

Name: Answer Key - WADE

# Final Review

## Regents Review Topic #1 – Living Things, Biochemistry and Cell

Directions: To find information to fill out this section refer to your notes and your review packets and then complete the review section

1. Write the definitions to the following terms:

- ✎ Metabolism - the sum of all chemical reactions happening in the body's cells
- ✎ Homeostasis - balance of internal environment even when external environment changes.

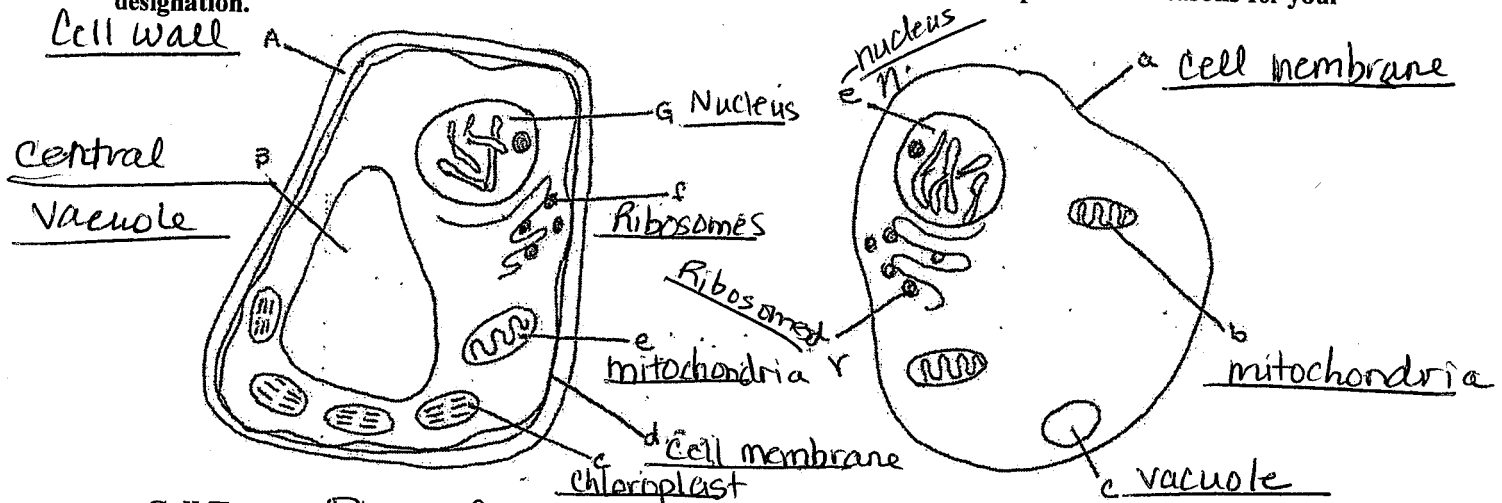
2. Complete the following table. Leave the shaded boxes blank.

Life Process	Action	Body System that Supports this	Human disorder of this system which disrupts this Life Process
NUTRITION	Obtaining nutrients from the environment and breaking them down so they can diffuse into the blood stream	- Digestive System	- Chrones Colitis - Celiac disease
TRANSPORT	Absorption and Circulation of materials throughout an organism	- Circulatory System	- Heart attack - Blood clot
<del>CELLULAR</del> RESPIRATION	Breaking the bonds of nutrients to release energy	- Mitochondria (Circulatory delivers)	- Asthma, emphysema O <sub>2</sub> + glucose from Resp. + Dig. (Syst.)
Synthesis	Combining simple substances to form complex ones	- digestive system gets raw materials in. Circ. System delivers	
GROWTH	Increasing in size or number of cells	all cells grow but muscles + bones "GROW"	Endocrine - deficiency in HGH
EXCRETION	Removing metabolic waste	excretory system	Kidney stones
Regulation	Responding to internal and external stimuli	nervous + endocrine Systems	- Multiple sclerosis (nerv.) - Type I diabetes (endo)
REPRODUCTION	Producing offspring	Reproductive System	Erectile dysfunction Pelvic inflammatory Disease

3.

Type of Compound	Definition	Example that is important for Life
Organic	- molecules that contain both Carbon + Hydrogen	C <sub>6</sub> H <sub>12</sub> O <sub>6</sub>
Inorganic	- molecules that <u>do not</u> contain both Carbon + Hydrogen	H <sub>2</sub> O, CO <sub>2</sub> , O <sub>2</sub>

6. Label the following organelles. Identify each cell as either a plant or animal and provide the reasons for your designation.

