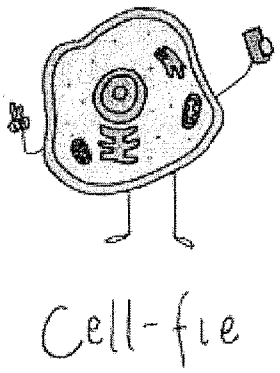
The Living Environment Midterm Review Packet



Name _____

Date _____

Teacher _____

Period _____

MIDTERM DATE: January _____

What do I need to know for the Living Environment Midterm Exam?

Q: How much time do I have to take the exam?

- You will have 90 minutes to complete the exam
- You must be on time! If you arrive later than the start time, you will not be allowed to take the exam.

Q: What do I need on the day of the midterm?

- #2 pencils with erasers
- Blue or Black ink pens (no gel pens!!)
- Dress comfortably
- You will **not** be allowed to have any other items at your seat. This includes pocket books, backpacks, cell phones, digital watches, books, etc.

Q: What do I write with and when?

- Graphs or diagrams - should be in **pencil**
- Bubble sheet - must be in **blue** or **black pen** (no gel pens!!)
- Short response - must be in **blue** or **black pen** (no gel pens!!)

MIDTERM VOCABULARY LIST #1

Active transport
Algae
Amino acids
Atom
ATP
Autotrophic
Bacteria
Balance
Balanced internal environment
Bonds
Breakdown
Building blocks
Carbon
Carbon dioxide
Carnivore
Cell membrane
Cells
Cellular respiration
Chemical energy
Chlorophyll
Chloroplasts
Complex organism
Compounds
Consumer
Cytoplasm
Decomposer
Diffusion
Dynamic equilibrium
Energy
Enzyme
Equilibrium
Functions
Glucose
Green plant
Growth
Heart rate
Herbivores
Heterotrophic
Homeostasis
Hydrogen
Inorganic
Level of organization
Life functions
Membrane
Metabolic
Mitochondria
Molecules
Movement
Multicellular
Nitrogen
Normal state
Nucleus
Nutrition
One-celled organism
Organ
Organ systems
Organelles
Organic
Organic compounds
Organism
Oxygen
pH
Photosynthesis
Protein
Regulation
Reproduction
Respiration
Respond
Response to stimuli
Ribosome
Shape of protein
Simple sugars
Stability
Starch
Steady state
Structures
Synthesis
Systems
Temperature
Temperature range
Tissues
Transport
Vacuole
Water

MIDTERM VOCABULARY LIST #2

Bias
Compound microscope
Computer
Conclusion
Control group
Controlled experiment
Controlled variables
Data
Data table
Dependent variable
Electronic balance
Experiment
Graduated cylinder
Graph
Hypothesis
Independent variable
Infer
Length
Magnification
Mass
Metric
Molecule
Observations
Sample Size
Specimen
Specimens
Staining technique
Stereoscope
Temperature
Theory
Thermometer
Triple-beam balance
Volume
Wet-mount slide

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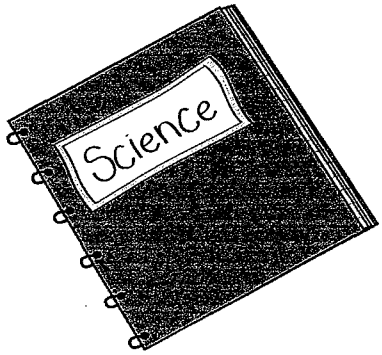


***Note: All practice questions are located at the back of the packet.**

I. Safety in the Laboratory

A) Check your laboratory safety guide for lab safety rules and guidelines.

II. Terms:

A) **Observation:** What is seen or measured.

B) **Inference:** A conclusion based on observation or evidence.

C) **Hypothesis:** An educated prediction based on available evidence. A good hypothesis states both cause and effect.

1. A correct hypothesis can be **tested** and **falsified** (proven incorrect) using an **experiment**.
2. The easiest way to write a correct hypothesis is as an **"if-then"** statement. (ex: If I give patients this pill, then they will not get sick.)

D) **Theory:** An explanation of natural events that is supported by strong evidence.

1. Theories tie together many scientific facts, hypotheses and laws.
2. **Common Mistake:** "Theories are things that are opinions, or are not proven."
   *This is an incorrect use of the word "theory" in a scientific context. A scientific theory is **not** a simple guess or conjecture, and **is** strongly supported by evidence.*

Example of a Controlled Experiment:

Hypothesis:
If people chew gum it will improve their memory.

Independent variable:
Chewing gum – some people will chew gum, some will not.

Dependent variable
Memory – all groups should have their memory checked both before and after the experiment to see if it was improved.

Experimental Group
Group that chews gum.

Control Group
Doesn't chew gum (remember – the control group never receives the new treatment)

Constants
Should be the **same** for both groups: People in each group should be of similar health with similar memory, with similar mixes of sexes, ages, and ethnicities. Each group should also be tested in the same way.

Data Collected
You should test people's memories both before and after the experiment.

III. Controlled Experiments:

Compares the results of an experiment between one or more experimental groups with a "normal" group.

A) **Experimental group:** Group being tested or receiving treatment.

B) **Control group:** "Normal" group. Should be identical to experimental group in every way except *one*: it does not receive the new treatment.

C) **Placebo:** A sugar pill or other "fake" treatment given to the control group. Usually only needed when using human subjects.

D) **Independent Variable:** Variable that is being tested (ex: new drug, new fertilizer).

1. The "If" part of an "If-then" hypothesis.
2. The independent variable is always plotted on the X axis.

E) **Dependent Variable:** Variable that is measured at the end of an experiment; the results.

1. The "then" part of an "If-then" hypothesis.
2. The dependent variable is always plotted on the Y axis.

IV. Graphs and Data Tables

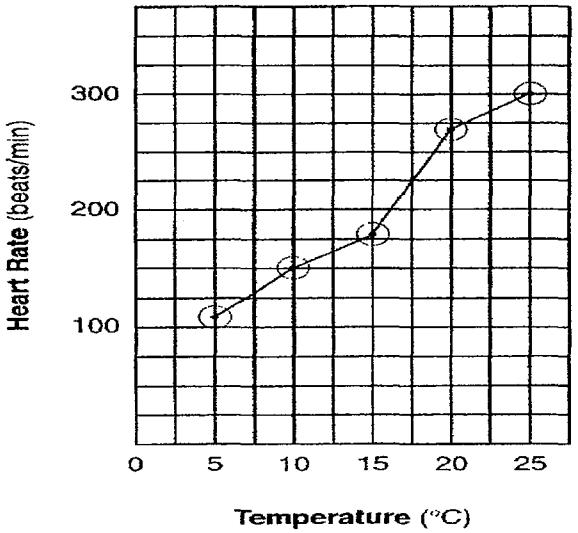
A) **Data tables** are used to organize data which will be plotted in a graph.
   1. First column in the table is for the **independent variable.**
   2. Second column is another for the **dependent variable.**
   3. Each column should be titled, and include units of measurement.
   4. Data in the table must be arranged in ascending or descending order.

Data Table

Temperature (°C)	Heart Rate (beats/min)
5	108
10	150
15	180
20	270
25	300

B) Both the x and y axis of the graph must be labeled or titled. These labels are typically the same ones used in the data table. Once again units of measurement must be written with the title.
   1. The **independent variable** is always plotted on the **x-axis**.
   2. The **dependent variable** is always plotted on the **y-axis**.

C) The x and y axis must be numbered.
   1. **These numbers must increase by a uniform increment** (that is you must count by 1's, 2's, 5's, 10's, etc).
   2. **Your numerical scales should take up most of the axes**. Squeezing it all into the bottom corner makes the graph impossible to read and no credit will be given.
   3. The **numbers must line up with the grid lines** of the graph, not with spaces between them.
   4. **You do not need to start numbering your axis with 0**.



D) To date, all graphs drawn on the LE Regents have been **line graphs**. Any student who draws a bar graph instead of a line graph will be denied credit for this part of the test.

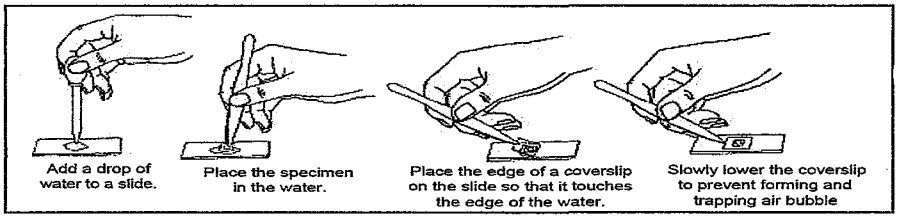
E) All points plotted on your graph must be **surrounded by a circle** (or sometimes a square or triangle, depending on the directions).

