

Today's Goals....

- To be able to identify the characteristics of life and what determines if something is a living or a nonliving object.
- To identify and explain steps of the scientific method in an experiment to test if living things can arise from non-living material

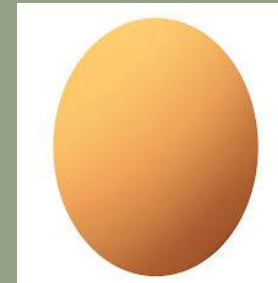
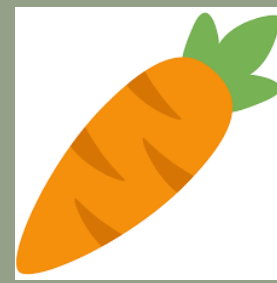
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Question: How do you determine if something is living?

Classify the objects below as living or nonliving

- Paper clip
- Leaf
- Water cup
- Rock
- Chip
- Carrot
- Egg
- Teeth

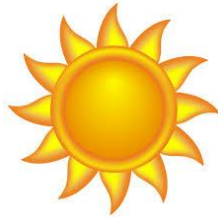


Characteristics of Living

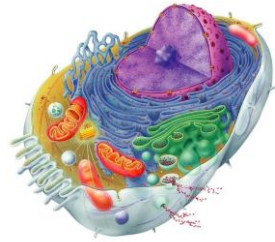


and develop

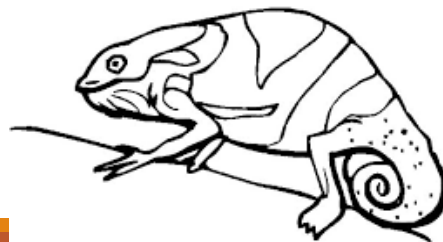
Obtain and use energy



Made of cells



Adapt to its environment



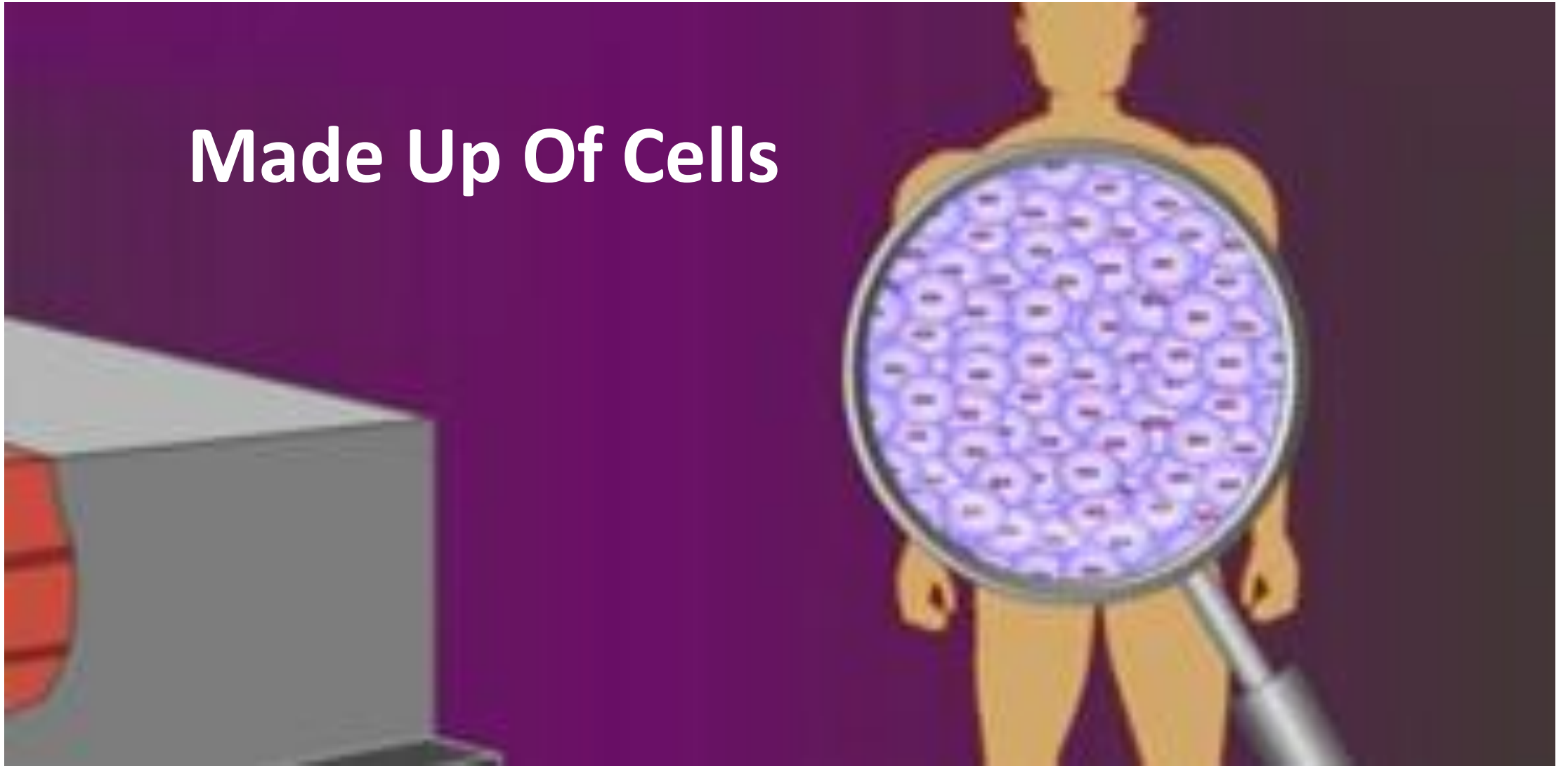
Reproduce



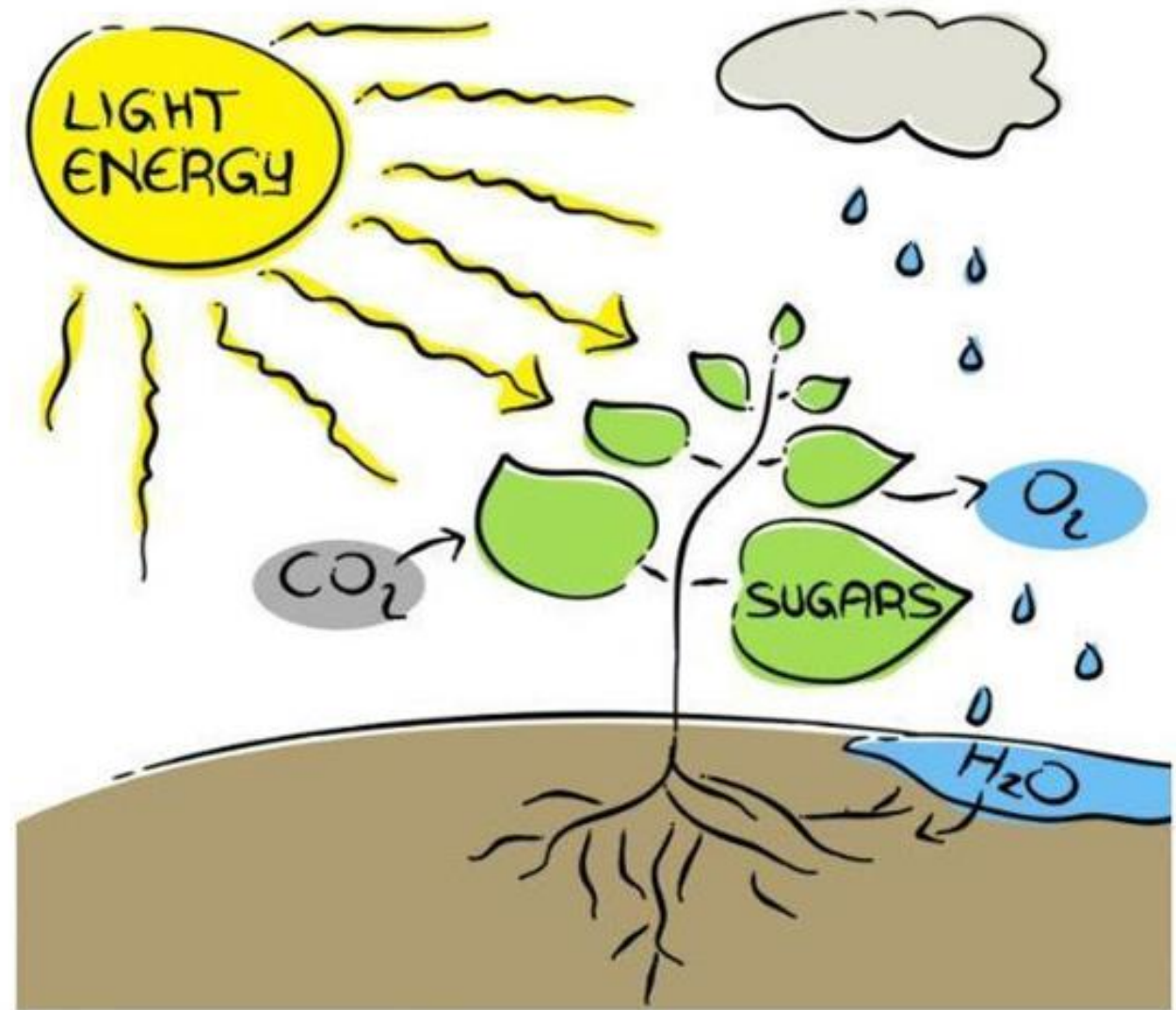
Respond to its environment



Made Up Of Cells



Obtain and Use Energy



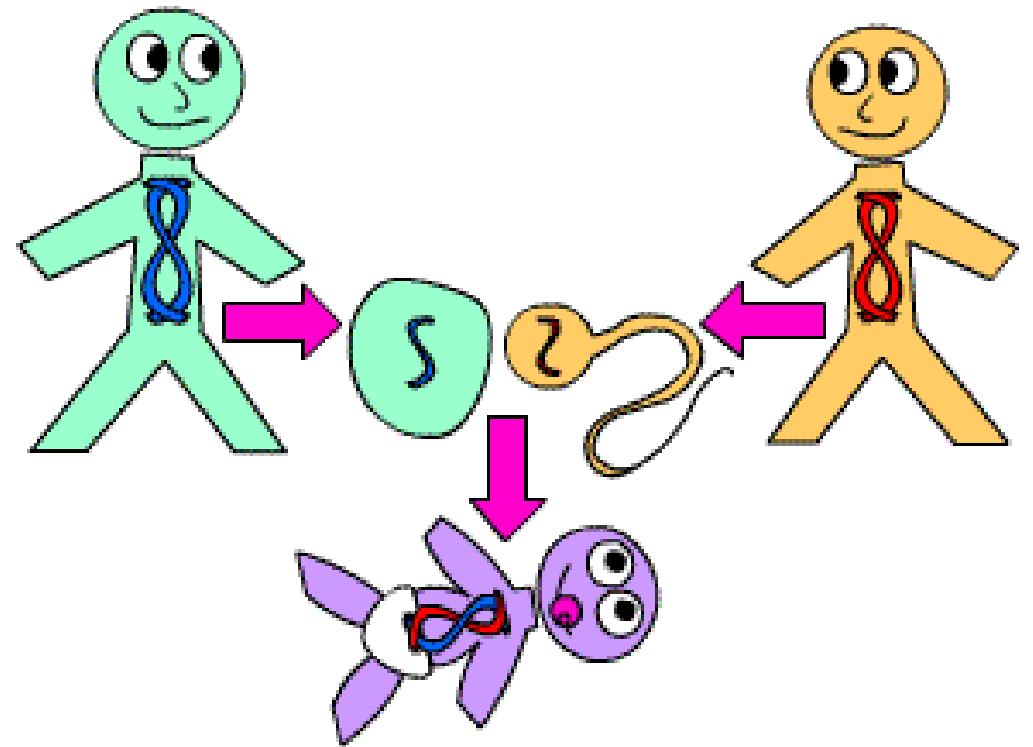
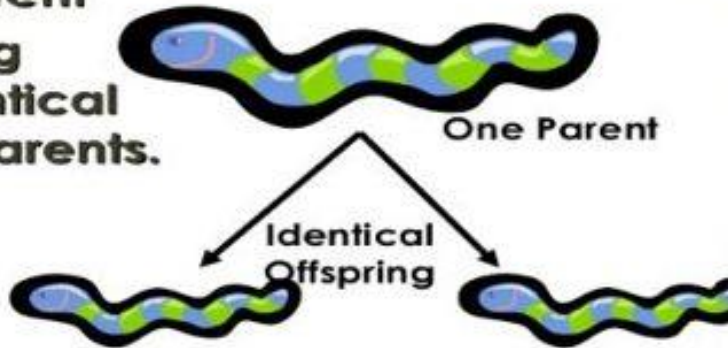
Grow and Develop



