

Lesson 3.2: Biological Levels of Organization

Task	Page(s)	Learning Target
1	2	I can explain the difference among cells, tissues, organs, and organ systems.
2	3	I can make an analogy for the biological levels of organization.
3	4-6	I can classify different levels of biology using text evidence.
4	7-10	I can use a microscope to observe and record characteristics and explain how a cell's structure can be related to its _____ (job).
5	11-18	I can use collaborative and problem-solving strategies to solve puzzles relating to cells and biological levels of organization.

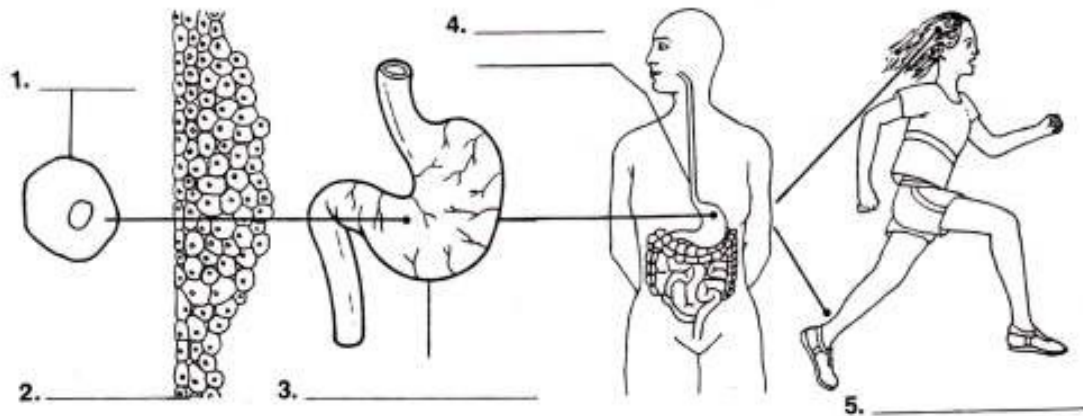
Task 1 Learning Target: I can explain the difference among cells, tissues, organs, and organ systems.

****SKIP LINES/LEAVE SPACE FOR ADDITIONAL NOTES

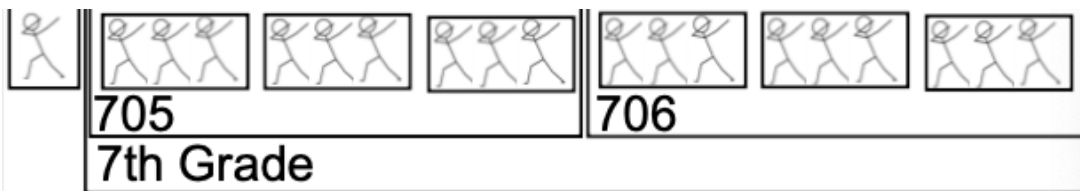
**Video link: <https://sites.google.com/a/ps207tigers.org/207sci/biological-levels>

- A. _____ is the smallest living unit of a living thing.
An example of a specialized cell is a _____ cell.
- B. A _____ is made of a group of similar cells working together.
One type of tissue is _____ tissue.
- C. An _____ is made of different tissues working together to do a specific job.
An example of an organ is the _____.
- D. An _____ is made of 2 or more organs working together to do a specific job.
An example of an organ system is the _____ system.
- E. Different organ systems work to maintain life in a **complex, multicellular** _____.
An example of a **complex, multicellular** organism is a(n) _____.
- F. Copy the following images into your notebook and match the correct word from the Word List below to drawings 1-5.

Word List:	Organism	Organ System	Organ	Tissue	Cell
-------------------	----------	--------------	-------	--------	------



- G. If an organism is compared to a school, then...
A student would represent a(n) _____,
A small group of students would represent a(n) _____,
A whole class would represent a(n) _____,
& a grade would represent a(n) _____.