V. Characteristics of a good experiment:

- **Can be repeated the same way and get the same results.**
- **Have large sample size/many test subjects.**
- **Are performed over longer periods of time.**
- **Test only one independent variable.** All other characteristics of the tested groups should be the same.
- **Are peer reviewed** – examined by other scientists to determine its accuracy.
- **Must test the hypothesis and show whether it is wrong or right.**
  - **Is objective** – the experiment and conclusion are fair and **unbiased**. Fact and opinion are not mixed. The experiment follows established **ethical** and **legal** standards.

VI. Science Skills

A) Preparing a **Wet Mount Slide**: The coverslip should be placed at a 45 degree angle to prevent air bubbles.



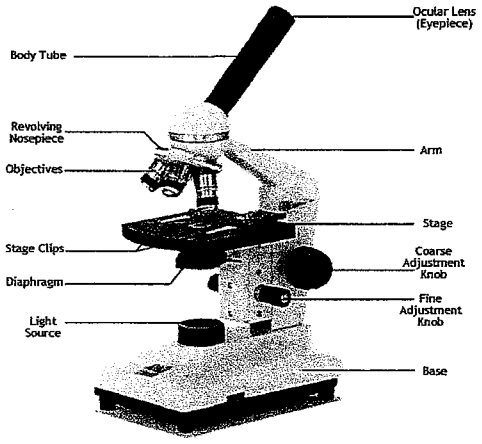
B) **Staining** – stains (such as methylene blue) are added to a slide to make organelles more visible.

C) Be able to identify and describe the **parts** of the Microscope

D) **Microscope Measurement** – when measuring on the microscope you will convert millimeters to micrometers by moving the decimal place three times to the right.

Example: 1. mm = 1000. um

- ✓ **Field of View**: diameter of the circle of light that you see when you look through the eye pieces.



VII. Making Connections (aka The Clothespin Lab)

A) **Part A**

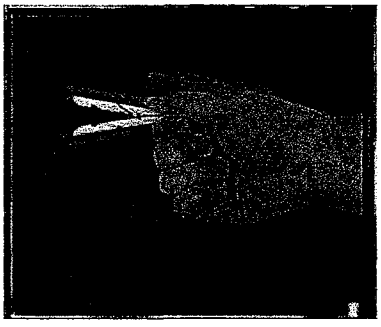
1. **What you did:** measured how exercise affected pulse rate.
2. **What you learned:** exercise increases pulse rate

B) **Part A2**

1. **What you did:** Squeezed a clothespin for 1 minute, then squeezed it again for another minute
2. **What you learned:**
   - If you squeezed more the second round, it may have been because your finger muscles were "warmed up" from increased circulation.
   - If you squeezed less the second round, it may have been because your finger muscles were fatigued.

C) **Part B**

1. **What you did:** Designed an experiment to test how exercise affects squeezing a clothespin.



2. **What you learned:** How to design an experiment (see example of controlled experiment on previous page) **Note:** When the exam says "design an experiment" you are simply answering questions based on aspects of the scientific method.

I. All living things must maintain **homeostasis** in order to stay alive.

A) Homeostasis: A balanced state in an organism's body.

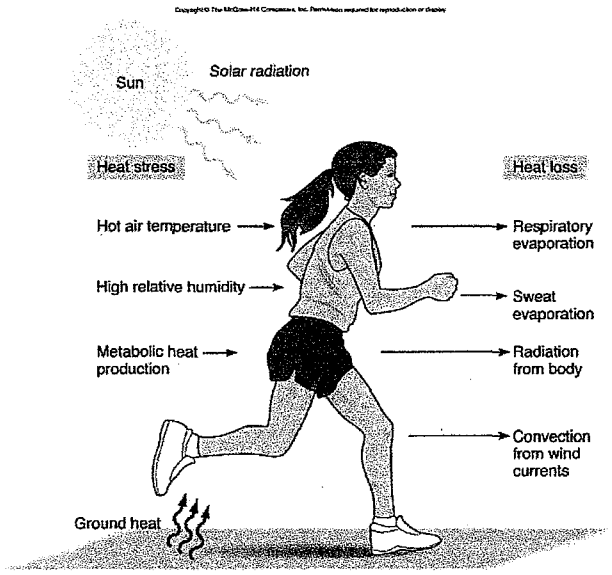
B) Failure to maintain homeostasis results in disease or death.

C) Homeostasis is often maintained using feedback mechanisms.

1. Feedback mechanisms are **cycles** in which the product of one reaction causes another to start or stop.

D) While organisms are balanced, they are not unchanging. The term used to describe the balanced state is **dynamic equilibrium.**

1. **Dynamic Equilibrium:** A balanced state created by many small, opposing changes.



II. Life Processes: All living things carry out the same basic chemical processes. Taken together, these processes make up an organism's metabolism.

A) Metabolism: All the chemical processes that take place in an organism.

1. **Reproduction**: Passes on genes to offspring.
2. **Regulation**: The **control and coordination** of life processes.
3. **Respiration:** Converts **energy** in food into a usable form (**ATP**).
4. **Growth:** The increase in size (unicellular) or number of cells (multicellular).
5. **Excretion**: Removing of wastes produced by metabolic activities.
6. **Nutrition:** Using nutrients for growth, synthesis, repair and energy.
7. **Transport**: Absorbing and distributing materials throughout the body.
8. **Synthesis**: Making complex chemicals from simple substances.

Topic Three: The Cell

I. Definition: The basic unit of structure and function in all living things.

II. Cell Theory has three parts:

1. **All living things are made of one or more cells.**
   - Unicellular – single celled organisms (amoeba, paramecium)
   - Multicellular – have more than 1 cell; may be only a few cells, or many *trillions* of cells. Almost all structures in multicellular organisms are made of or by cells.
2. **Cells carry out all life processes.**
   - Everything you do is the result of the work of your cells – walking, talking, even thinking and feeling. When you get sick, it is because your cells are not working correctly.
3. **All cells come from preexisting cells.**
   This seems obvious now, but at one time people believed in *spontaneous generation*, the idea that living things regularly emerged from nonliving things.

B) **Exceptions to the Cell Theory**

1. **Viruses** are not made of cells. However, they also do not carry out all life processes, so many biologists do not consider them true living things.
2. **The first cell** obviously could not come from another cell.

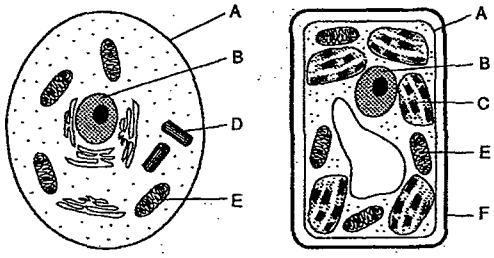
III. Organization (AMOCTOOO)

A) **Atoms**
B) **Molecules**
C) **Organelles** – Cell structures
D) **Cells**- basic unit of life
E) **Tissues** – Cells with the same structure and function.
F) **Organs** – Made of different tissues working together for the same function.
G) **Organ Systems** - Groups of organs that work together.
H) **Organism** – one individual living thing

IV. Cell Organelles: These are the tiny cell parts that make up a cell.

1. **Nucleus**
   - Controls the cell
   - Contains hereditary material (chromosomes, genes, DNA)
2. **Cytoplasm** (technically not an organelle)
   - Fluid/liquid in the cell – mostly water
   - Helps transport material
3. **Mitochondrion**
   - Carries out **cellular respiration** (creating energy from food)
   - Gives cell **energy (ATP)** (Powerhouse of the cell).
4. **Ribosome**
   - Makes **proteins** from **amino acids**.

5. **Vacuole**
   - Stores food, water and waste
   - Food vacuoles may digest large molecules.
   - Waste vacuoles may excrete waste out the cell membrane
6. **Chloroplast**
   - Carries out **photosynthesis**
   - Plant and algae cells only
7. **Cell Wall**
   - Gives shape, structure and protection.
   - NEVER found in animal cells.
8. **Cell Membrane**
   - Separates cell interior from environment
   - Controls what enters and leaves the cell using **transport proteins.**
   - Has **receptor molecules** that pick up signals from other cells.