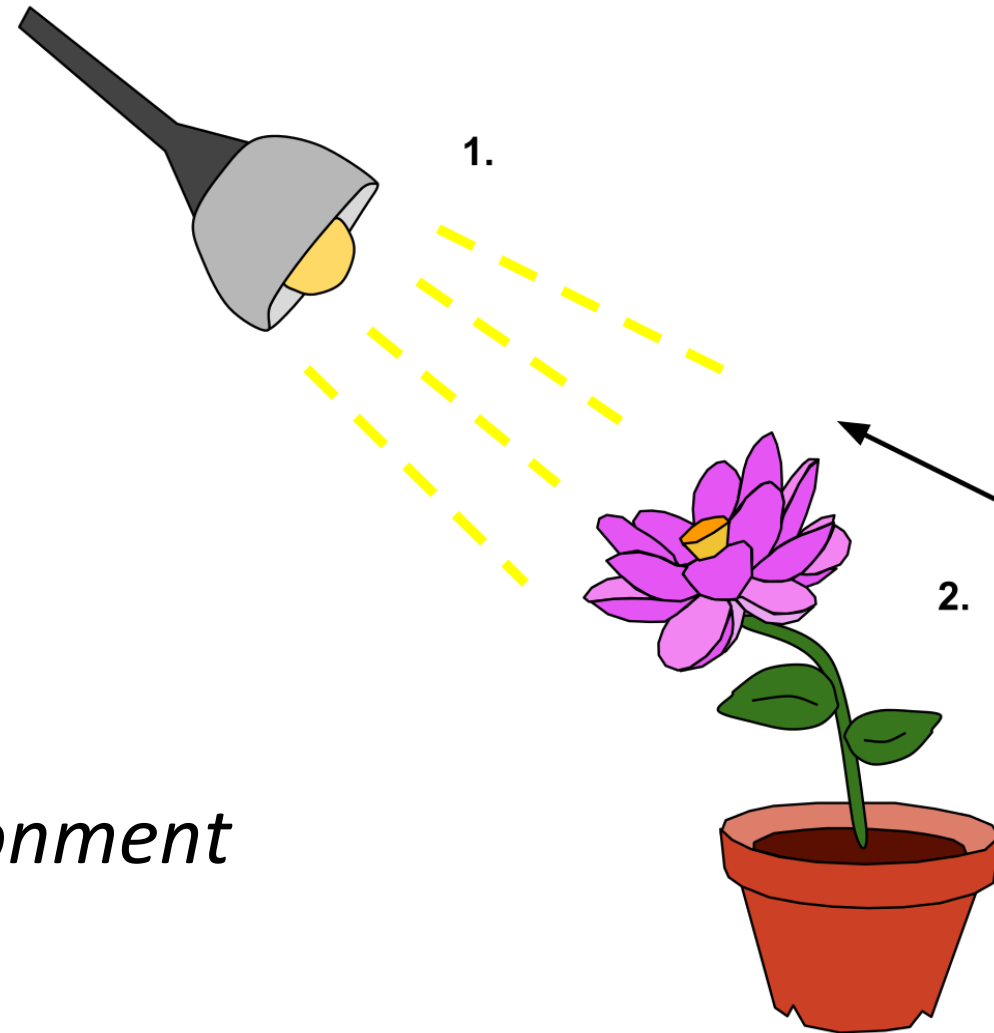
Reproduction

Asexual Reproduction

- One parent
- Offspring are identical to the parents.



Respond to Environment



Stimulus = change in environment

Adapt to Environment

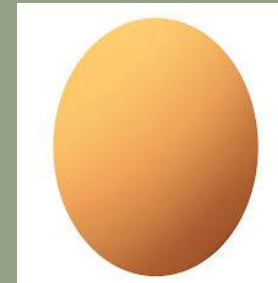
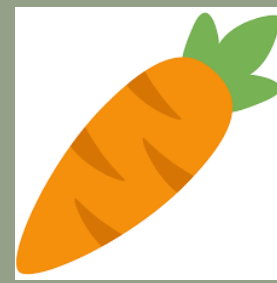


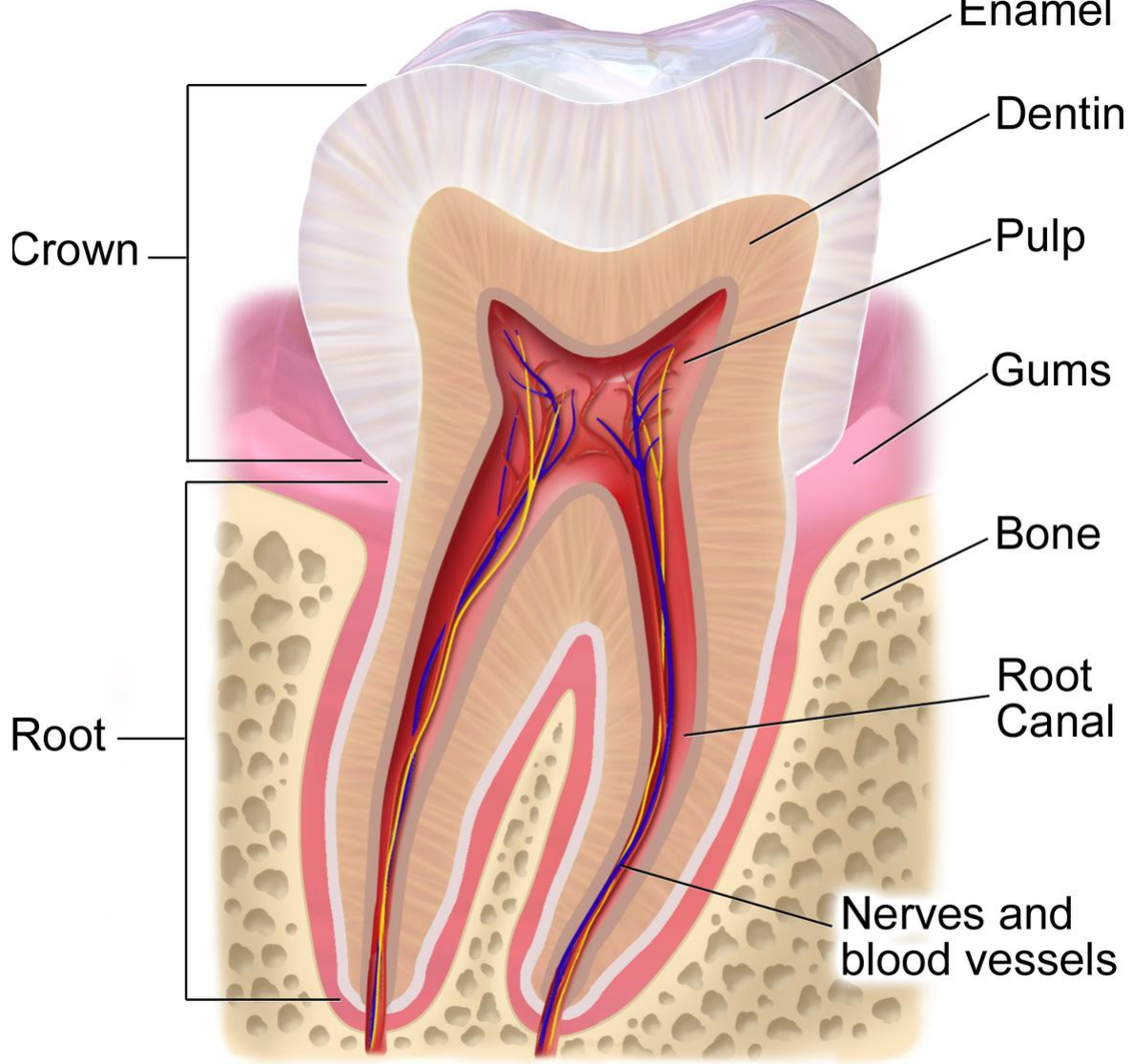
Deserts are dry, hot places. Plants called succulents have **adapted** to this climate by storing water in their thick stems and leaves.

Question: How do you determine if something is living?

Classify the objects below as living or nonliving

- Paper clip
- Leaf
- Water cup
- Rock
- Chip
- Carrot
- Egg
- Teeth



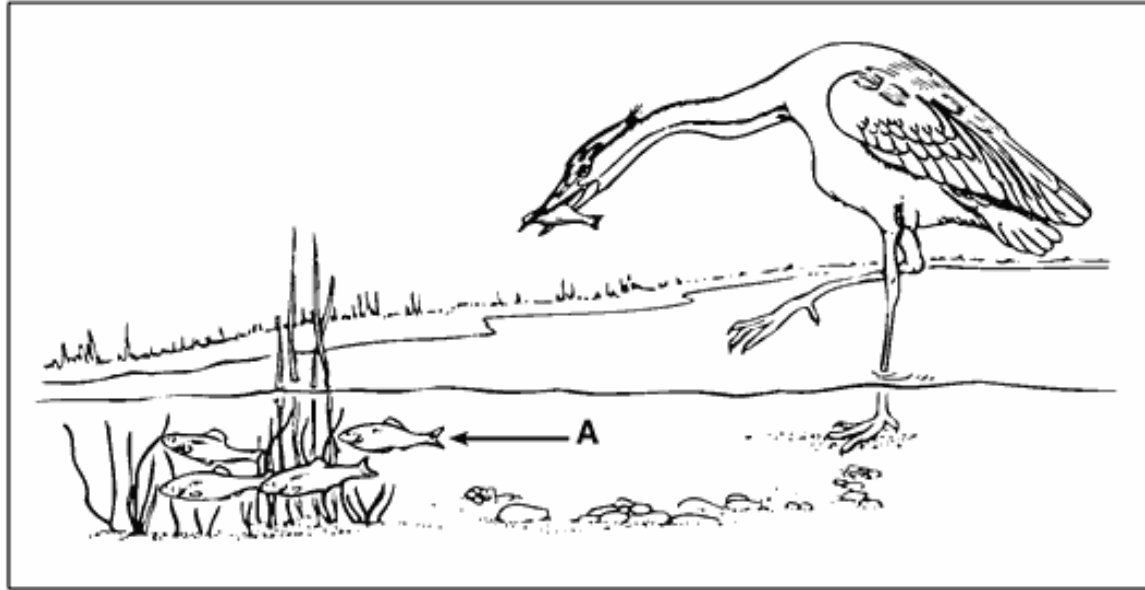


Tooth Anatomy

Teeth are alive because they grow inside of your jaw bone. They do have a hard exterior that is technically not alive, but was produced by the enamel organ **living** inside the **tooth**.