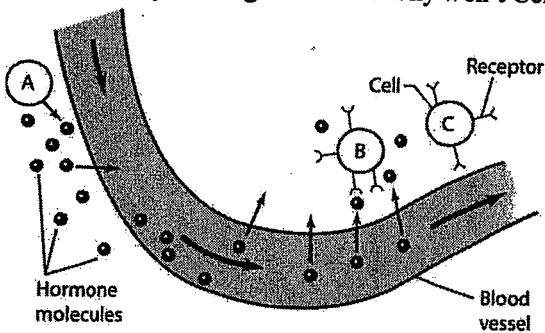


Cell Type - Plant Cells  
 Reason - cell wall, chloroplasts, large central vacuole

Cell Type - Animal cell  
 Reason - no cell wall or chloroplasts not shown - Centrioles

Organelle	Function	Life Process it supports
Nucleus	Holds materials that control the production of proteins	Synthesis, Regulation
Vacuole	Storage of food and wastes	excretion
Ribosomes	Site of Protein Synthesis	Synthesis
Cell Membrane	Regulates what enters and leaves a cell	Gas exchange
Mitochondria	Site of aerobic cell respiration	Cellular Respiration
Chloroplast	Site of photosynthesis	Photosynthesis, Nutrition

8. Study the diagram below. Why won't Cell C respond to the hormone molecules?



Cell C will not respond to the hormone molecules because the receptor proteins are not the correct shape.

9. What does passive transport mean? What is another name for this type of transport?

Passive transport is the movement of molecules ~~from~~ across the cell membrane without the use of energy. The molecules move from high  $\rightarrow$  low concentration.

Also known as diffusion

Ex. Osmosis = diffusion of  $H_2O$

7. Next to each set of the test tubes place the appropriate color changes from the list below that would indicate positive tests for both starch and glucose. [2]

Amber, Black, Blue, Green, Indigo, Orange, Pink, Purple, Red, Yellow

	Beginning Color	Ending Color (Positive Test)
Starch Test iodine	Color - <u>Amber</u>	Color - <u>Blue/Black</u>
Glucose Test Benedict's Solution	Color - <u>Blue</u>	Color - <u>Red/Orange</u>

### Topic Set 2 - Homeostasis in Organisms: Energy Reactions, Human Body Systems

1. Define Homeostasis: Maintaining a stable internal environment even when conditions change outside the body.

#### Biochemical Processes:

2. Fill in the table below.

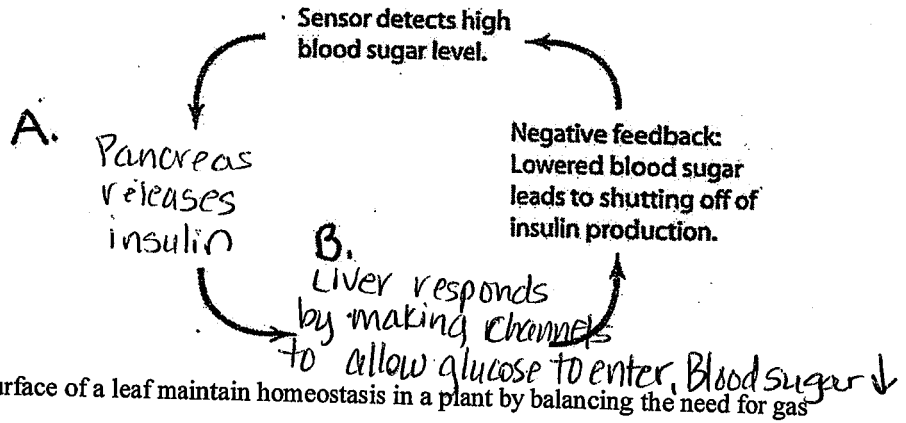
Metabolic Process	Materials Used	Materials Produced	Location	Importance of	Plants, Animals or Both
Photosynthesis	CO <sub>2</sub> , H <sub>2</sub> O Sunlight	glucose O <sub>2</sub>	Chloroplast	- makes food for food web	Plants
Aerobic Cell Respiration	O <sub>2</sub> , glucose	ATP, CO <sub>2</sub> H <sub>2</sub> O <u>36 ATP</u>	mitochondria	- make energy available for use by cells	Both
Anaerobic Cell Respiration	glucose	lactic acid 2 ATP alcohol, CO <sub>2</sub> 2 ATP	cytoplasm	- making ATP	lactic acid ferm. in animals, bacteria alc. Ferm in yeast

3. What is the difference between synthesis and digestion (hydrolysis)? Synthesis is the making of large molecules by putting building blocks together. Digestion is the break down of larger molecules into the building blocks.

