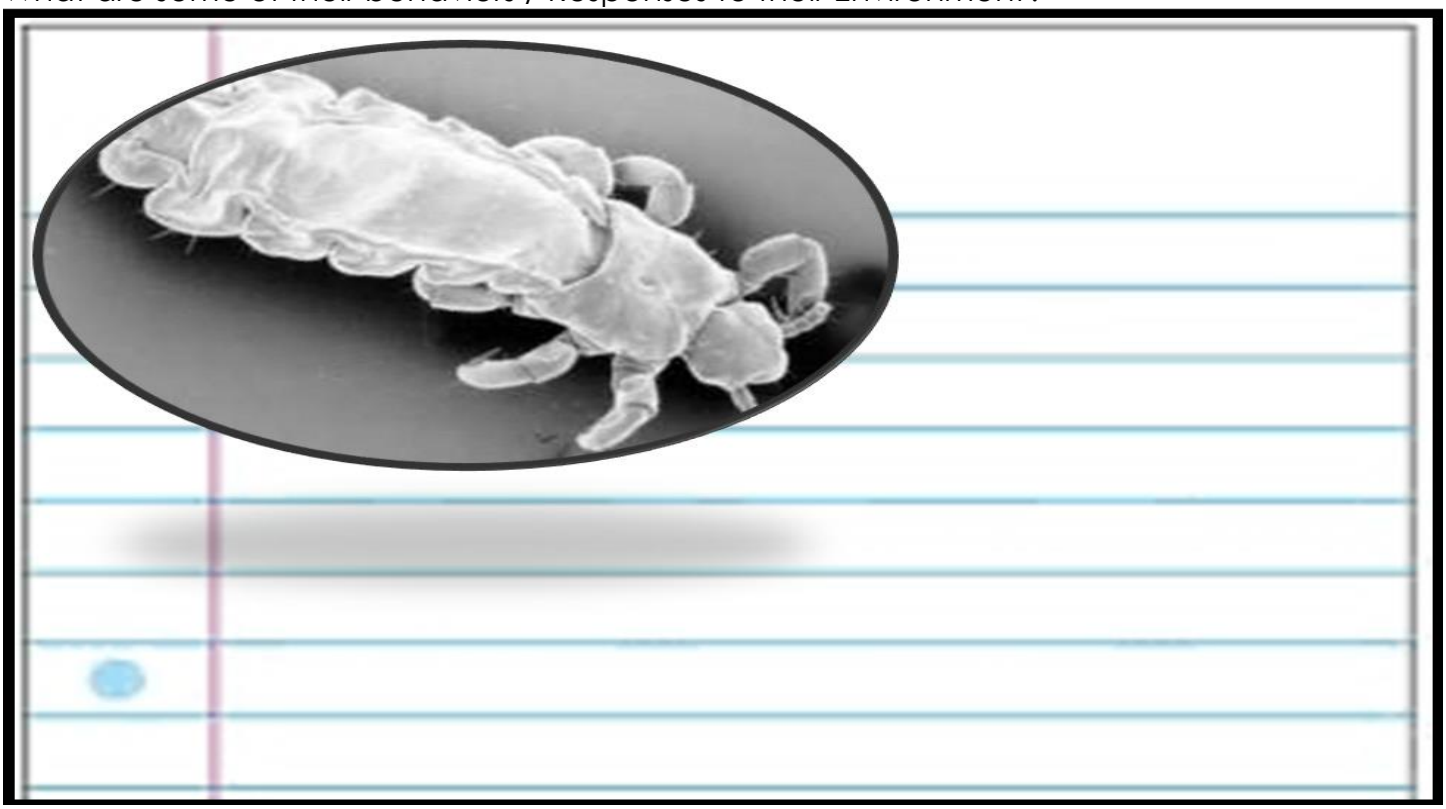
# Part 5 On Origins

Name:

Part 5 Lesson 1

Due:

Please describe the Sewer Lice *(Pediculus deficus)*in the space below. What are they doing? What are some of their behaviors / Responses to their Environment?



Organism: An organism is any individual entity that embodies the properties of _____.

- Organisms are classified by taxonomy into groups such as _____cellular animals, plants, and _____ or _____cellular microorganisms such as protists, bacteria, and archaea.

What are the Six Kingdoms of Life? There is an error in the characteristics? Can you find it?

| Domain | | | Eukaryotes | | | |
|---|---|---|---|---|---|---|
| Kingdom | | | | | | |
| Example |  |  |  |  |  |  |
| Characteristics | *Bacteria are simple unicellular organisms* | *Simple unicellular organisms that live in extreme environments* | *Unicellular and complex* | *Unicellular or multi-cellular and absorb food* | *Multicellular and absorb their own food* | *Multicellular and take in their own food* |

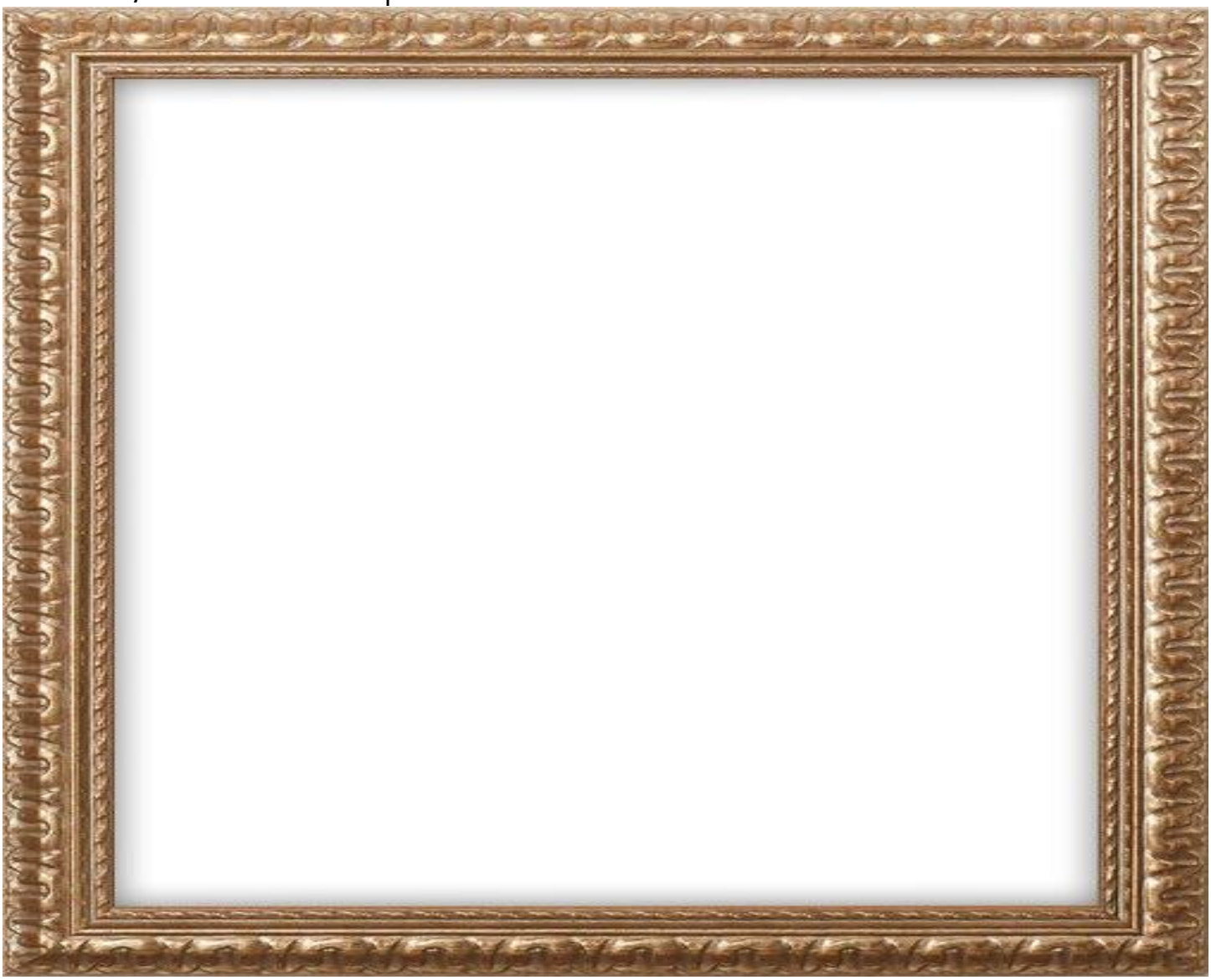
SPONCH -25 of the elements are essential for life.

