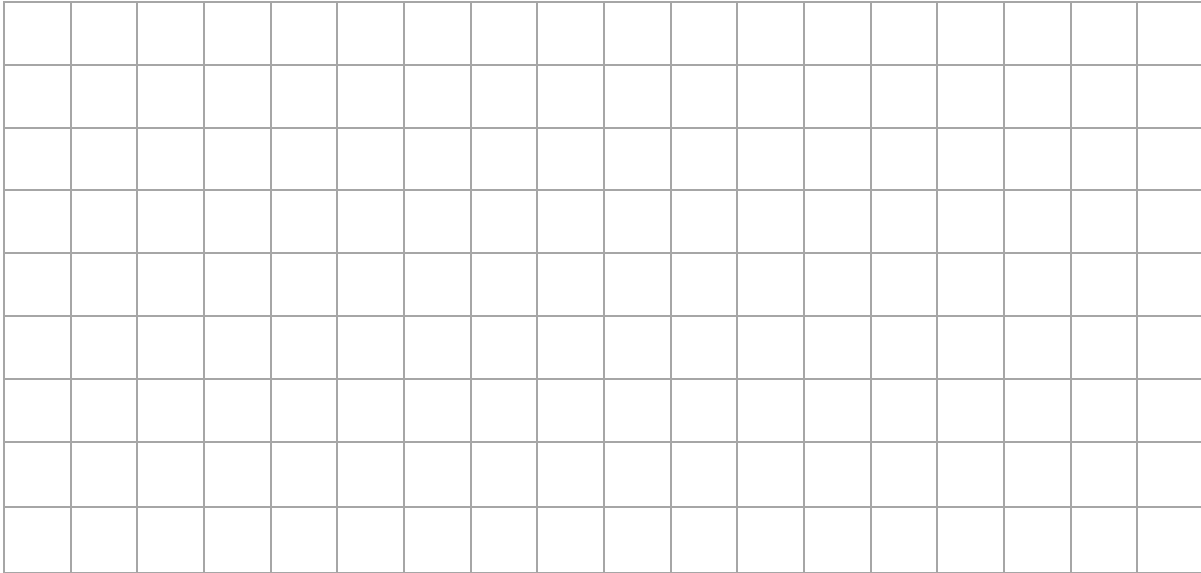
- **Scientific Method, Exp Design, Graphing**

pH measures how acidic a substance is. Water is considered neutral and generally has a pH of 7. You wanted to know if tadpoles would survive better in tanks of water that had a pH different than 7. You put 100 tadpoles into 6 different tanks of water that had different pH's and then counted how many tadpoles were still alive after 3 days. The results are in the table to the right:

pH of water	Number of tadpoles
8.0	45
7.5	69
7.0	78
6.5	88
6.0	43
5.5	23

- What is the scientific question that is being tested?
- What is the independent variable in this experiment?
- What is the dependent variable?
- What are some variables that were held constant in this experiment?
- Which group is considered the control group?

- f. Graph the data in an appropriate line graph. **Please include a title and label your axes** accordingly. Remember, the **independent variable** goes on the **x-axis** and the **dependent variable** goes on the **y-axis**.



- g. Based on this data, what is the optimum water pH for tadpole development?
- h. Between which two pH readings is there the greatest change in tadpole number?
- i. Based on your graph, approximately how many tadpoles would you expect to find in water that had a pH of 5.0?

- **Characteristics of Life**

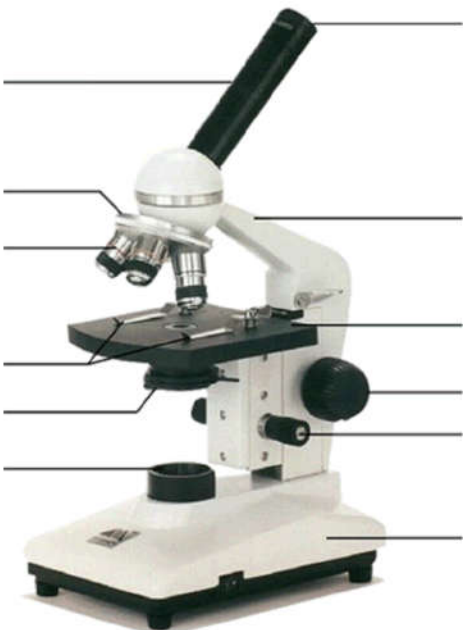
- What are the 7 characteristics of living things? (ROACH ERG!)

