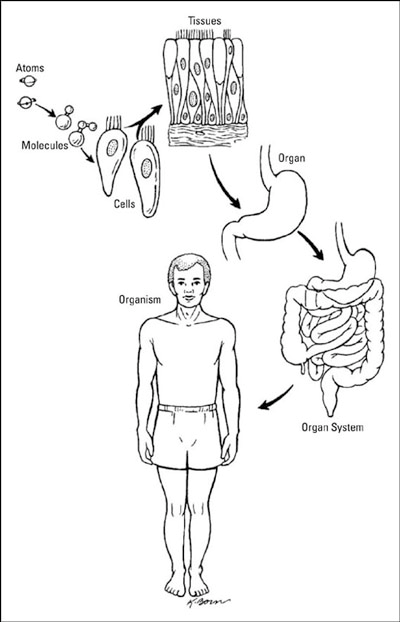
Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Unit 3: Cells, Transport, & Bioenergetics



**Unit 3 Key Take-Aways:**

* Cells are the smallest living thing, and they are made up of smaller parts that each have a special job
* Cells must communicate with each other through hormones and/or neurons
* Cells work to maintain homeostasis through passive and active transport
* Photosynthesis and Respiration are a cycle, which provide the fuel and energy for all life-sustaining reactions to happen!

**Quiz #1:**

**Quiz #2:**

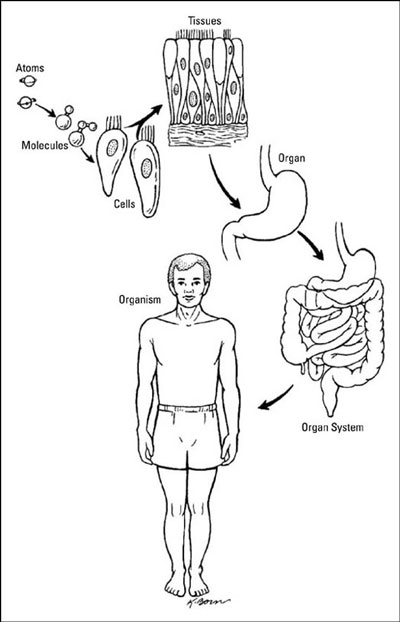
**Quiz #3:**

**Unit Test:**

Vocabulary (Choose 5): Cell, Organelle, Mitochondria, Chloroplast, Ribosome, Membrane, Osmosis, Diffusion, Facilitated Diffusion, Cytoplasm, Cell Respiration, Photosynthesis, Neuron, ATP, ADP, Phospholipid bilayer, Eukaryote, Prokaryote, Chlorophyll, Stem Cell, Active Transport, Bioenergetics, Passive Transport, Aerobic respiration, Anaerobic respiration, fermentation, equillibrium

**Cells**

**U3-1**

What is a cell?

* Cells are the smallest \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ things
* **Cell hierarchy**:

Cell**🡪** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **🡪** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **🡪** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **🡪**Organism

* Cell’s job is to make \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: which control \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the organism does!

\_\_\_\_\_\_\_\_\_ **living things are made up of** \_\_\_\_\_\_\_\_\_\_!

**Read page 172-173 in order to fill in the blanks below**(Prokaryotes and Eukaryotes).

|  |  |
| --- | --- |
| **Book Says…** | **I say…** |
| Cells come in a…. | True or False. ALL CELLS are exactly the SAME? |
| Despite their differences…. | What are the **two** characteristics that ALL CELLS have in common? |
| They are surrounded by a barrier…. |  |
| and, at some point in their lives, they contain the molecule….. | Which of the 4 organic molecules is **DNA** an example of? |
| The **nucleus** is a….. | What does the nucleus surround and protect? |
| **Eukaryotes** are….. | Draw a eukaryotic cell. |
| **Prokaryotes** are…. | Draw a prokaryotic cell. |

Prokaryotic Vs. Eukaryotic Cells

**U3-2**

Use the following words to COMPARE and CONTRAST the two types of cells [HINT: think **pro=no** (nucleus)]

* **Nucleus**
* **DNA**
* **Plasma (cell) membrane**
* **Small**
* **Large**
* **Simple**
* **Complex**
* **Older**
* **Younger**

**Prokaryotic**

**Eukaryotic**

Plant, Animal, Bacterial Cells

There are 3 examples of cells that you MUST KNOW!!! Let’s figure out how to categorize them!

|  |  |  |  |
| --- | --- | --- | --- |
| **Name** | Description: http://highered.mcgraw-hill.com/sites/dl/free/0078617022/167365/408_187_q1_q2_q3.jpg  Bacteria | Description: http://waynesword.palomar.edu/images/plant3.gif  Plants | Description: http://waynesword.palomar.edu/images/animal4.gif  Animals |
| **Characteristics** | NO nucleus  DNA | Nucleus  DNA  Internal Structures | Nucleus  DNA  Internal Structures |
| **Cell type** |  |  |  |
| **Justification**  (HOW do you know??) |  |  |  |

Active Reading

**U3-3**

Section: Introduction to Cells

Read the passage below. Then answer the questions that follow.

The first cells to appear on Earth were prokaryotic cells. A **prokaryote** is an organism made of a single prokaryotic cell. The earliest prokaryotes may have arisen more than 2.5 billion years ago. Bacteria are prokaryotes. They are very small cells with a simple structure. Prokaryotes do not have a **nucleus.** This means that their DNA is not enclosed in a membrane inside the cell. Instead, prokaryotes have a single loop of DNA that floats in the cell’s **cytoplasm.** Protein-making bodies called **ribosomes** also form part of the cytoplasm. Like all cells, prokaryotes have a **cell membrane.** All prokaryotes also have a cell wall surrounding the cell membrane. The cell wall helps provide support and protection for the cell. Some prokaryotes are enclosed by an additional layer. This layer is called the capsule. The capsule has a sticky surface area, so it allows prokaryotes to cling to surfaces, such as your skin and your teeth.

Eukaryotic cells are more complex than prokaryotic cells. They all have a cell membrane, ribosomes, and DNA as prokaryotic cells do. However, the DNA of eukaryotic cells does not float freely in the cytoplasm. Instead, it is found in the nucleus, an internal compartment bound by a cell membrane. The nucleus is one kind of organelle found in eukaryotic cells. **Organelles** are structures that perform specific functions. Most organelles are surrounded by a membrane. Some organelles have membranes that form channels which help transport substances from one part of the cell to another part of the cell.