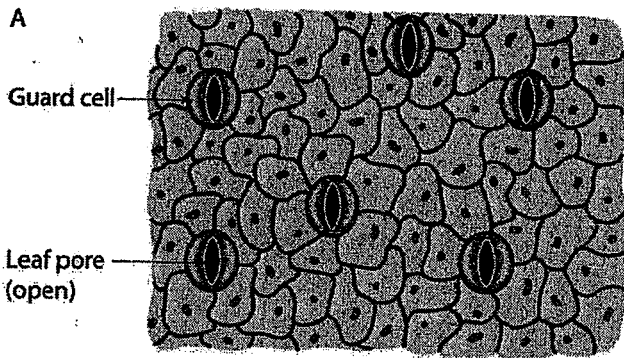
4. Fill in the table below.

Protein	Function in Organisms	Importance of Shape - what does it fit with?
Enzymes	Catalyze (Speed up) reactions	fits with a substrate
Hormones	Communication	fits w/ receptors on specific target tissues
Antibodies	fight off pathogens by rendering them harmless	Antigens on the pathogen

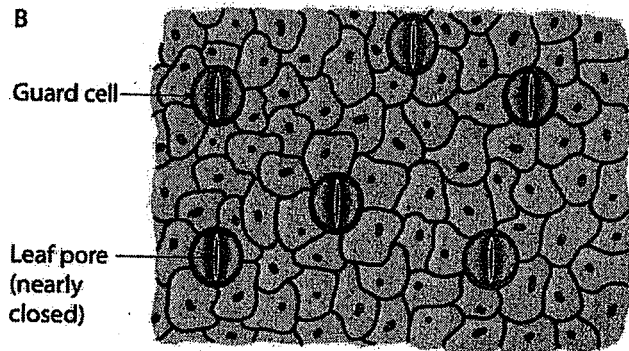
9. Fill in the feedback mechanism below.



10. Explain how the activity of guard cells on the surface of a leaf maintain homeostasis in a plant by balancing the need for gas exchange and water retention..



When water is plentiful the guard cells create a C shape (stomata) making a large opening to allow  $CO_2$  in for photosynthesis. Since photosynthesis uses  $H_2O$  + water is available, photosynthesis continues to occur.



When dehydrated, the cells lose their "C" shape and the stomata gets significantly smaller.  $CO_2$  is limited in the leaf and less photosynthe

**Immune System helps maintain homeostasis**

1. Any condition that prevents the body from maintaining homeostasis is called a(n) disease or disorder
2. A pathogen is a microbe that causes disease

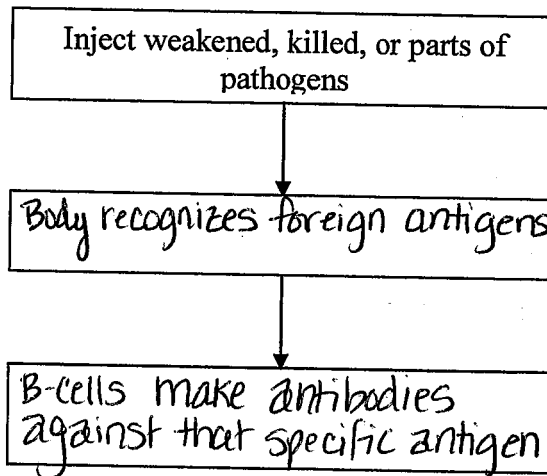
18. List some ways humans can protect themselves from disease.