- **Homeostasis**

- Be able to give an example of how homeostasis is maintained in your body.

- **Classification of Organisms**
- **Naming Organisms:** Word Bank: *genus, species (x2), different (x2), same (x3), kingdom*
- An organism's scientific name is made of its \_\_\_\_\_ then its \_\_\_\_\_
- If 2 organisms are in the same genus, they must be in the \_\_\_\_\_ family
- Clostridium tetani and Clostridium botulinum are two types of bacteria from the Eubacteria \_\_\_\_\_. They are \_\_\_\_\_ species, but they are in the \_\_\_\_\_ genus
- The **Class** of Mammals includes organisms such as rabbits and elephants which are in the \_\_\_\_\_ **Phylum** but \_\_\_\_\_ **Species**
- Only organisms that interbreed and produce fertile offspring are in the same \_\_\_\_\_
- **Kingdoms:** complete the chart using the terms: *eukaryotic, unicellular, multicellular, autotroph, heterotroph, prokaryotic*

<b>Kingdom</b>	<b>Cell Type</b>	<b>Cell Structure</b>	<b>Number of cells</b>	<b>Nutrition</b>	<b>Examples</b>
Eubacteria		Cell wall (Peptidoglycan)		Autotroph or heterotroph	All common bacteria
Archeabacteria		Cell wall	Unicellular	Autotroph or heterotroph	Extremophiles
Protista	Eukaryotic	Mixed	Uni or Multicellular	Autotroph or Heterotroph	Ameoba, Paramecium
Fungi		Cell wall (chitin)	Uni or Multicellular		Mushrooms, yeast
Plantae		Cell Wall (cellulose)			Grass, Flowers
Animalia		No cell wall			Cats, Jellyfish

- **Microscope:** Label the parts of the microscope
- 
- Assume the ocular lens is 10x.
    - If the magnification of objective lens was 4x what is the total magnification?
    - If the magnification of the objective lens was 50x, what is the total magnification?
  - Why is it important to start at the lowest power objective lens?
  - What is the only adjustment knob that should be used at the highest magnification?
  - When should the diaphragm be used?

Identify the genus each bird belongs to



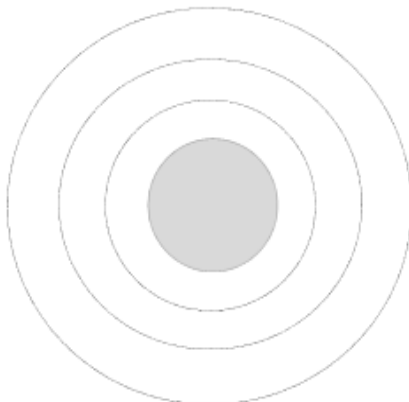
Dichotomous Key to Representative Birds	
1. a. The beak is relatively long and slender.....	<i>Certhidea</i>
b. The beak is relatively stout and heavy.....	go to 2
2. a. The bottom surface of the lower beak is flat and straight .....	<i>Geospiza</i>
b. The bottom surface of the lower beak is curved .....	go to 3
3. a. The lower edge of the upper beak has a distinct bend .....	<i>Camarhynchus</i>
b. The lower edge of the upper beak is mostly flat .....	<i>Platyspiza</i>

**Unit 2**

- Atoms, elements, molecules
- What are the 6 elements that are known as the “elements of life” (CHNOPS)?