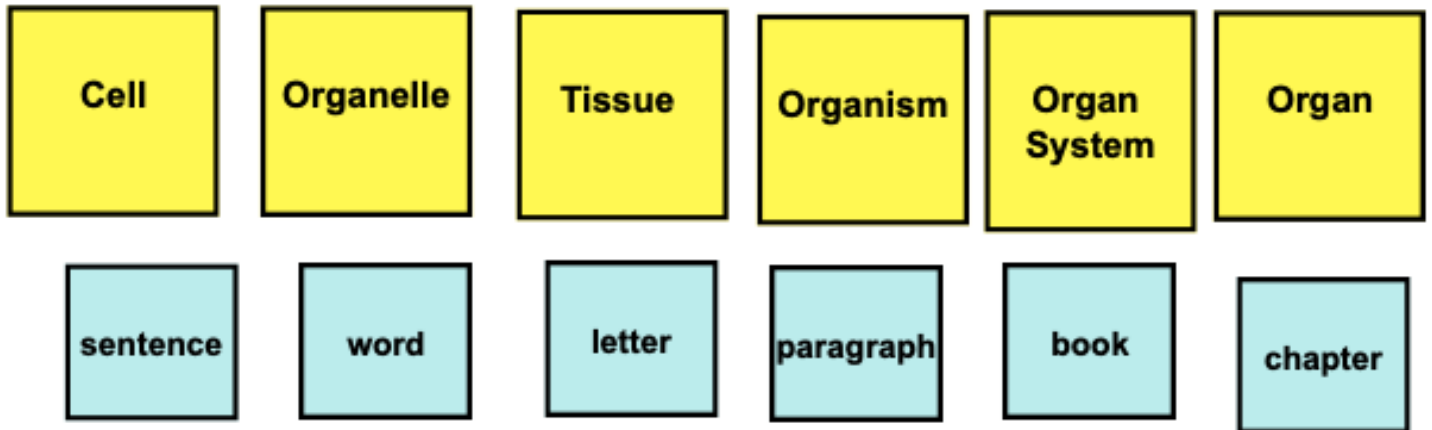


Task 2 Learning Target: I can make an analogy for the biological levels of organization.

1. Arrange the cards in order from smallest to largest.

**To better manipulate and arrange the cards, copy the words on separate sheets of paper, index cards, or post-its.

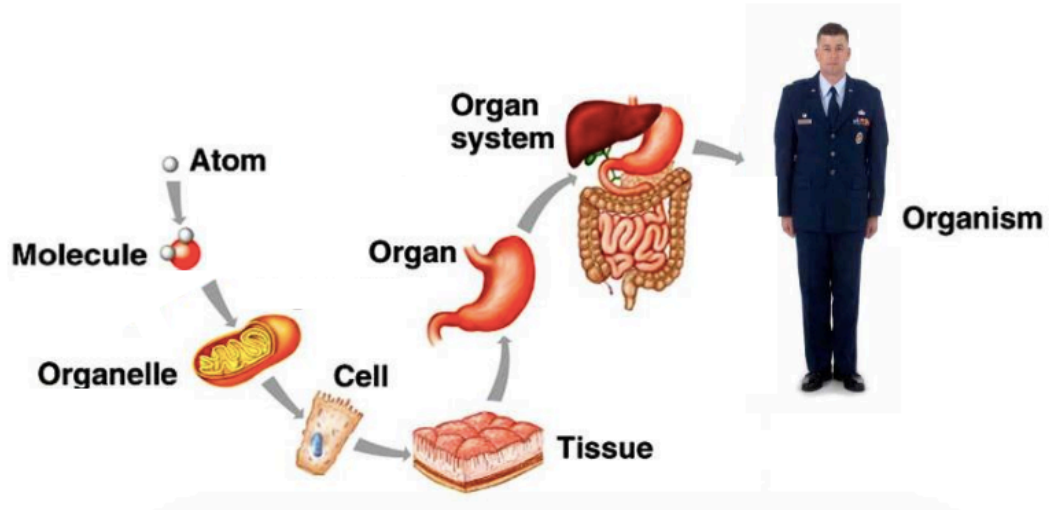
2. Copy your display into your notebook adding images/symbols of each word.



Task 3 Learning Target: I can classify different levels of biology using text evidence.

Levels of Biological Organization

Background: In unicellular (single-celled) organisms, the single cell performs all life functions. It functions independently. However, multicellular (many-celled) organisms have various levels of organization within them. Individual cells may perform specific functions and also work together for the good of the entire organism. The cells become dependent on one another.

