

Name: _____
Date: _____
Period: _____

The Structure and Function of DNA

Background

1. What type of macromolecule is DNA?
 - a. Carbohydrate
 - b. Protein
 - c. Nucleic Acid
 - d. Lipid

2. What percentage of human DNA is identical?
 - a. 30%
 - b. 50%
 - c. 75%
 - d. 99%

3. What are packages of DNA known as?
 - a. Genes
 - b. Chromatid
 - c. Chromosomes
 - d. RNA

Structure of DNA

The building blocks of DNA are known as _____. Nucleotides are composed of three parts: a _____ group, a sugar group, and one of four _____ bases. DNA strands are made up of many nucleotides, linked together to form a _____.

The four types of nitrogen bases are identified by letter. They are

- A: _____
- G: _____
- C: _____
- T: _____

Adenine and _____ are purines. Thymine and _____ are pyrimidines.

The sequence of nucleotides in DNA affects what biological _____ the DNA contains. The structure of DNA is referred to as a _____. DNA consists of two strands that wind around each other to form a _____ ladder. The backbone of DNA is made of an alternating _____ and _____ group.

Inheritance of DNA

DNA is passed down from generation to generation through _____. This allows for change over time. DNA contains the instructions needed for an organism to _____, survive and reproduce. DNA must be converted into _____ so that the body can use its set of instructions.

Give one example of how an organism can change over time in response to his or her environment.

DNA Replication

One crucial aspect of DNA is its ability to _____, or make copies of itself DNA replication is essential for successful cell division. Simply put, every new cell must have the proper _____ and _____ to carry out its job.

1. What enzyme is responsible for unwinding the strands DNA?
 - a. DNA Polymerase
 - b. Helicase
 - c. DNA Polymerase III
 - d. Amylase
2. Which of the following supports the separated strands of DNA?
 - a. Single-stranded binding proteins
 - b. DNA ligase
 - c. Histone
 - d. Okazaki fragments
3. Which of the following enzymes adds new DNA to a separated strand?
 - a. RNA primase
 - b. Helicase
 - c. DNA polymerase III
 - d. DNA polymerase I

Additional Resources

- Build your own DNA strand:
<http://learn.genetics.utah.edu/content/molecules/builddna>
- DNA Structure and Replication:
<https://www.youtube.com/watch?v=8kK2zwjRV0M>
- Chromosome (Telephone Parody):
https://www.youtube.com/watch?v=khBmRuFc_P4



RNA vs. DNA

Name:

Date:

Pd:

1. What organic molecule are RNA and DNA?
2. What are their monomers?
3. What three things do their nucleotides include?
 -
 -
 -
4. How do their sugars differ?
5. What three bases do RNA and DNA both have?
 -
 -
 -
6. DNA has _____ and RNA has _____, although both pair with _____.
7. What are the two groups of bases and which bases are included with them?
 - - 1.
 - 2.
 - - 1.
 - 2.
 - 3.
8. How many strands do RNA and DNA have
 - DNA -
 - RNA -
9. The double helix is bonded together by what bonds?
10. What are the three kinds of RNA? (write the full name)
 -
 -
 -
11. What RNA type has anti-codons?
12. What kind of bonds hold together amino acids?
13. Where _____ is used for its genes to code _____, _____ is used for its codon sequence to create _____.

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Protein Synthesis: Transcription and Translation

Transcription

- Protein Synthesis starts with _____.
- Transcription is the process in which _____
_____.
- This occurs in the _____.
- A _____ marks the start point for the _____.
- This is called the _____, or a sequence of _____ and _____ bases.
- _____ binds to the promoters sequence and _____.
- RNA polymerase adds _____ to one strand of the DNA; the RNA bases _____ with the DNA bases. The RNA _____ and the DNA _____.
- The _____ signals the end of the gene and tells the _____ to stop. This is also a sequence of _____. From the _____ to the _____ is _____.
- _____ exits through the _____, goes through the _____, and into the _____.

Translation

- Translation is the process in which _____
_____.
- This occurs in the _____.
- Translation starts when a small _____ and a _____ 'sandwich mRNA.
- There are three sections in the ribosome: _____, _____, _____.
- In the reaction section, _____ brings specific amino acids to the _____ and pairs them with a _____ of mRNA.
- A sequence of three mRNA bases is called a _____, while the complementary sequence of the three tRNA bases is called a _____.
- The mRNA sequence, AUG is called the _____. It signals the _____ of a segment of DNA that codes for a _____.
- As the _____ brings in amino acids, _____ are formed between amino acids in the exit section.
- The release factor is a _____ that tells the ribosome to end _____ and release the newly created protein.