**Eukaryotes** are organisms made of one or more eukaryotic cells. The earliest eukaryotes, like the first prokaryotes, were single-celled organisms. They arose about 1 billion years later than the earliest prokaryotes. Later, multicellular eukaryotes arose. Every type of multicellular organism that exists is made up of eukaryotic cells.

skill: Reading Effectively

Read each question, and write your answer in the space provided.

1. What is a prokaryote, and when did prokaryotes arise?

2. Describe three main features inside a prokaryotic cell.

3. Describe the structures that form the outside of a prokaryotic cell. Tell whether each structure is common to all prokaryotes.

4. What is a eukaryote, and when did eukaryotes first arise?

Organelles

**U3-4**

“little\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_” found inside cells! Each one has a unique structure and function.

|  |  |  |  |
| --- | --- | --- | --- |
| **Organelle** | **Function** | **Sketch** | **Found Where?**  (plant, animal, bacteria) |
| **Cell membrane** |  |  |  |
| **Cell wall** |  |  |  |
| **Nucleus** |  |  |  |
| **Mitochondria** |  |  |  |
| **Chloroplast** |  |  |  |
| **Ribosome** |  |  |  |
| **Vacuole** |  |  |  |
| **Cytoplasm** |  |  |  |
| **Lysosome** |  |  |  |
| **Golgi Body/Apparatus** |  |  |  |
| **Endoplasmic Reticulum (smooth ER and rough ER)** |  |  |  |

Making Predictions…

**U3-5**

|  |  |  |
| --- | --- | --- |
| **If this happened…** | **Then this would happen…** | **Justification: WHY???** |
| All of the ribosomes disappeared |  |  |
| The cell membrane broke down |  |  |
| The nucleus was destroyed |  |  |
| A virus attacks and destroys all of the mitochondria |  |  |
| Chloroplasts in a plant cell stopped absorbing sunlight |  |  |

Love Letter

Role: Nucleus

Audience: Mitochondria

Form: Love Letter

Topic: Tell the mitochondria why you love it oh so very much!

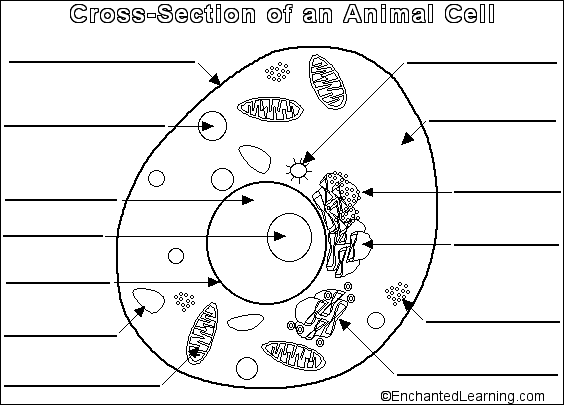
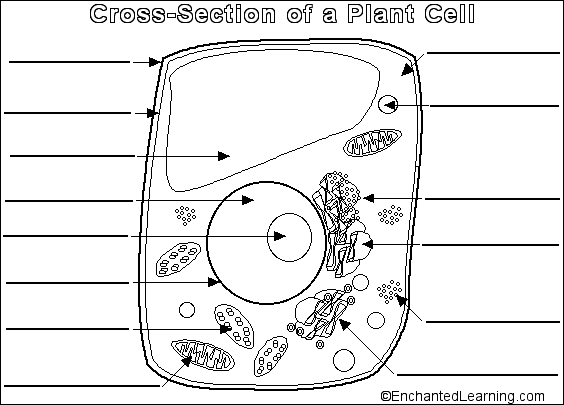
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Eukaryotes: Plant vs. Animal Cells

**U3-6**

Animal & plant cells are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. Cells have smaller parts inside them called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. This means “little organ.” They perform special functions for the cell to keep it (and the organism) alive.



**Cell Project**

**U3-7**

**Option 1:  CELL NEWSPAPER**

You are an organelle that is reporting on the breaking news happening in your CELL CITY. Be creative in your reporting and story headlines.  The paper should be formatted like a newsletter or newspaper and can include breaking news, comics, horoscopes, personal ads, special reports, weather, etc.

**Directions**:

1. You can include as many organelles as you want, but you must cover the following organelles:

* **cell membrane**
* **ribosomes**
* **nucleus**
* **mitochondria**
* **vacuole**
* **cytoplasm**

1. You must identify if your CELL CITY is in an animal or plant cell
2. The news story must reference the *function* of the organelle.

*A headline example might be*:   "Vacuoles go on strike due to an increase in garbage"

*A horoscope example for the Mitochondria might be*:   "You are always on the go and have enough energy to run a marathon 10 times over, but the stars are aligned with Saturn, and you are bound to meet another mitochondria who can keep up.

**Option 2:   CELL CHILDREN'S BOOK**

For this project you will create the text and illustrations for a children's book.  You will create a simile to explain to children the structure and function of cell organelles. You will recall from your English class that a simile is a comparison between two unlike things.  For example, using the simile a cell is like a factory, the **cell membrane** is the **fence** surrounding the factory and that the **vacuole** was the **garbage room**.

Be creative and remember that children need complex concepts to be broken down into the simplest form in order to understand.  I encourage you to use your own drawings and illustrations, but you can also use collage or found images.

**Directions**:

1. You can include as many organelles as you want, but you must cover the following and identify if it is an animal or plant cell:

* **cell membrane**
* **ribosomes**
* **nucleus**
* **cell wall**
* **mitochondria**
* **vacuole**
* **cytoplasm**

1. The book must use your Cell Simile
2. The book must be at least 10 pages

**U3-8**

**Option 4:   3-Cell Poster**

You will create a poster of a plant or animal cell complete with organelles using images that are analogous to each organelle.

**Directions**:

1. You will create a poster of either a PLANT or ANIMALcell.
2. The cells will have pictures from magazines, drawings, or 3D objects fixed to the cells. THERE WILL NOT BE ANY PICTURES OF REAL ORGANELLES IN YOUR CELL.
3. Each object must have an explanation as to why this object was used to represent that organelle.
4. Use must include the following organelles in your cells:

**Animal Cell**

* + - Ribosomes
    - Nucleus
    - Vacuole
    - Mitochondria
    - Cell Membrane
    - Lysosome
    - Cytoplasm

**Plant Cell**

* RIbosomes
* Nucleus
* Vacuole
* Mitochondria
* Chloroplasts
* Cell Wall
* Cell Membrane
* Cytoplasm

1. For *example*, using the cell is like a factory simile, the **cell membrane** is the **fence** surrounding the factory and the **vacuole** is the **garbage room**.