Wash hands, ~~Wash~~ adequate sleep, proper nutrition, have people cover their coughs

Define the following terms:

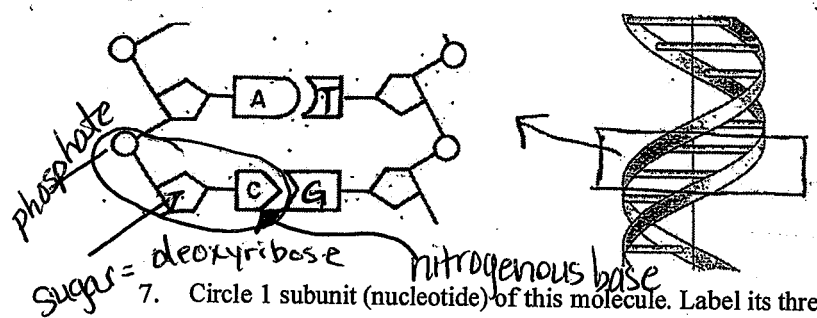
3. Antigen: A marker protein on the surface of cells
4. Immunity: The ability to fight disease because we have antibodies against the pathogen
5. Vaccine: injection of dead/weakened pathogens that stimulate production of antibodies
6. White Blood Cell: Engulf pathogens some produce antibodies, some kill infected cells.
7. Antibody: protein designed specifically to attach to a pathogen's antigens making the pathogen unable to infect other cells.
8. What kind of immunity is provided by antibiotics and why? temporary immunity. The antibiotics kill bacterial cells directly, but that does not prevent the same bacteria from infecting the same person again.

9. Fill in the flow chart below about vaccines:



10. What is AIDS? What body system is affected and how is it affected? How can it be prevented?

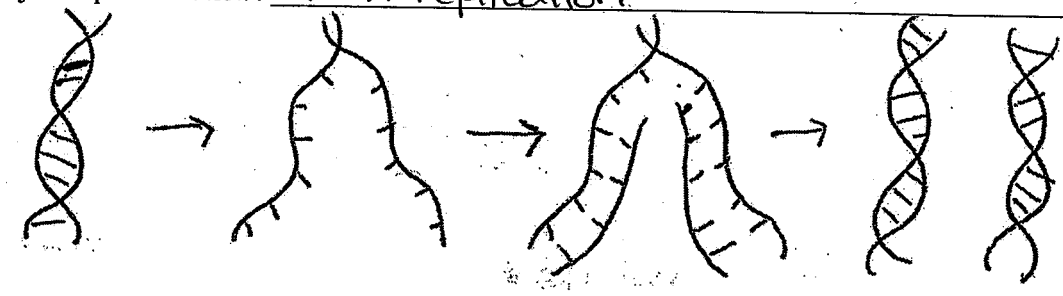
Acquired immune deficiency caused by the human immunodeficiency virus. The immune system is affected by the destruction of the helper T-cells. Without helper T cells the body cannot fight off infection as easily. It can be prevented by using condoms during sexual intercourse, by not sharing needles.



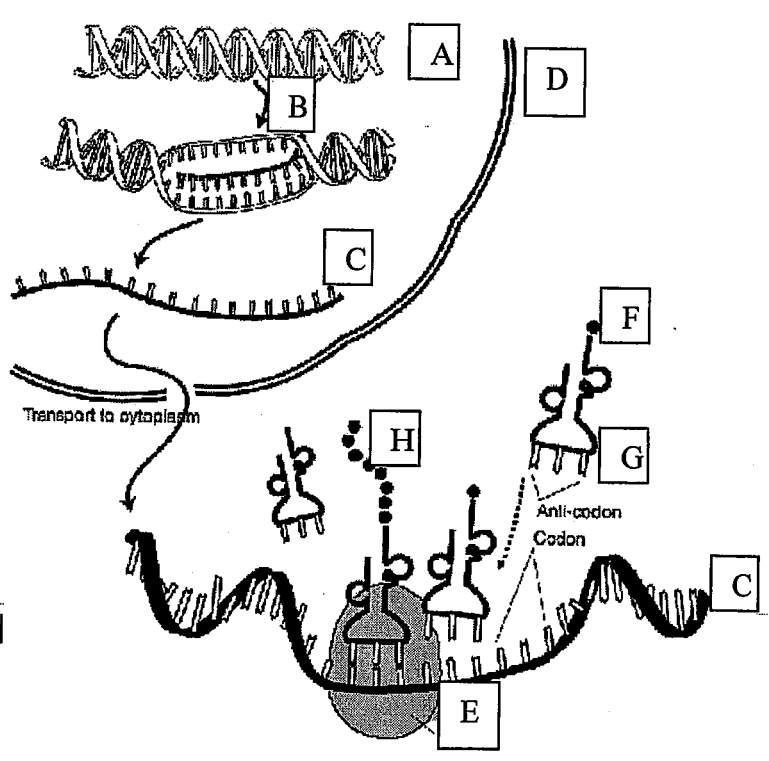
6. What is the name of the molecule on the left? Give reasons to support your answer.