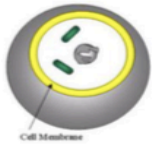


1: Use the descriptions to determine which level of organization (organelle, tissue, organ, system, etc.) is being described. Write the level of organization in the parentheses provided above the picture.

2: After reviewing the different levels of organization, use the function description to help you complete the table. (Hint: You will need to use a type of tissue twice to complete the chart). *Each box will be filled in with one term.

	Organelle	Tissue	Organ	System
Protects by forming a selective barrier	1.	7.	13.	19.
Breaks down food for energy	2.	8.	14.	20.
Removes waste	3.	9.	15.	21.
Provides means of transportation	4.	10.	16.	22.
Gives structural support	5.	11.	17.	23.
Controls and coordinates actions	6.	12.	18.	24.

Cell Membrane (_____)



This cell part is a barrier that controls what goes in and out of the cell.

Bladder (_____)



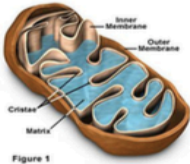
The bladder is a hollow, muscular organ that collects urine from the kidneys before disposal by urination.

Lysosomes (_____)



Lysosomes are cell parts that contain proteins that break down and remove waste in the cell.

Mitochondria (_____)



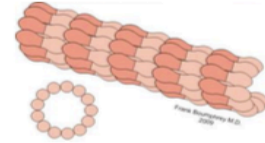
Mitochondria are the site of cellular respiration in which sugar molecules are broken down to release energy.

Skin (_____)



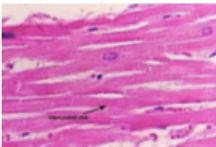
The skin is the largest organ. It protects muscles, bones, and organs. It helps keep our bodies at the right temperature. The skin also gives us the sense of touch.

Microtubules (_____)



Microtubules are part of the cell's system of structural support. They give the cell shape.

Cardiac (_____)



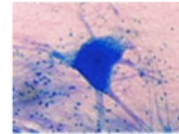
This group of cells in the heart pump blood throughout the body.

Digestive (_____)



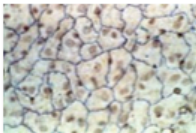
This group of organs work together to break down food so that it can be used for energy by the body.

Nervous (_____)



This collection of nerve cells form the brain and spinal cord which control body functions.

Epithelial (_____)



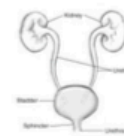
This collection of cells is located on the very outside of an organism as well as the lining of hollow organs such as the bladder. It serves to protect.

Skeletal (_____)



The skeletal system provides support for the body where softer tissue and organs are attached.

Urinary (_____)



This collection of organs work together to produce, store and eliminate urinary waste.

Bones (_____)



Bones are rigid organs that help organisms to move. Bones also help support and protect the body.

Nucleus (_____)



This cell part contains the cell's genetic material (DNA) and therefore controls the cell's activities.

Brain (_____)



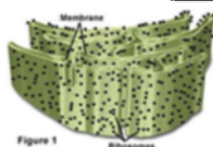
The brain is the central organ of the nervous system. It controls the other systems of the body by either controlling muscles or releasing chemicals.

Heart (_____)



The heart is a muscular organ found in all animals with a circulatory system. It is responsible for pumping blood throughout the body.

Endoplasmic Reticulum (_____)



The endoplasmic reticulum is an organelle that serves to transport newly made proteins.

Stomach (_____)



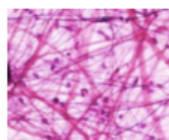
The stomach is a muscular, hollow organ that works with the digestive system. It releases strong acids that help to break down food.

Circulatory (_____)



This system transports nutrients carried in blood throughout the body. It is powered by involuntary contractions of the heart.

Connective (_____)



Connective tissue is made up of cells that provide structural support. Bone, blood, cartilage, and fat are the four main types of connective tissue.

Nervous (_____)



This system contains a network of specialized cells called neurons and organs that control actions by sending signals throughout the body.

Integumentary (_____)



The integumentary system consists of the skin, hair, and nails. It serves to protect the body as well as detect pain, sensation, and pressure.

Smooth Muscle (_____)



Smooth muscle tissue is able to contract on its own without a signal from the brain. These involuntary contractions help organs such as the stomach to break down and move food throughout the digestive system.