**Option 5: TRAVEL BROCHURE**

For this project you will create a travel brochure that highlights the trip you could take inside either a plant or animal cell.

**Directions:**

1. You can include as many “destination” organelles as you would like but your brochure must cover the following organelles:
   * **cell membrane**
   * **ribosomes**
   * **nucleus**
   * **mitochondria**
   * **vacuole**
   * **cytoplasm**
2. Include photos of your organelle “destinations” and be COLORFUL.

*An example* for the cell membrane: “Come visit the cell membrane, an exclusive bar where only a SELECT few can get in!”

**Option 6:  CELL RAP**

You saw an example of two raps in class. Write a rap that includes the cells of the organelles and their functions. The rap must make sense and be scientifically accurate. You must perform your rap. If you would rather shoot a video recording of your rap, than rap live in front of the class that is a viable option.

1. **Directions**:You can include as many organelles as you want, but you must cover the following and identify if it is an animal or plant cell: **cell membrane, ribosomes, nucleus, chloroplast, mitochondria, vacuole, and cytoplasm.**

**U3-9**

**Cell Specialization**

All cells start out the same way (called \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_). The \_\_\_\_\_\_ tells it what type of cell to become and makes special \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to do the job it is told to do.

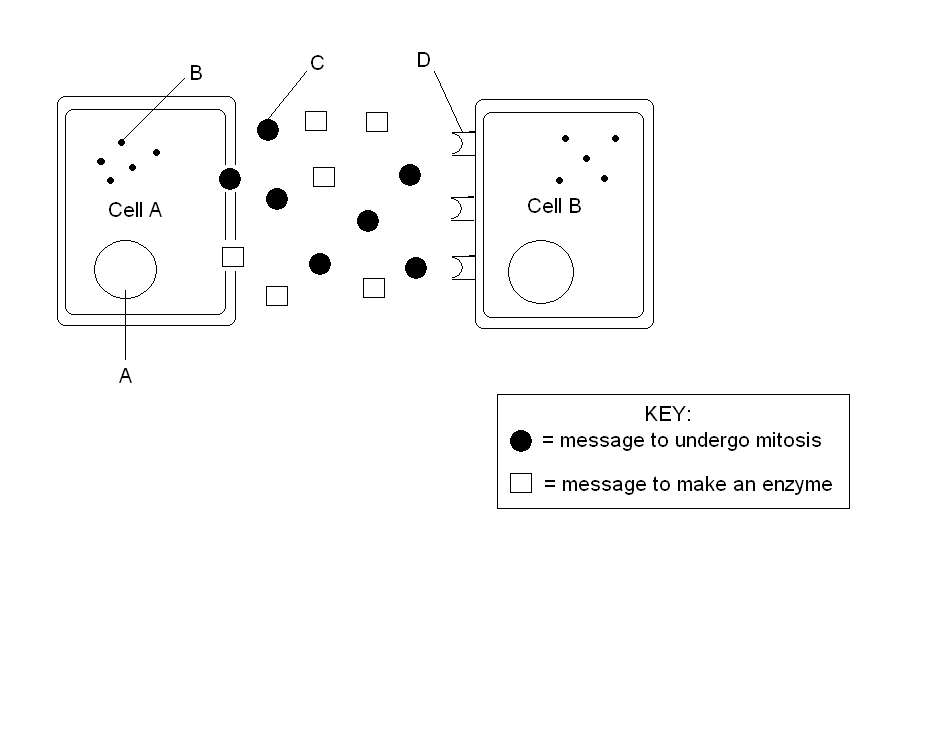


|  |  |  |  |
| --- | --- | --- | --- |
| **Cell Type** | **Picture** | **Function** | **Special Structures** |
| Sperm Cell |  |  |  |
| Skin Cell |  |  |  |
| Red Blood Cell |  |  |  |
| Muscle Cell |  |  |  |
| Nerve Cell |  |  |  |

Cell Communication

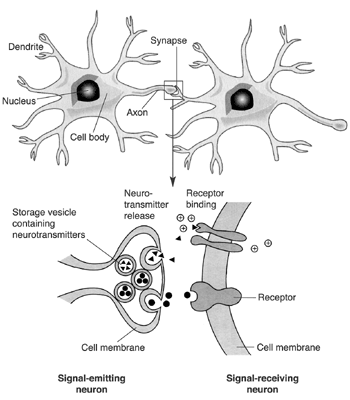
1. **Hormones**

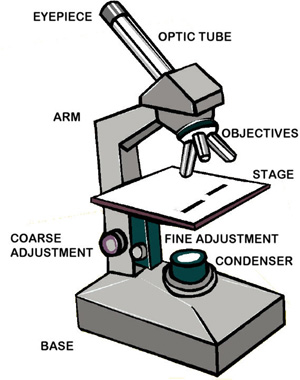
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so shape matters!
* Only work for cells with the right \_\_\_\_\_\_ proteins
* Travel slowly
* In \_\_\_\_ \_\_\_ AND \_\_\_\_\_\_\_\_\_\_\_\_\_



1. **Neurons**

* In the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ system.
* Messages travel electrically
* Travel quickly
* In \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ONLY



**Microscope Lab**

**U3-10**

**Purpose:** To observe different types of cells under the microscope and visualize differences between plant, animals, and prokaryotes.

**Pre-Lab Questions:**

1. There are 3 objectives on the microscope. To calculate the magnification, you multiply the magnification on the objective by the magnification of the eyepiece. Calculate the following magnifications below:

**Red**: 4X × Eyepiece (10X) = \_\_\_\_\_\_\_X

**Yellow**: 10X × Eyepiece (10X) = \_\_\_\_\_\_\_X

**Blue**: 40X × Eyepiece (10X) = \_\_\_\_\_\_\_X

1. Label the OBJECTIVES and the EYEPIECE on the following microscope:

**Data & Lab Drawings:**

Draw what you see in the microscope!

Station 1: Mammal Skeletal Muscle

**Mammal Skeletal Muscle Analysis:**

1. Describe the general shape of the muscle fibers.
2. What color are the nuclei of the cells?

Color of Objective:

Magnification:

**Total** Magnification:

Station 2: Nerve Cells

**Mammal Bull Sperm Analysis:**

1. What do you think these cells are specialized for? (What are they good at?) Why do you think that?

Color of Objective:

Magnification:

**Total** Magnification:

Station 3: Human Blood

**U3-11**

**Human Blood Smear Analysis:**

1. There are two types of blood cells in view, what color are they?
2. Describe the shape of the blood cells. Why do you think this is a good shape for blood cells that have to travel through our blood vessels?