Make it Stick:

1. Identify *one* abiotic factor that would directly affect the survival of organism A shown in the diagram below.



2. Which characteristic does the object in the cup hold of a living thing?

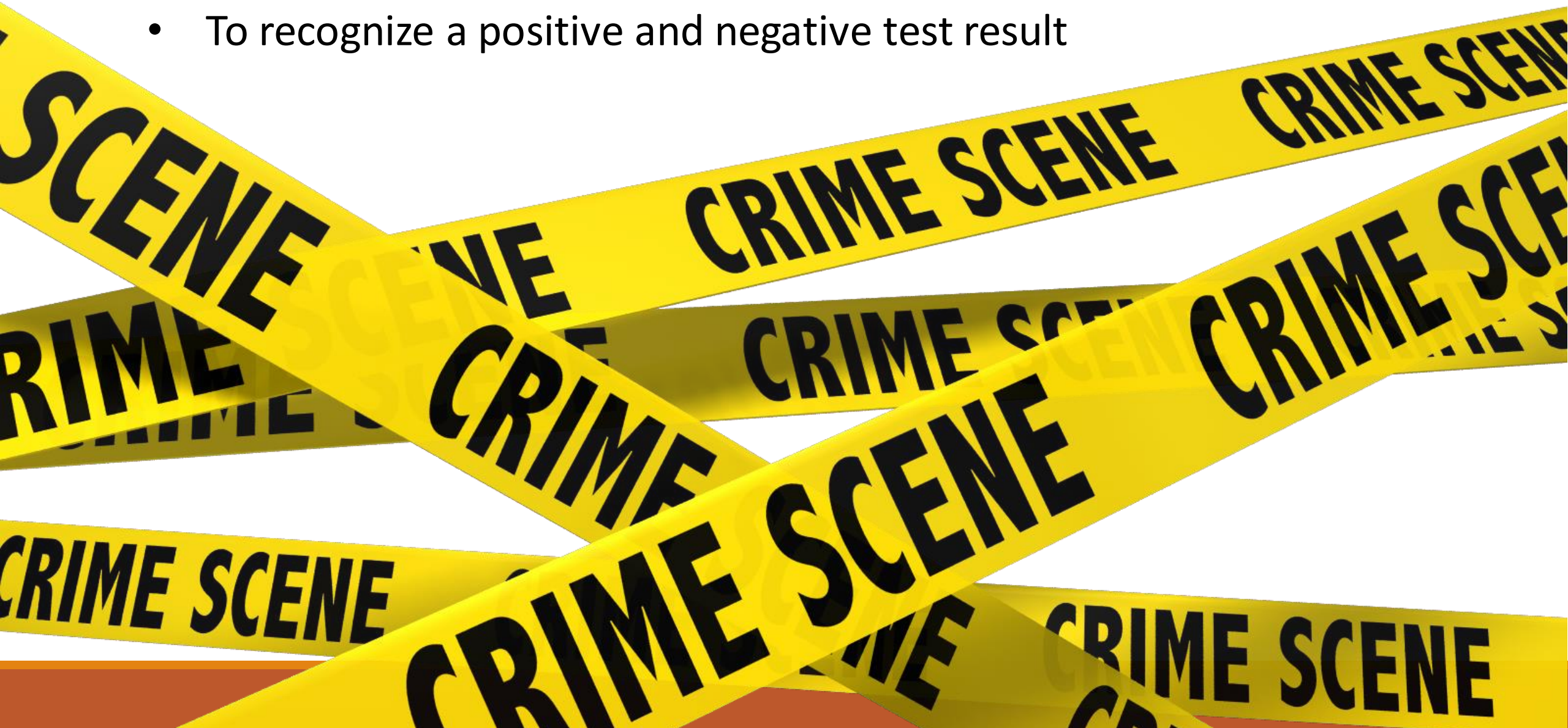
3. Why is it not considered living?

You should be able to ...

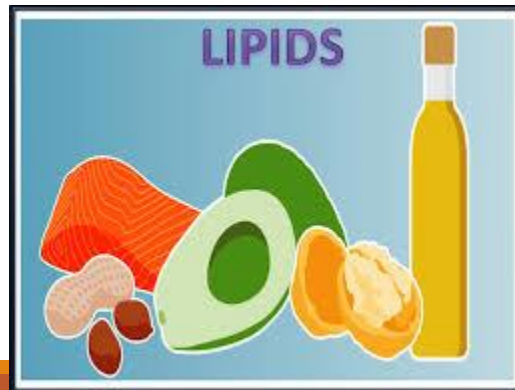
Identify the characteristics of life and what determines if something is a living or a nonliving object.

Lab Goals..

- Properly use indicators to test for macromolecules
- To recognize a positive and negative test result



Macromolecule		Indicator	Positive	Negative
Starch	A carb which stores energy	Lugol's Iodine	Major color change	Original color
Lipid (You'll do this test first)	Provides energy to cell	Benedict's solution	Major color change	Original color
Glucose	Sugar, body uses it for energy	Brown Paper Bag	Translucent	Opaque



Today's Goals....



- To recognize a positive and negative test result
- Differentiate biotic and abiotic

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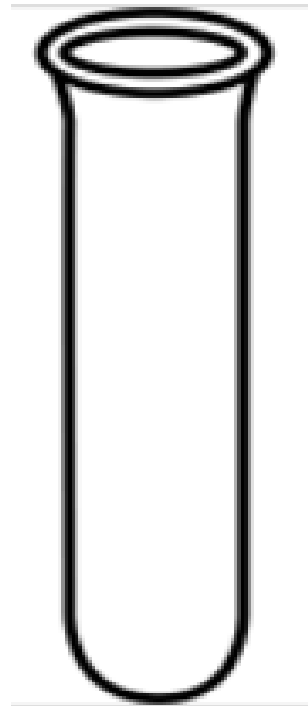
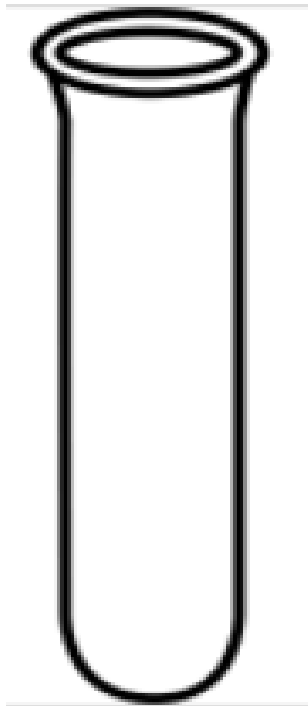
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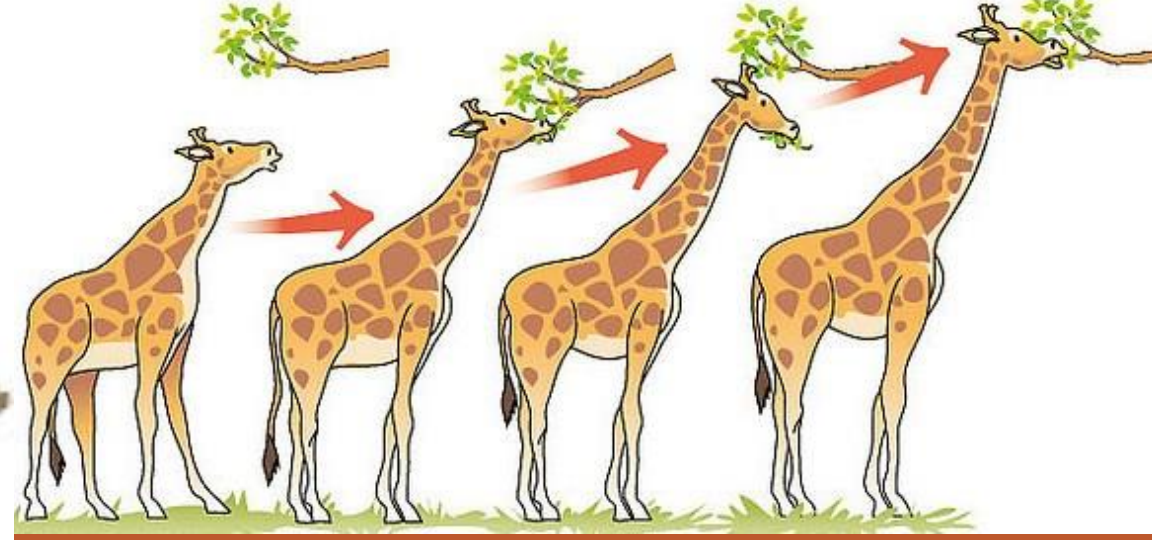
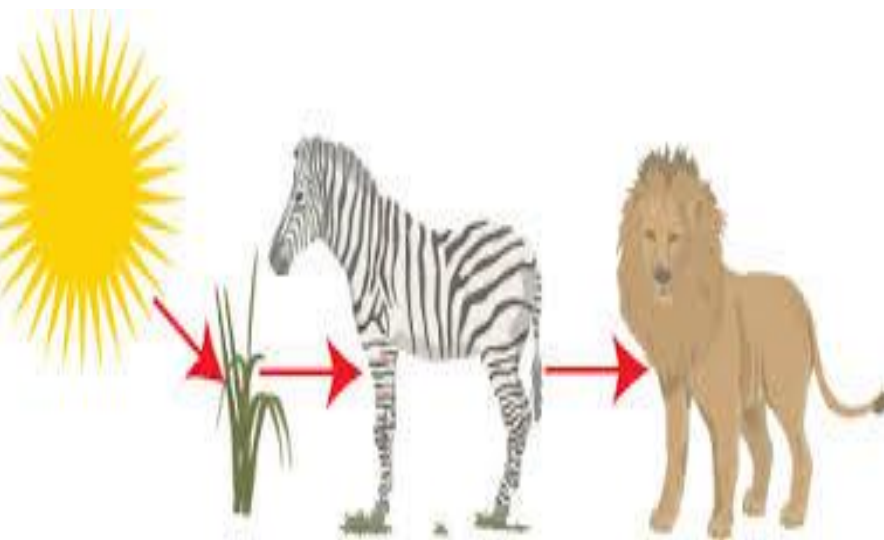
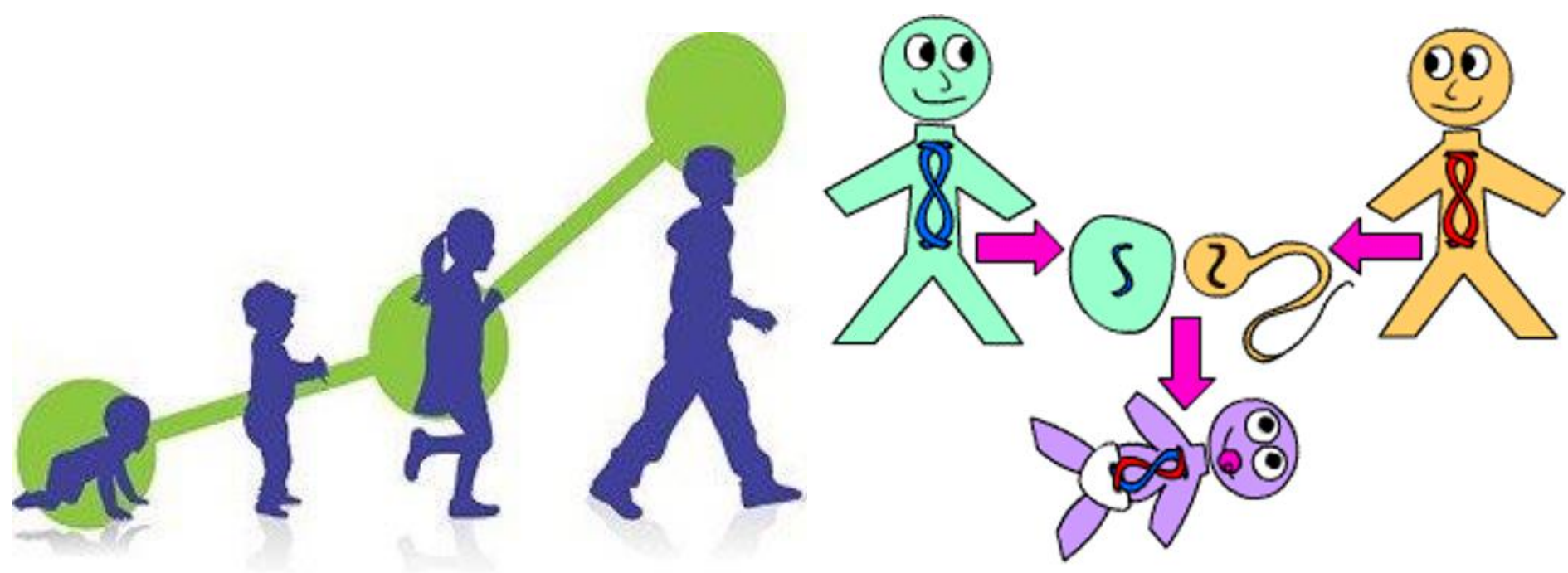
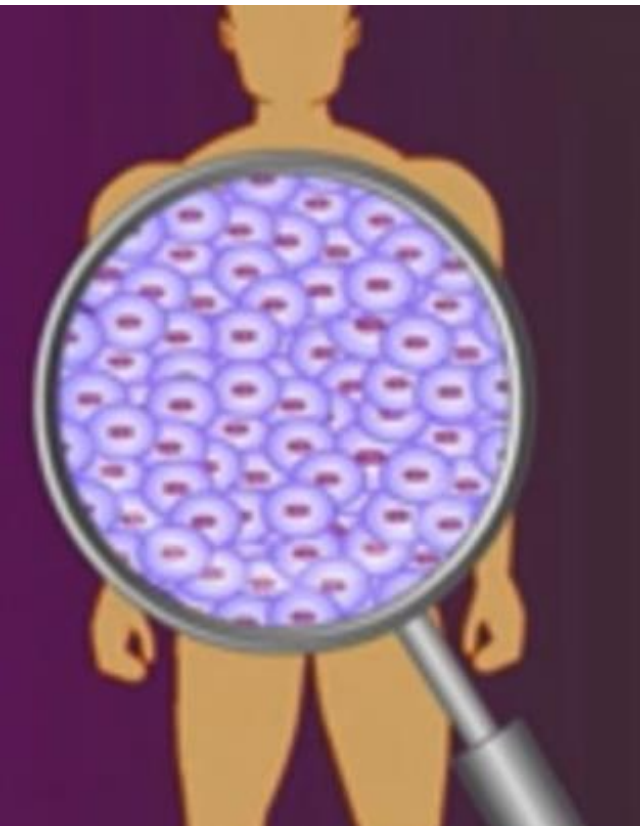
Indicator:

Is a chemical which is added to change color depending on the presence/absence of a nutrient




Indicator	Nutrient	Color Change	Heated Yes or No
Lugol's	<u>Starch</u>	Purple/Black	NO
Benedict's	<u>Glucose</u>	Red/Orange	YES
	<u>Lipid</u>	Translucent / Clear	NO





Living Things Are:

- *Made of cells*
 - *Obtain and use energy*
 - *Grow and develop*
 - *Reproduce*
 - *Respond to their environment*
 - *Adapt to their environment*
- 

BIOTIC (LIVING)



ABIOTIC (NON-LIVING)





You must use evidence from Michael Jackson's *Thriller* video to determine which of the 8 characteristics of life the zombies do and do not have. You must justify your response using what you have learned about what it means to be a “living” organism.



1. Jennifer carefully cuts a thin slice of an acorn and observes it under a microscope. She sees that the acorn is actually made of a great number of tiny units. What characteristic of life has Jennifer observed?

2. Felicia plants an acorn in the soil outside of his school. After a week or so, Felicia notices a small green shoot emerging from the ground where she planted the acorn. A few weeks later, the shoot is twice as tall as it first was and has produced a number of leaves. What characteristic of life has Felicia observed?

3. Justin performs experiments with an oak seedling and finds that the leaves of the oak seedling absorb sunlight and carbon dioxide. Justin determines that the oak tree uses the sunlight and carbon dioxide to produce chemicals that give the oak seedling the energy it needs to live and grow. What characteristic of life has Justin observed?

4. As autumn approaches and the air grows cooler, Maddy observes that the leaves of an oak tree turn brown and then fall to the ground. As spring arrives and the air gets warmer, she sees new green leaves emerging from the branches of the oak tree. What characteristic of life has Maddy observed?

5. Zack notices that in the spring, the oak trees in her neighborhood are covered with tiny flowers and the air is filled with oak pollen. Zack observes that after a week or two, tiny acorns have begun to develop from the flowers. Zack knows that these acorns might one day become new oak trees. What characteristic of life has Zack observed?

INDEPENDENT VARIABLE



What I CHANGE



DEPENDENT VARIABLE

What I OBSERVE



CONTROLLED VARIABLE

What I KEEP THE SAME

Developing a Hypothesis

" If _____, Then _____, Due to _____."

Independent
Variable

Dependent
Variable

Rationale/Reason



Lab :Can living things
arise from non-living
material?



FRANCIS

REI

ST
MUSEO
VATICO



Redi's Experiment

	Redi Placed meat in two identical jars. He left one jar covered and the other jar with a cloth that lets air in.
	After a few days, Redi observed maggots (young flies) ONLY on the decaying meat in the open jar.

What is the dependent *variable*?

What is the *independent variable*?

What is *control*?

Scientific Method and Spontaneous Generation

- Problem?
- Hypothesis?
- Results?
- Conclusion?



Today's Goals....




- To be able to list characteristics of life
- To be able to identify a positive with indicators
- *To be able to identify the processes of life*

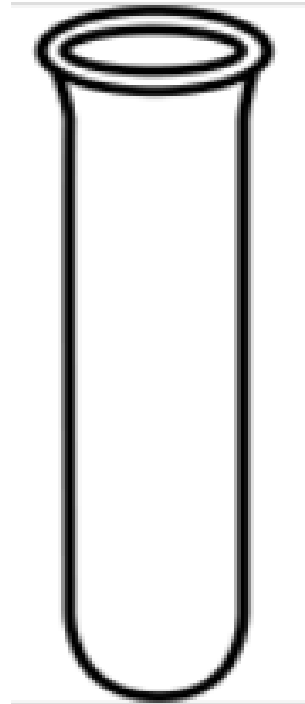
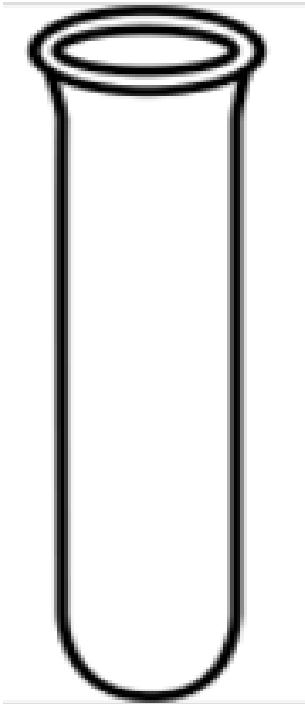
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Living Things Are:

- *Made of cells*
 - *Obtain and use energy*
 - *Grow and develop*
 - *Reproduce*
 - *Respond to their environment*
 - *Adapt to their environment*
- 

Indicator	Nutrient	Color Change	Heated Yes or No
Lugol's	<u>Starch</u>	Purple/Black	NO
Benedict's	<u>Glucose</u>	Red/Orange	YES
	<u>Lipid</u>	Translucent / Clear	NO





1. Which characteristics of life led you to believe if the zombies are living or non-living organisms?

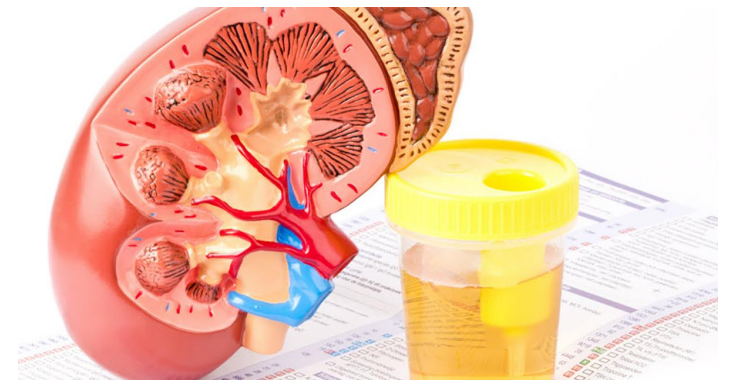
2. If a zombie were living and had cell(s), do you think it would be multicellular or unicellular? Explain.

3. The scientific term for a living thing is an _____.

What do we have in common with a Pill Bug?



Today's Goals....



- *To be able to explain the processes of nutrition*
- *To be able to explain the process of excretion*

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3RGENTS

- Regulate
- Reproduction
- Respiration
- Growth
- Excretion
- Nutrition**
- Transport
- Synthesis

Bell Work: A. *Processes of Life*

The science of biology studies life and living things. Do you know what is meant by the term "life"? Scientists do not agree on one definition of life. They do agree, however, that the cells of living things (Organisms) carry on certain processes that are necessary for life. These processes or activities, common to all living things, are known as life functions. An organism is considered to be alive as long as its cell perform certain life functions. Nutrition, transport, respiration, excretion, regulation, growth, reproduction are life functions shared by living things. The total of all life functions required to sustain life is metabolism.

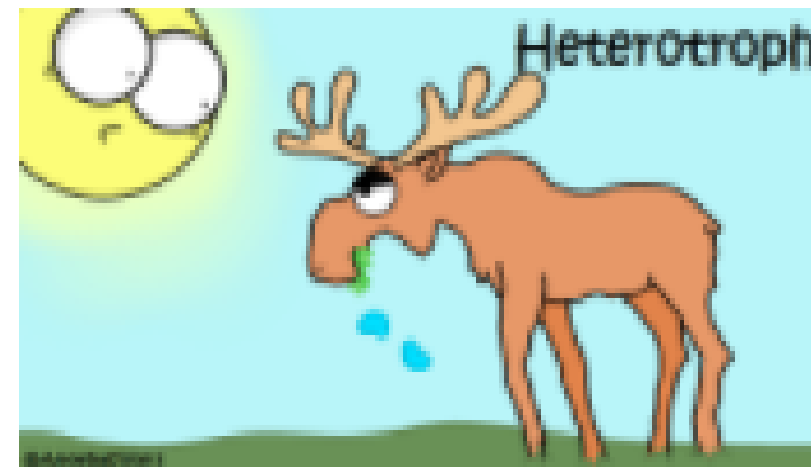
1. The term "organism" is another word for _____.

2. List the life functions

B. Nutrition

Living things need food to supply energy for life activities and materials for the growth and repair of cells. During the life process of nutrition organisms obtain (get) and process food. Some organisms, such as green plants, can make their own food/sugars while other living things must obtain their food already formed. Organisms that are able to make their own food are called autotrophs. Heterotrophs are organisms that are not able to make their own food.

Nutrition involves ingestion and digestion. Food is taken in from the environment by ingestion. Ingested food is not usually in a form that can be used by body cells and must be changed into a usable form. Digestion is the process that changes food into a form that can be used by the cell. During digestion large complex molecules are broken down into small simple molecules.



1. The life activity responsible for obtaining and processing food is called NUTRITION.
2. What happens to food during ingestion? Food is taken in from environment and into the organism.
3. What is digestion? Changes food into a useable form for cells
4. Explain why living things need food.
To supply **energy** for life activities and materials for the **growth** and repair of cells.

Nutrition

An organism obtains food from the environment and breaks it down into an energy form that can be absorbed and used by its cells.

Ex. Green plants used sunlight to obtain nutrition or sugars

3RGENTS

- Regulate
- Reproduction
- Respiration
- Growth
- Excretion**
- Nutrition
- Transport
- Synthesis

Bell Work: C. *Excretion*



Life processes result in the formation of cellular wastes. These wastes are harmful to the organism and must be removed. Excretion is the removal of waste materials produced in the cells as a result of life activities. Products commonly excreted from cells are carbon dioxide and water.