These are the Biologically Important Elements
(These letters deserve to look cool, please put their names below)

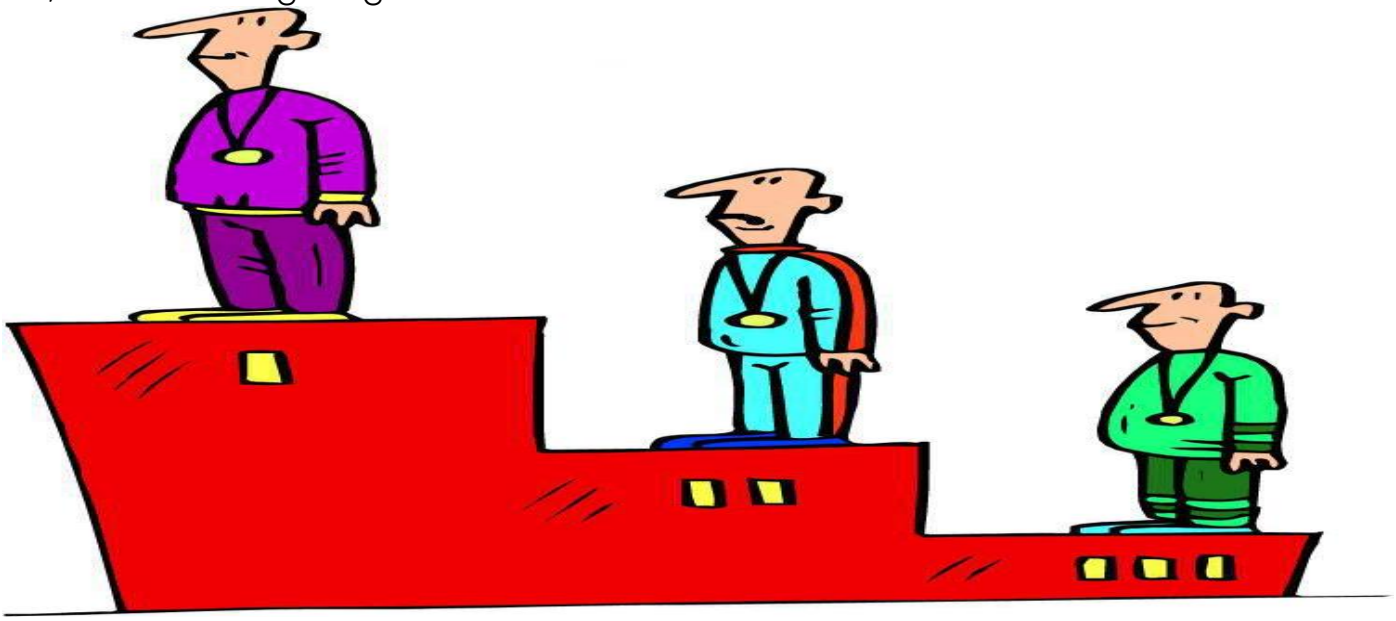
| | | | | | |
|---|---|---|---|---|---|
| | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Name | | | | | |
| % in living things | | | | | |

## Animal / SPONCH Graph



If these athletes were biologically important Elements, which element is used the most (1st), 2nd, and 3rd in living things.



Part 5 Lesson 2

**Characteristics of Life**

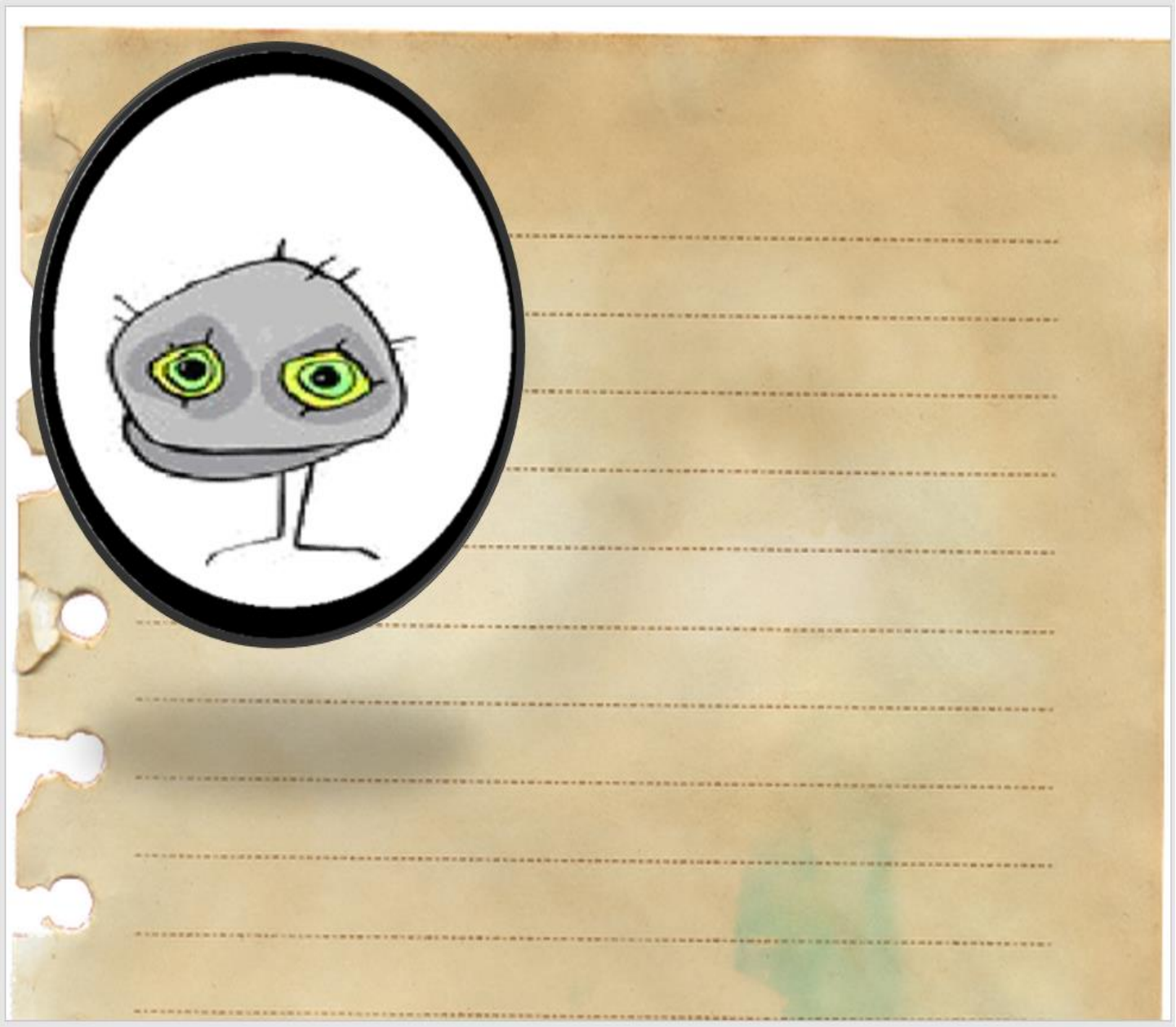
-Made of mostly __ __ __ __ __ __ elements
-Made of _____.
-M_____.
-Responds to a _____.
-Uses _____.
-Adjusts to _____.
    -Maintains steady body conditions.
    -Maintains _____.
-R_____.
-Grows and D_____.
    -Grow-To increase in size.
    -Develop-To change in ability.
-Adapts to _____.
-Evolves / Inherits traits that promote survival.
-Has a _____ span.

| | |
|---|---|
| Which is not a characteristic of Life?<br>• Moves<br>• Made of cells<br>• Does not use energy<br>• Maintains homeostasis with environment<br>• Grows and develops<br>• Reacts to a stimulus<br>• Reproduces by exchanging it's own DNA<br>• It evolves over time | Which is not a characteristic of Life?<br>• Moves<br>• Made of cells<br>• Uses energy<br>• Maintains homeostasis with environment<br>• Grows and develops<br>• Reacts to a stimulus<br>• Reproduces by exchanging it's own DNA<br>• Cannot evolve over time |

| | |
|---|---|
| • Has a life span | • Has a life span |

Characteristics of Life

While looking under the microscope, you observe the object below. How can you determine if this is a living creature? What will it need to survive if it is living?

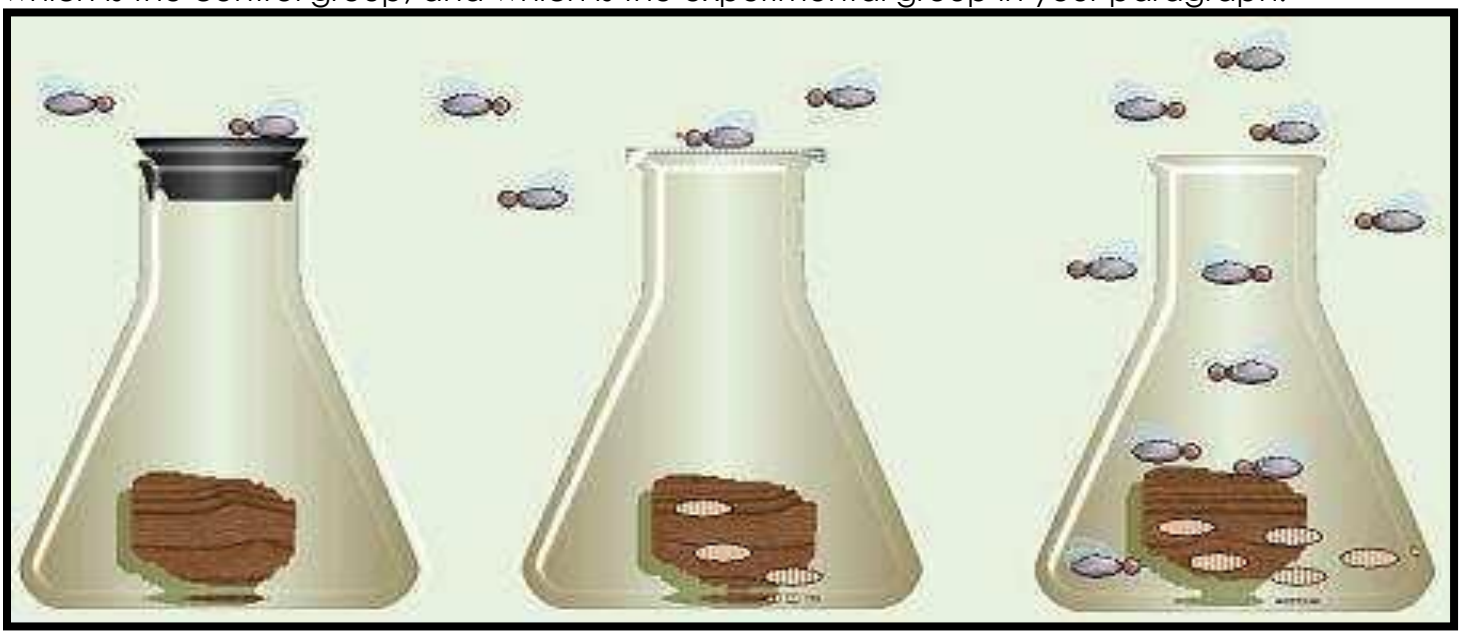


Spontaneous Origin: The belief that living organisms are produced / generated from _____-living sources.