Color of Objective:

Magnification:

**Total** Magnification:

Station 4: Onion

**Onion Analysis:**

1. Are these plant or animal cells? How did you know?
2. What color are the nuclei?
3. Describe the general shape of each cell.

Color of Objective:

Magnification:

**Total** Magnification:

Station 5: Bacteria from Mouth

**Bacteria from Mouth Analysis:**

Bacteria are waaaay too small for us to see individually with the microscopes we have at school.

1. So what are you looking at?!
2. Why do scientists “stain” a specimen before looking at it under the microscope?

Color of Objective:

Magnification:

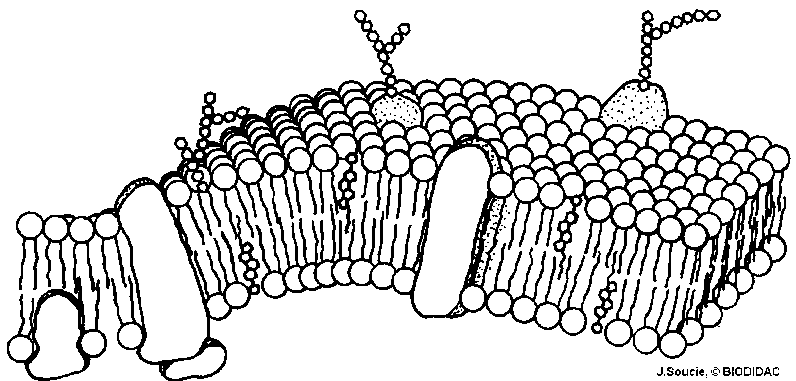
**Total** Magnification:

**U3-12**

The Cell Membrane

Made of 2 main organic molecules: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

The cell membrane allows only \_\_\_\_\_\_\_\_\_\_\_ molecules to pass through while prohibiting others.



Other names for the cell membrane:

**Plasma membrane**

**Phospholipid bilayer**

Phospholipid🡪

Bilayer 🡪

**Semi-permeable**

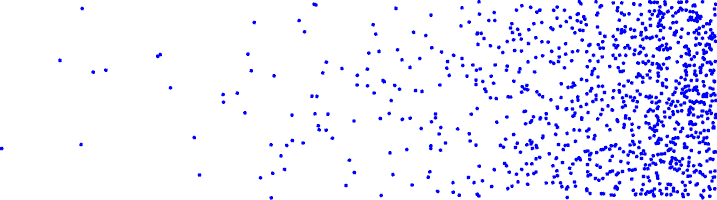
Semi 🡪

Permeable 🡪

Homeostasis: Maintaining a constant internal \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* Plants and animals regulate things like: \_\_\_\_\_\_, water, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, glucose, \_\_\_\_\_\_\_\_\_\_, etc.
* The cell \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ controls what goes \_\_\_\_\_ and \_\_\_\_\_\_\_\_ = **maintains homeostasis**!
* **Concentration gradient**: the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ across the \_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**NOT** in homeostasis: In homeostasis:

 (concentration gradient)

Transport

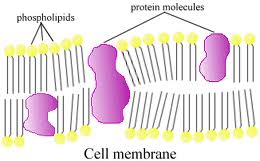
The membrane controls what \_\_\_\_\_\_\_\_\_\_\_\_\_\_ and what \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ a cell.

This action of maintaining homeostasis across the cell membrane is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **TYPE** | **MOVES?** | **DIRECTION?** | **USES ENERGY?** | **USES A PROTEIN?** |
| **PASSIVE** | Diffusion |  |  |  | NO |
| Osmosis |  | \_\_\_\_\_\_\_ to Low |  | NO |
| Facilitated Diffusion | Particles | High to \_\_\_\_\_\_ |  |  |
| **ACTIVE** | Active Transport | Particles |  |  |  |

**U3-13**

**Cell Membrane Practice**

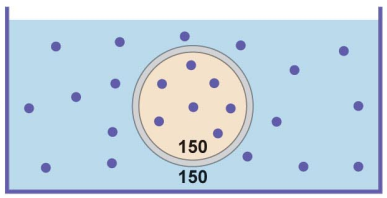
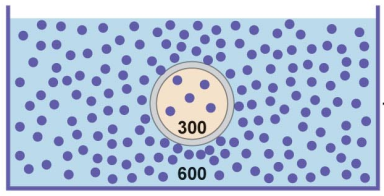
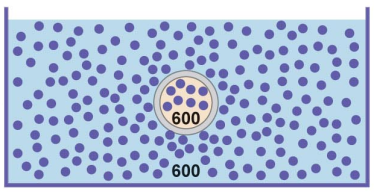
1. The cell membrane is described as being **selectively permeable**. Describe how it is like a window screen. What does this mean?
2. The cell membrane is described as being a **bilayer**. What does this mean?
3. What **2 main molecules** make up the cell membrane?
4. Identify the following in the picture to the right: **phospholipid, protein, bilayer**

**Osmosis vs. Diffusion Practice**

1. In your own words, describe **diffusion.**
2. In your own words, describe **osmosis**.
3. What is the difference between **osmosis** and **diffusion?**

How are the molecules moving in the examples below (4-11)? Write **D** (DIFFUSION) or **O** (OSMOSIS).

1. After sitting in the bathtub for hours, your fingers start to look like prunes. \_\_\_\_\_\_\_\_\_
2. The girl sitting two rows ahead of you put on too much perfume this morning.\_\_\_\_\_\_\_\_\_
3. One way to get rid of slugs in your garden is to sprinkle salt on them, so they shrivel up. \_\_\_\_\_\_\_\_\_
4. Yum! Something smells good. The neighbors are cooking on the grill! \_\_\_\_\_\_\_\_\_\_\_\_\_
5. Oxygen molecules move from the air sacs in the lungs across the cell membranes into the blood \_\_\_\_\_\_
6. Robert sprays water on the veggies in the produce section to “plump them up”.\_\_\_\_\_\_\_
7. You put raisins in a glass of water and they plump up. \_\_\_\_\_\_\_\_\_\_\_\_\_
8. Gargling salt water when you have a sore throat causes your swollen throat cells to shrink and feel better. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
9. In the following pictures a cell has been placed in a new environment. Is the cell in equilibrium with its environment? Write Y (yes) or N (no). The first one has been done for you.