Task 4 Learning Target: I can use a microscope to observe and record characteristics and explain how a cell's structure can be related to its function (job).

"Micro" refers to tiny, "scope" refers to view or look at. Microscopes are used to make more detailed observations and measurements of objects too small for the naked eye. The compound light microscope is the most common instrument used in education today. It is an instrument containing two lenses, which magnifies, and a variety of knobs to resolve the picture. It is a rather simple piece of equipment to understand and use.



Watch the following video to learn how to use a microscope:

<https://www.youtube.com/watch?v=-b3Eejf4rDQ&t=107s>

Pre Lab Tasks:

-  a. Describe how to handle/carry a microscope.
-  b. Describe the ocular and objective lenses.
-  c. Describe the function of a microscope stage.
-  d. Compare/contrast the coarse and fine adjustment knobs. (In your answer, explain why the fine adjustment knob and not the coarse adjustment knob should be used with high power objective lenses.)
-  e. Describe how and why light sometimes needs to be adjusted.

Procedure:

1. Turn the objective lens so that the lowest power objective (scanning) lens (eg. 4x) is clicked into position.
2. Place the microscope slide on the stage and fasten it with the stage clips.
3. Look at the stage from the side and turn the coarse focus knob so the stage moves upward. Move it up as far as it will go without letting the slide touch the lens.
4. Now look into the eyepiece/ocular lens and use the coarse adjustment knob to bring the specimen into focus.
5. Look through the eyepiece/ocular lens and move the fine focus knob until the image becomes sharpened.
6. Adjust the diaphragm and light intensity.
7. Move the microscope slide around until the sample is in the center of the field of view.
 -  f. Draw, color and label what you see to scale.
8. When you have a clear image of your sample with the lowest power objective, you can change to the next objective lenses. You might need to readjust the sample into focus using the fine adjustment knob only and/or readjust the diaphragm and light intensity. **Do not let the objective lens touch the slide!**
 -  g. Draw, color and label what you see to scale.
9. When finished, lower the stage, click the low power lens into position and remove the slide.

****Use the information on the following page to help identify the cells being viewed under the microscope.**

Although cells share many of the same features and structures, they also can be very different.

Each cell in your body is designed for a specific task. In other words, cells are shaped in ways that help them do their jobs.

Bone cells (osteocytes) often form cylindrical structures that consists of several parts. They are sometimes described to look like a cross section of a tree trunk. A central tube contains blood vessels and nerves. Rings of a strong matrix form from mineral salts including calcium. The mineral salts result in the hardness of the bone structure.

A **sperm** has three main parts:

1. The head of the sperm contains the nucleus. The nucleus holds the DNA of the cell.
2. The midpiece of the sperm is packed with mitochondria. Mitochondria are organelles in cells that produce energy. Sperm use the energy in the midpiece to move.
3. The tail of the sperm moves like a propeller, around and around. This tail pushes the sperm forward through the female reproductive tract.

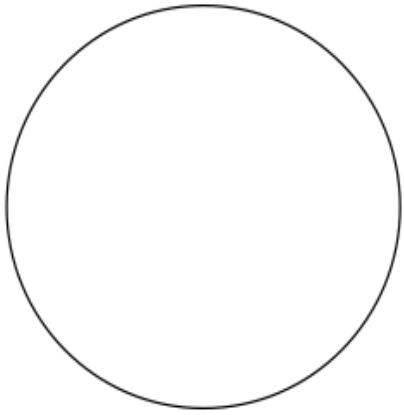
The **neuron (nerve cell)** is the basic building block of the brain and central nervous system. Neurons are specialized cells that transmit chemical and electrical signals. Neurons have several branch-like structures that extend from the cell body. These unique structures allow neurons to transmit signals in the form of electric impulses from the brain to the body and back.

Red Blood Cells appear as very small round disks (mostly circular). They have a “biconcave” shape, meaning that the top and bottom of the cells concave inward (like a jelly doughnut). Under a microscope it would appear that the cells have holes, but they do not. The small size and specific shape allow each cell to squeeze through small blood vessels carrying larger amounts of oxygen.