DNA - double helix, made up of nucleotides.

7. Circle 1 subunit (nucleotide) of this molecule. Label its three parts.
8. Record the letters, which would be found on the right half of this molecule.
9. What do these letters stand for? A = adenine T = Thymine C = cytosine G = guanine
10. DNA has two main jobs in the cell, what are they?
- Replicate prior to cell division
  - Be transcribed so that protein synthesis can occur.
11. Which of these two jobs is pictured below? DNA replication

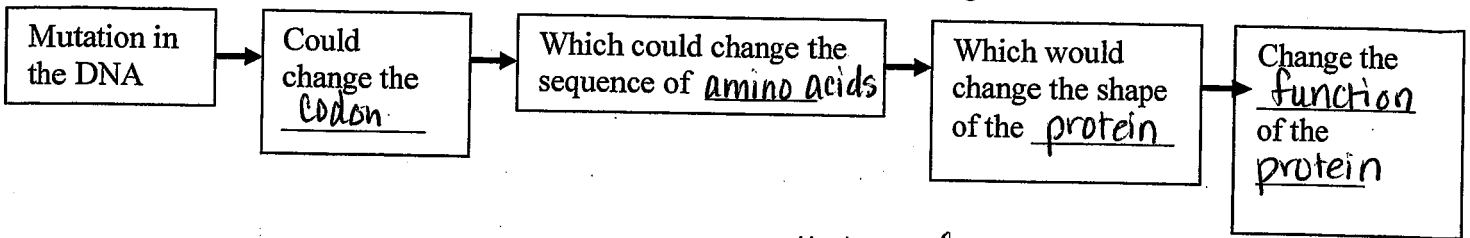


12. When would a cell need to do this job? prior to either mitosis or meiosis
13. Why can one strand (one side) of a DNA molecule be considered a "template"? Because using the one side, the other can be constructed using Chargaff's base pairing rules
14. Use the word bank to correctly identify structures and processes lettered in the diagram.

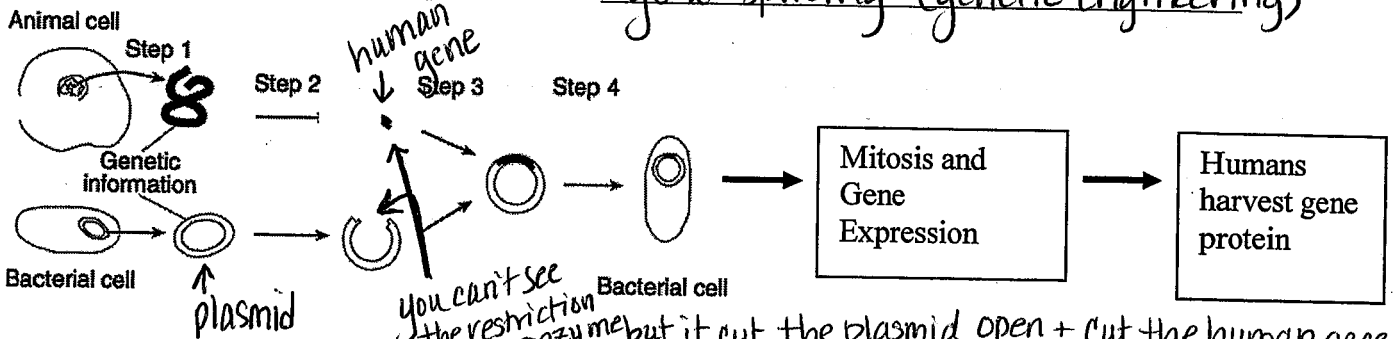


WORD BANK	
Ribosome =	<u>E</u>
mRNA =	<u>C</u>
Protein =	<u>H</u>
tRNA =	<u>G</u>
Amino acid =	<u>F</u>
Transcription =	<u>B</u>
DNA/Gene =	<u>A</u>
Nuclear membrane =	<u>D</u>

19. Explain how a mutation to a DNA molecule can cause a genetic disorder by filling in the boxes.



20. What is the name of the process pictured below? gene splicing (genetic engineering)



21. Label the human gene, the plasmid, the restriction enzyme and the recombinant bacteria cell in the diagram above.

22. Briefly describe how this process can help someone suffering from diabetes or other hormone deficiency?  
By splicing a human gene onto the bacterial plasmid + putting it into a bacteria, the bacteria can now transcribe + translate the the human gene to make large quantities of the human protein quickly, safely + cheaply.