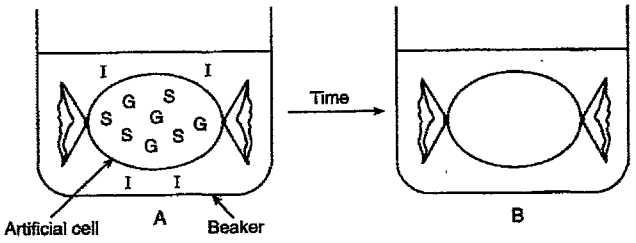
D. Cell Membrane & Transport

1. **Diffusion**: movement of molecules from high concentrations to low concentrations. Requires no energy (passive transport).
2. **Active Transport** requires the use of energy, usually moving molecules from a low concentration to a high concentration (against the flow of diffusion).
3. **Osmosis** is the diffusion of water into or out of the cell. If water diffuses into the cell, the cell swells (get larger) and may burst. If it loses water (being put in salt water for example) it will shrivel up

V. Diffusion Through A Membrane State Lab

A) **Part A**

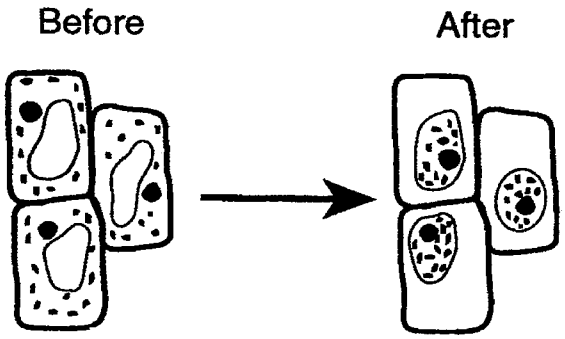
1. **What you did:**
   - Made a model cell using **dialysis tubing**.
   - Put glucose and starch inside your "cell."
   - Put starch indicator (iodine) outside cell
2. **What you saw:**
   - Inside of cell turned blue-black because iodine diffused *into* the cell
   - Because outside of the cell was not blue-black, you know the **starch did not diffuse** through the membrane. Starch is **too big** to diffuse out.
   - Used blue glucose indicator (Benedict's solution) to see that glucose did diffuse through the membrane.
3. **What you learned**
   - Small molecules (glucose, iodine) can **diffuse** through a membrane on their own.
   - Large molecule (starch) cannot diffuse through a membrane on their own.
   - You can use indicators to identify the presence of specific substances.



B) **Part B**

1. **What you did:**
   - Looked at red onion cells under the microscope.
   - Added salt water to the onion cells.
   - Added distilled (pure) water to the onion cells.
2. **What you saw:**
   - Salt water caused the onion cells to shrivel.
   - Distilled water cause the cells to swell back to normal.

3. **What you learned:**
   - **Salt water causes water to diffuse out of a cell.**
   - **In pure water, water will diffuse into a cell.**



Inorganic Chemicals: Simple compounds (do not contain Carbon and Hydrogen bonded together)

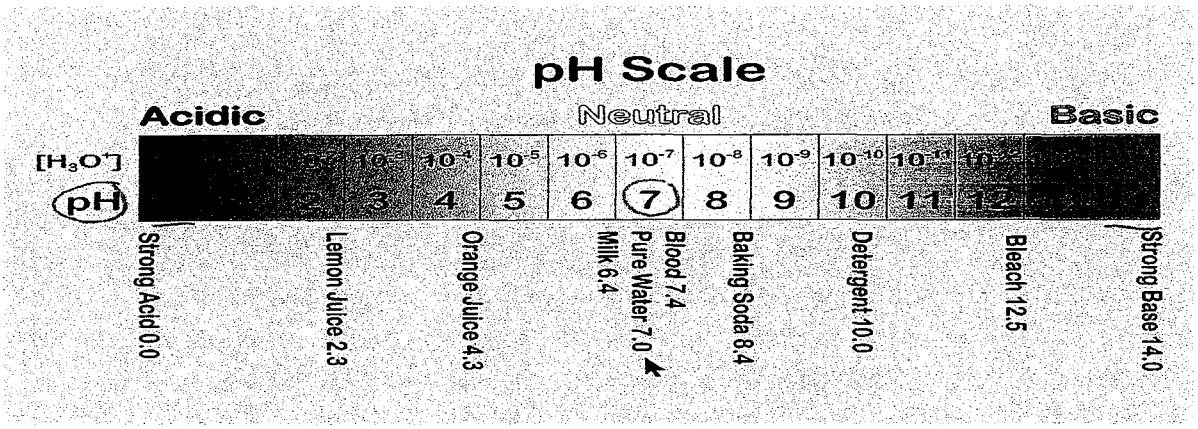
A) Water (H_2O) : Most common substance in all living things (about 60% of body mass)
- Needed for chemical reactions (which won't happen in "dry" conditions)
- Dissolves other molecules into **solution,** allowing them to be **transported** through the body.

B) Oxygen (O_2): Needed by **most** (not all) organisms for **cellular respiration**.
- Released by plants and algae as a waste product of **photosynthesis.**
- **Aerobic respiration:** Process that uses oxygen to extract **energy** from glucose (sugar). Used by most organisms.
- Anaerobic respiration: Process that extracts energy from glucose without using oxygen. Gives less energy, so only used by some simple organisms (some bacteria, yeast). These organisms do not need to breathe in oxygen.

C) Carbon Dioxide (CO_2):
- With water, used by plants to make glucose (**photosynthesis)**.
- Waste product of **aerobic respiration**.

D) Nitrogen (N_2):
- Most common gas in air (70%)
- Needed to make protein.
- Converted into **nitrates** by soil bacteria. Nitrates are absorbed by plants and then eaten by animals.
- Excreted as waste in **urine**.

E) Acids and Bases:
- Measured by the **pH scale**
- Very high and very low pHs are usually lethal.
- **pH**: The pH scale measure the strengths of **acids** and **bases**. A low pH (0-6.9) is an acid, a high pH (7.1-14) is a base, and 7 is neutral (water).



- pH can affect rates of chemical reactions; for example, digestive **enzymes** work fastest in acidic environments, which is why we make stomach acid (hydrochloric acid, or HCl).

III. Organic Compounds: Larger, more complex chemicals. Always contain the elements carbon (C)and hydrogen (H). Synthesized from simpler substances (building blocks).

A) Carbohydrates: Sugars and starches

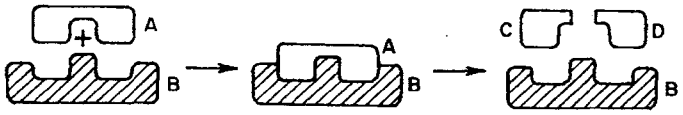
1. Building blocks: Simple sugars
2. Functions:
   - Provides energy
   - Stores energy in plants (starch)

B) Lipids: Fats, oils and waxes

1. Functions:
   - Stores energy (animal fat)
   - Insulation
   - Water proofing
   - Cell membrane

C) Proteins: Complex compounds that carry out all the body's activities.

1. Building blocks: Amino acids
2. Have many different functions as determined by their shape.
3. **Lock and Key Model:** Proteins must have the right shape to "fit" with other molecules.
   - **Changing the shape of a protein will change what it can interact with its function.**
4. **Important types of <u>proteins:</u>**
   - **Hormones** and **neurotransmitters** – carry messages through the body.
   - Cell receptors – in cell membrane; receive hormones and neurotransmitters.
   - Antibodies – attack foreign **pathogens**
   - **Enzymes**- act as **catalysts**, controlling all chemical reactions in the body.
     - High temperatures will cause enzymes to denature (lose their shape) and stop functioning. This is why high fevers are dangerous.
     - Shape of an enzyme correlates with it's function.



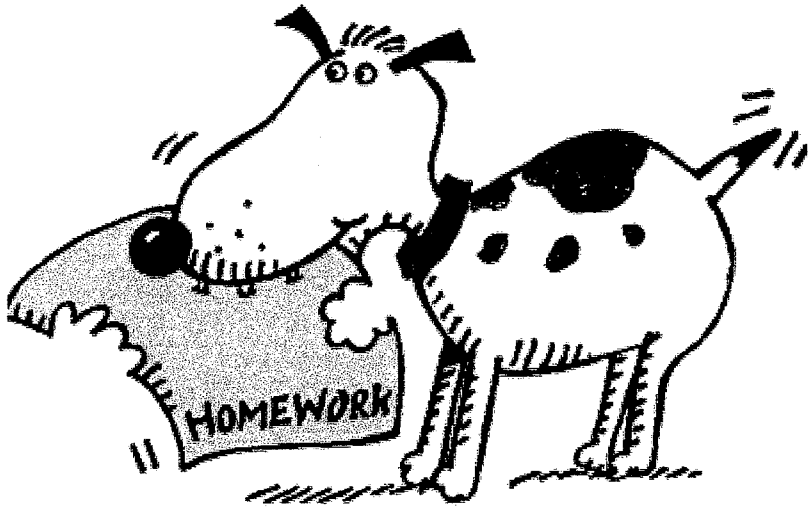
A starch (A) is broken down by an enzyme (B) into two simple sugars (C, D). This is also a good example of the **lock and key model**.