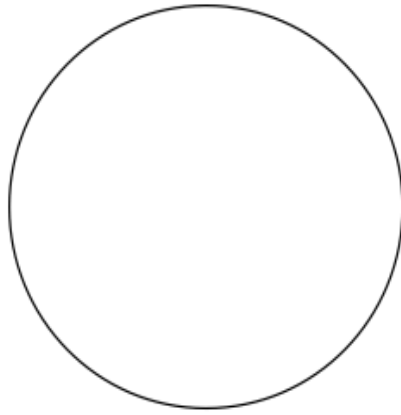
Fat cells are usually described as large, round globules (not perfect circles). They usually form tightly connected to other fat cells. These large cells that squeeze tightly together help to provide warmth/insulation.

Name: _____ Date: _____ Class: _____

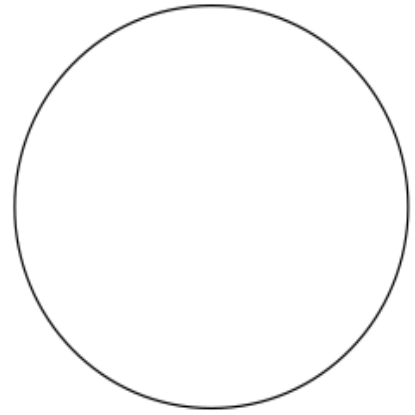
Recording Observations: Slide # _____ :



LOW POWER

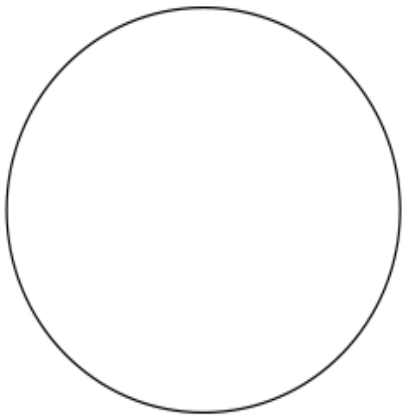


MEDIUM POWER

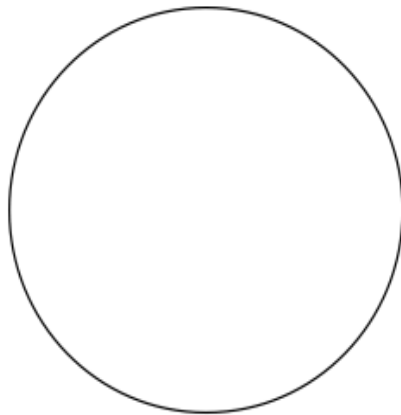


HIGH POWER

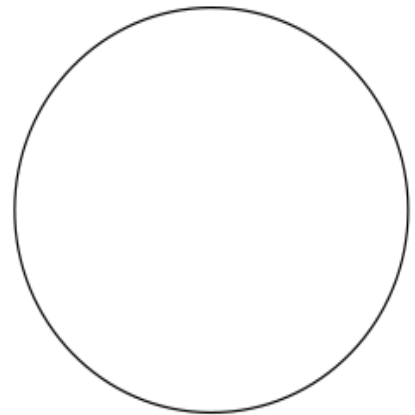
Recording Observations: Slide # _____ :