23. Why would insulin produced by bacteria be safer for the baby than insulin from a pig? The insulin from a pig may be contaminated

24. Give an example of another human protein that genetically engineered bacteria produce. insulin human growth hormone

25. Before we had the capability manipulating DNA, scientists and, animal breeders had to rely on another process manipulate genes to achieve the desirable phenotype in their herd or crop. Name and describe this process.  
Selective breeding, the 2 parents with desirable traits were chosen to be mated in hopes of creating a desirable outcome.

26. We currently have identified hundreds of genetic variations in a persons DNA. Explain why scientists believe that relying 100 percent on the genes when making a prediction of disease probability is a mistake. (Hint: Study picture below.)



Because environment affects the gene expression

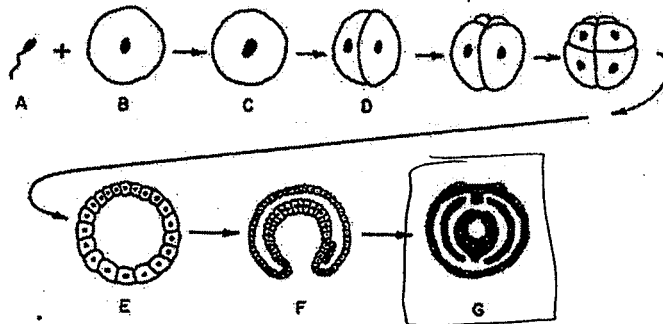
27. If every cell in our body has an identical set of genes, why aren't our cells all identical?  
because of differentiation whereby specific genes are turned on producing proteins unique to that cell. These proteins give the cell unique structure and function.



7. Explain 2 ways meiosis is a source of variation.

Meiosis is a source of variation because of crossing over and because of independent assortment

8. Look at the diagram below. Circle where differentiation occurs.

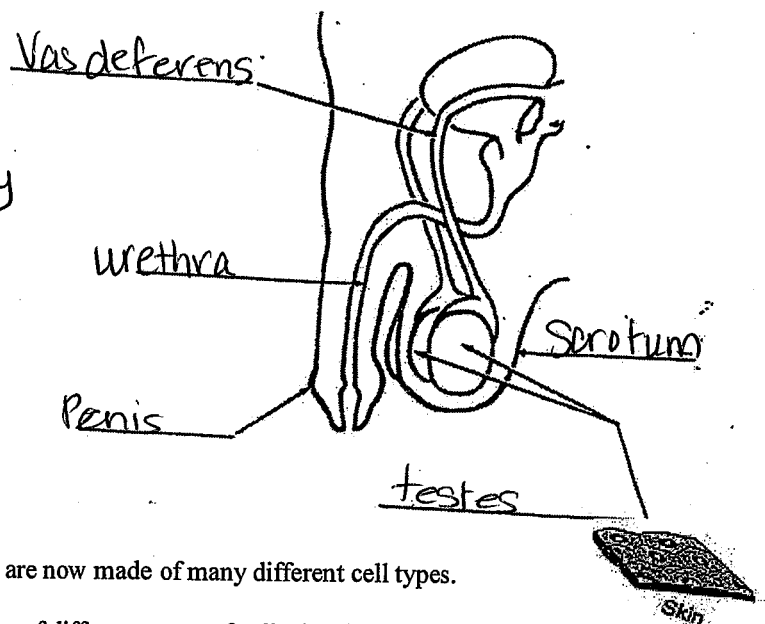
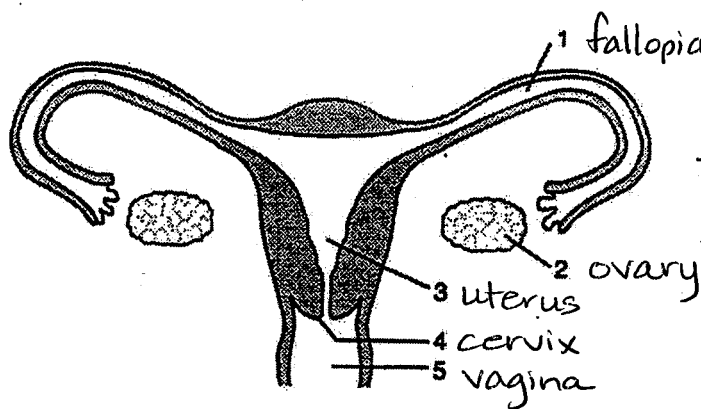


9. Label the diagram of the female and male reproductive system below.

10. Circle the location of meiosis.

11. Put a square around the location of fertilization.

12. Draw an x in the place that the embryo implants.



13. Even though you began as a single celled zygote, you are now made of many different cell types.

a. What is the word, which describes the process of different types of cells developing from one cell type?