- Complete the Bohr Diagram and information for Sodium

22.98977
<b>Na</b>
11
Sodium



Element Name	_____
Atomic Number:	_____
# Protons:	_____
# Electrons:	_____
Atomic Mass:	_____
# Neutrons:	_____
# electrons in 1 <sup>st</sup> shell:	_____
# electrons in 2 <sup>nd</sup> shell:	_____
# electrons in 3 <sup>rd</sup> shell:	_____
# valence electrons	_____

- **Ionic vs. Covalent Compounds:** fill in the blanks with “shared” or “transferred”
  - In an ionic compound, electrons are \_\_\_\_\_
  - In a covalent compound, electrons are \_\_\_\_\_
- In general, how many valence electrons does each atom want to have? What are the exceptions?
- What is meant by “HONC-1234”? (think back to the molecular models lab)

• **Properties of Water, Acid, Base, pH**

**Word Bank:** hydrogen bonding, float, acids, body temperature, capillary action, water, polar, 7, cohesion, solvent, adhesion, bases, high heat capacity, homeostasis, surface tension

- Water molecules have an unevenly distributed charge, this means that the molecule is \_\_\_\_\_
- \_\_\_\_\_ is the attractive force found between the positive end of one water molecule and the negative end of another water molecule.

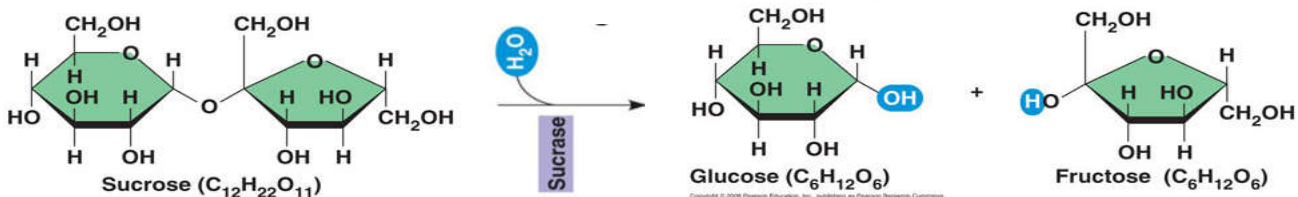
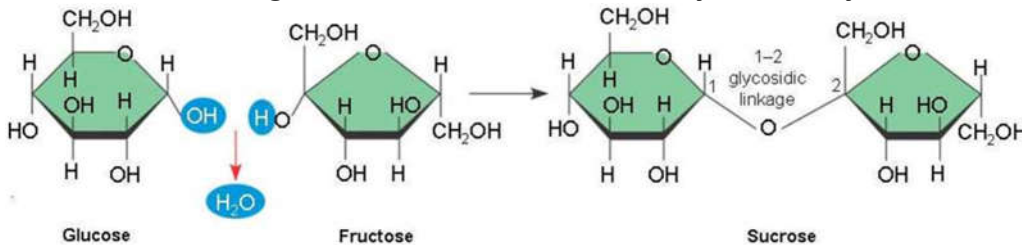
Many of the unique properties of water are caused by hydrogen bonding

- \_\_\_\_\_ is the movement of water up thin tubes, due to \_\_\_\_\_ which means that water molecules 'stick' to each other and \_\_\_\_\_ which means that water molecules can 'stick' to other substances.
- The property that helps bugs stand on water is called \_\_\_\_\_.
- Water expands when it freezes which makes ice \_\_\_\_\_.
- Water has a \_\_\_\_\_ which means it takes a lot of energy to raise or lower its temperature. This is important because it helps organisms maintain \_\_\_\_\_ by keeping a constant \_\_\_\_\_.
- Because water is a polar molecule, it is called the universal \_\_\_\_\_ which means that it can dissolve many substances.
- Cells are mostly \_\_\_\_\_, therefore much of your entire body is made of water.
- **The pH scale** is from 0-14. \_\_\_\_\_ range 0-6. \_\_\_\_\_ range 8-14. A neutral solution has a pH of \_\_\_\_\_.

• **Monomers, Polymers**

- What is the difference between a monomer and a polymer?