Needs of Living Things

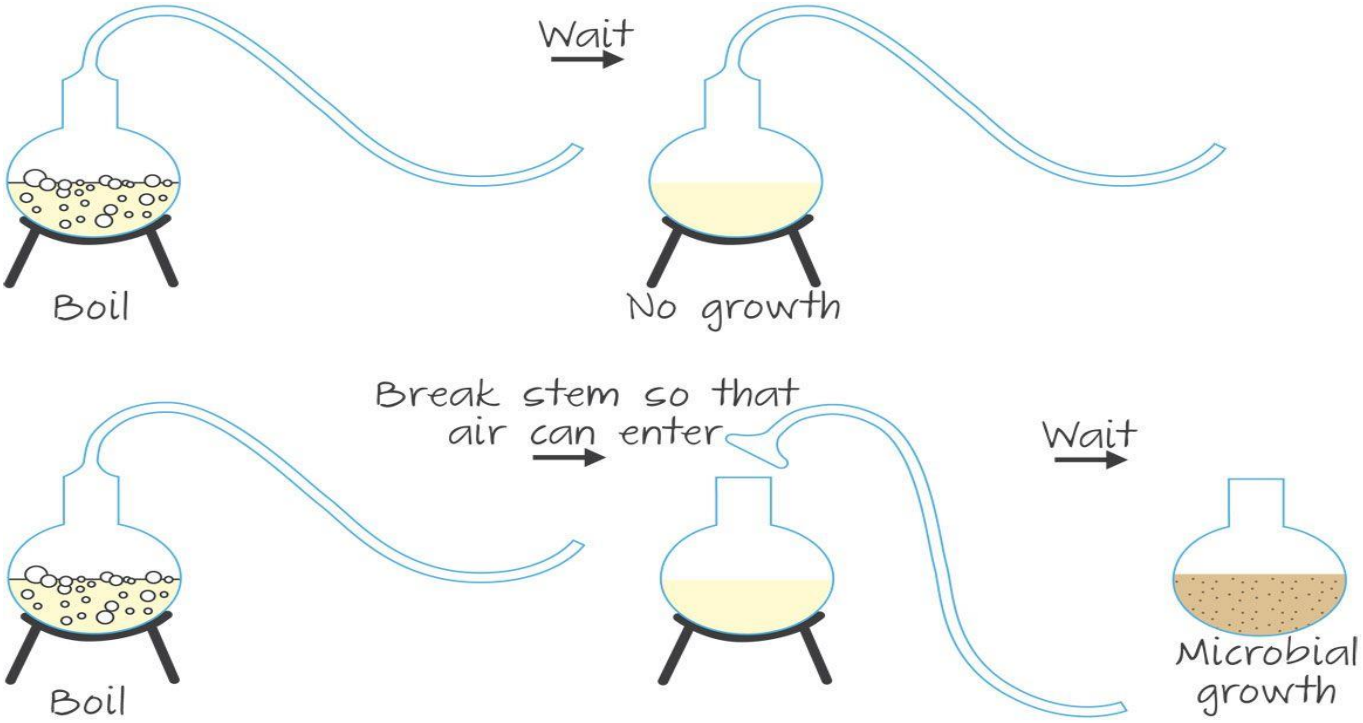
_____ – Supplied by the sun (most of the time) and stored in food.
_____ – To burn the food in cells. (Respiration)
_____ – To keep things moving in and out of cells. (Universal Solvent)
_____- For proper chemical balance.

Briefly describe the findings of Francesco Redi's experiment in 1668. Make sure to include which is the control group, and which is the experimental group in your paragraph.



Make sure to discuss the control group!

Briefly describe the findings of Louis Pasteur in 1862 that helped disprove spontaneous origin. Make sure to include which is the control group, and which is the experimental group in your paragraph. Also, how did this study help people… think mircrobiology.



Part 5 Lesson 3

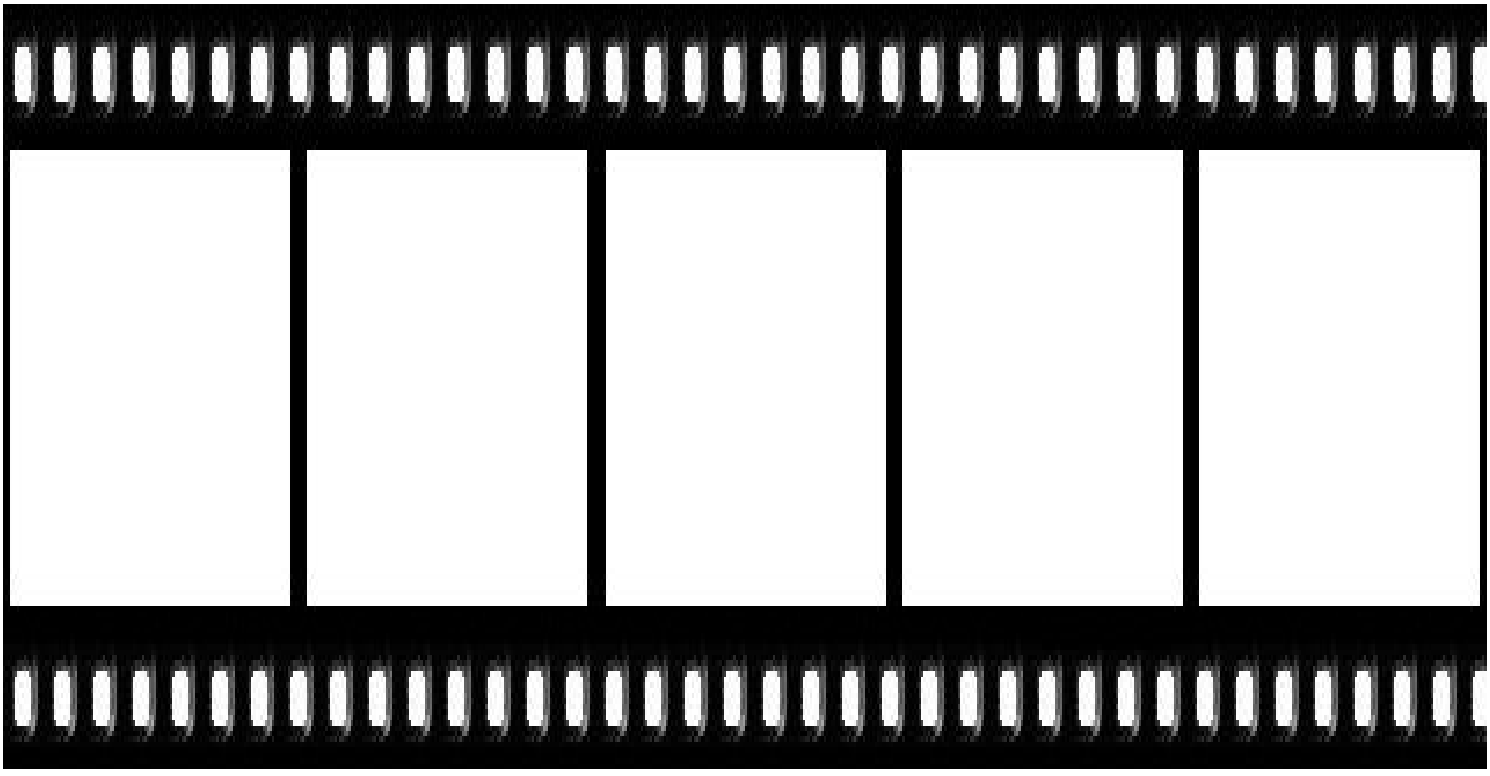
In Science theory

-Abiogenesis explains the origin of life.
-Evolution explains how life has changed once it exists.
- The two are different.

The four general ideas about the origin of life.

-Special _____ – divine forces (god).
-E.T. _____origin – landed from space.
-Spontaneous origin (abiogenesis) – life came from _____ materials.
-Science viewpoint Which includes
-_____ (Darwinism).
-Cosmology (_____)
-_____ (Earth System History)
-Abiogenesis (Primitive life / _____).

Please use the filmstrip below to take five snap shots of the earth over the last 4.6 billion years. Record a brief statement of what is happening under your drawing.



Origins of the Universe, a timeline.

Big Bang roughly _____ billion years ago.
_____ billion years ago: Earth was created.
_____ billion years ago: life arose.
Prebionts - Nonliving structures that evolved into the first living cells. (Simple)
_____ billion years ago: Eukaryotic cells (single cells with a nucleus) evolved.
_____ billion year ago: Oxygen began to saturate the atmosphere.