Differentiation

b. Give a molecular explanation for why a stomach cell can produce acid but a muscle cell in the arm will not.

The genes activated in the stomach cell are different from the proteins made in the muscle cell



**Topic: 4 Evolution and Ecology & Human Impact.**

Define the following terms

**Evolution** - Changes in a species over time

**Genetic Variation** - Variety in the DNA yielding different phenotypes

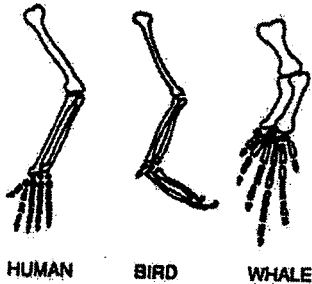
**Adaptation** - Ability to withstand certain environmental changes/challenges

**Natural Selection** - When nature chooses one variety of a species to survive over another

1. What is evolution through natural selection?

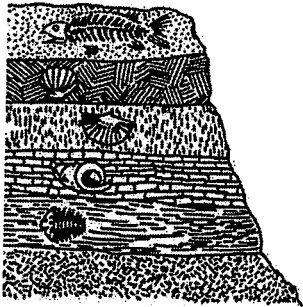
change in a species as a whole because nature chose one specific trait to survive over another.

2. Label the 4 different types of evidence that scientist use to support the Theory of Evolution.



Organism	DNA Codes
American black bear	ATT GGA GCA GAC TTA
Giant panda	ATT GGC ACT AAT CTA
Red panda	ATT GGA ACT AAC CTT
Raccoon	ATC GGA TCT AAC CTT

homologous structures



fossil evidence

comparative biochemistry

ORGANISM	ENZYME TYPE			
	1	2	3	4
A	X		X	
B				X
C	X	X	X	X
D	X		X	X

X = Enzyme present in organism

Comparative biochemistry

10. Why is variation important to survival of a population? If variation exists within the population then when there is a change in the environment there is a good chance that some members in the population will survive

11. When Charles Darwin was developing his theory of evolution, he considered variations in a population important. However, he could not explain how variation occurred. Name two processes that can result in variation in a population. Explain how these processes actually cause variation.

Mutations - they actually change the DNA which change the proteins  
Sexual Reproduction - they cause new combinations of genes and also crossing over

12. Complete the table below by recording, slow evolutionary rate or fast evolutionary rate for each of the following conditions.

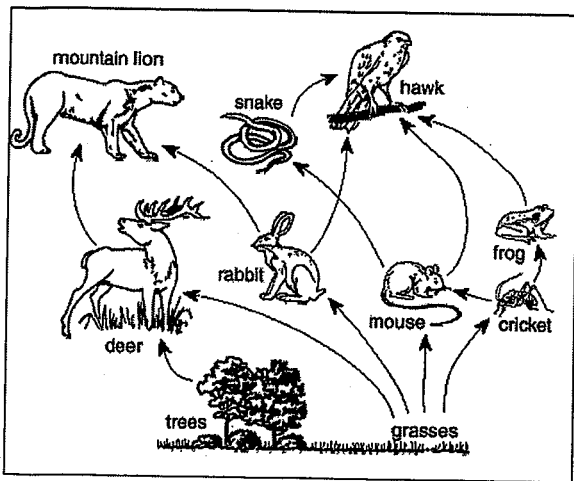
Condition	Slow/Fast evolutionary rate
Environmental change	Fast evolutionary rate
Stable Environment	Slow evolutionary rate
Zero population growth	Slow evolutionary rate
Exponential population growth	Fast
Long reproductive cycle (generation time)	Slow
Short reproductive cycle	fast
High levels of genetic variation	fast
Little genetic variation	Slow

13. What happens to the frequency of genes within a population which have adaptive value? The frequency of the gene with adaptive value increases

14. What happens to a population when the adaptive characteristics are insufficient to allow its survival in a new environment? if a population does not have sufficient adaptive value it will not be able to survive

15. Explain the concept that populations, rather than individuals evolve through evolution. populations evolve, not individuals because if 1 member is different + it does not get chosen to survive when the population doesn't really change at all.