Egestion is the process that removes undigested materials from the body. Do not confuse the process of egestion, which means to get rid of solid wastes, with excretion. Excretion is the elimination of gaseous or liquid wastes of cellular respiration.

1. What is excretion?

Removal of waste materials which were produced in the cells as a result of life activities.

2. Why is it necessary for an organism to remove wastes?

Harmful to organism

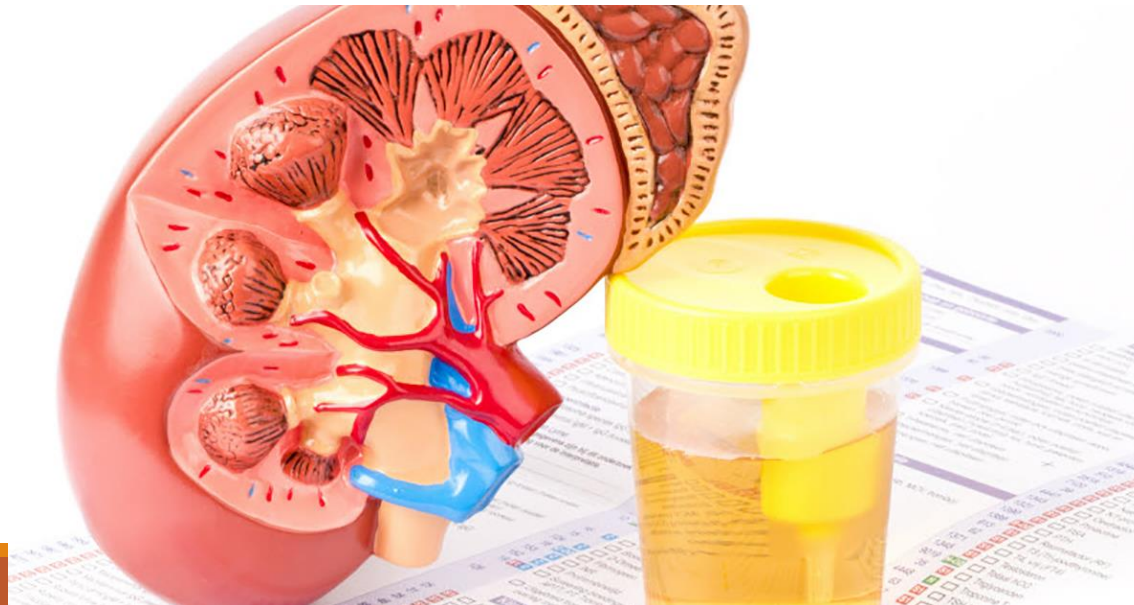
3. What is egestion the removal of?

Undigested materials (POOP)

Excretion

Process by which the metabolic wastes are removed from the organism.

Ex. In humans the kidney filters metabolic wastes.



Excretion

Front Door:

1. Exhale
2. Urine
3. Sweat



Station 4: Excretion

1. What do the yellow beads represent?

2. What is excretion?

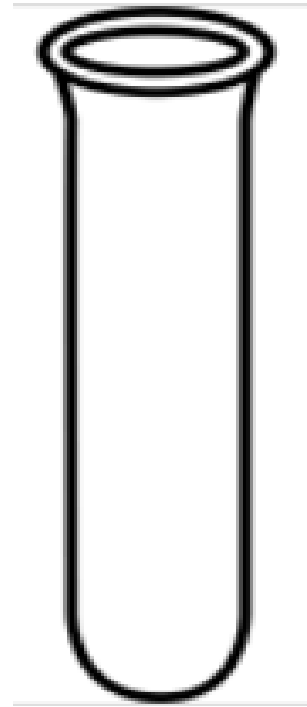
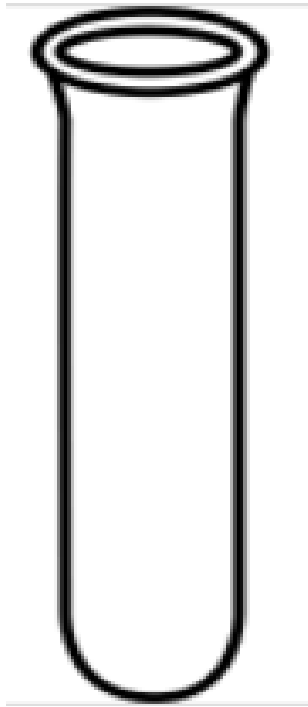
3. Why do complex organisms need a specialized system?

4. Where do metabolic wastes come from?

Lab Goals....

- *To be able to identify a positive test*
- *To understand how to conduct an indicator test*

Indicator	Nutrient	Color Change	Heated Yes or No
Lugol's	<u>Starch</u>	Blue/Black	NO
Benedict's	<u>Glucose</u>	Red/Orange	YES
	<u>Lipid</u>	Translucent / Clear	NO



Label 6 test tubes

Glucose & Benedict's (1 GB)

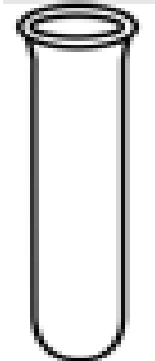
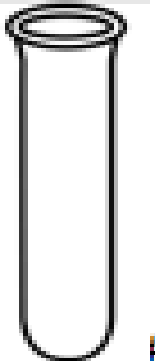
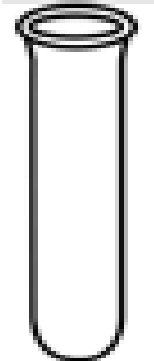
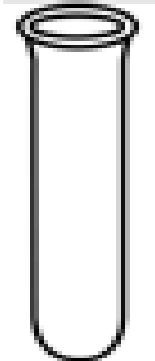
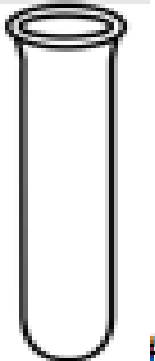
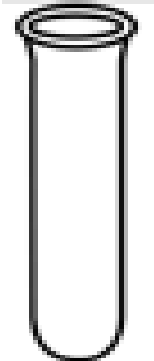
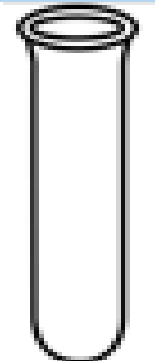
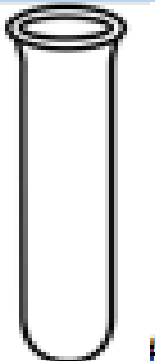
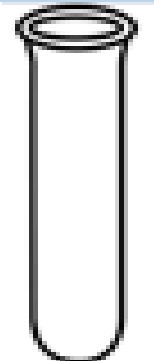
Glucose & Lugol's (2 GL)

Starch & Benedict's (3 SB)

Starch & Lugol's (4 SL)

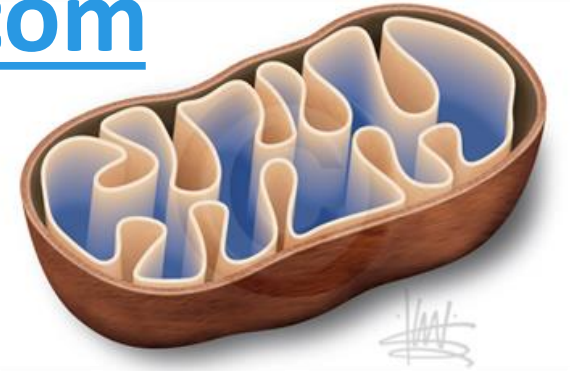
Water & Benedict's (5 WB)

Water & Lugol's (6 WL)

	Initial Observation	After Adding Benedict's Solution	After Adding Lugol's Solution
Substance A (Water with Glucose)		 #1	 #2
Substance B (Water with Starch)		 #3	 #4
Substance C (Water)		 #5	 #6



Term	Function	Example
Respiration		
Regulation		
Reproduction		
Excretion		
Growth		

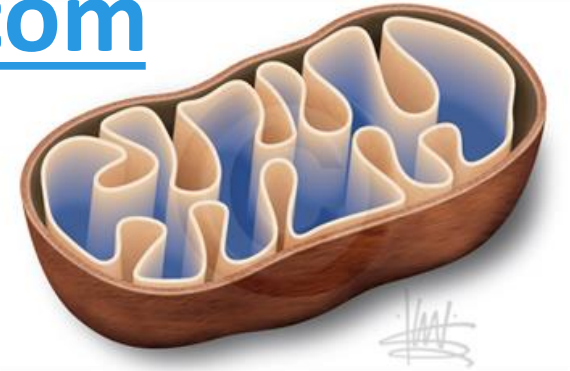


Today's Goals....

- *To be able to explain the processes of Transport*
- *To be able to explain the process of Respiration*

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Today's Goals....

- *To be able to explain the processes of Transport, Respiration, Regulation, Synthesis, Growth and Reproduction*

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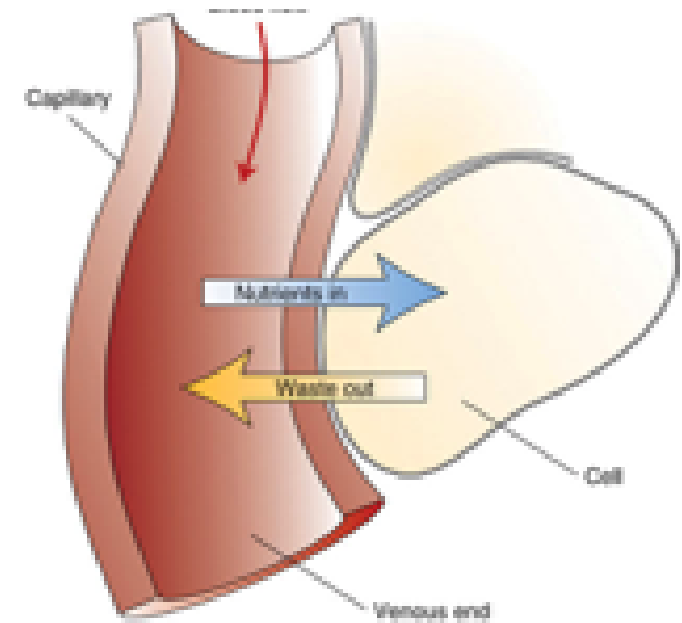
Glucose =
 $C_6 H_{12} O_6$

3RGENTS

- Regulate
- Reproduction
- Respiration
- Growth
- ✓ Excretion
- ✓ Nutrition
- Transport
- Synthesis

Bell Work: D. *Transport*

After digestion is completed nutrients, the parts of food that can be used by the cell, are carried to the cell. Transport is the life process that includes the **ABSORPTION** and **CIRCULATION** of materials throughout an organism. Absorption is the process by which the usable materials from food called the end products of digestion, as well as other dissolved materials, are taken into the cells, within cells, and/or throughout an organism. Along with nutrients, oxygen, water and wastes are also transported throughout a cell or organism.