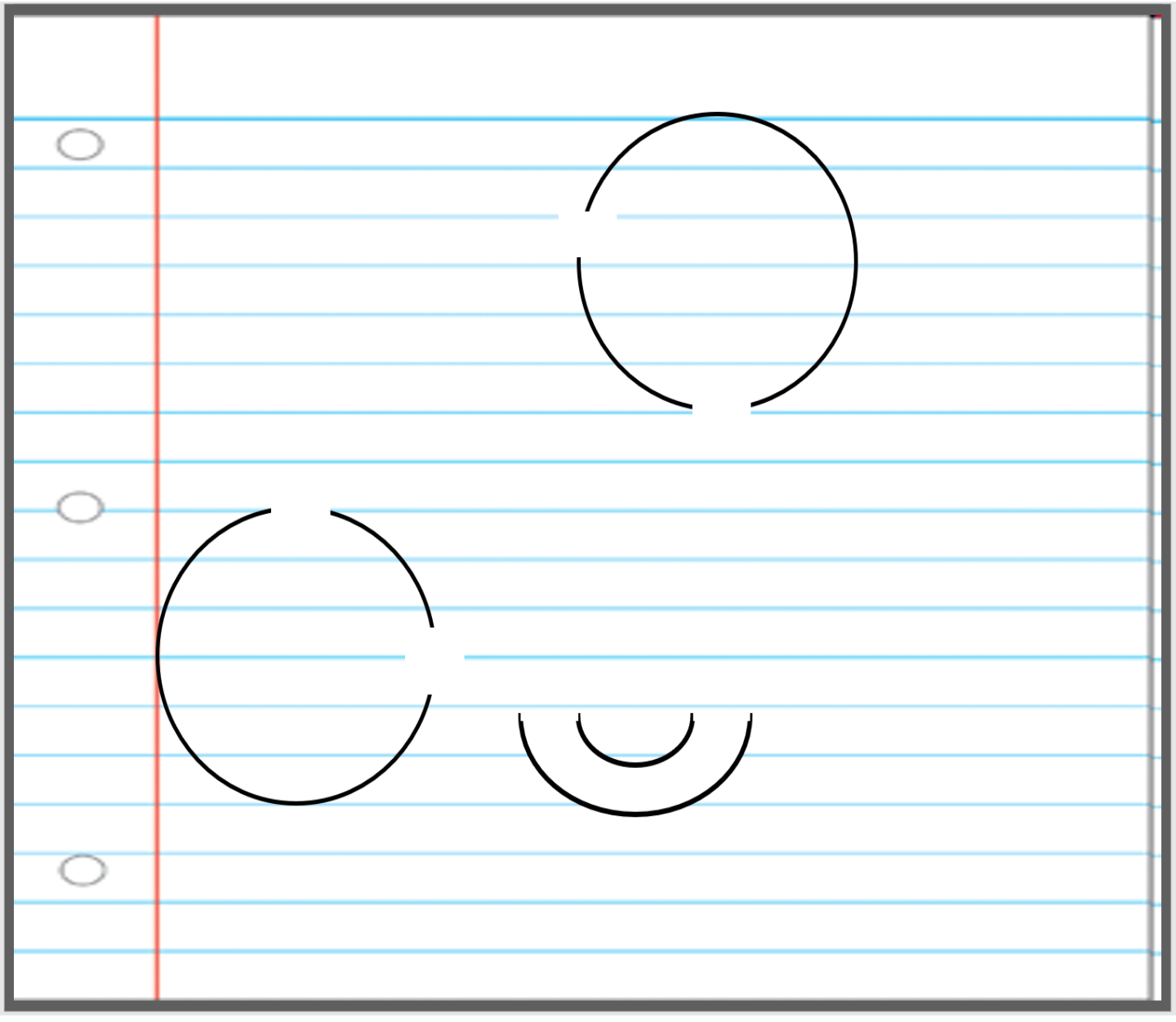
Prebionts: Nonliving structures that evolved into the first living cells. (Simple)
1.8 billion years ago: Eukaryotic cells (single cells with a nucleus) evolved.

2 billion years ago: Oxygen began to saturate the atmosphere.

Part 5 Lesson 4

The _____ experiment was a chemical experiment that _____the conditions thought at the time to be present on the early Earth and tested the chemical origin of life under those conditions

Miller-Urey Experiment, Used…
Methane (_____)
Ammonia (_____)
Water (_____)
Hydrogen (____)

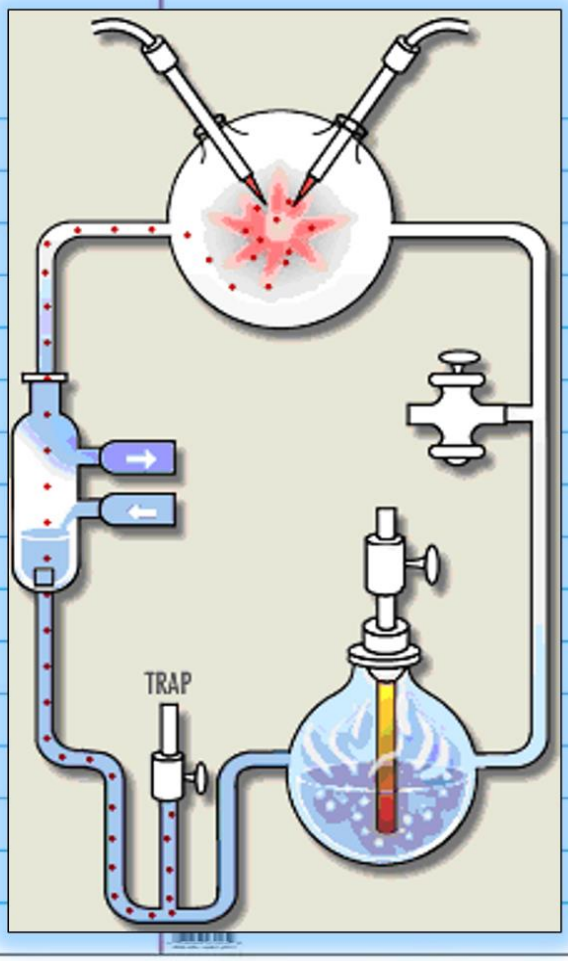


The experiment used…

_____ (lightning)
_____ (UV) light (no ozone yet).
Heat (convection currents).
_____(condensation)
No _____ (no life yet / photosynthesis).

What did the Miller-Urey experiment find?

Please describe as much as possible about Miller-Urey (1953) and their study concerning primitive earth. Please include the SPONCH elements where appropriate.



Part 5 Lesson 5

A _____ = 100 amino _____ of 20 varieties
Proteins can build DNA / RNA

Use the space below to describe some info as described in the slideshow about protocells and the key steps to early life.

Water aided in origin of life in three ways

-As a _____ – Everything dissolves in water. Ex-food, oxygen, minerals,
-As a _____ in chemical reactions such as photosynthesis.
-As a _____, Organisms move through, waste travels away, sex cells travel through,

How did water aid in the origin of life? Don't forget, (Solvent, Medium, Participant)

**Across**

1. Water aided in the origin of life as a _____ for organism move through
2. Louis _____'s experiments (1860' s) showed that micro-organisms are even carried in the air.
6. 1.8 billion years ago: E_____ cells (single cells with a nucleus) evolved.
7. Organisms are classified by taxonomy into groups such as multicellular _____, plants, and fungi; or unicellular microorganisms such as protists, bacteria, and archaea.
8. Water aided in the origin of life as a _____ in chemical reactions
9. Living things respond to a _____
13. Living things Adjust to _____
14. This explains how life has changed once live has formed
16. Living things must use E_____
17. Living things _____ over time
19. earth was created about 4.6 _____ years ago
20. Organisms are classified by taxonomy into groups such as multicellular animals, plants, and fungi; or unicellular microorganisms such as protists, _____, and archaea.
22. Living things Grow and _____
23. Living things M_____

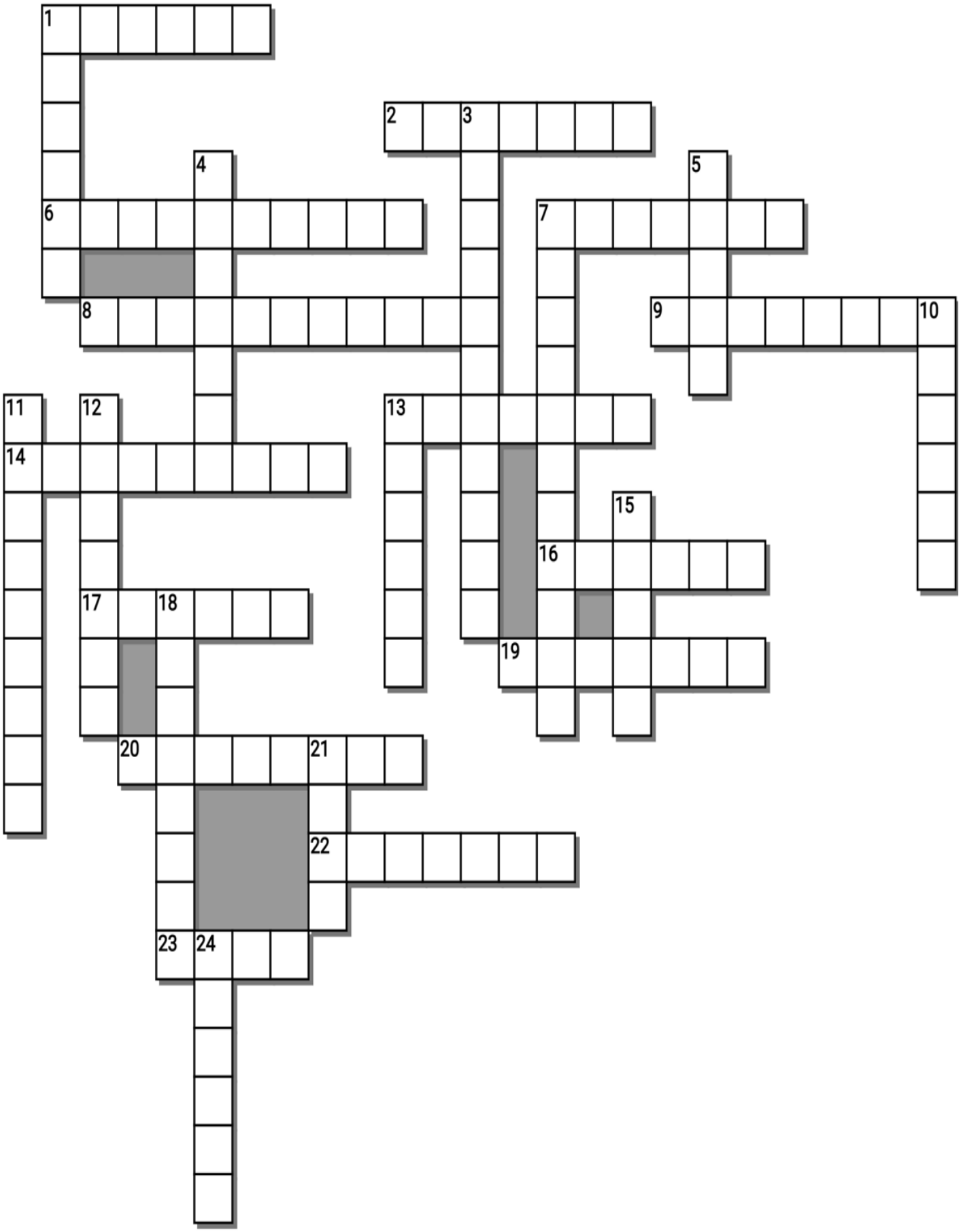
**Down**

1. The _____–Urey experiment was a chemical experiment that simulated the conditions thought at the time to be present on the early Earth and tested the chemical origin of life under those conditions
3. S_____ Origin: The belief that living organisms are produced / generated from non-living sources.
4. Organisms are classified by taxonomy into groups such as multicellular animals, plants, and fungi; or unicellular microorganisms such as _____, bacteria, and archaea.
5. F_____acids are believed to have formed the structure for the first protocells.
7. In science theory, A_____ explains the origin of life.
10. Living things are made of the _ _ _ _ _ _ _ elements
11. All living things must R_____
12. Water aided in the origin of life as a _____ Everything dissolves in water.
13. This element is considered the duct of life as holds together many organic compounds
15. Living things are made of...
18. Any individual entity that embodies the properties of life.
21. Francesco _____ – (1668) Experiment about Spontaneous Origin
24. 2 billion years ago: _____ began to saturate the atmosphere.