- Label the following two reactions as either **dehydration synthesis** or **hydrolysis**



- **Macromolecules**

**Organic Compounds:** There are **4** different organic compounds.

**All** organic molecules contain **carbon** and are necessary for **life!!!!**

- **Carbohydrates** Word Bank: *monosaccharides, built, glucose, broken down*

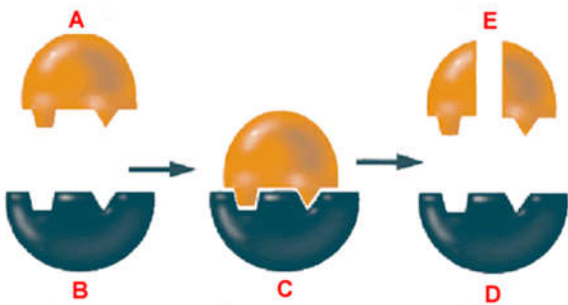
- Carbohydrates are \_\_\_\_\_ to store energy in plants and are \_\_\_\_\_ to be used as cellular energy to accomplish the characteristics of life.
- \_\_\_\_\_ are the building blocks of carbohydrates
- example \_\_\_\_\_

- **Lipids** Word Bank: *fat, cuticle, oil, store, wax, insulate*

- lipids are organic compounds that include \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- lipids are used to \_\_\_\_\_ energy in animals
- leaves have a protective lipid layer called the \_\_\_\_\_ that prevents water loss.
- lipids like those in whale blubber and human fat help \_\_\_\_\_ organisms, protecting them and keeping them warm

- **Proteins:** Word Bank: *unchanged, amino acids, active sites, peptide, enzymes, speed up, substrate*

- Proteins are made up of \_\_\_\_\_ joined together by \_\_\_\_\_ bonds.
- \_\_\_\_\_ are a special group of proteins that \_\_\_\_\_ reactions.
- Enzymes have \_\_\_\_\_ with specific shapes that allow them to interact with only one type of \_\_\_\_\_.
- Enzymes are \_\_\_\_\_ during reactions.
- Label the **substrate, enzyme, and products** in the diagram below



- **Nucleic Acids:** Word Bank: *sugar, nucleotides, phosphate, DNA (x2), RNA, nitrogen base*

- The two types of nucleic acids are \_\_\_\_\_ and \_\_\_\_\_.
- The building block of a nucleic acid is a \_\_\_\_\_, which is made of a \_\_\_\_\_, a \_\_\_\_\_, and a \_\_\_\_\_.
- \_\_\_\_\_ is common to **all** living things and it stores genetic information.