D) Nucleic Acids (DNA and RNA): Make up genes and chromosomes.

1. **Building blocks**: Nucleotides; molecular bases (ATCGU)

Homework Practice Questions begin on next page →

Please refer to Midterm Homework Schedule on page 3 for assignment dates.



TOPIC 1 PRACTICE QUESTIONS

1. When heating a solution in a test tube, a student should

   A) point the test tube in any direction
   B) hold the test tube with two fingers
   C) cork the test tube
   D) wear goggles

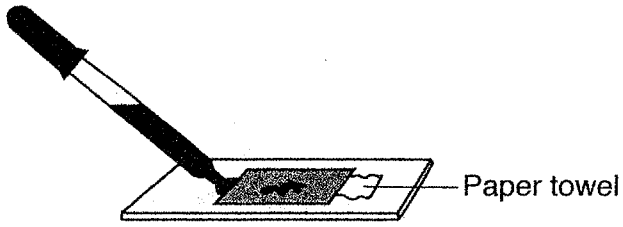
2. Which group of measurement units is correctly arranged in order of increasing size?

   A) micrometer, millimeter, centimeter, meter
   B) millimeter, micrometer, centimeter, meter
   C) meter, micrometer, centimeter, millimeter
   D) micrometer, centimeter, millimeter, meter

3. A coverslip should be slowly lowered from a 45° angle onto a slide in order to

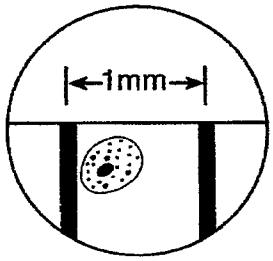
   A) prevent the slide from being scratched
   B) stop the loss of water from under the coverslip
   C) ensure that the specimen being viewed will stay alive
   D) reduce the formation of air bubbles

4. Which laboratory procedure is represented in the diagram below?



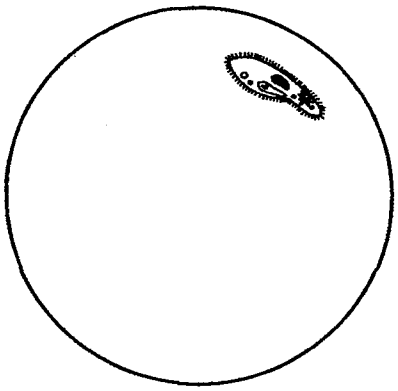
   A) placing a coverslip over a specimen
   B) removing a coverslip from a slide
   C) adding stain to a slide without removing the coverslip
   D) reducing the size of air bubbles under a cover- slip

5. What is the approximate diameter of the cell shown in the low-power field of a compound light microscope represented below?



   A) 100 μm
   B) 500 μm
   C) 800 μm
   D) 1,000 μm

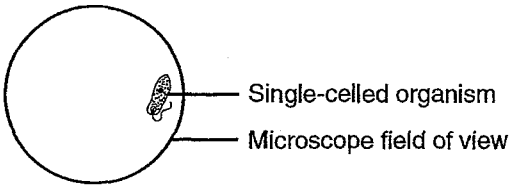
6. A cell in the field of view of a compound light microscope is shown in the diagram below.



   In which direction should the slide be moved to center this cell in the microscopic field?

   A) to the right and up
   B) to the right and down
   C) to the left and up
   D) to the left and down

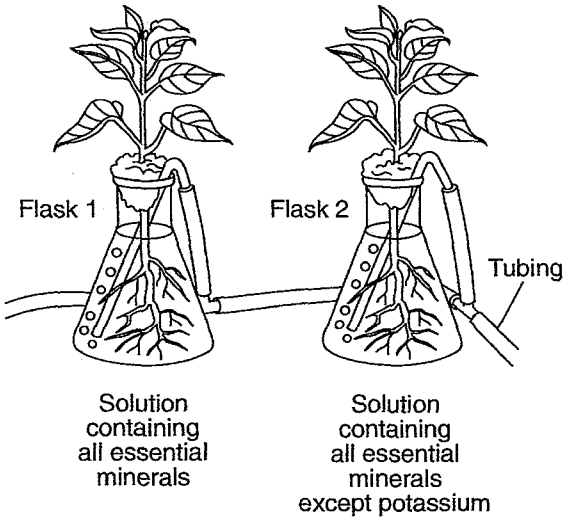
7. A student used the low-power objective of a compound light microscope and observed a single-celled organism as shown in the diagram below.



When he switched to high power, the organism was no longer visible. This most likely happened because switching to high power made the

A) field too bright to see the organism
B) image too small to be seen
C) area of the slide being viewed smaller
D) fine-adjustment knob no longer functional

Base your answers to questions **8** and **9** on the experimental setup shown below. The tubing connected to both flask setups used in the experiment provides oxygen to the solution.



Source: Campbell and Reece, *Biology*, 6th edition (adapted)

8. State what type of data would most likely be collected during the experiment to support or refute your hypothesis.

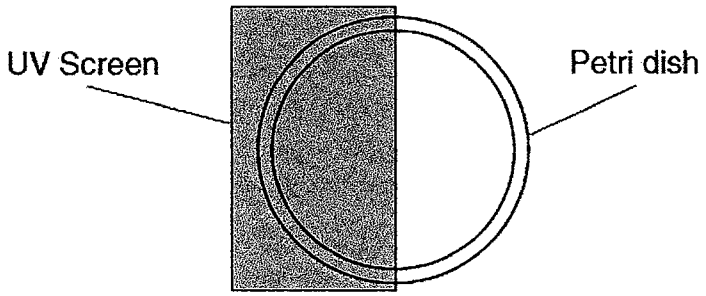
_____
_____

9. State *one* possible hypothesis for the experiment.

_____
_____

10. Base your answer to the following question on the information below and on your knowledge of biology.

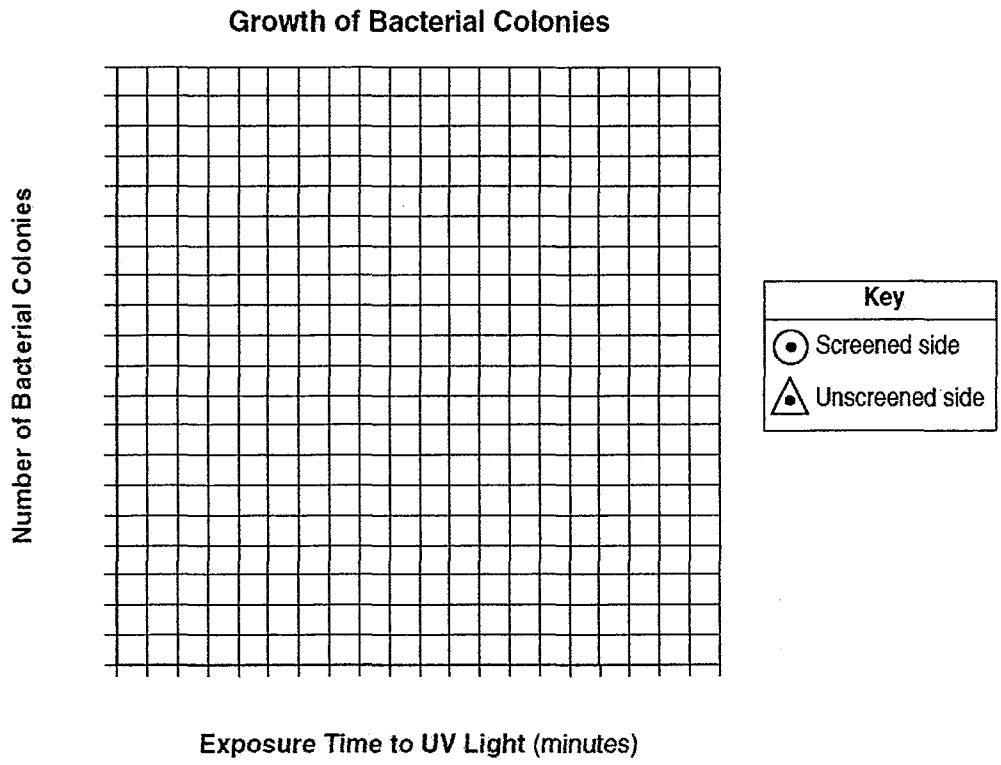
An experiment was carried out to determine the effect of exposure to UV light on the growth of bacteria. Equal quantities of bacteria were spread on 5 petri dishes containing nutrient agar. Half of each petri dish was exposed to UV light for various amounts of time, and the other half was protected from the UV light with a UV screen. After the UV treatment, the bacteria were grown in an incubator for 24 hours, and the number of colonies was counted. The diagram below represents the initial set up.