 ****  

a. N b. \_\_\_\_\_ c. \_\_\_\_\_ d. \_\_\_\_

1. In which picture above will the salt particles (dots) move either in or out of the cell. How do you know?

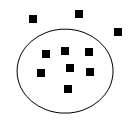
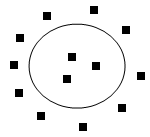
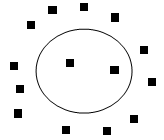
Practice

**U3-14**

**Part 1:** Drawing. Draw arrows to show which way the materials will move.

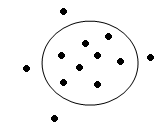
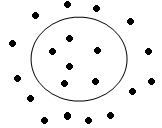
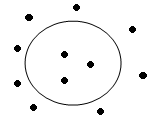
**Diffusion:** squares are SALT particles.

1. Salt **can** move: B. Salt **can** move: C. Salt **can** move:

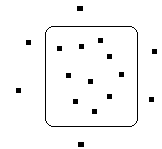
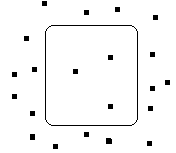
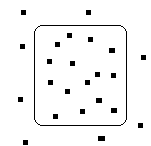
**Osmosis:** circles are SALT particles.

D. Salt **CANNOT** move: E. Salt **CANNOT** move: F. Salt **CANNOT** move:

**Active Transport:** squares are SALT particles.

G. H. I.

**Part 2:** Make a prediction about what will happen to a cell under these conditions

|  |  |  |
| --- | --- | --- |
| **What will happen to the size of a cell if…** | **Explanation** | **Draw a Picture** |
| Water moves in |  |  |
| Water moves out |  |  |

**Part 3:** Name the following types of transport as **ACTIVE** or **PASSIVE**:

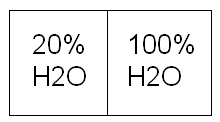
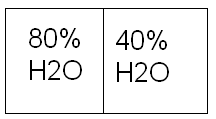
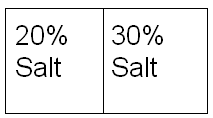
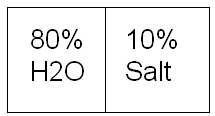
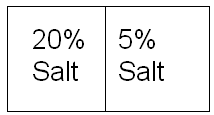
**U3-15**

|  |  |  |
| --- | --- | --- |
| **Type of Transport** | **Needs ATP? (energy)** | **Active or Passive?** |
| Active Transport |  |  |
| Diffusion |  |  |
| Facilitated Diffusion |  |  |
| Osmosis |  |  |

**Part 4 :** Draw which way the **water** will move:

**water**

Example:

B. C. D.  E. F.

**Part 5** Explain what would happen in the following conditions: The cylinder is a beaker of water. The oval is a cell.

* 1. Use a **RED** arrow to show which way the **water** will move in the diagram below if the **salt** CANNOT move across the membrane. EXPLAIN:
  2. Use a **BLUE** arrow to show which way the **salt** would move if salt CAN cross the cell membrane. EXPLAIN:

Key:

= salt molecule

= beaker of H2O

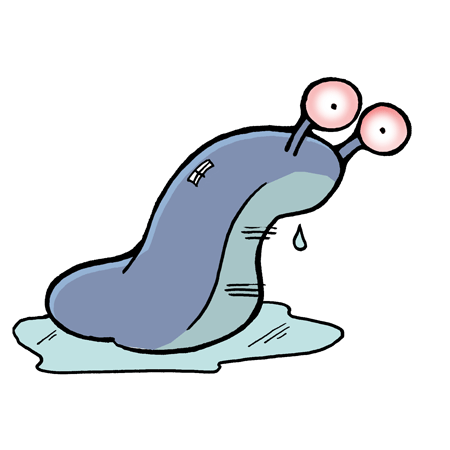
= animal cell

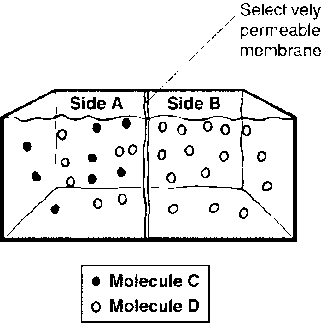
**U3-16**

**Part 6:** Read the problem carefully and select the correct response. DRAW a picture of what is happening.

|  |  |
| --- | --- |
| 1. A cell with 5% solute concentration is placed in a beaker with a 1% solute concentration. What will happen to the cell over time? 2. The cell will gain water and expand. 3. The cell will lose water and shrink. 4. The cell will both gain and lose equal amounts of water; thus, it will remain the same size. 5. The cell will undergo no exchange of water with its surroundings. | 3. A cell is taken from an environment that has a high salt concentration and is placed into an environment that does not contain any salt. What effect will the change in environment have on the cell?  A. there will be no change in the cell  B. the cell will shrink  C. the cell will swell  D. the cell will divide |
| 1. While cleaning a saltwater aquarium, students placed the aquarium plants in a container of distilled water. What effect will this have on the plants? 2. The plant cells will swell. 3. The plant cells will separate. 4. The plant cells will remain the same. 5. The plant cells will shrink 6. While cleaning a saltwater tank, students placed a salt water cell in a bowl filled with regular tap water. What effect will this have on the cell?    1. The cells of the protozoan will disintegrate.    2. The cells will swell.    3. The cells will shrink and shrivel.    4. The cells will remain the same. | 4. An ocean plant is placed into distilled water. What will happen to the cell?  A. water will flow out of the cell and cause it to wilt  B. water will flow into the cell and it will burst  C. water will flow into the cell, but it will not burst only become swollen  D. water will flow in and out of the cell, but the size of the cell will not change   1. If someone is sitting across the room smoking, you may still breathe in some of the smoke. The movement of smoke across the room is an example of what type of transport? 2. Osmosis C. facilitated diffusion 3. Diffusion D. active transport |

1. Using terms from this unit, describe what would happen to a slug if you poured salt on it. Draw arrows too! [HINT: slugs are very watery inside!]