1. The usable parts of food are called Nutrients.

2. Transport is the life process that includes the absorption and circulation of materials throughout an organism.

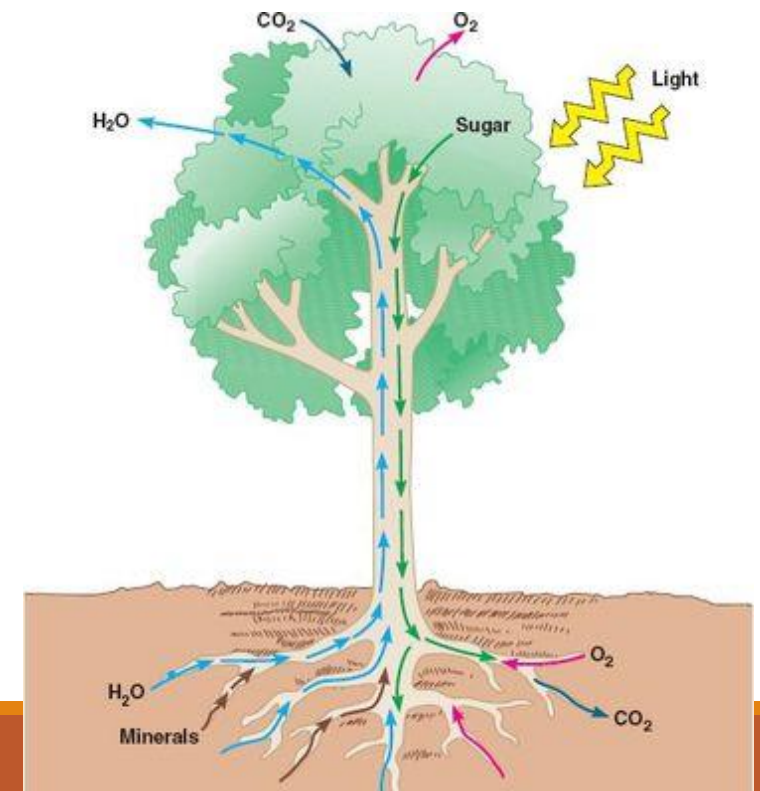
3. What is circulation?

Moves nutrients, oxygen, water and wastes to and from cells.

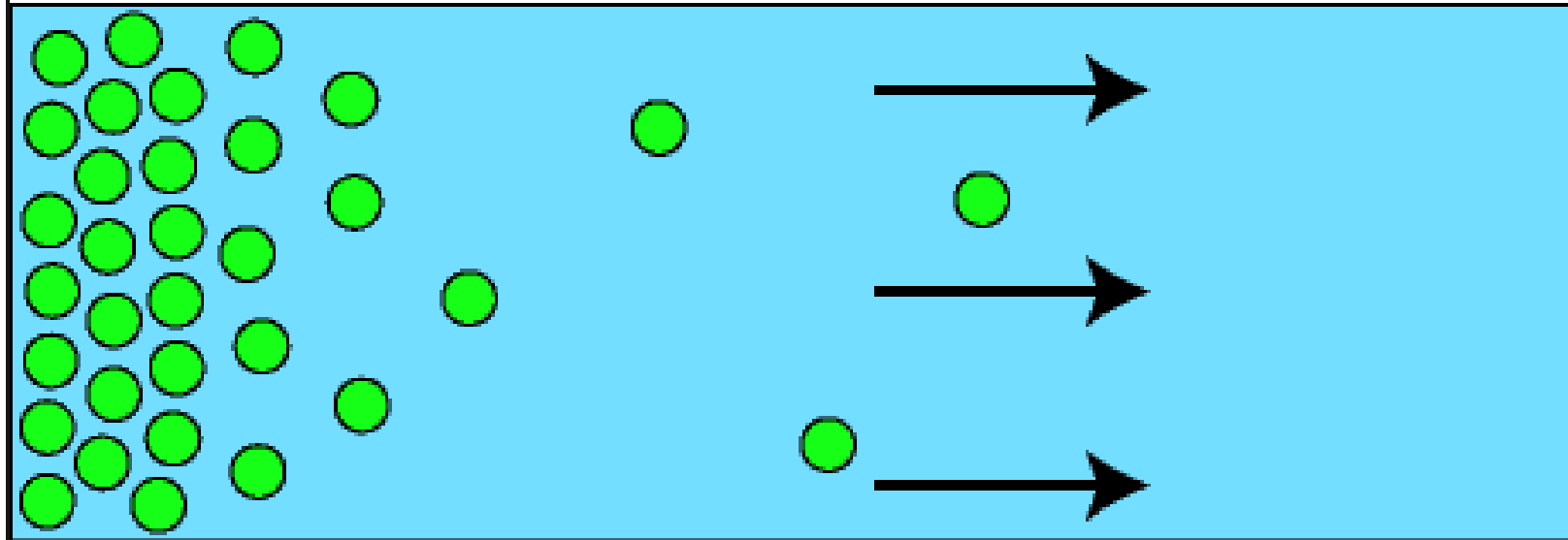
Transport

Materials (nutrients, oxygen, water and wastes) are taken into the organism by **ABSORPTION** and distributed throughout by **CIRCULATION**

Ex. Heart & Blood = Humans
Stem/trunk/ leaves = Tree



Diffusion



high concentration

low concentration

● solute

Station 2: Transport

Write Yes (Y) or No (N) to record if your partner was able to smell the scent.

Balloon 1	Balloon 2	Balloon 3

1. What did the balloon represent?

CELLS

2. What did the smell represent?

Molecules/nutrients

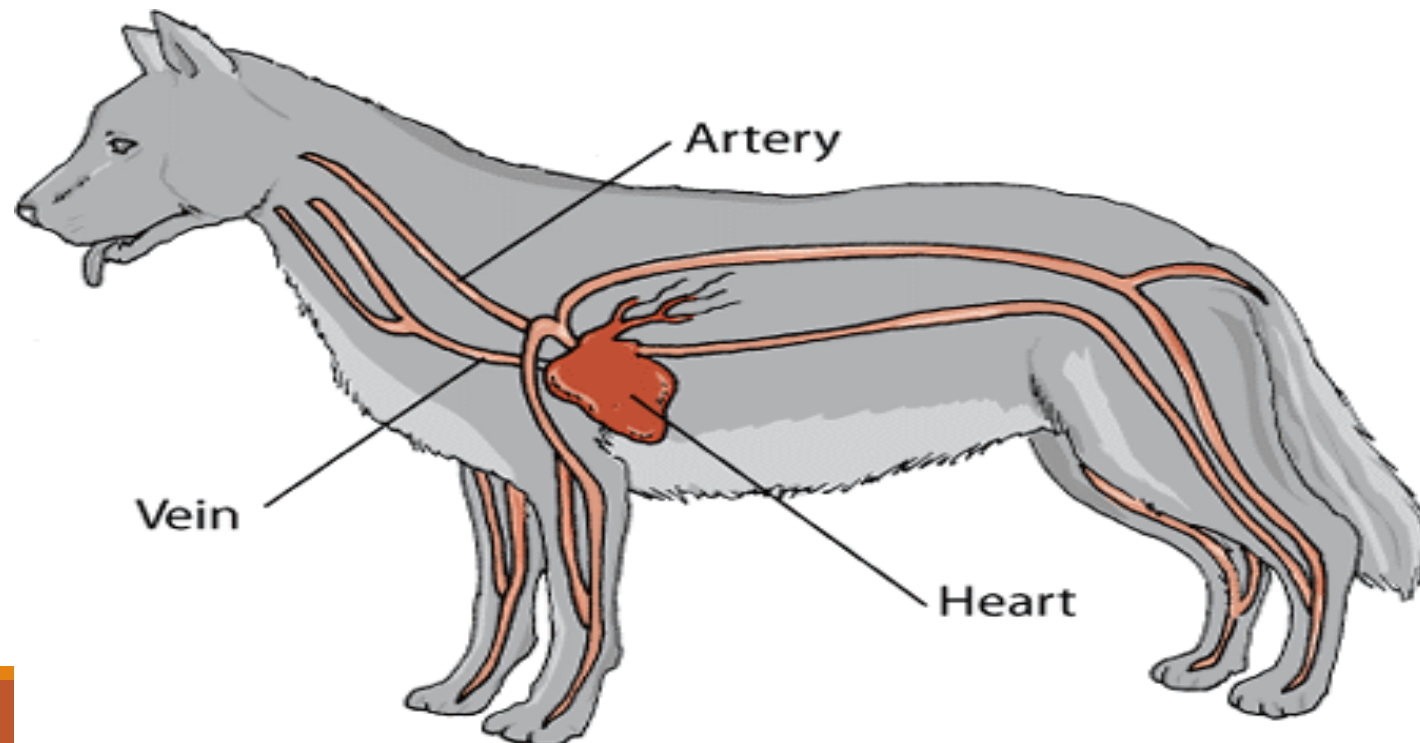
3. Could you and your partner identify all the scents?

4. What is accomplished by the transport process?

Materials are taken into the organism and distributed to cells for life processes!

5. In most animals, digested food is transported to all the cells of the body by which system?

Circulatory System : Heart, blood and blood vessels



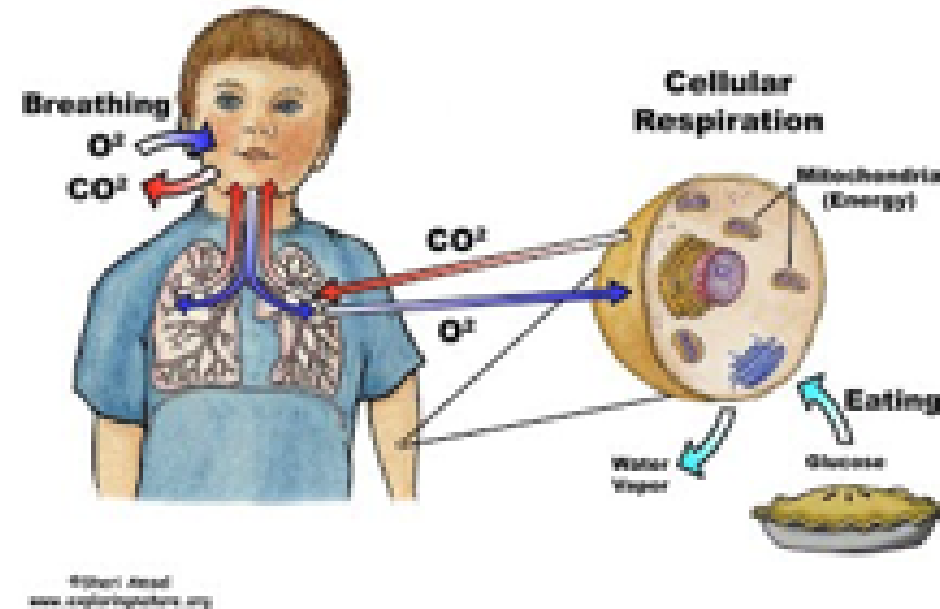
3RGENTS

- Regulate
- Reproduction
- Respiration
- Growth
- Excretion
- Nutrition
- Transport
- Synthesis

E. Respiration

Living things need a constant supply of energy for their life activities. Respiration is a complex series of chemical reactions that release energy for life activities.

An organism's energy is stored in food nutrients. Most organisms need oxygen for respiration – they are called aerobic organisms. A few organisms, known as anaerobic organisms, do not need oxygen for their respiratory process.



1. What do living things need?

Energy !!

2. What is respiration?

NOT BREATHING! It's a process that releases energy for life activities.

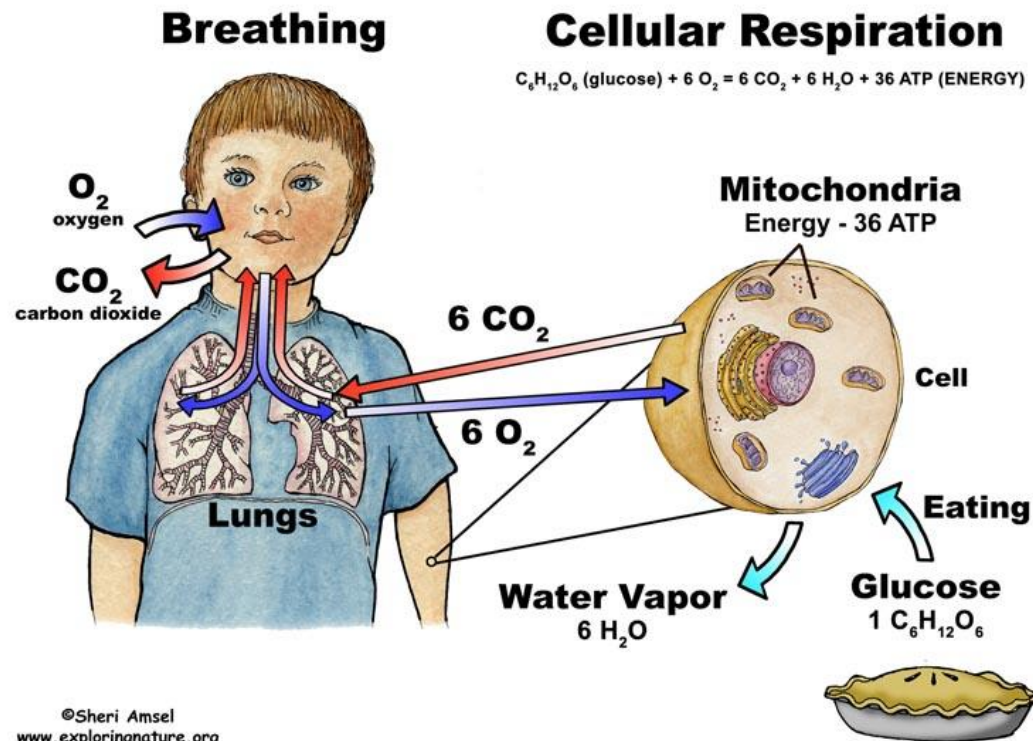
3. What is the difference between aerobic and anaerobic organisms?