The table below contains the data collected by counting the number of bacterial colonies growing on both the screen-covered side and the unscreened side.

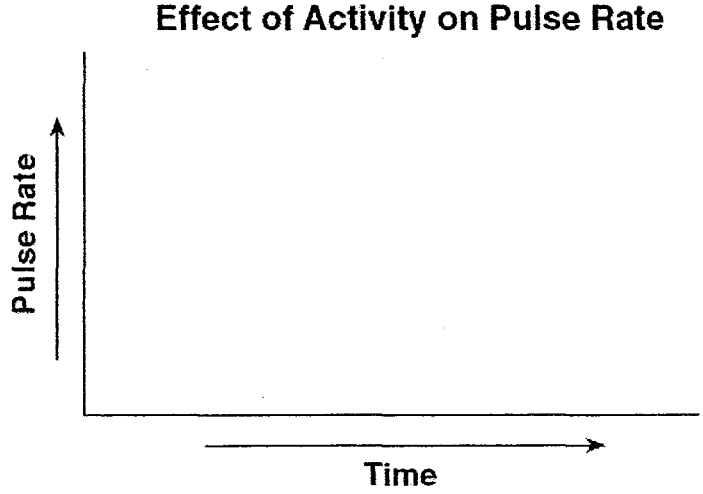
Growth of Bacterial Colonies

Petri Dish	Exposure Time to UV Light	Number of Bacterial Colonies on Screened Side	Number of Bacterial Colonies on Unscreened Side
1	No Exposure (0.0 minutes)	17	18
2	1.0 minutes	18	15
3	2.0 minutes	17	11
4	5.0 minutes	18	4
5	10.0 minutes	16	1



Plot the data for the number of bacterial colonies on the unscreened side. Connect the points and surround each point with a small triangle.

11. A student went out to the school track and walked two laps, ran two laps, and then walked two more laps. On the grid below, draw a line that shows what most likely happened to the pulse rate of the student during these activities.



12. When people exercise, their body cells build up more waste quickly. Which two body systems work together to remove these wastes from their cells?

A) immune and endocrine
B) digestive and skeletal
C) respiratory and circulatory
D) circulatory and digestive

13. In an experiment to determine the effect of exercise on pulse rate, a student checks his pulse rate before and after exercising for several minutes. The purpose of checking his pulse rate before exercising is that it

A) serves as the conclusion for the experiment
B) is needed to justify the sample size
C) serves as a control for the experiment
D) is needed to formulate a hypothesis

14. Base your answer to the following question on on the information below and on your knowledge of biology.

An investigation is carried out to determine the effect of exercise on the rate at which a person can squeeze a clothespin

Muscle fatigue occurs during this activity when

A) carbon dioxide is used up in the muscle cells
B) simple sugar is converted to starch in the muscle cells
C) proteins accumulate in mitochondria in the muscle cells
D) certain waste products collect in the muscle cells

Base your answers to questions **15** through **17** on the passage below.

Some poinsettia plants have green leaves that turn red. A garden club decided to study the color change of poinsettia plants. Knowing that poinsettias change color during the short daylight periods of winter, they decided to investigate the effect of different daylight lengths on color change.

Design a controlled experiment using three experimental groups that could be used to determine if the number of hours of daylight has an effect on the color change of poinsettias.

15. Describe experimental results that would support your hypothesis.

_____

_____

16. Identify the dependent variable in the experiment.

_____

_____

17. Identify *two* factors that must be kept the same in all three groups.

_____

_____

Base your answers to questions **18** through **20** on the information below and on your knowledge of biology.

An experiment was carried out to answer the question "Does the pH of water affect the growth of radish plants?" Two groups of ten radish plants were set up. One group was watered with water having a pH of 3.0, and the other group was watered with water having a pH of 7.0. Both groups of plants received the same amount and intensity of light, the same amount of water, and they were grown in the same type of soil. The heights of the radish plants were measured every 2 days for a period of 2 weeks.

18. Which activity might help to increase the validity of this experiment?

A) repeating the experiment several times
B) using two different types of radish seeds in each group
C) using the same pH for both groups of plants
D) placing one set of plants in sunlight and one in darkness

19. What was the dependent variable in this experiment?

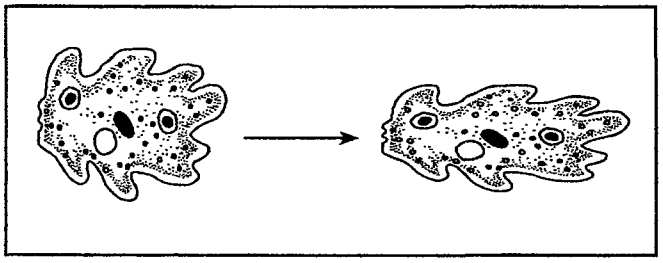
A) heights of the plants
B) pH of the water
C) temperature of the water
D) type of soil

20. Which sentence is a possible hypothesis that was tested in this experiment?

A) Does the pH of water affect the growth of radish plants?
B) Will the amount of water alter the heights of the radish plants?
C) The temperature of the water will affect the heights of the radish plants.
D) The pH of the water will affect the heights of the radish plants.

TOPIC 2 PRACTICE QUESTIONS

1. Two methods of moving from place to place are represented below. The single-celled ameba moves by a process that involves the flow of cytoplasm.



Which statement is best supported by these diagrams?

A) Both simple and complex organisms move directly by the movement of cytoplasm.
B) Single-celled organisms, like complex organisms, are able to move; however, they differ in the way they carry out this activity.
C) Cytoplasm is a fluid substance in simple cells and a solid substance in cells of complex organisms.
D) Cells in complex organisms function in the exact same way as cells in simple organisms.

2. Materials are transported within a single-celled organism by the

A) nucleus B) cytoplasm
C) mitochondrion D) ribosome

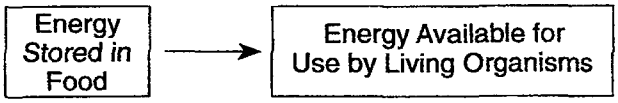
3. Nutrition involves those activities by which organisms

A) remove cellular waste products
B) obtain and process materials needed for other activities
C) exchange gases with their environment
D) absorb and circulate materials

4. The energy an organism requires to transport materials and eliminate wastes is obtained directly from

A) DNA B) starch
C) hormones D) ATP

5. Which process is represented by the arrow in the diagram below?



A) growth B) respiration
C) regulation D) excretion

6. Which observation could lead to the conclusion that an object is nonliving?

A) It passes on hereditary information only through asexual reproduction.
B) It carries out synthesis.
C) It cannot perform metabolic processes.
D) It is composed of a cell, but does not have tissues.

7. Arrows *A*, *B*, and *C* in the diagram below represent the processes necessary to make the energy stored in food available for muscle activity.

Food $\xrightarrow{A}$ Simpler molecules $\xrightarrow{B}$ Mitochondria $\xrightarrow{C}$ ATP in muscle cells

The correct sequence of processes represented by *A*, *B*, and *C* is

A) diffusion → synthesis → active transport
B) digestion → diffusion → cellular respiration
C) digestion → excretion → cellular respiration
D) synthesis → active transport → excretion

8. Which term is defined as all the chemical reactions that are required to sustain life?

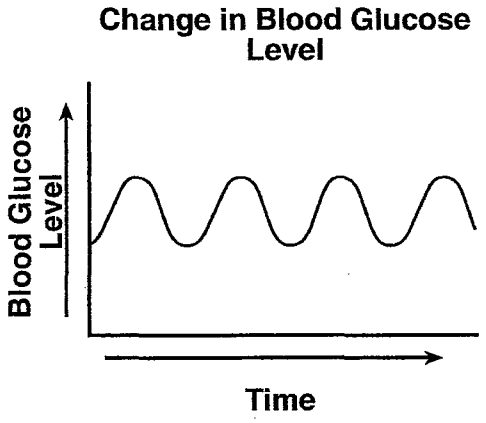
A) metabolism
B) nutrition
C) regulation
D) synthesis

9. Which row in the chart below contains correct information concerning synthesis?

Row	Building Blocks	Substance Synthesized Using the Building Blocks
(1)	glucose molecules	DNA
(2)	simple sugars	protein
(3)	amino acids	enzyme
(4)	molecular bases	starch

A) 1 B) 2 C) 3 D) 4

10. The graph below shows changes in the level of glucose in the blood of a person over a period of time.



The graph represents the

A) maintenance of dynamic equilibrium
B) failure of homeostasis
C) reaction of white blood cells to a pathogen
D) oxygen carrying capacity of the blood

11. The process that removes metabolic waste products from an organism is known as

A) egestion
B) secretion
C) excretion
D) oxidation

12. Which statement concerning sexual reproduction is correct?

A) It is not necessary in order for the individual to survive.
B) The offspring are identical to the parent.
C) It is necessary in order for the individual to survive.
D) The offspring are identical to each other.