----------Teacher can remove this work bank to make puzzle more challenging----------

**Possible Answers**

ABIOGENESIS, ANIMALS, CARBON, CELLS, CHNAGES, DEVELOP, ENERGY, EUKARYOTIC, EVOLUTION, EVOLVE, FATTY, MEDIUM, MILLER, MOVE, ORGANISM, OXYGEN, PARTICIPANT, PASTEUR, PROTIST, REDI, REPRODUCE, SPONCH, SOLVENT, SPONTANEOUS , STIMULUS, BACTERIA, BILLION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# Part 5 Review Game Lesson 6

Name:

1-10 = 10 pts * = Bonus + 1 pt,
(Secretly write owl in correct space +1 pt)
Final Question = 5 pt wager

Due: Today
Score ____ / 100

| WHAT IS LIFE? | NEEDS | IT CAME FROM THE… | BUBBLY | NAME THAT DETERGENT<br>Bonus round<br>1 pt each |
|---|---|---|---|---|
| 1) | 6) | 11) | 16) | *21) |
| 2) | 7) | 12) | 17) | *22) |
| 3) | 8) | 13) | 18) | *23) |
| 4) | 9) | 14) | 19) | *24) |
| 5) | 10) | 15) | 20) | *25) |

Final Question Wager ___ /5 Answer: _____

# Part 5 On Origins

Name:

Part 5 Lesson 1

Due:

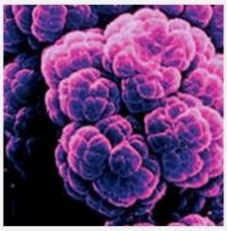
Please describe the Sewer Lice *(Pediculus deficus)*in the space below. What are they doing? What are some of their behaviors / Responses to their Environment?

The sewer lice were raisins and the sewer water was ginger ale. The $CO_2$ bubbles from the carbonation got caught under the wrinkles of the raisin and the raisin floated to the top where the bubbles met the air, and then the raisin sank. Teacher would just look for observations that the student was participating in this section.

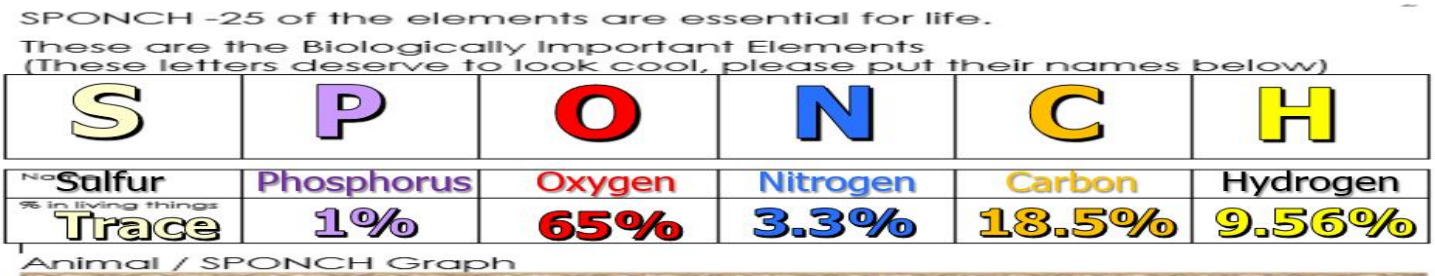
Organism: An organism is any individual entity that embodies the properties of life.

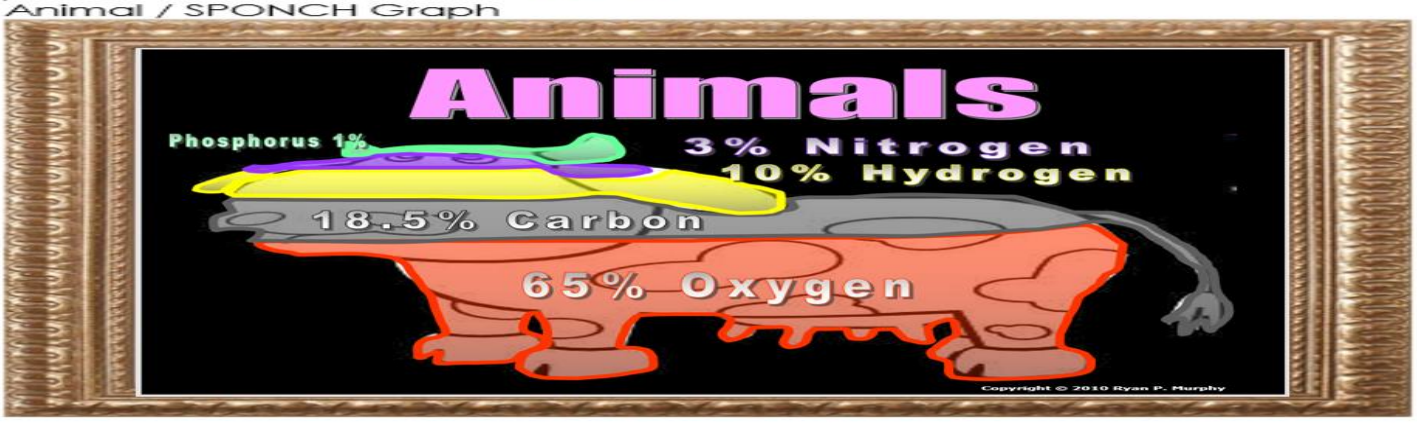
- Organisms are classified by taxonomy into groups such as multicellular animals, plants, and fungi or unicellular microorganisms such as protists, bacteria, and archaea.

What are the Six Kingdoms of Life? There is an error in the characteristics? Can you find it?

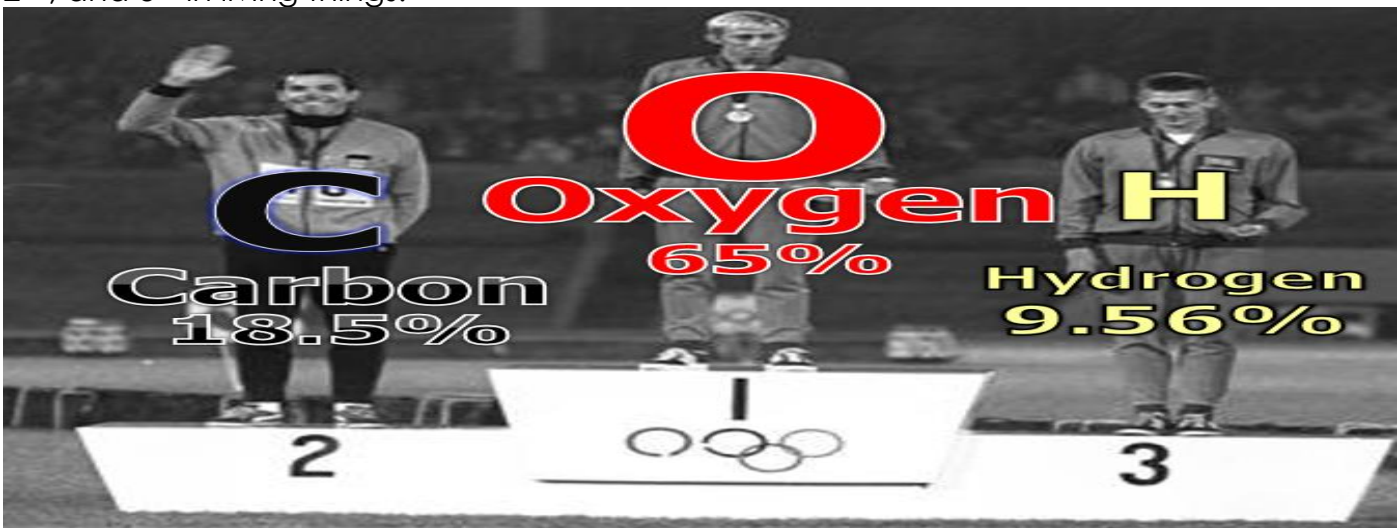
| Domain | Prokaryote | | Eukaryotes | | | |
|---|---|---|---|---|---|---|
| Kingdom | Bacteria | Archaea | Protista | Fungi | Plants | Animals |
| Example |  |  |  |  |  |  |
| Characteristics | *Bacteria are simple unicellular organisms* | *Simple unicellular organisms that live in extreme environments* | *Unicellular and complex* | *Unicellular or multi-cellular and absorb food* | *Multicellular and* make *their own food* | *Multicellular and take in their own food* |

SPONCH -25 of the elements are essential for life.



If these athletes were biologically important Elements, which element is used the most (1st), 2nd, and 3rd in living things.