### Unit 3

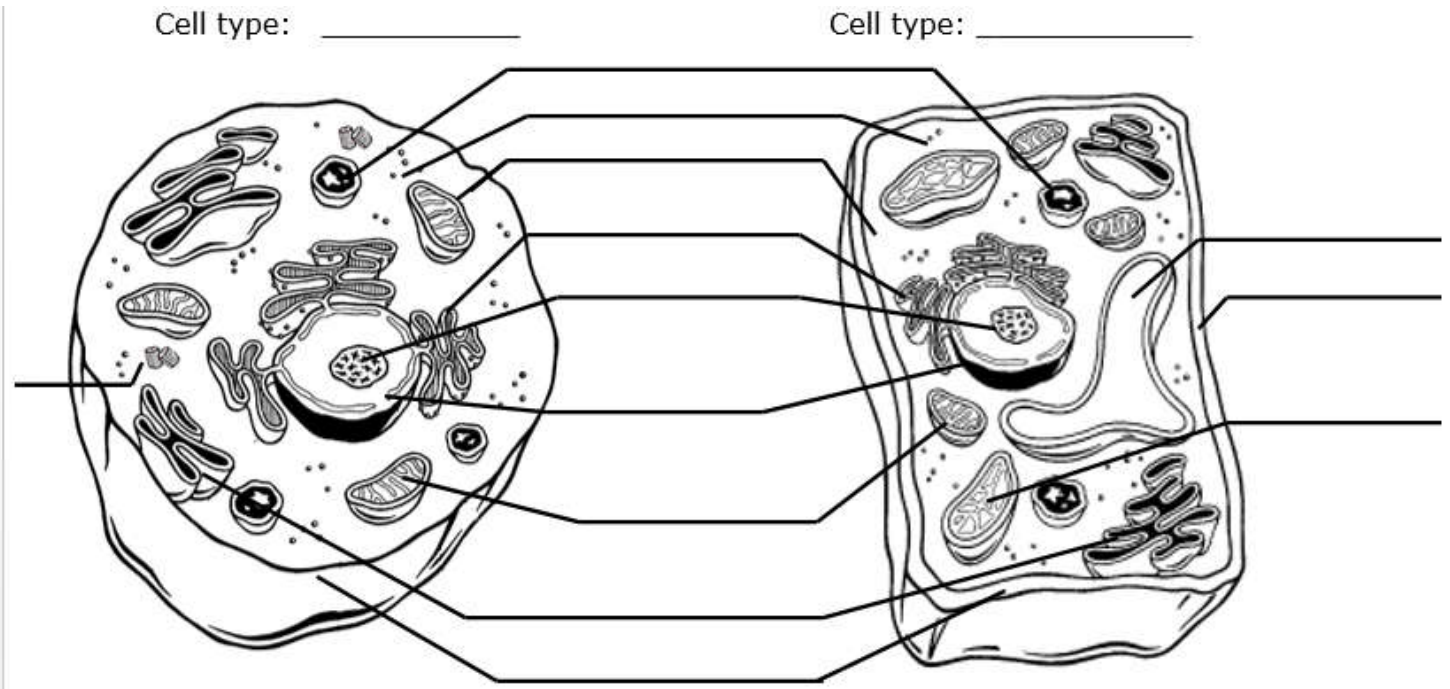
- **Types of Cells** Word Bank: *prokaryotes, eukaryotes, both* (each can be used more than once)

1. \_\_\_\_\_ - have a nucleus
2. \_\_\_\_\_ - have organelles
3. \_\_\_\_\_ - includes the kingdom Eubacteria and Archaeobacteria
4. \_\_\_\_\_ - do not have organelles (mini-organs)
5. \_\_\_\_\_ - includes Protists, Fungi, Plants, and Animals
6. \_\_\_\_\_ - have DNA, (HINT: ALL kingdoms have this in common)
7. \_\_\_\_\_ - go through mitosis
8. \_\_\_\_\_ - go through binary fission
9. \_\_\_\_\_ - have ribosomes to synthesize (make) proteins

- **Cellular Organelles:** Word Bank: *nucleus, mitochondria, vacuole, ribosomes, golgi body/apparatus, endoplasmic reticulum, nucleolus, centriole, cell wall, cytoplasm, chloroplast, lysosomes, cell membrane*

1. \_\_\_\_\_ - command center of the cell; DNA in the form of chromosomes is here
2. \_\_\_\_\_ - small organelle in the nucleus that makes ribosomes
3. \_\_\_\_\_ - the site of protein synthesis in prokaryotes and eukaryotes
4. \_\_\_\_\_ - transport system of the cell
5. \_\_\_\_\_ - collects, packages, and distributes proteins
6. \_\_\_\_\_ - contains digestive enzymes to break down old cell parts
7. \_\_\_\_\_ - storage tank of the cell
8. \_\_\_\_\_ - the powerhouse of the cell
9. \_\_\_\_\_ - organelle that conducts 'photosynthesis' for plant cells
10. \_\_\_\_\_ - assists in cell division in animal cells only
11. \_\_\_\_\_ - the jelly-like material in which organelles float inside a cell
12. \_\_\_\_\_ - made of cellulose (plants) or chitin (fungi); boundary outside of the cell membrane in some cells
13. \_\_\_\_\_ - encloses cell, controls what gets into and out of the cell

- **Cell Parts:** Label the organelles in the cells below and identify the cell type (plant vs. animal)