13. Write the structures listed below in order from least complex to most complex.

organ
cell
organism
organelle
tissue

Least complex: _____

_____

_____

_____

Most complex: _____

_____

_____

14. Some levels of organization in a multicellular organism are shown in the sequence below.

A → cells → tissues → B → organ systems → organism

Which terms represented by letters *A* and *B* would complete the sequence?

A) *A*–gametes; *B*–zygote
B) *A*–zygote; *B*–gametes
C) *A*–organs; *B*–organelles
D) *A*–organelles; *B*–organs

15. The cytoplasm in a single-celled organism and the circulatory system in a human both

A) break down molecules into smaller components
B) release energy to be used by the organism
C) transport substances throughout the organism
D) distribute blood to all of the parts of the organism

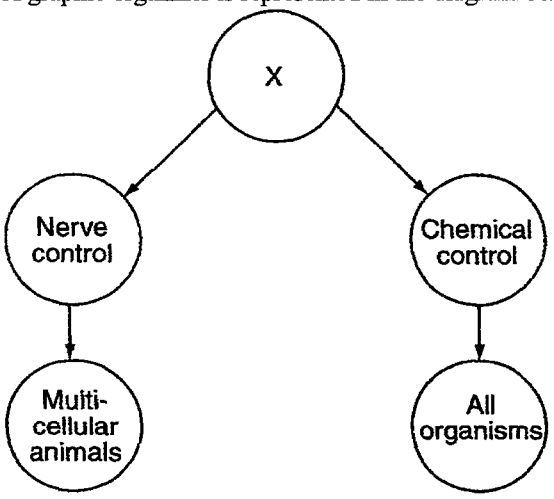
16. Which process is a form of autotrophic nutrition?

A) transport
B) regulation
C) fermentation
D) photosynthesis

17. The removal of carbon dioxide and nitrogenous wastes from an organism illustrates the life function known as

A) regulation
B) nutrition
C) respiration
D) excretion

18. A graphic organizer is represented in the diagram below.



The letter *X* most likely represents the term

A) regulation
B) excretion
C) growth
D) transpiration

19. A student collected and recorded data on the response of an earthworm to varying amounts of light. The data collected would most likely provide information about earthworm

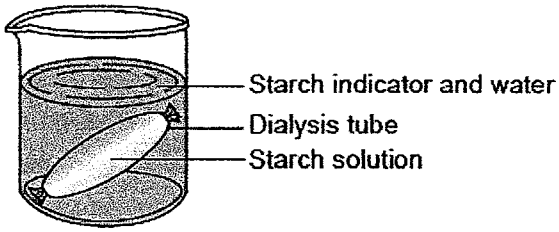
A) cell structure regulation
B) regulation
C) chemical digestion
D) egestion

20. ATP is a compound that is synthesized when

A) chemical bonds between carbon atoms are formed during photosynthesis
B) energy stored in chemical bonds is released during cellular respiration
C) energy stored in nitrogen is released, forming amino acids
D) digestive enzymes break amino acids into smaller parts

TOPIC 3 PRACTICE QUESTIONS

Base your answers to questions **1** and **2** on the diagram below and on your knowledge of biology. The diagram represents an experimental setup.



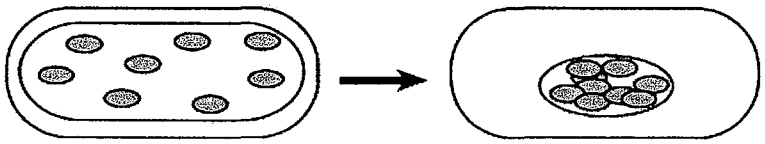
1. A student filled a dialysis tube with 97% water solution and sealed the ends. The tube and its contents had a mass of 55 grams. The student placed the tube in a solution, and the mass of the tube and its contents increased to 60 grams. Into which solution was the dialysis tube placed?

   A) 0% water B) 95% water C) 97% water D) 99% water

2. Which term correctly identifies the process by which molecules move through the dialysis tube membrane?

   A) paper chromatography B) active transport
   C) diffusion D) digestion

3. The diagram below represents a green plant cell viewed with the high power of a compound light microscope before and after a particular substance was added.

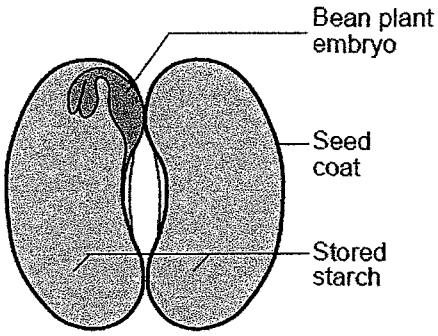


Identify a substance that could have been added to the slide to bring about the change shown.

4. Which process utilizes cellular energy to move particles through a membrane?

   A) osmosis B) passive diffusion
   C) active transport D) transpiration

5. Base your answer to the following question on the diagram and information below and on your knowledge of biology. The diagram represents a germinating bean seed that has been split open.



Germinating bean seed (split open)

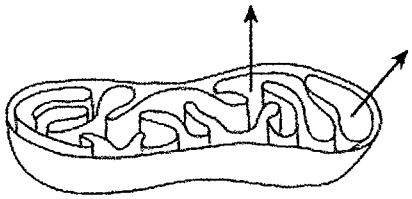
When water is available and growth begins, the plant embryo inside the seed secretes enzymes to digest the starch stored in the seed. The enzymes in cells of the plant embryo are produced directly by the

A) ribosomes B) nuclei
C) mitochondria D) vacuoles

6. Which cell structure is mainly responsible for releasing energy from food molecules in some single-celled organisms?

A) ribosome B) chloroplast
C) cell membrane D) mitochondrion

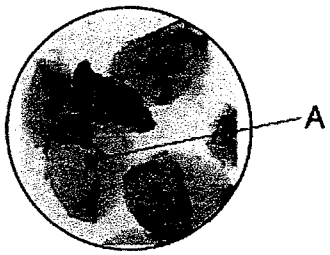
7. The diagram below represents a cell structure involved in converting energy stored in organic molecules into a form used by animal cells.



The arrows represent the movement of which substances?

A) carbon dioxide and sugar
B) oxygen and ATP
C) ATP and carbon dioxide
D) oxygen and sugar

8. A photograph of human cells as seen with a compound light microscope is shown below. A cell structure is labeled *A*.



Structure *A* is most likely a

A) mitochondrion that synthesizes food for the cell
B) nucleus that is the site of food storage
C) mitochondrion that absorbs energy from the Sun
D) nucleus that is responsible for the storage of information

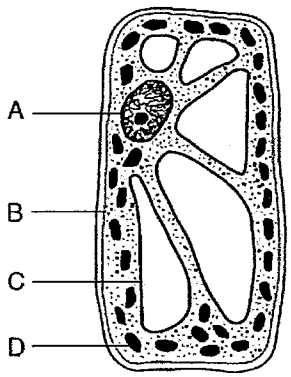
9. In a multicellular organism, organs carry out a variety of life functions. In a single-celled organism, these functions are performed by

A) tissues B) organelles
C) organ systems D) organs

10. Which two cell structures work together in the process of protein synthesis?

A) nucleus and chloroplast
B) ribosome and vacuole
C) nucleus and ribosome
D) mitochondrion and cell membrane

11. The diagram below represents a cell of a green plant.



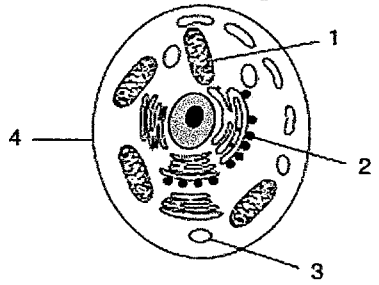
Solar energy is used to produce energy-rich compounds in structure

A) A B) B C) C D) D

12. What is the main function of a vacuole in a cell?

A) storage B) coordination
C) synthesis of molecules D) release of energy

13. Within which structure shown in the diagram below are energy-rich organic compounds used to produce ATP?



A) 1 B) 2 C) 3 D) 4

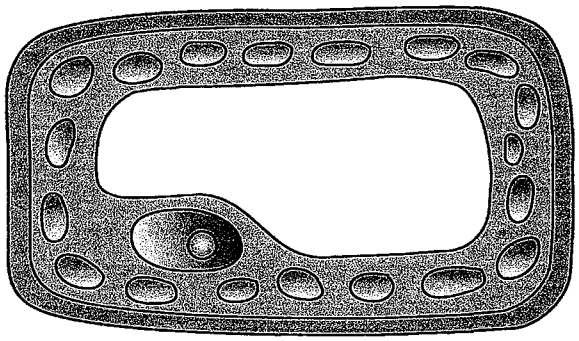
14. Which organelle is correctly paired with its specific function?