LOW POWER

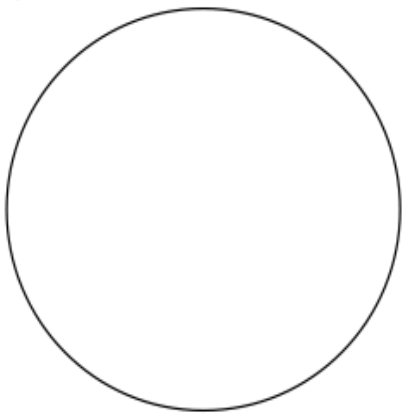


MEDIUM POWER

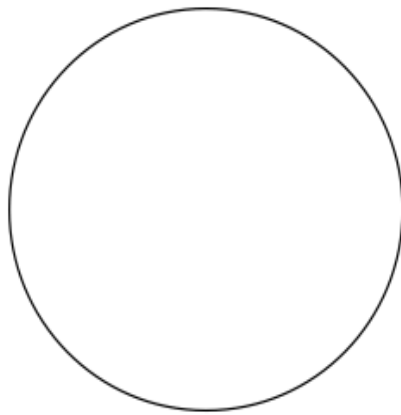


HIGH POWER

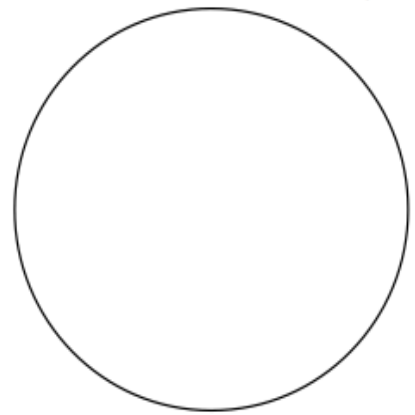
Recording Observations: Slide # _____ :



LOW POWER



MEDIUM POWER



HIGH POWER

Conclusion/Analysis:

1. How do the cells you observed under the microscope compare in structure?
2. How could the structure of each cell relate to its function?

	3	2	1
Lab Procedure Understanding	The lab is thoroughly understood. All lab procedure questions/tasks are answered/completed thoroughly and accurately.	The lab is partially understood. Most lab procedure questions/tasks are answered/completed thoroughly and accurately.	The lab is partially understood. Few lab procedure questions/tasks are answered/completed thoroughly and accurately.
Observations	All observations are recorded accurately and precisely.	Most observations are recorded accurately and precisely.	Few observations are recorded accurately and precisely.
Conclusion Analysis	Conclusion/analysis questions are answered thoroughly and correctly.	Conclusion/analysis questions are answered correctly however there is a need for more detail.	Conclusion/analysis questions are answered however there are errors.

Participation					
I often contributed good ideas that were relevant to the topic and task. I came to meetings prepared. I did my share of the work.	4	3	2	1	I seldom contributed good ideas. Sometimes I was talking off-task. I did not come to meetings prepared. I did not do my share of the work.
Working with Others					
I often compromised and cooperated. I did take initiative when needed and/or listened and respected the ideas of others.	4	3	2	1	I seldom compromised and cooperated. I did not take initiative when needed and/or did not listen and respect the ideas of others.
Product					
My part of the task is complete and accurate. My work was submitted on time.	4	3	2	1	I did not complete my part of the task. The information I presented was inaccurate and/or not done correctly. It was not completed on time.
Understanding Content					
I can speak about the topic and group work knowledgeably. I can sum-up the lesson.	4	3	2	1	I do not understand what I did in my group. I did not ask or answer questions. I cannot sum-up the lesson.

Task 5 Learning Target: I can use collaborative and problem-solving strategies to solve puzzles relating to cells and biological levels of organization.

Identify and make sense of the problem
Choose a strategy and plan
Carry out the plan to solve the problem
Verify your work with others

Lock Puzzle:

YOUR CHALLENGE-You must quickly answer these puzzles about cells.

Digit Lock Link Below:

https://docs.google.com/forms/d/e/1FAIpQLSeo8KGnOG-WjCh_PYACgFG2CG1Afc_QDBkz8zSUKe3xxBrEIg/viewform

Puzzle 1:

Where do living things come from?

Living things come from other living things through reproduc_____ion.

Four _____undred years ago people believed that life could appear from nonliving material. For example, when people saw flies swarming around decaying meat, they concluded that flies were produced by rotting meat. The mistake that living things can arise from nonliving sources is called *spontan_____ous generati_____n*.

In the 1600s, an Italian doctor named Francesco _____edi helped to disprove spontaneous generation. Redi designed a controlled experiment to show that maggots, which develop into new flies, do not arise from decaying meat.

He left just one jar uncovered, while covering two others.