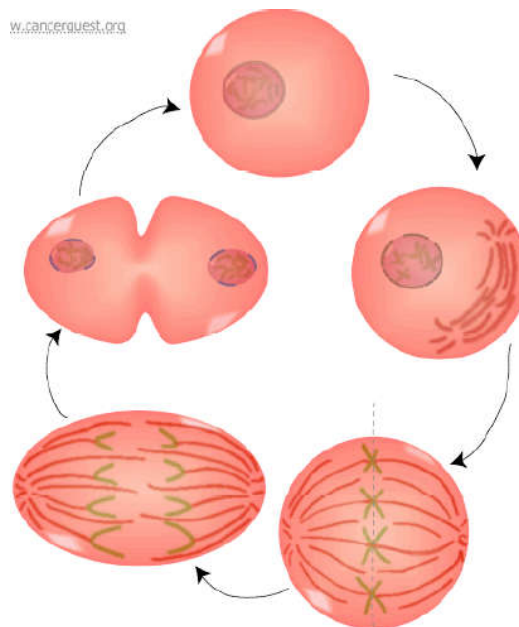
- **Cell Size**
- How does the surface area to volume ratio affect a cell's ability to absorb nutrients and get rid of waste?
- **Cell Differentiation**
- What does it mean when we say embryonic stem cells are **pluripotent**?
- Describe briefly how embryonic stem cells divide and differentiate into several different types of specialized cells in multicellular organisms.



- **Mitosis**

Word Bank: *replicated, interphase, prophase (x2), metaphase, anaphase (x2), telophase, cytokinesis, centromere (x2), chromatids, chromatin, centrioles, spindle fibers, plate, furrow*

- A chromosome is made of two identical parts called \_\_\_\_\_.
- The parts of a chromosome are held together by a \_\_\_\_\_.
- Only animal cells have \_\_\_\_\_ to help with chromosome movement.
- During \_\_\_\_\_ sister chromatids are separated at the \_\_\_\_\_ and are pulled to opposite ends of the cell.
- DNA is \_\_\_\_\_ during \_\_\_\_\_ so each cell will have the same information
- Chromosomes line up along the equator of the cell in \_\_\_\_\_.
- Loose or uncoiled chromosomes are actually DNA in the form of \_\_\_\_\_.
- During \_\_\_\_\_ spindle fibers shorten which pulls chromosomes to the poles.
- After the nucleus divides, \_\_\_\_\_ occurs: the division of the cytoplasm
- In plant cells only, a cell \_\_\_\_\_ forms during cytokinesis.
- In animal cells only, a cell \_\_\_\_\_ forms during cytokinesis.
- \_\_\_\_\_ are attached to chromosomes at the centromere
- \_\_\_\_\_ - chromosomes become visible
- \_\_\_\_\_ - nuclear membrane begins to disappear
- \_\_\_\_\_ - two daughter cells are formed
- Label each phase of mitosis in the diagram below:



- **Cell Membrane, Diffusion, Membrane Transport**

Word Bank: *diffusion, proteins (x2), active transport, phospholipids, energy, low (x2), high (x2), carbohydrates, facilitated diffusion, osmosis*

- The cell membrane is composed of \_\_\_\_\_, \_\_\_\_\_, and \_\_\_\_\_.
- Passive transport is also called \_\_\_\_\_ and it doesn't require \_\_\_\_\_
- Passive transport moves molecules move from areas of \_\_\_\_\_ to \_\_\_\_\_ concentration.
- \_\_\_\_\_ - diffusion where carrier proteins help molecules across the membrane.
- \_\_\_\_\_ is a type of diffusion involving only the movement of water molecules.
- The type of transport that requires energy is \_\_\_\_\_.
- The movement that requires energy moves molecules from \_\_\_\_\_ to \_\_\_\_\_ concentrations.
- Molecules are transported across the cell membrane by carrier \_\_\_\_\_.
- What is the structure of the cell membrane? Draw a few molecules and label the hydrophilic and hydrophobic portions. What do hydrophilic and hydrophobic mean?
- Below are animal cells placed in beakers of various concentrations.
  - Draw an arrow to show which way the water would move by osmosis
  - Identify the type of solution (isotonic, hypertonic, or hypotonic) and indicate whether the cell would swell, shrink, or remain the same in size
  - How does "salt sucks" apply to the movement of water in these scenarios?