A) cell membrane—storage of hereditary information
B) chloroplast—transport of materials
C) ribosome—synthesis of proteins
D) vacuole—production of ATP

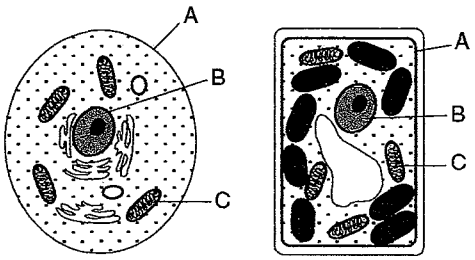
15. In a cell, all organelles work together to carry out

A) diffusion B) active transport
C) information storage D) metabolic processes

16. Draw an arrow to indicate, *one* part of the plant cell below that would *not* be found in an animal cell. The tip of the arrow must touch the part being identified.



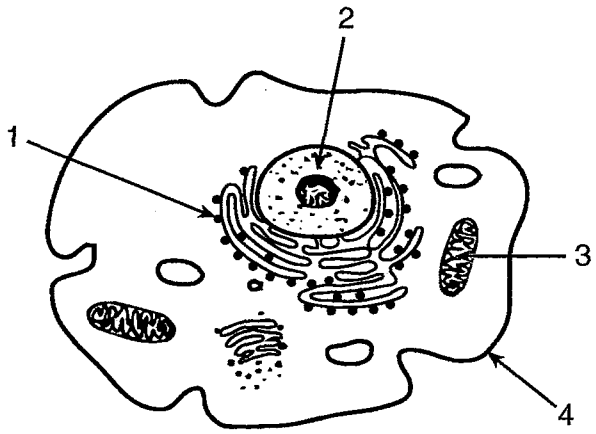
17. Base your answer to the following question on the diagrams below of two cells, *X* and *Y*, and on your knowledge of biology.



Cell X **Cell Y**

Identify one process that is carried out in cell *Y* that is *not* carried out in cell *X*.

18. Base your answer to the following question on the diagram of a cell below.



Choose either structure 3 *or* structure 4, write the number of the structure on the line below, and describe how it aids the process of protein synthesis.

Structure: _____

_____

_____

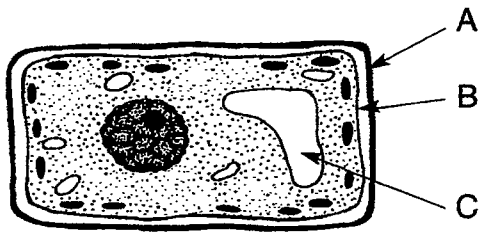
19. Identify a specific structure in a single-celled organism. State how that structure is involved in the survival of the organism.

_____

_____

). Base your answer to the following question on the information below.

A plant cell is represented in the diagram below.



Select one of the lettered structures. Record the letter of the structure chosen and, using one or more complete sentences, state the function of the structure.

_____

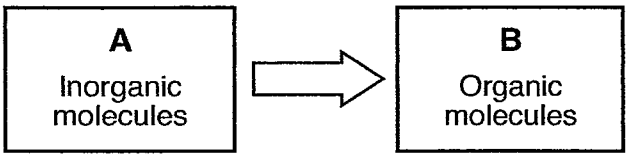
_____

TOPIC 4 PRACTICE QUESTIONS

1. Which substance is an inorganic molecule?

   A) starch B) DNA C) water D) fat

2. The diagram below represents a biological process



   Which set of molecules is best represented by letters *A* and *B*?

   A) A: oxygen and water
      B: glucose
   B) A: glucose
      B: carbon dioxide and water
   C) A: carbon dioxide and water
      B: glucose
   D) A: glucose
      B: oxygen and water

3. A chemical analysis of organisms from each kingdom shows that living things are primarily composed of the elements

   A) carbon, hydrogen, chlorine, and sulfur
   B) carbon, hydrogen, oxygen, and nitrogen
   C) iron, calcium, hydrogen, and oxygen
   D) chlorine, carbon, calcium, and sulfur

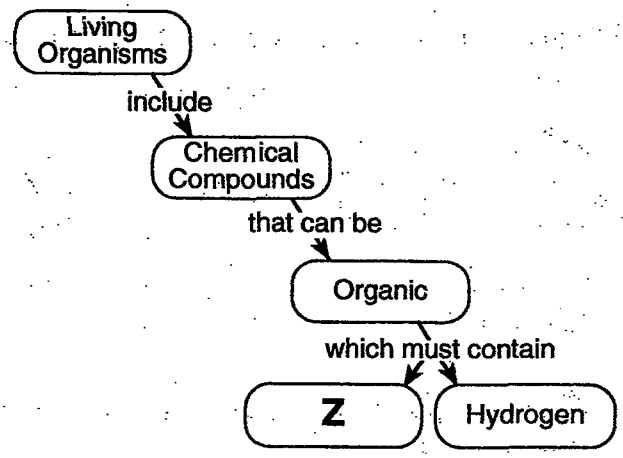
4. Groups A and B in the table below contain molecular formulas of compounds.

Group *A*	Group *B*
$C_6H_{12}O_6$	NaCl
$C_{12}H_{22}O_{11}$	NH_3

   How would the compounds in these groups be chemically classified?

   A) group A - inorganic
      group B - organic
   B) group A - organic
      group B - inorganic
   C) group A - monosaccharides
      group B - disaccharides
   D) group A - disaccharides
      group B - monosaccharides

5. In the diagram below, which substance belongs in area Z?



   A) water B) oxygen
   C) nitrogen D) carbon

6. Which statement best describes enzymes?

   A) Every enzyme controls many different reactions.
   B) The rate of activity of an enzyme might change as pH changes.
   C) Temperature changes do not affect enzymes.
   D) Enzymes are produced from the building blocks of carbohydrates.

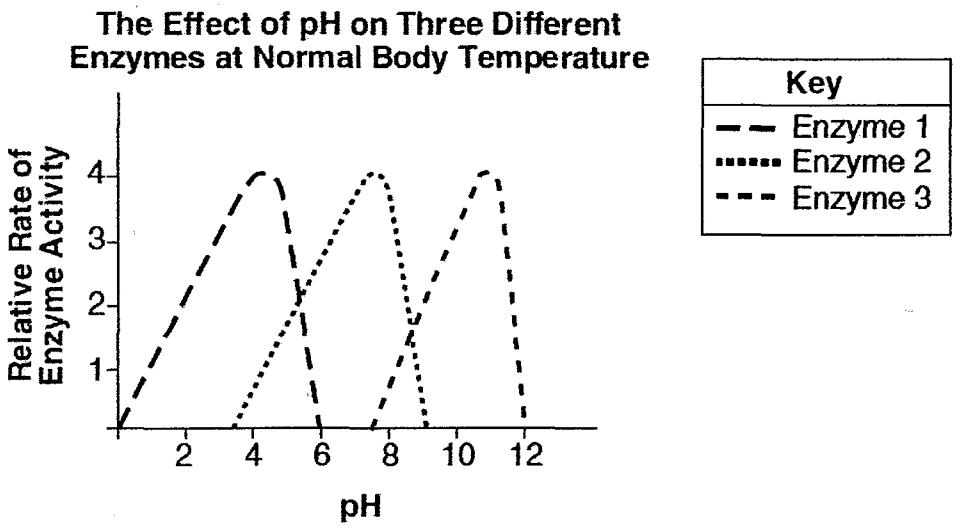
7. Experiments revealed the following information about a certain molecule:

   — It can be broken down into amino acids.
   — It can break down proteins into amino acids.
   — It is found in high concentrations in the small intestine of humans.

   This molecule is most likely

   A) an enzyme B) an inorganic compound
   C) a hormone D) an antigen

8. The graph below represents the effect of pH on three different enzymes at normal body temperature.



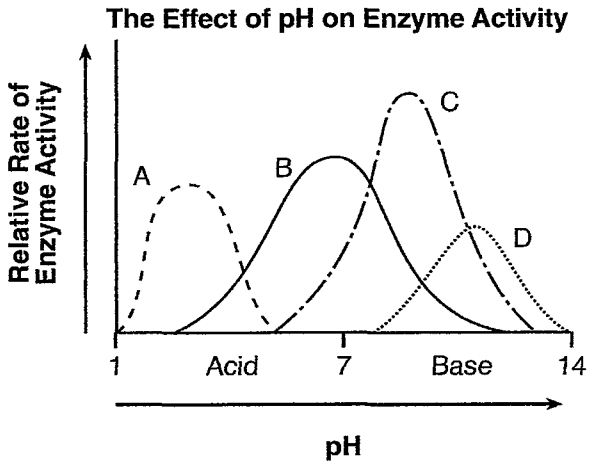
The graph illustrates that enzymes 1, 2, and 3

A) are not affected by pH
B) work best at different pH levels
C) work best in an acidic environment
D) work best in a basic environment

9. Base your answer to the following question on the information and graph below and on your knowledge of biology.

The pH of the internal environment of lysosomes (organelles that contain digestive enzymes) is approximately 4.5, while the pH of the surrounding cytoplasm is approximately 7. The average pH of the human stomach during digestion is approximately 2.5, while the average pH of the small intestine during digestion is about 8.