Part 5 Lesson 2

**Characteristics of Life**

-Made of SPONCH Elements
-Made of Cells.
-Moves.
-Responds to a stimulus.
-Uses energy.
-Adjusts to change.
    -Maintains steady body conditions.
    -Maintains homeostasis.
-Reproduces.
-Grows and Develops.
    -Grow-To increase in size.
    -Develop-To change in ability.
-Adapts to change.
-Evolves / Inherits traits that promote survival.
-Has a life span. "dies"

| | |
|---|---|
| Which is not a characteristic of Life?<br>• Moves<br>• Made of cells<br>• Does not use energy<br>• Maintains homeostasis with environment<br>• Grows and develops<br>• Reacts to a stimulus<br>• Reproduces by exchanging it's own DNA<br>• It evolves over time<br>• Has a life span | Which is not a characteristic of Life?<br>• Moves<br>• Made of cells<br>• Uses energy<br>• Maintains homeostasis with environment<br>• Grows and develops<br>• Reacts to a stimulus<br>• Reproduces by exchanging it's own DNA<br>• Cannot evolve over time<br>• Has a life span |

Characteristics of Life

While looking under the microscope, you observe the object below. How can you determine if this is a living creature? What will it need to survive if it is living?

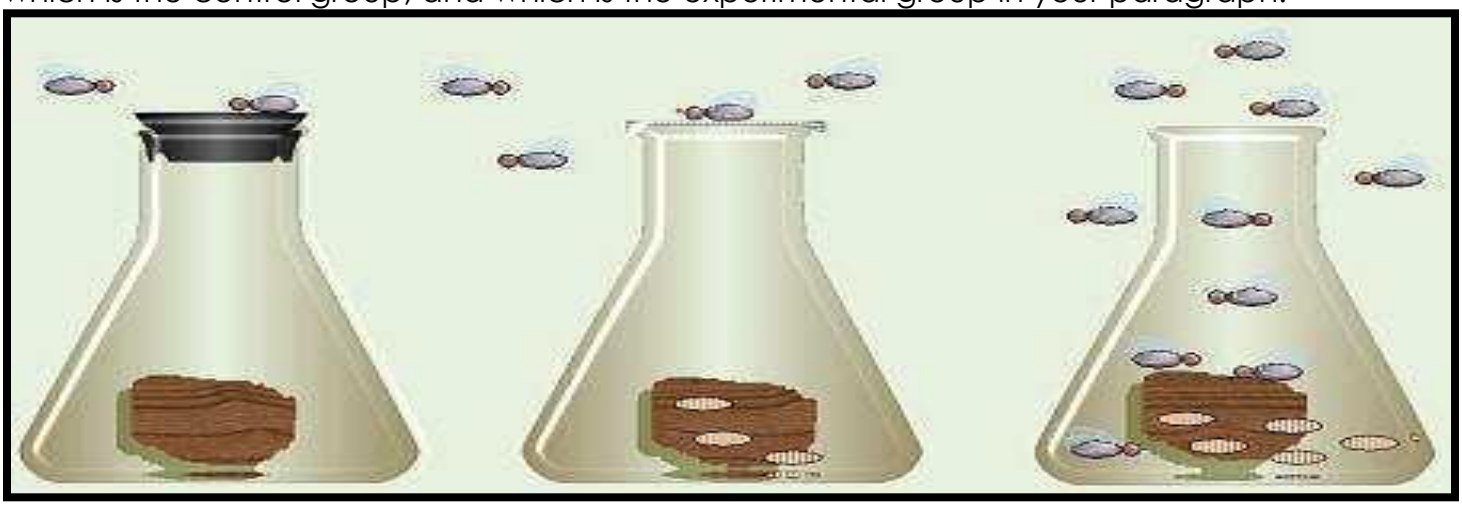
| | |
|---|---|
|  | The answer is just looking for the student to include some of the characteristics of life to make a decision. A strong answer would include if the specimen is made of cells, using energy, maintaining a balance with the environment, reacting to stimulus. Just try and have the student stay away from it's just ink on paper. |

Spontaneous Origin: The belief that living organisms are produced / generated from non-living sources.

Needs of Living Things

Energy – Supplied by the sun (most of the time) and stored in food.
Oxygen – To burn the food in cells. (Respiration)
Water – To keep things moving in and out of cells. (Universal Solvent)
Minerals- For proper chemical balance.

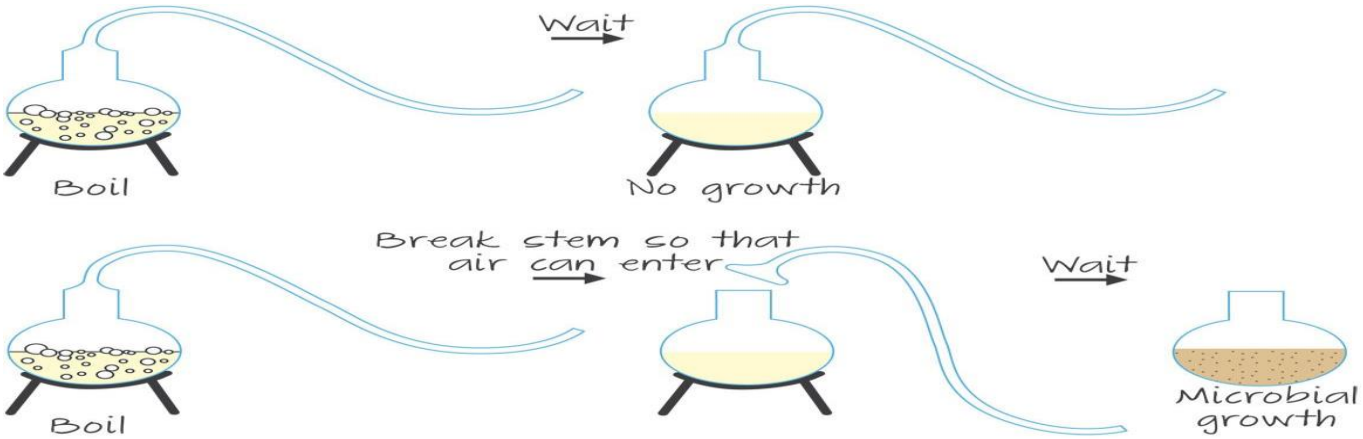
Briefly describe the findings of Francesco Redi's experiment in 1668. Make sure to include which is the control group, and which is the experimental group in your paragraph.



Make sure to discuss the control group!

In 1668, Francesco Redi, an Italian scientist, designed a scientific experiment to test the spontaneous creation of maggots by placing fresh meat in each of two different jars. One jar was covered with a cloth to prevent flies from entering and was the control group. The other jar contained meat that the flies could land on. Redi successfully demonstrated that the maggots came from fly eggs and thereby helped to disprove spontaneous generation. Life must come from life.

Briefly describe the findings of Louis Pasteur in 1862 that helped disprove spontaneous origin. Make sure to include which is the control group, and which is the experimental group in your paragraph. Also, how did this study help people… think mircrobiology.




Pasteur conducted a now infamous experiment in which he used a glass flask with an S shaped neck. This he explained was because the germ particles in the air attempting to enter the flask had become became trapped in the s shaped bend. Therefore, they had not contaminated the liquid. This experiment demonstrated that microorganisms are present in the air as they contaminated the broth in the container where air could enter. This helped demonstrate the need for sterilization and the presence of microorganisms.

Part 5 Lesson 3

In Science theory

-Abiogenesis explains the origin of life.

-Evolution explains how life has changed once it exists.

- The two are different.

The four general ideas about the origin of life.

-Special Creation – divine forces (god).

-E.T. Extraterrestrial origin – landed from space.

-Spontaneous origin (abiogenesis) – life came from non-living materials.

-Science viewpoint Which includes

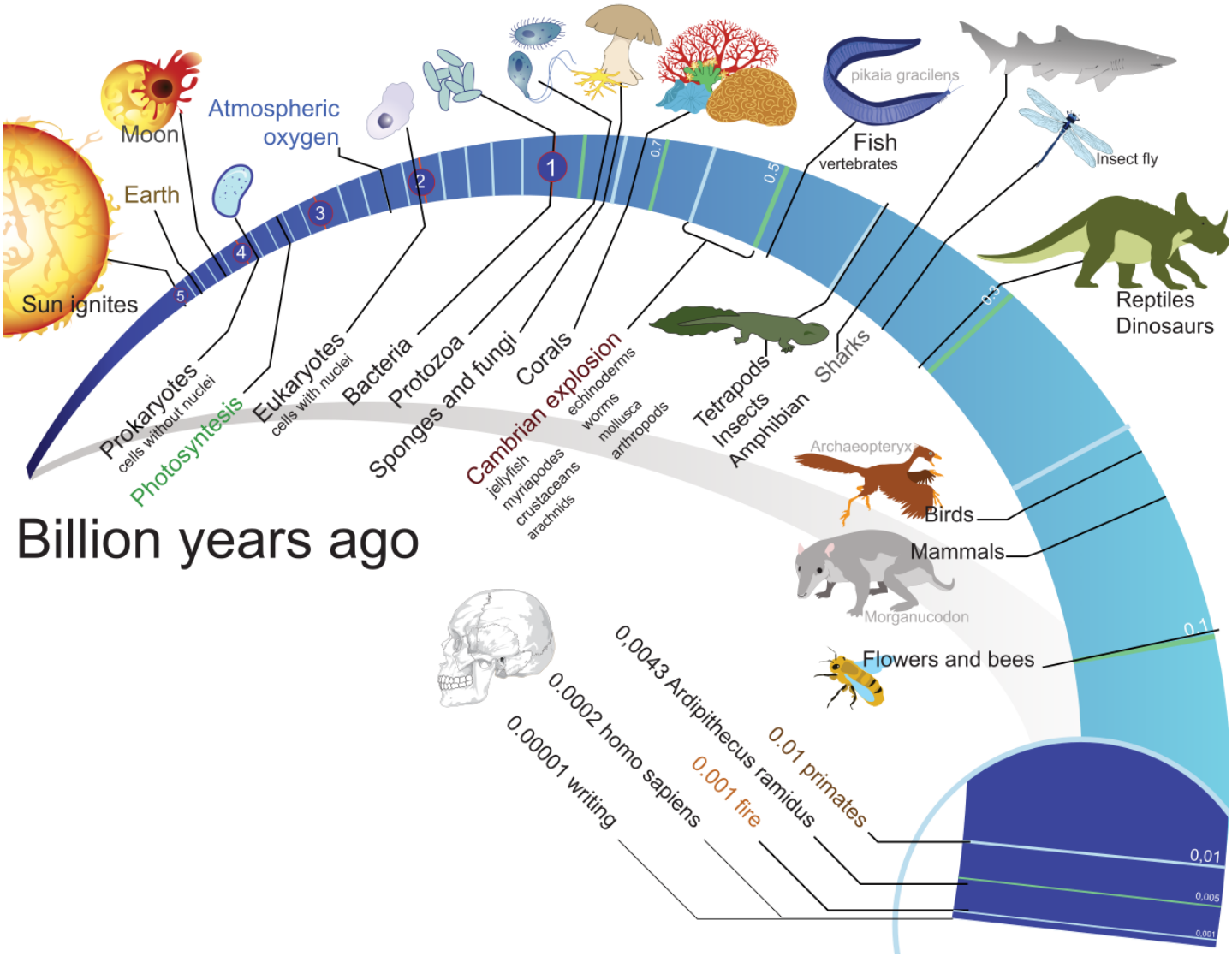
-Evolution (Darwinism).