1. The membrane only lets molecule D cross. Over time, what will happen to the molecules in the figure to the right?

GUMMY BEAR LAB

**U3-17**

**Objective**: To understand the movement of water into and out of a cell.

**Materials**: Beaker or plastic cup, distilled water, kosher salt, Gummy bears, ruler, masking tape, triple beam balance, wax paper, paper towel, calculator

**Vocabulary**: osmosis, cell membrane¸ water molecules, transport, concentration, selectively permeable, passive transport

**Prediction**: How will soaking your Gummy bear in water affect the size of the Gummy bear?

**Procedures**:

1. Use masking tape to label your beaker/cup with your name and class period. Label one cup distilled water and the other salt water.
2. Use the ruler to find the height and width of two Gummy bear in millimeters. Record this information in your data table. You might want to complete these procedures for a few extra bears in case one breaks.
3. Use a triple beam balance to find the mass of your gummy bear in grams. Record in the data table below.
4. Describe as much as you can about your Gummy bears. Record your observations in the data table below.
5. Fill your beaker/cup 1 about ½ full with distilled water, and beaker/cup 2 about ½ full with salt water.
6. Put one bear in the distilled water and one in salt water.
7. Set your beakers/cups aside for 1 day.
8. After the bears have been soaking overnight, very ***gently*** take them out of the water and pat them dry. **CAREFUL** as the candy is now extremely breakable.
9. Measure the height and width of your Gummy bears again. Record in the data table.
10. Measure the mass of your Gummy bears again. Record in the data table.
11. Describe your Gummy bears again. Record in the data table.

Data:

**U3-18**

|  |  |  |  |
| --- | --- | --- | --- |
| **Before Soaking in Water** | **After Soaking in Water** | **Before Soaking in Salt Water** | **After Soaking in Salt Water** |
| **Height** | **Height** | **Height** | **Height** |
| **Width** | **Width** | **Width** | **Width** |
| **Mass** | **Mass** | **Mass** | **Mass** |
| **Description** | **Description** | **Description** | **Description** |

Calculations:

Change in height Distilled Water =

Change in height Salt Water=

(Height after soaking – Height before soaking)

Change in width Distilled Water=

Change in width Salt Water =

(Width after soaking – Width before soaking)

Change in mass Distilled Water=

Change in mass Salt Water=

(Mass after soaking – Mass before soaking)

Make a bar graph for each of the changes (height, width, mass).

**BAR GRAPH OF HEIGHT, WIDTH AND MASS**

**U3-19**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
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|  |  |  |  |  |  |  |  |  |  |  |

Height width mass

Conclusions:

1. What happened to your Gummy bear after soaking in distilled water for 24 hours?
2. Why did this happen? Think about what you learned about osmosis to answer.
3. What happened to your Gummy bear after soaking in salt water?
4. Why did this happen? Think about what you learned about osmosis to answer.
5. Which solution made the gummy bear swell larger than the other?
6. Why was there a difference in how much the gummy bear “grew” in the distilled water solution and the salt water solution?

Starch Diffusion Lab

**U3-20**

**Purpose:** Observe how molecules move from an area of high concentration to an area of low concentration, through a membrane.

**Hypothesis:** If a bag with starch and water is placed in a beaker of iodine, then \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_because\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Data:**

Draw the before and after images below. You MUST include COLOR.



**BEFORE AFTER**

**Analysis:**

1. Describe what happened:
2. Discuss diffusion and where in this experiment it occurred.
3. What part of the cell is responsible for maintaining homeostasis? What material in this lab acted like this cell part?

**Bioenergetics**

**U3-21**

What is ATP?!

* It is the energy \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of all living things!
* It is produced by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
* It is a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so it has 3 main parts: \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| ATP | ADP |
| **ATP:**\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ | **ADP:**\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ |
|  |  |

**Cellular Respiration**: Occurs in the Mitochondria

|  |  |
| --- | --- |
| **What?** | CELLULAR RESPIRATION |
| **Where?** |  |
| **Why?** | The purpose is to \_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_!!! |
| **How?** | Uses \_\_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (sugars!) to make \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, and \_\_\_\_\_\_. |
| **Who?** | **ALL LIVING THINGS!** |











STOP & think:

1. What is the connection between ATP and respiration?
2. What two things do mitochondria need in order to perform respiration? Where do these two items come from (how does the organism or cell get them)?
3. Plants cannot **eat** food (sugars) but all living things MUST perform respiration so that they can make ATP!! Where do plants get their sugars?!

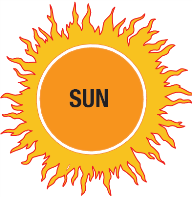
**Photosynthesis**: Occurs in the Chloroplast

**U3-22**

|  |  |
| --- | --- |
| **What?** | PHOTOSYNTHESIS |
| **Where?** |  |
| **Why?** | The purpose is to \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_!!! |
| **How?** | Uses \_\_\_\_\_\_\_, \_\_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_ to make \_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (sugars!) |
| **Who?** | Organisms that can produce their own food: \_\_\_\_\_\_\_\_\_\_\_\_\_\_/\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |







STOP & think:

1. Why don’t humans need to perform photosynthesis?
2. What does the root word “-synthesis” mean? Why do you think this process is called “photosynthesis”?
3. In plants, what must happen first, photosynthesis or respiration? WHY??

Bioenergetic Reactions

Using the cut-outs at your table, set up both bioenergetics reactions. Then draw the answers in the boxes so that they are permanently in your notes.

**The pluses (+) and arrows (🡪) can be placed in the small boxes.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Photosynthesis |  |  |  |  |
|  |  |  |  |  |
| Cellular Respiration |  |  |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **What goes**  ***in*?** | **Where does it happen?** | | **What comes *out*?** | **When does it happen?** | **Who does it?** |
| **Photosynthesis** | CO2  H2O (water)  \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_    Chloroplasts are green because they contain \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: a pigment that absorbs \_\_\_\_\_\_ & \_\_\_\_\_\_\_\_\_ light and reflects \_\_\_\_\_\_\_\_\_\_ light. | | \_\_\_\_\_\_\_\_\_\_\_\_\_  O2 (oxygen) | when there is enough \_\_\_\_\_\_\_\_\_\_\_\_\_\_ | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_: plants, algae, some bacteria  **They make their OWN FOOD using the sun!** |
| **CO2+ H2O C6H12O6  + O2** | | | | | |
| **Cellular Respiration** | \_\_\_\_\_\_\_\_\_\_\_\_\_\_  O2 (oxygen) | \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (eukaryotes)    \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  (prokaryotes- they don’t have a mitochondria!) | CO2  H2O (water)  \_\_\_\_\_\_ | | \_\_\_\_hours a day | \_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_: plants, animals, bacteria, fungi, etc. |
| **C6H12O6 + O2 CO2  + H20 + \_\_\_** | | | | | |