19 | Page when a gene begins to increase within the population then nature can select that trait over another.



ecosystems

4. What would happen if the mice became extinct?

if the mice became extinct the snake population would decrease because they would have less food available.

Energy Flow

5. Sunlight : original source of energy for most

6. The amount of available energy and biomass decreases as you move up through the food chain

7. Biodiversity: A measure of the amount of variety of species + the number of each of that species within an ecosystem.

a. Increases / decreases stability in an ecosystem

8.

	<p>Identify the levels on the energy pyramid at the left.</p> <p>1 = Producers / Autotrophs                  2 = Primary consumers                  3 = Secondary consumer                  4 = Top order Consumer</p> <p>What do the arrows represent? <u>energy lost as heat</u></p> <p>How much energy on average is lost between steps of this energy pyramid? <u>90</u> %</p> <p>Why doesn't this energy pyramid run out of energy? <u>Continual supply of sunlight</u></p>
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9. There are always more producers organisms than consumers in any stable ecosystem.

10. Biological Magnification: the concentration of harmful chemicals increases as you move up the food chain.

\_\_\_\_\_:

11. Niche : an organisms role in the environment, where they are and what they do.

Resources	Description	Examples
Renewable Resources	A resource that <del>human</del> can be replaced in a short period of time	Sunlight, trees (Replant)
Nonrenewable resources	once they are used up there cannot be more	Oil, Coal

#### Human activities and the loss of biodiversity

1. Habitat destruction	The destruction or removal of species from their habitats. This can result in endangerment of extinction of many species
2. Deforestation	the cutting down of trees for various purposes... development, harvesting them
3. Invasive Species	Import and release of a species from one environment into another. They usually become pests because there are no natural predators. Disrupts existing food webs.

#### Technology and industrialization:

Technology	How impacts environment	Ways to reduce impact
1. Fossil fuels	When fossil fuels are burned gases such as CO <sub>2</sub> and sulfur dioxide are released (from coal) CO <sub>2</sub> → global warming	1. Carpool
2. Ground Pollution	A harmful change in the chemical make-up of the soil	alternatives to pesticides (biological controls)
3. Acid Rain	Acid rain makes certain lakes incapable of supporting life	Filters on smoke stacks
4. Global Warming	Earth's average temperature is increasing due to an increase in greenhouse gases such as CARBON DIOXIDE	3. Carpool 4. Carpool, turn off lights when not in use. Keep heat cooler in winter
5. Ozone depletion	Destruction of the ozone shield layer that protects earth and organisms from sun's UV radiation. Caused by CFC, which was banned in the 1980s	5. reduce CFC use

9. A student placed five geranium plants of equal size in five environmental chambers. Growing conditions were the same for each plant except that each chamber was illuminated by a different color of light of the same intensity. At the end of 20 days, plant growth was measured.

- State a possible hypothesis for this experiment. The geranium plants in red light will grow tallest
- Describe a possible control group for the experiment? A geranium plant placed in regular light
- What is the dependent variable? ~~Number of plants~~ The height of the plant.
- What is the independent variable? The color of the light
- Describe one modification you would make in the design of this experiment to make the results more reliable. have ~~more~~ more than 1 plant in each color, repeat the experiment

Base your answers to questions 10 through 14 on the information below and on your knowledge of biology.

Insecticides are used by farmers to destroy crop-eating insects. Recently, scientists tested several insecticides to see if they caused damage to chromosomes. Six groups of about 200 cells each were examined to determine the extent of chromosome damage after each group was exposed to a different concentration of one of two insecticides. The results are shown in the data table below.

Cell Damage After Exposure to Insecticide

Insecticide	Insecticide Concentration (ppm)	Number of Cells with Damaged Chromosomes
Methyl parathion	0.01	7
	0.10	15
	0.20	30
Malathion	0.01	3
	0.10	4
	0.20	11

Directions (10-13): Using the information in the data table, construct a line graph on the grid, following the directions below.

- Label one axis "Number of Cells with Damaged Chromosomes" and mark it with the appropriate axis [2]
- Label one axis "Insecticide Concentration (ppm)" and mark it with the appropriate axis [2]
- Plot the data for methyl parathion on the grid. Surround each point with a small circle and connect the points. [1]
- Plot the data for malathion on the grid. Surround each point with a small triangle and connect the points. [1]

⊙ = Methyl parathion  
 △ = Malathion

Cell Damage after Exposure to Insecticide