-Cosmology (Astronomy / Understanding the Origin and Development of the Universe)

-Geology (Earth System History)

-Abiogenesis (Primitive life / Organic Chemistry).

Please use the filmstrip below to take five snap shots of the earth over the last 4.6 billion years. Record a brief statement of what is happening under your drawing.




Origins of the Universe, a timeline.

Big Bang roughly 13.8 billion years ago.
4.5 billion years ago: Earth was created.
3.7 billion years ago: life arose.
Prebionts - Nonliving structures that evolved into the first living cells. (Simple)
2.7 billion years ago: Eukaryotic cells (single cells with a nucleus) evolved.
2.3 billion year ago: Oxygen began to saturate the atmosphere.

Prebionts: Nonliving structures that evolved into the first living cells. (Simple)
1.8 billion years ago: Eukaryotic cells (single cells with a nucleus) evolved.

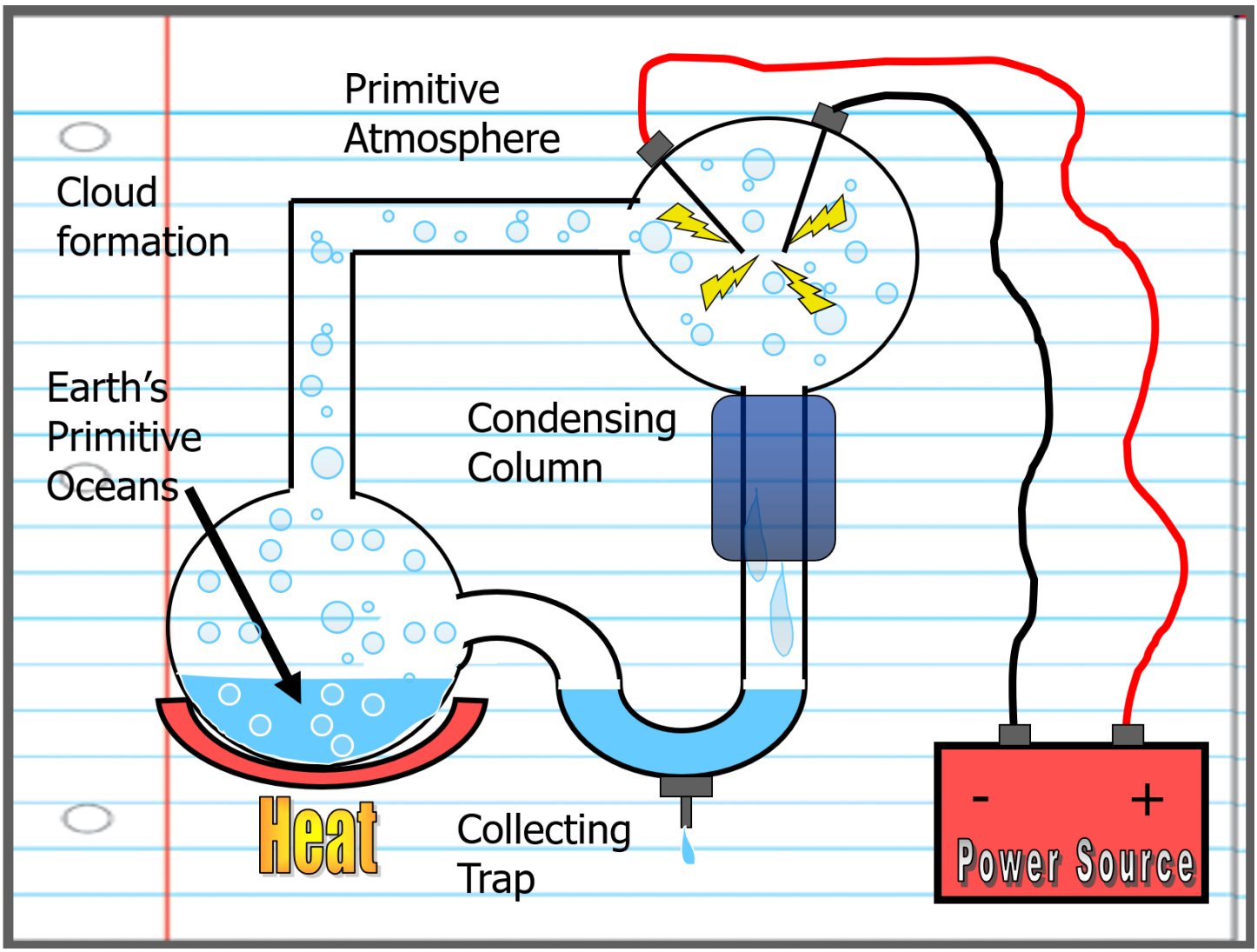
2 billion years ago: Oxygen began to saturate the atmosphere.

Part 5 Lesson 4

The Miller-Urey experiment was a chemical experiment that simulated the conditions thought at the time to be present on the early Earth and tested the chemical origin of life under those conditions

Miller-Urey Experiment, Used…

Methane ($CH_4$)
Ammonia ($NH_3$)
Water ($H_2O$)
Hydrogen ($H_2$)



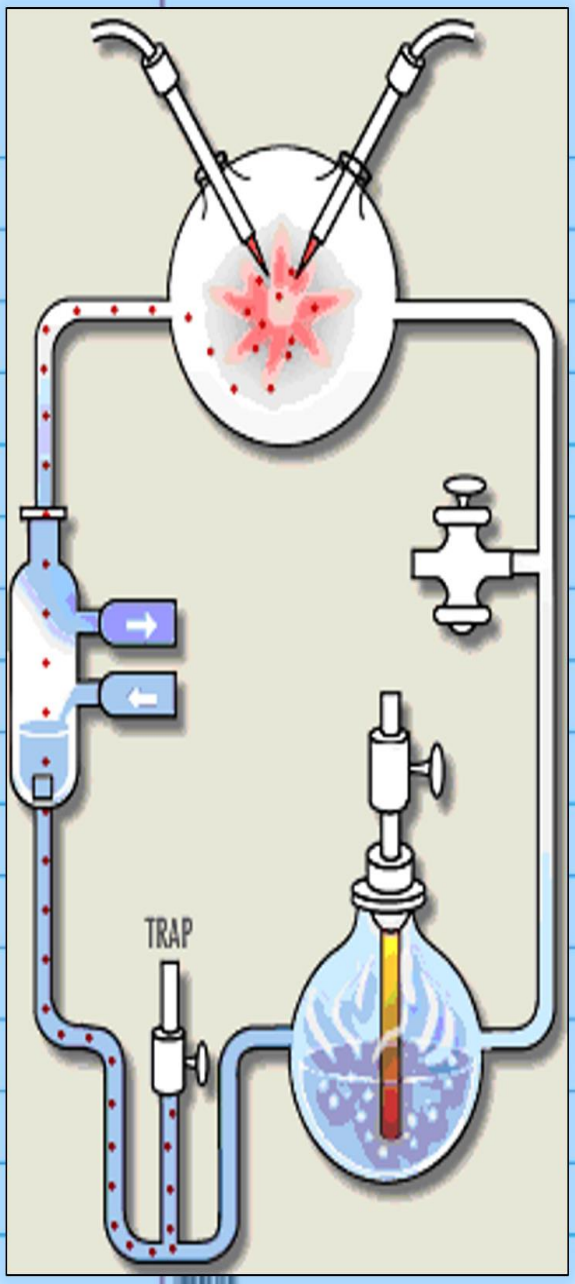

The experiment used…

Electricity to simulate (lightning)
Ultra-violet (UV) light (no ozone yet).
Heat (convection currents).
Cooling (condensation)
No Oxygen (No life yet / Photosynthesis)

What did the Miller-Urey experiment find?

- It did create some molecules that are important to life. The Miller-Urey experiment provided the first evidence that organic molecules needed for life could be formed from inorganic components.

Please describe as much as possible about Miller-Urey (1953) and their study concerning primitive earth. Please include the SPONCH elements where appropriate.




Miller and Urey performed an experiment to describe the origin of life on earth. They were of the idea that the early earth's atmosphere was able to produce amino acids from inorganic matter. The two biologists made use of methane, water, hydrogen, and ammonia which they considered were found in the early earth's atmosphere. The chemicals were sealed inside sterile glass tubes and flasks connected together in a loop and circulated inside the apparatus. Electrodes were also used to simulate lightning. The water vapor was heated and the vapor released was added to the chemical mixture. The released gases circulated around the apparatus imitating the earth's atmosphere. The water in the flask represents the water on the earth's surface (water cycle). The vapors were cooled and the water condensed. This condensed water trickles back into the first water flask in a continuous cycle. Miller and Urey examined the cooled water after a week and observed that 10-15% of the carbon was in the form of organic compounds. 2% of carbon had formed 13 Amino Acids.