**U-23**

**Snail &Plant Problem**

**U3-24**

**Draw arrows on the picture showing the path of oxygen, carbon dioxide, sugar, and water.**CO2 has been done for you.

Oxygen (O2) = Green

Carbon Dioxide (CO2) = Black

Sugar (C6H12O6) = Red

Water (H2O) = Blue

Description: uxlwdmq0%5b1%5dDescription: j0193364

**Complete the following chart based on your notes and the picture of the snail and plant:**

**Photosynthesis Cellular Respiration**

|  |  |  |
| --- | --- | --- |
| **Equation** |  |  |
| **Reactants** |  |  |
| **Products** |  |  |
| **Sunlight used or ATP produced?** |  |  |
| **Organelle** |  |  |
| **Types of Organisms** |  |  |
| **Purpose** |  |  |

**Analysis Questions (questions 1-5 refer to the snail/plant problem):**

1. What are the needs of the plant for survival?
2. What are the needs of the snail for survival?
3. In what ways does the snail need the plant for survival?
4. Does the plant need the snail for survival? Why or why not?
5. If you had to choose one as more important (the snail or plant), which would you pick and why?
6. Describe how photosynthesis and respiration work together to provide the needs of all organisms.
7. Give at least TWO REASONS why photosynthesis and respiration are often described as being the “opposite” of each other.

**U3-25**

**\_\_\_\_\_\_\_\_\_\_\_\_\_**

In the \_\_\_\_\_\_\_\_\_\_\_\_ of plants, algae, some bacteria

The CARBON

CYCLE!

**\_\_\_\_\_\_\_\_\_\_\_\_\_**

In the \_\_\_\_\_\_\_\_\_\_\_\_\_ of autotrophs & heterotrophs

**anaerobic**

**aerobic**

**“\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_”**

\_\_\_\_ ATP molecules are produced!

**This is the best way to go- you get more bang for your buck (produces the most energy)!!**

**“\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_”**

**Only \_\_\_\_ ATPs are produced!**  
Because it happens in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, not the mitochondria!

**2 types:**

1. **In HUMANS:**  
   **\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ fermentation**

* Produced in your \_\_\_\_\_\_\_\_\_ when the muscles cannot get enough \_\_\_\_\_\_\_\_\_\_\_\_!
* Build up of lactic acid is responsible for your painful, burning muscles after hard \_\_\_\_\_\_\_\_\_\_\_.

1. **In YEAST & BACTERIA:**

**\_\_\_\_\_\_\_\_\_\_\_ fermentation**

* Produces \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_
* Responsible for \_\_\_\_\_\_\_\_ rising and making beer.

Description: C:\tempie\Temporary Internet Files\Content.IE5\3TMREQG7\MC900040271[1].wmf

**Bromothymol Blue Demonstration**

**Background Information**: Bromothymol Blue is an indicator. It will turn yellow in the presence of carbon dioxide.

**Question**: What will happen to the color of the bromothymol blue when a student blows into it? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

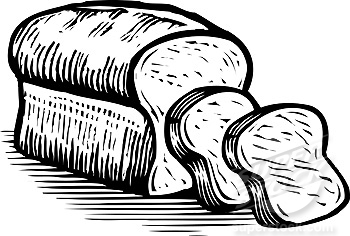
**Hypothesis**: The bromothymol blue will \_\_\_\_\_\_\_\_\_\_\_\_\_ (stay blue or turn yellow) because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Experimental set-up (draw and label it!)**: (Start color) (End color)



**Discussion**:

1. Based on the results, what gas must be a product of cellular respiration?



**U3-26**

Description: C:\tempie\Temporary Internet Files\Content.IE5\3TMREQG7\MC900156065[1].wmfCellular Respiration Activities

Station 1 Station 2

|  |  |
| --- | --- |
| **Procedure:**   1. Partner 1, hold your arms straight out in front of you. 2. Partner2, hold your arms straight above your head. 3. Description: C:\tempie\Temporary Internet Files\Content.IE5\3TMREQG7\MC900040271[1].wmfSee who can hold it the longest. 4. Record the winner’s name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_   **Analysis:**  What did you notice happening to your arms?  Why do you think this was?  **Explanation**: When your muscle cells need to make a lot of energy, they use up oxygen QUICKLY. When our muscle cells run low on O2, they start making lactic acid which causes us to feel a BURN.   1. What kind of respiration is this? (Lack of oxygen!)   Lactic acid is produced as a BYPRODUCT!!! This is why your arms were burning. | **Procedure:**   1. Description: http://wwwdelivery.superstock.com/WI/223/1538/PreviewComp/SuperStock_1538R-48058.jpgRead the blurb & observe the flask at the station. 2. Use this information and your observations to complete the analysis!   *The yeast in the flask are prokaryotes. They break down the sugar which is also in the bottle to make their energy. When they do, they produce CO2gas which fills the balloon up and causes it to rise. They also produce ALCOHOL as a byproduct! If you could smell the bottle after a few hours have passed, it would smell like alcohol.*  **Record the reactants and the products of the yeast’s respiration.**  Reactants: Products:   1. Description: http://www.world-builders.org/lessons/less/les4/les4gifs/bottle.gifWhat type of respiration do the yeast perform? 2. How do you know?   **Explanation**: When the yeast break down the sugar and release alcohol this is called **ALCOHOLIC FERMENTATION!** |

**Respiration**

**U3-27**

**Anaerobic vs. Aerobic**

**Energy in the cell**

Use the molecule to the right to answer the following questions.

A

P

P

P

1. What is this molecule called?
2. Why is this molecule important to living things?
3. What is “leftover” when energy is released from this molecule?

**Aerobic Vs. Anaerobic**

1. What does “aerobic” mean?
2. What does “anaerobic” mean?

Complete the following chart comparing aerobic and anaerobic respiration

|  |  |  |
| --- | --- | --- |
|  | **Aerobic** | **Anaerobic** |
| **Location** | mitochondria |  |
| **Oxygen Requirements** |  | Does not use O2 |
| **End Products** |  | alcohol + CO2  or  Lactic acid |
| **Energy Produced** | Lots of energy  (38 ATP) |  |

**Cellular Respiration**

1. Is Cellular Respiration aerobic or anaerobic? **WHY?!**
2. [](http://www.google.com/imgres?imgurl=http://www.clker.com/cliparts/m/i/q/x/R/j/mitochondria-hi.png&imgrefurl=http://www.clker.com/clipart-mitochondria-1.html&usg=__diYaj76SenLv_MLopQqLt3r9Mi0=&h=596&w=348&sz=28&hl=en&start=26&zoom=1&tbnid=obVBkAC-naR8PM:&tbnh=135&tbnw=79&ei=GUIZUefZJJDm8QTi84C4CQ&prev=/search?q=mitochondria+sketch&start=20&um=1&hl=en&safe=active&sa=N&rls=com.microsoft:en-us&tbm=isch&um=1&itbs=1&sa=X&ved=0CDQQrQMwBTgU)On the mitochondria below, fill in the boxes to show which molecules are reactants (ingredients) and which molecules are products.