Aerobic = requires oxygen Anaerobic = no oxygen required

Respiration

is a set of reactions and that converts nutrients into adenosine triphosphate (ATP)

Ex. In a cell Mitochondria / Power House= Makes ATP



Anaerobic vs Aerobic Respiration



**N= No Oxygen Required

Station 3: Respiration

1. What process is taking place in the Barf Bag?

Cellular Respiration

2. What gas is being produced in the Barf Bag?

CO₂ , H₂O & ATP

3. Name another real-life activity that uses a process similar to the Barf Bag?



Swimmer



Marathon runner

The release of energy during cellular respiration



4. What is accomplished by the process of respiration?

Respiration releases energy (ATP) from food by a complex series of chemical reaction.

5. What is the difference between breathing and respiration?

Breathing = physical

Respiration= Chemical





Today's Goals....

- *To be able to explain the processes of Regulation, Synthesis, Growth, Reproduction and Immunity*

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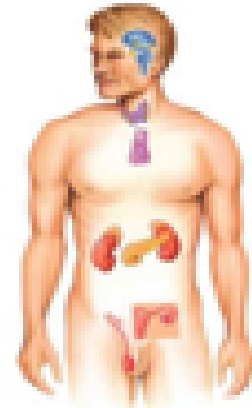
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3RGENTS

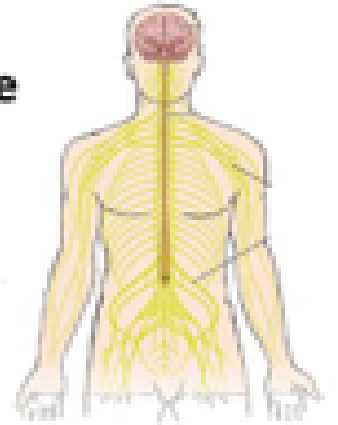
- Regulate
- Reproduction
 - ✓ Respiration
 - Growth
 - ✓ Excretion
 - ✓ Nutrition
 - ✓ Transport
 - Synthesis

Bell Work: F. Regulation

The life activity responsible for the control and coordination of all the various activities of an organism is called regulation. The nervous and endocrine systems are responsible for regulation. Regulation allows organisms to respond to changes in the environment. This means they can find food, avoid danger, respond to light, and perform other tasks important to their survival. A change in the internal or external environment is known as a *stimulus*. Some examples of stimuli are light and temperature.



The Endocrine System
vs.
The Nervous System



1. Regulation is the life activity responsible for

Control

and

Coordination

2. What is a stimulus?

Change in Environment External or Internal

3. What are two examples of stimuli?

Light and Temperature

Regulation

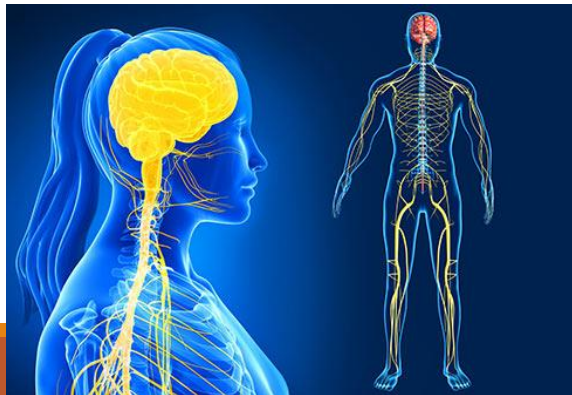
Control and coordination within the body through endocrine and nervous system.

Ex.

In Humans:

Endocrine= Hormones to activate/deactivate

Nervous=Sends the electrical messages



Station 5: Regulation

1. What did you feel while you were balancing on one foot?

2. What kinds of thing did you observe your classmates doing while they were balancing on one foot?

3. Did it become more or less difficult to balance as time went on? Why do you think this is?

4. What did your foot in the air want to do when balancing?

5. What did your foot on the ground want to do when you were balancing?

6. How was your body trying to maintain homeostasis (regulation)?

7. What does homeostasis mean?

8. What are some environmental factors (stimuli) that organisms respond to?

9. What are two internal factors that organisms respond to?

G. Homeostasis

The maintenance of a stable internal (inside) environment in spite of changes in the external (outside) environment is called homeostasis. When the organism is in homeostasis it is in a balanced or "steady" state. If there is a disruption in any organ system there may be a corresponding imbalance in homeostasis. Homeostasis in an organism is constantly threatened- if the organism's body fails to respond effectively, disease and/or death can occur. The metabolic processes are adjusting their function to help keep a balanced internal environment.



1. What is homeostasis?

Stable/balanced internal environment

2. What can happen if homeostasis is no longer present?

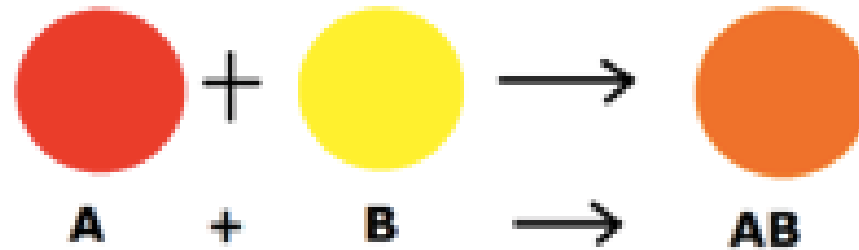
Disease or death can occur

3RGENTS

- ✓ Regulate
- Reproduction
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- ✓ Transport
- Synthesis**

Bell Work: H. *Synthesis*

Living things are able to produce complex substances from simpler substances by the process of synthesis. During this process the simpler food molecules produced during digestion are put together to make the complex materials needed by the organism. These complex materials become part of the structure of the organism. For example, during photosynthesis green plants "make" complex compounds (sugars) from simpler materials.



1. The process of synthesis makes Complex materials from Simpler food molecules.

2. What happens to the materials that are synthesized by an organism?

They become part of the structure of the
organism

Synthesis

Making large complex molecules from simple/smaller molecules

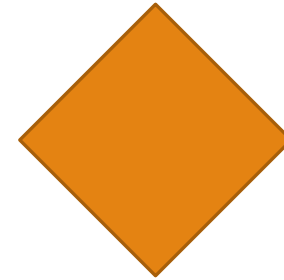


Ex. Human hair



Station 6: Synthesis

1. Small molecules are Combined to form large molecules by the process of synthesis.
2. Draw your protein below using the building blocks, amino acids

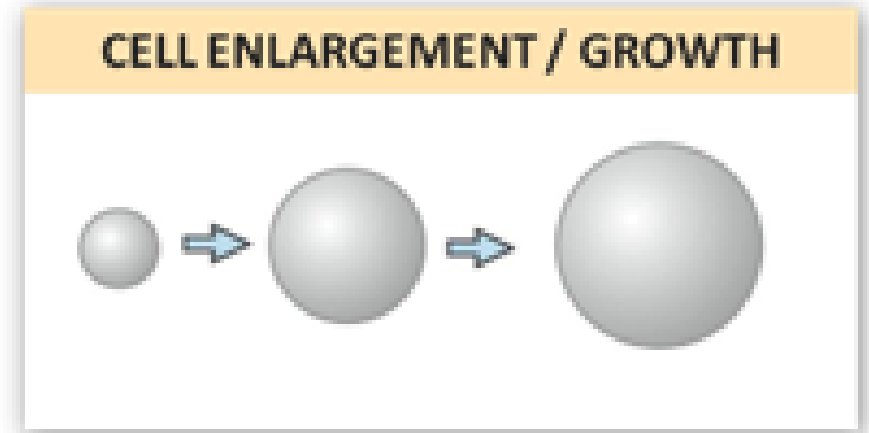


3RGENTS

- ✓ Regulate
- ☐ Reproduction
- ✓ Respiration
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- ✓ Synthesis

I. Growth

Growth results from synthesis. Growth is an increase in the size and/or number of cells of an organism. The complex materials produced during synthesis are used for growth. When cells grow, the size of the cytoplasm changes but not the size of the nucleus.



1. Growth results from the complex materials produced during

Synthesis.

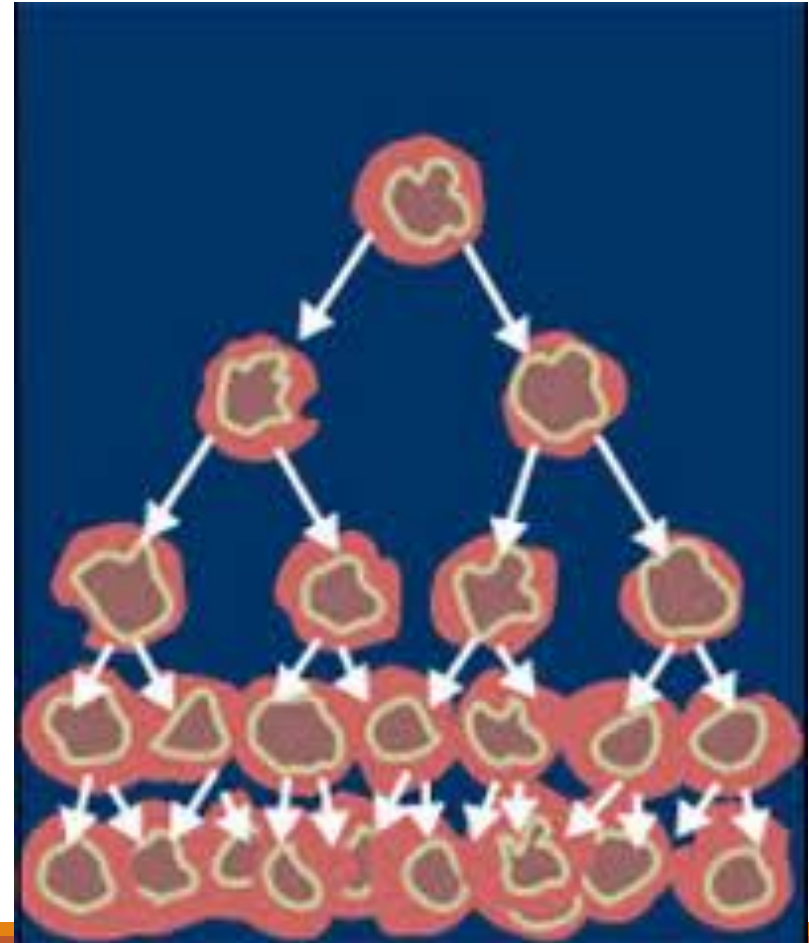
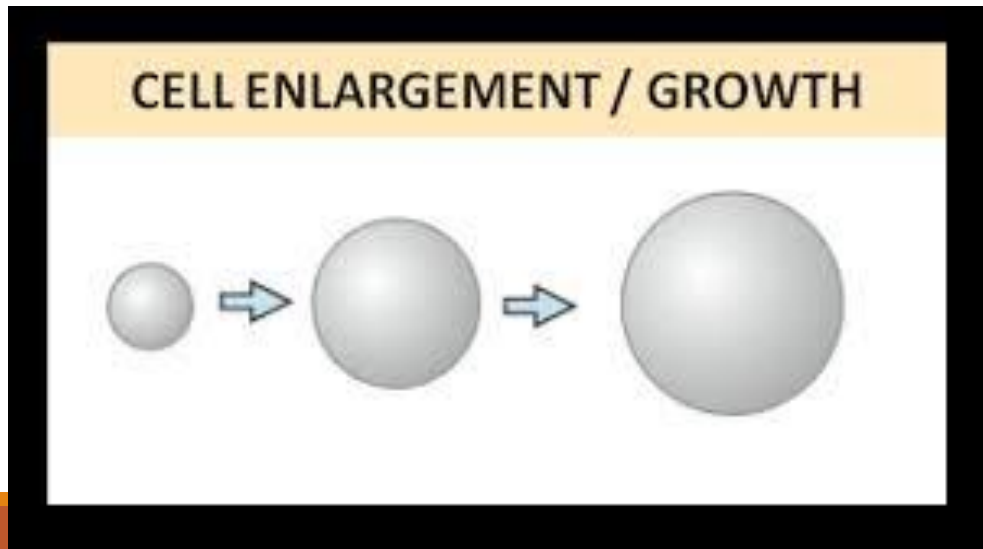
2. Compare the changes in the size of the cytoplasm and the size of the nucleus that occurs as result of growth.