Part 5 Lesson 5

A Protein= 100 amino acid of 20 varieties
Proteins can build DNA / RNA

Use the space below to describe some info as described in the slideshow about protocells and the key steps to early life.

- Answer! The fat layer should mix and form small vesicles or round structures because oil (non-polar) and water (polar) don't mix.
  - Larger bubbles will engulf smaller bubbles.

- Fatty acids are believed to have formed the structure for the first protocells.
- They are also permeable so simple monomer units can enter.
- These fatty acids expand when they are closer to heat (hydrothermal vents) allowing for more monomer units to enter cell.
- These monomer units link and attach with hydrogen, forming first primitive nucleotide.
- When a large fatty vesicle meets a smaller vesicle it engulfs it and its contents.
- The vesicle gets larger and more complex.
- Mutations occur within the vesicle, mutations that favor self replication allow that Proto-cell to continue.
- Evolution then get's involved in the process.
- Those protocells that can self replicate pass on this characteristic.
- Small changes over billions of years lead to new and better replicating protocells.

The Key Steps to early life
A.) Formation of complex organic molecules.
B.) These are expected to be common on early Earth.
C.) Self-replicating systems.
D.) Protein Synthesis.
E.) RNA can be both genetic material and serve the role of proteins in replication.
F.) Compartmentalization: The First Cell.

Water aided in origin of life in three ways
-As a Solvent – Everything dissolves in water. Ex-food, oxygen, minerals,
-As a Participant in chemical reactions such as photosynthesis.
-As a Medium, Organisms move through, waste travels away, sex cells travel through,

How did water aid in the origin of life? Don't forget, (Solvent, Medium, Participant)

A paragraph that just uses this is acceptable
As a Solvent – Everything dissolves in water. Ex-food, oxygen, minerals,
-As a Participant in chemical reactions such as photosynthesis.
-As a Medium, Organisms move through, waste travels away, sex cells travel through,

**Across**

1. Water aided in the origin of life as a _____ for organism move through
2. Louis _____'s experiments (1860' s) showed that micro-organisms are even carried in the air.
6. 1.8 billion years ago: E_____ cells (single cells with a nucleus) evolved.
7. Organisms are classified by taxonomy into groups such as multicellular _____, plants, and fungi; or unicellular microorganisms such as protists, bacteria, and archaea.
8. Water aided in the origin of life as a _____ in chemical reactions
9. Living things respond to a _____
13. Living things Adjust to _____
14. This explains how life has changed once live has formed
16. Living things must use E_____
17. Living things _____ over time
19. earth was created about 4.6 _____ years ago
20. Organisms are classified by taxonomy into groups such as multicellular animals, plants, and fungi; or unicellular microorganisms such as protists, _____, and archaea.
22. Living things Grow and _____
23. Living things M_____

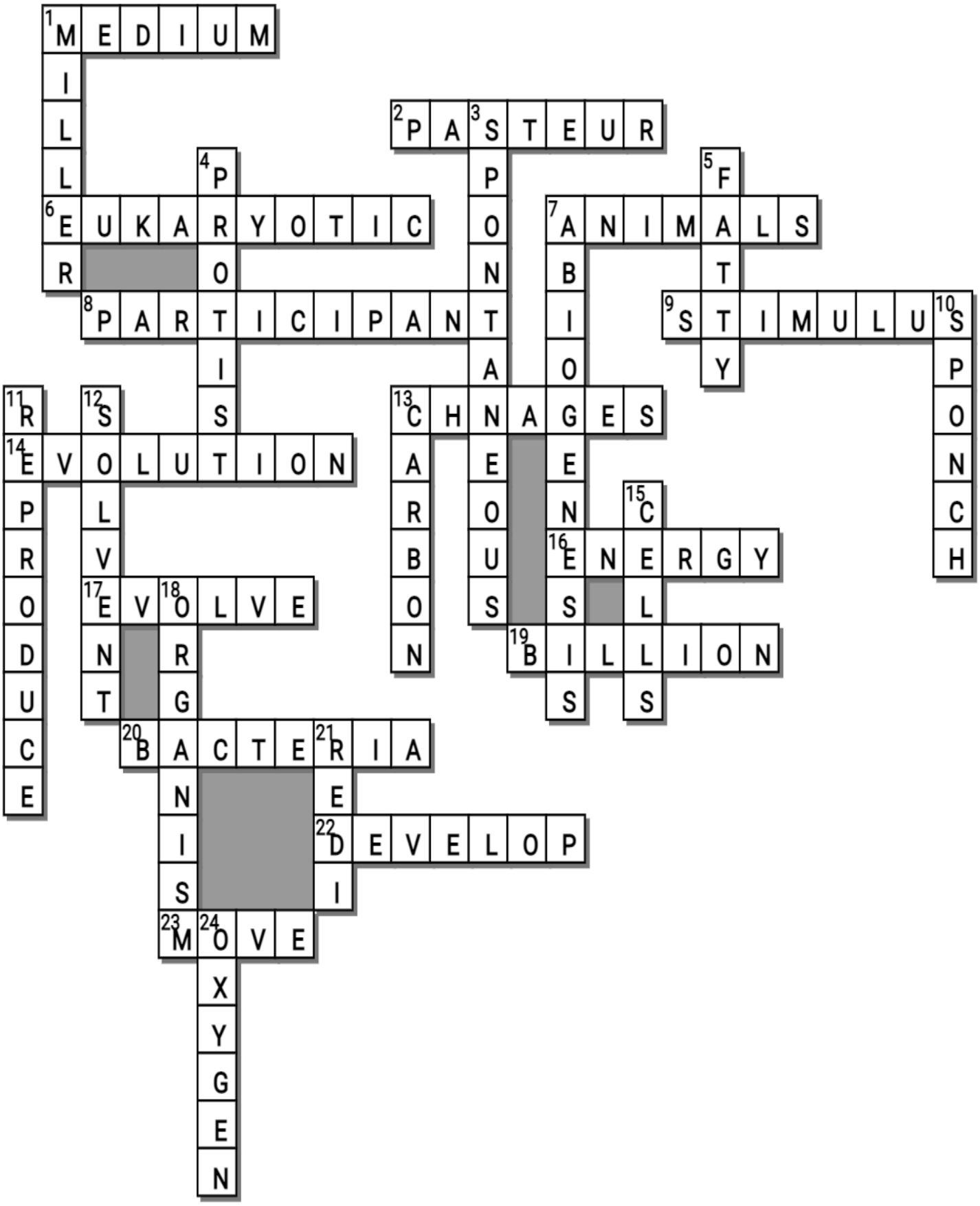
**Down**

1. The _____–Urey experiment was a chemical experiment that simulated the conditions thought at the time to be present on the early Earth and tested the chemical origin of life under those conditions
3. S_____ Origin: The belief that living organisms are produced / generated from non-living sources.
4. Organisms are classified by taxonomy into groups such as multicellular animals, plants, and fungi; or unicellular microorganisms such as _____, bacteria, and archaea.
5. F_____acids are believed to have formed the structure for the first protocells.
7. In science theory, A_____ explains the origin of life.
10. Living things are made of the _ _ _ _ _ _ _ elements
11. All living things must R_____
12. Water aided in the origin of life as a _____ Everything dissolves in water.
13. This element is considered the duct of life as holds together many organic compounds
15. Living things are made of...
18. Any individual entity that embodies the properties of life.
21. Francesco _____ – (1668) Experiment about Spontaneous Origin
24. 2 billion years ago: _____ began to saturate the atmosphere.

----------Teacher can remove this work bank to make puzzle more challenging----------

**Possible Answers**

ABIOGENESIS, ANIMALS, CARBON, CELLS, CHNAGES, DEVELOP, ENERGY, EUKARYOTIC, EVOLUTION, EVOLVE, FATTY, MEDIUM, MILLER, MOVE, ORGANISM, OXYGEN, PARTICIPANT, PASTEUR, PROTIST, REDI, REPRODUCE, SPONCH, SOLVENT, SPONTANEOUS , STIMULUS, BACTERIA, BILLION


1 MEDIUM
2 PASTEUR
3 STEP
4 PROKARYOTIC
5 FATTY
6 EUKARYOTIC
7 ANIMALS
8 PARTICIPANT
9 STIMULUS
10 SPONGE
11 PRODUCER
12 SOLVENT
13 CHANGES
14 EVOLUTION
15 CARBON
16 ENERGY
17 EVENT
18 EVOLVE
19 BILLIONS
20 BACTERIA
21 REDISTRIBUTE
22 DEVELOP
23 MOVE
24 OXYGEN

# Part 5 Review Game Lesson 6

Name:

1-10 = 10 pts * = Bonus + 1 pt,
(Secretly write owl in correct space +1 pt)
Final Question = 5 pt wager

Due: Today
Score ____ / 100

| WHAT IS LIFE? | NEEDS | IT CAME FROM THE… | BUBBLY | NAME THAT DETERGENT<br>Bonus round<br>1 pt each |
|---|---|---|---|---|
| 1)<br>Moves | 6)<br>Oxygen | 11)<br>Francesco Redi | 16)<br>Organism | *21)<br>TIDE |
| 2)<br>Made of Cells | 7)<br>Water | 12)<br>Louis Pasteur | 17)<br>Sulfur, Phosphorus, Oxygen, Nitrogen, Carbon, Hydrogen | *22)<br>GAIN |
| 3)<br>Uses Energy | 8)<br>Sun | 13)<br>Charles Darwin | 18)<br>C.) 4.6 and 3.8 b.y.a. | *23)<br>ALL |
| 4)<br>Responds to a Stimulus | 9)<br>Prebionts Protocells | 14)<br>Miller-Urey Experiment | 19)<br>Eukaryotic Cells | *24)<br>ARM and Hammer |
| 5)<br>Reproduces | 10)<br>Hydrothermal Vents | 15)<br>Water | 20)<br>A.) Formation of complex inorganic molecules. | *25)<br>PUREX |

Final Question Wager ____/5 Answer: B.) Oxygen Gas ($O_2$)