**Fermentation**

1. Is Fermentation aerobic or anaerobic? **WHY?!**
2. What are the two types of fermentation? What type do humans perform? What type do yeast/bacteria perform?

**Unit 3 Study Guide**

**U3-28**

*The best place to study is your notes and the activities we’ve done. Use this to check yourself!!*

**Vocabulary Review**

\_\_\_\_\_\_ 1. Eukaryote A. Maintaining a constant internal balance

\_\_\_\_\_\_ 2. Prokaryote B. Made in yeast when there is no oxygen

\_\_\_\_\_\_ 3. Cell C. When there are different amounts of molecules on either side

\_\_\_\_\_\_ 4. Organelle D. Uses energy and a protein to move molecules from low to high

\_\_\_\_\_\_ 5. Cell specialization E. A cell with no nucleus or organelles (ex. bacteria)

\_\_\_\_\_\_ 6. Stem cell F. Means without oxygen

\_\_\_\_\_\_ 7. Neuron G. How cells communicate quickly, using neurotransmitters

\_\_\_\_\_\_ 8. Hormone H. Water, Sunlight, and CO2 are turned into Glucose and O2

\_\_\_\_\_\_ 9. Homeostasis I. A cell with a nucleus and organelles (ex. plants and animals)

\_\_\_\_\_\_ 10. Equilibrium J. The form of energy that cells use

\_\_\_\_\_\_ 11. Distilled water K. Water that has nothing in it

\_\_\_\_\_\_ 12. Passive transport L. A smaller part of a cell, that each has a special function

\_\_\_\_\_\_ 13. Active transport M. Made in muscle cells when there is no oxygen

\_\_\_\_\_\_ 14. Photosynthesis N. The smallest living thing

\_\_\_\_\_\_ 15. Respiration O. Glucose and oxygen are turned into ATP, water, and CO2

\_\_\_\_\_\_ 16. ATP P. How cells communicate, using a protein

\_\_\_\_\_\_ 17. Anaerobic Q. A cell that can become any cell in the body

\_\_\_\_\_\_ 18. Alcoholic fermentation R. When a cell receives the right signals, it begins doing its job

\_\_\_\_\_\_ 19. Lactic acid fermentation S. Uses no energy and moved molecules from high to low

**Match the Organelle with its Job!**

\_\_\_\_\_\_ 1. Cell membrane A. Controls what goes in and out of the cell

\_\_\_\_\_\_ 2. Cell wall B. Packages and ships proteins

\_\_\_\_\_\_ 3. Nucleus C. Makes ATP

\_\_\_\_\_\_ 4. Ribosome D. Offers support and protection

\_\_\_\_\_\_ 5. Mitochondria E. Makes Glucose

\_\_\_\_\_\_ 6. Chloroplast F. Protein assembly line filled with ribosomes

\_\_\_\_\_\_ 7. Vacuole G. Makes proteins

\_\_\_\_\_\_8. Endoplasmic reticulum H. Storage

\_\_\_\_\_\_9. Golgi apparatus I. Contains DNA, controls all cellular functions

**Make predictions**..what would happen?!

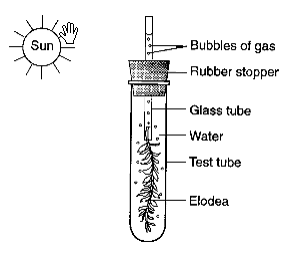
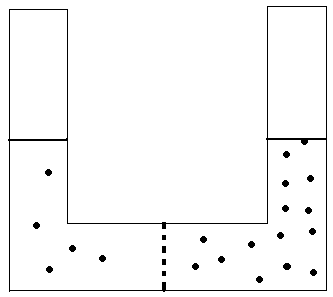
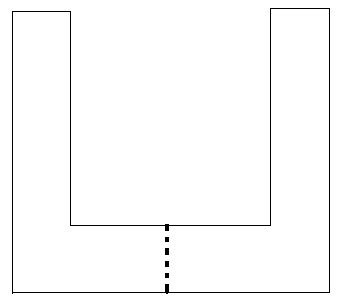
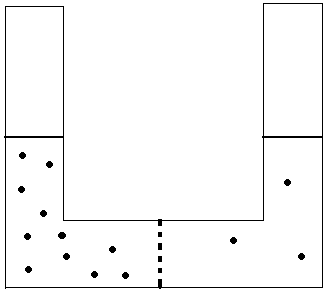
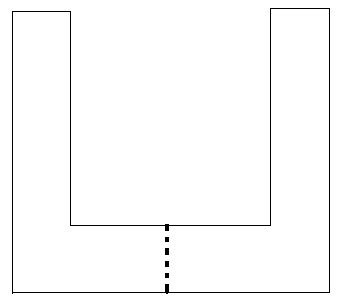
|  |  |  |
| --- | --- | --- |
| **If this happened…** | **Then this would happen…** | **Justification: WHY???** |
| Salt is poured on a freshly sliced watermelon. *The salt cannot enter the watermelon cells.* |  |  |
| A person is injected with fresh water instead of saline (salty) water. |  |  |
| 30% salt outside a cell. 5% salt inside a cell. The cell membrane is impermeable to salt. |  |  |
| 10% carbon dioxide outside  60% carbon dioxide inside |  |  |

**U3-29**

**Complete the table below for active and passive transport:**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **TYPE** | **MOVES?** | **DIRECTION?** | **USES ENERGY?** | **USES A PROTEIN?** |
| **Passive** |  | particles |  |  |  |
|  | water |  | no |  |
|  |  |  |  | no |
| **Active** |  |  |  |  |  |

**Answer the following questions.**

1. Look at the diagram below and answer the following questions:
   1. What gas is being produced?
   2. In what organelle is this process taking place?
   3. In addition to the gas, what other compound is being made?
   4. What does the sun provide?
2. In the scenarios below, **ONLY THE WATER** can move through the membrane. What will happen to the level of the water? **Draw an AFTER picture**.

**BEFORE AFTER BEFORE AFTER**

1. Fill out the flow chart!