Cytoplasm changes but not the size of the nucleus

3. An increase in the size or number of cells in an organism is called Growth

Growth is an increase in the size of an organism.

- Ex.
- Increasing size by adding cells
- By cells getting larger
- replacing cells.



Station 7: Growth

1. How do all organisms begin life?

1 cell

2. What is the difference between growth and development?

Growth is the size Development is the maturity or quality

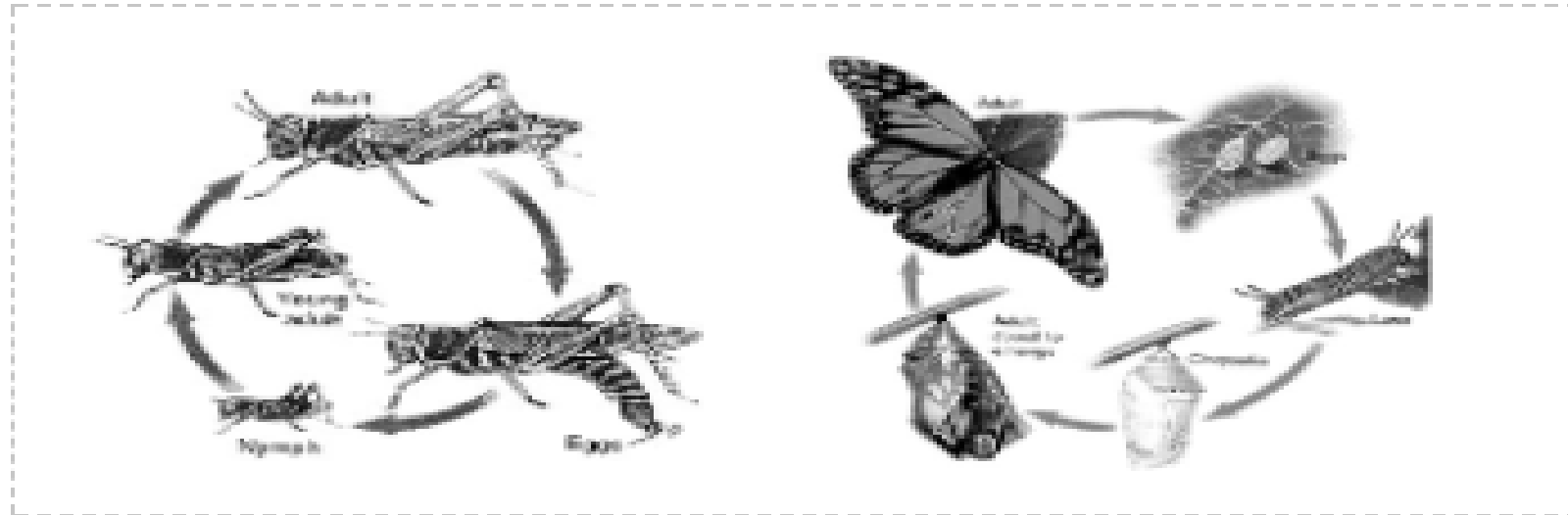
3. Do unicellular organisms GROW? Do unicellular organisms DEVELOP?

Yes

4. Do multicellular organisms GROW? Do multicellular organisms DEVELOP?

Yes

5. Identify which graphic BEST shows *growth* and which BEST shows *development*.



Growth

Development

6. List the three ways an organism's cell(s) grow

- Increasing in size
- Increasing in cell number
- Replacing old cells

3RGENTS

✓ Regulate

□ **Reproduction**

✓ Respiration

✓ Growth

✓ Excretion

✓ Nutrition

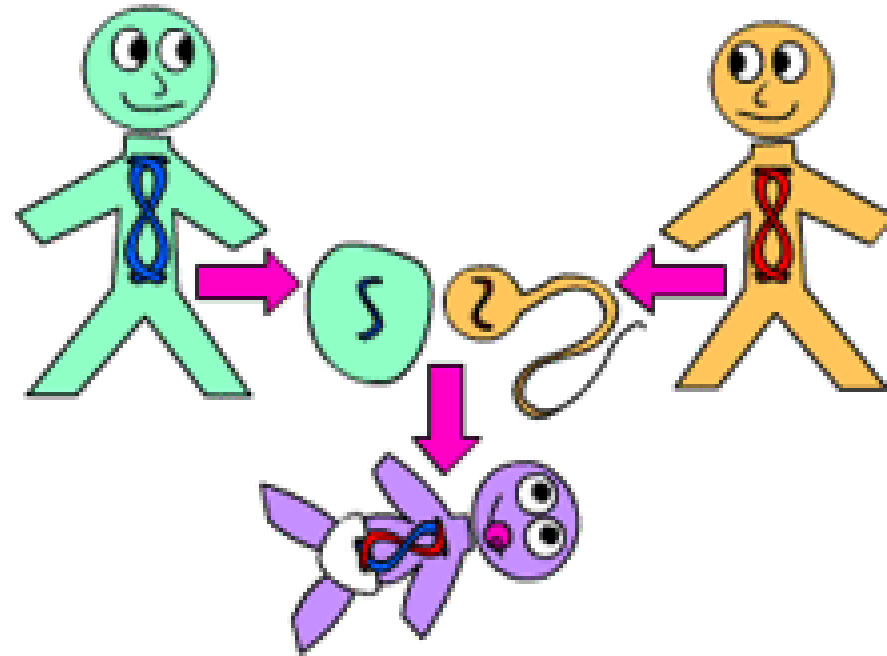
✓ Transport

✓ Synthesis

Bell Work: J. *Reproduction*

Reproduction is the production (making) of new organism. This is the only life process that is not necessary for the life of an individual organism. It is, however, necessary for the continued existence of a particular group of organisms. For example, one cat can live a normal life without reproducing, but if all cats stopped reproducing, the group of organisms called cats would become extinct.

Cells reproduce by cell division- one cell divides into two cells. Cell division involves a series of changes in the cell leading to the production of two new cells. In organisms made up of many cells, multicellular, the production of new cells also results in the growth and repair of damaged tissues.



1. Do organisms need to reproduce to stay alive?

NO

2. If an organism didn't reproduce what would happen?

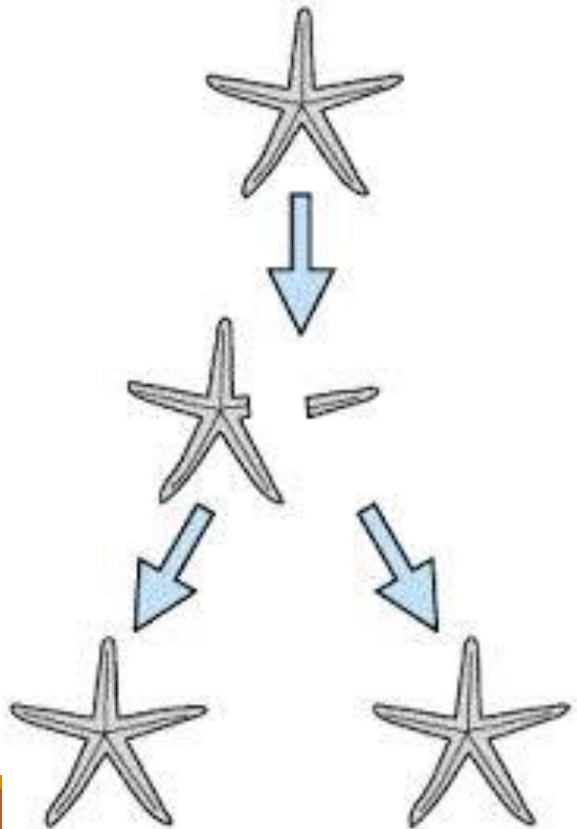
Gene line wouldn't continue

3. What process do cells reproduce by?

Cell division

Reproduction

Making more of a species and allows passing of genetic material (DNA / Genes)



Sexual= 2 parent

Asexual= 1 Parent

Ex. Asexual= Starfish (Budding)

Station 8: Reproduction

1. Must EVERY member of a particular species (one kind of organism) be able to reproduce in order for the species to survive? Explain why or why not.

No, not every member must reproduce because there are other individuals that can carry on species if reproduction occurs

2. What would happen if all individuals in a species were sterile (not able to have babies)?

Species will become EXTINCT

3. Reproduction is NOT essential for the survival of an individual Organism but is essential for the survival of the Species.
4. What is meant by extinction?

No individuals left of a species

5. List 3 organisms that produce asexually?
 - _____
 - _____
 - _____
6. List 3 organisms that produce asexually?
 - _____
 - _____
 - _____

IMMUNITY

3RGENTS

- ✓ Regulate
- ✓ Reproduction
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- ✓ Synthesis

Immunity



the protection against infectious disease

Vaccine : A dead or weakened pathogen used to establish immunity



NOVA

HOW VACCINES WORK



Station 9: Immunity

1. What happened when you added the magnetic tape to the jar and mixed it with the salt and iron filings?

It stuck to the iron filings

2. How is this similar to a real antibody response in our body?
-

Antibody binds to a toxin just as
the iron and magnet

3. How is the secondary immune response different from the primary immune response?

The primary immune response of the body to antigen occurs on the first occasion it is encountered. Secondary is now familiar and occurs more rapid

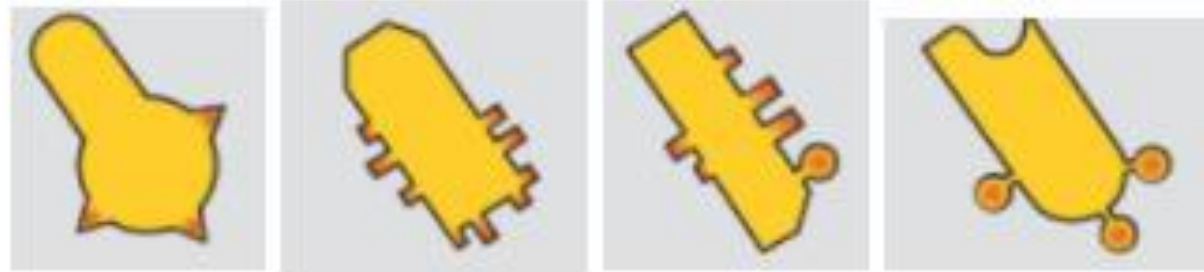
4. What's a pathogen?

An agent that causes disease/infection



5. Draw a line to match the antigen to the appropriate receptor at the specific bonding site below.

Antigens



Antibodies