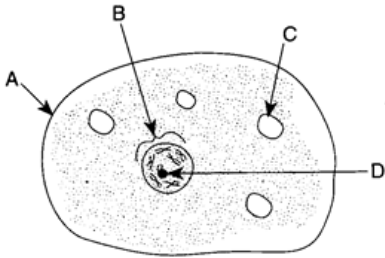
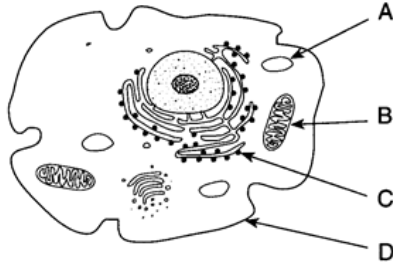
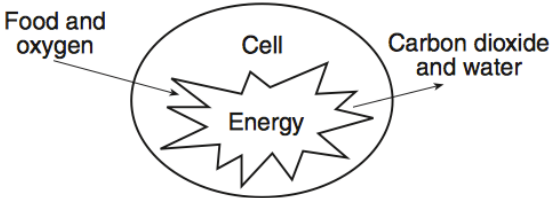
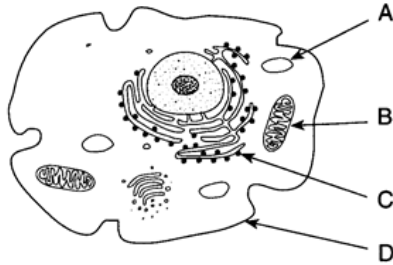
One was covered in cork, while the other was covered in gauze/cloth.

The flies could not get through the cork, but the_____ did reproduce on top of the gauze. This allowed Redi to show the maggots on top of the gauze, not in the jar with the cork, and on the meat with the open jar.

CELL

1. All living things are made of one or more cells
2. The cell is the basic unit of life in which life activities occur
3. Cells come from cells that already exist

Puzzle 2:

<p>1 Water</p>	<p>Nucleus (B)</p> 	<p>2 DNA</p>
<p>3 cell membrane</p>	<p>Barrier (D)</p> 	<p>4 Nucleus</p>
<p>5 Oxygen</p>	<p>Cellular Respiration Requirement</p> 	<p>6 Carbon dioxide</p>
<p>7 A</p>	<p>Respiration</p> 	<p>8 B</p>
<p>1 Mitochondrion</p>	<p>Singular</p>	<p>2 Mitochondria</p>

Puzzle 3:

1. D3, D4, C4, D2, A5, A4, C3, A1
2. E2, A1, D4, A5, D2,
3. A5, C3, A5, D2, B2, E4,
4. B3, A5, D2, A5, A4, B4, D4, A1, D2, E4

GRID

	1	2	3	4	5
A	A	B	C	D	E
B	F	G	H	I J	K
C	L	M	N	O	P
D	Q	R	S	T	U
E	V	W	X	Y	Z

3 Cell Membrane	2 Cytoplasm	5 Nucleus
6 DNA	1 Vacuole	4 Mitochondria

Puzzle 4:

**TINHK YOU CAN SVAE YUROSELF?
CALISSFY THE ORAGNELLES OT RVEELA A CDOE.**

A. Nucleus	B. Mitochondrion

energy 20

oval bean 40

hereditary material 50

round 35

coordinates activities 40

respiration 50

Puzzle 5:

NEWS ALERT

Set to AT

JLSS KPCPZPVU



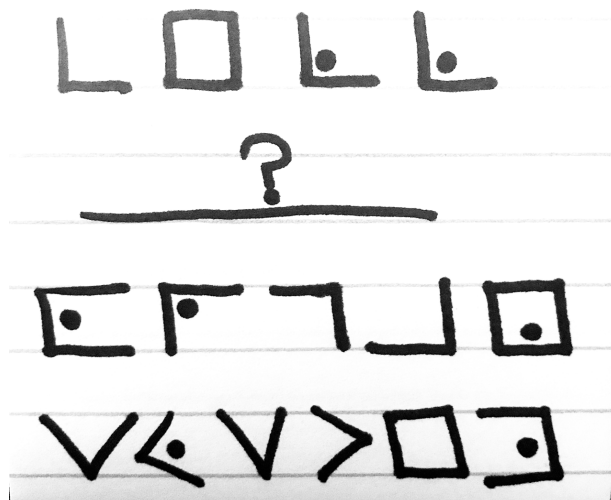
https://www.youtube.com/watch?v=rgLJrvoX_g0

Puzzle 6:

A	B	C	J	K	L
D	E	F	M	N	O
G	H	I	P	Q	R

S	U
T	V

W	Y
X	Z



Puzzle 7:



Use the phone dial for help!

The _____ is the site of cellular respiration.

The _____ stores minerals and waste.

The _____ holds hereditary material.

All of the above are classified as cell

_____.