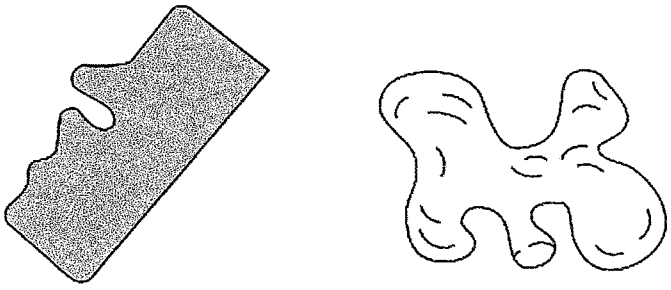
The graph below shows how pH affects the enzyme activity of four different enzymes, *A*, *B*, C, and *D*.



Which enzyme functions best in a pH environment most similar to that of human stomach enzymes?

A) *A*
B) *B*
C) *C*
D) *D*

10. The diagrams below represent two molecules that are involved in metabolic activities in some living cells.



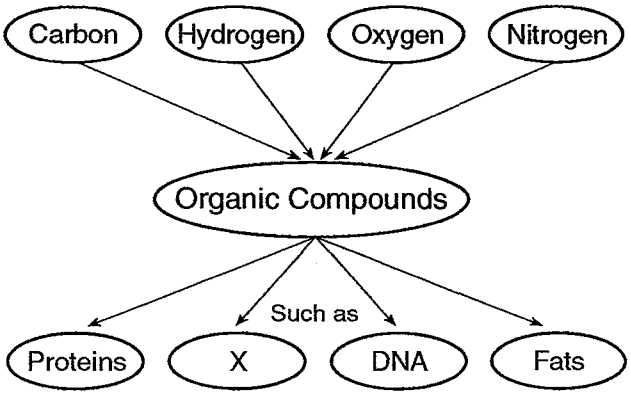
The shape of each of the molecules is important because

A) molecules having different shapes are always found in different organisms
B) the shape of a molecule determines how it functions in chemical reactions
C) the shape of a molecule determines the age of an organism
D) if the shape of any molecule in an organism changes, the DNA in that organism will also change

11. The function of a specific enzyme is most directly influenced by its

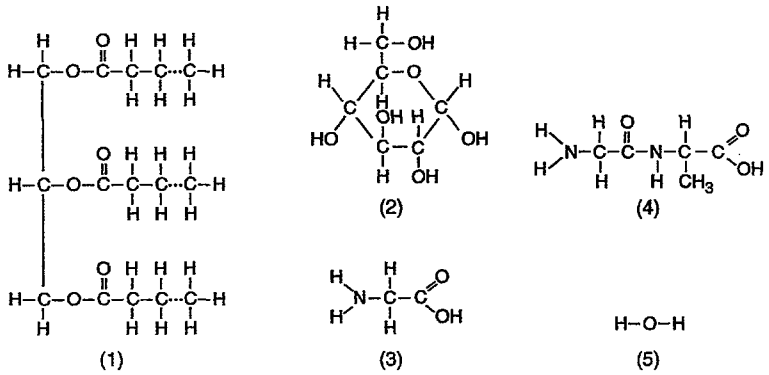
A) molecular size
B) physical shape
C) carrying capacity
D) stored energy

12. What substance could be represented by the letter *X* in the diagram below?



A) carbohydrates
B) ozone
C) carbon dioxide
D) water

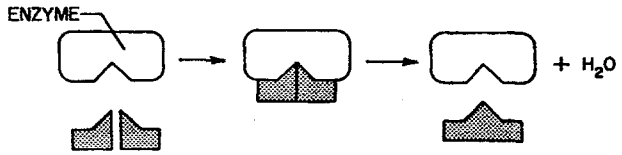
13. Base your answer to the following question on the diagram below. For each of the following phrases, select the molecule, chosen from those shown below, which is best described by that phrase.



An example of a carbohydrate

A) 1 B) 2 C) 3 D) 4 E) 5

14. Which process is represented by the reactions illustrated in the diagram below?

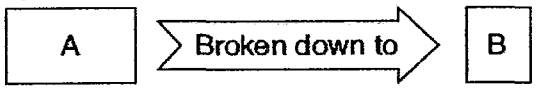


A) hydrolysis B) dehydration synthesis
C) chemical digestion D) absorption

15. Butter and oil are examples of food composed of

A) carbohydrates B) lipids
C) proteins D) nucleotides

16. The diagram below represents a process that occurs in organisms.

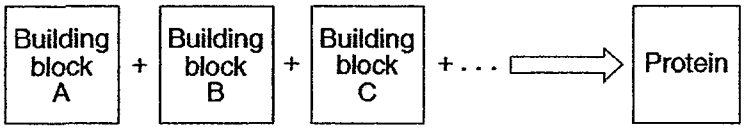


Which row in the chart indicates what *A* and *B* in the boxes could represent?

Row	A	B
(1)	starch	proteins
(2)	starch	amino acids
(3)	protein	amino acids
(4)	protein	simple sugars

A) 1 B) 2 C) 3 D) 4

17. Base your answer to the following question on the diagram below and on your knowledge of biology.



If the sequence of building blocks were changed, what effect could it most likely have on the protein?

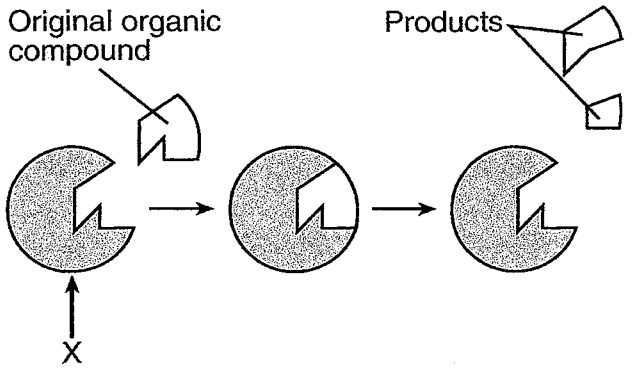
18. The table below lists enzymes that function in different locations in the human body, and the temperature and pH ranges of these locations.

Enzyme	Location	Temperature (°C)	pH
ptyalin	mouth	36.7–37.0	6.5–7.0
pepsin	stomach	37.3–37.6	1.0–3.0
trypsin	small intestine	37.3–37.6	7.5–9.0

Different enzymes are secreted in each of the three locations. Ptyalin digests carbohydrates. Pepsin and trypsin both digest proteins. Discuss the activity of these enzymes. In your answer, be sure to:

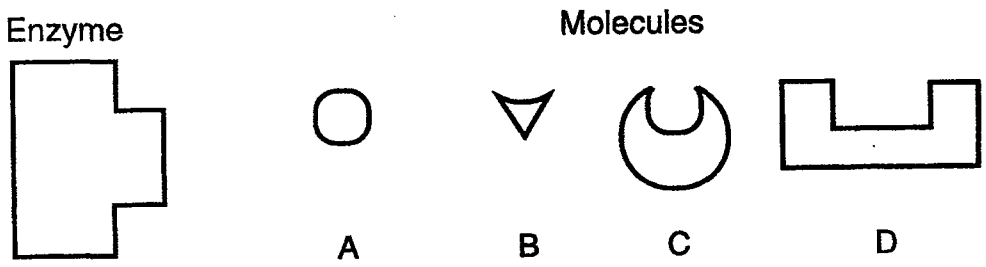
- state how the activity of pepsin will most likely change after it moves with the food from the stomach to the small intestine
- support your answer using data from the table
- state how a fever of 40°C would most likely affect the activity of these enzymes and support your answer
- identify the characteristic of enzymes that prevents ptyalin and trypsin from digesting the same type of food

19. The diagram below represents stages in the digestion of an organic compound.



Explain why substance *X* would *not* be likely to digest a different organic compound.

20. Base your answer to the following question on the diagram below that represents a human enzyme and four types of molecules present in a solution in a flask.



Which molecule would most likely react with the enzyme? Why?