Mitosis

Match the key terms with their description.

- | | |
|------------------------------|---|
| 1. ____ Diploid (2n) | a) one strand of a duplicated chromosome |
| 2. ____ Somatic cells | b) fibers that are used to create structure for a cell |
| 3. ____ Asexual Reproduction | c) regular body cells |
| 4. ____ Centrioles | d) organelles that are only found in animal cells that are usually found in pairs and contain spindles |
| 5. ____ Spindle fibers | e) DNA molecules and histones combined in their "relaxed" state |
| 6. ____ Chromatin | f) the membrane that surrounds the nucleus |
| 7. ____ Chromosome | g) reproduction that produces two genetically identical organisms/cells, and does not require two individuals |
| 8. ____ Chromatid | h) strands composed of DNA wrapped around histones |
| 9. ____ Centromere | i) a protein that holds two chromosomes together at the center |
| 10. ____ Nuclear Envelope | j) a cell that has two sets of chromosomes |

11. Which kind of reproduction is mitosis?

12. What is the purpose of mitosis?



13. What is interphase? (Describe the stages.)

a) _____

b) _____

c) _____

14. What is mitosis? (Describe the stages)

a) P _____

1.

2.

3.

4.

b) M _____

1.

2.

c) A _____

1.

3

2.

3.

d) T _____

1.

2.

3.

4.

e) C _____ (explain what happens)

Animals

Plants

Accessory Handout (5)

Name: Robin Bailey
Afia Osei
Yasmeen Brooks
Jennifer Nguyen

Mitosis Review Guide

1. True or False: Mitosis results in *two genetically identical diploid cells*.
2. Mitosis is a type of _____. (circle all that apply)
 - A. Sexual Reproduction
 - B. Asexual Reproduction
 - C. Budding
 - D. Cell Division
3. Mitosis is used for _____.
 - A. Cell Growth
 - B. Cell Repair
 - C. Cell Reproduction
 - D. All of the Above
4. What happens before mitosis? _____
5. Which of the following is the correct order of mitosis?
 - A. metaphase, telophase, cytokinesis, prophase, anaphase
 - B. prophase, anaphase, telophase, cytokinesis, metaphase
 - C. prophase, metaphase, anaphase, cytokinesis, telophase
 - D. prophase, metaphase, anaphase, telophase, cytokinesis

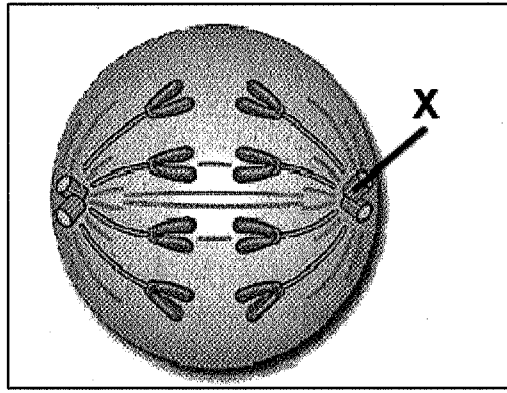
For numbers 6-10, use the word bank below to fill in the blanks.

coils	identical chromatids	chromatid	centrioles
nuclear membrane	produce	cytoplasm	Nuclear membranes
equator	identical	opposite	chromosomes
uncoil	Metaphase	Telophase	proteins
Interphase	chromosomes		

6. In Prophase, DNA _____ into chromosomes and the _____ begins to dissolve. Next, _____ (organelles that _____ spindle fibers), move to _____ ends of the cell. Spindle fibers also begin to appear in Prophase.

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7. The second step of mitosis is _____. In Metaphase, chromosomes line up at the _____, or the middle of the cell. Spindle fibers also attach to the _____.
8. The third step of mitosis is Anaphase. In Anaphase, chromosomes separate into _____. Each _____ is pulled by spindle fibers to opposite ends of the cell.
9. The last step of mitosis is _____. In telophase, the cell begins to split into two. _____ begin to surround the two sets of _____. Chromosomes begin to _____ at the end of telophase to make _____.
10. After mitosis happens, cytokinesis takes place. _____ divides and cells are completely separate now. New cells have _____ DNA and are ready for _____.



11. What phase of Mitosis is this?
A. Prophase
B. Metaphase
C. Anaphase
D. Cellular Respiration
12. What organelle is labeled 'X'?
A. Spindle Fibers
B. Mitochondria
C. Chromosomes
D. Centrioles

6

Meiosis Accessory Handout

Interphase

Interphase has _____ during cell division just like in Mitosis those three steps are G1, S, and G2 phase

G1 Phase: Cell Growth- Cells _____ and synthesize new proteins and organelles

S phase: DNA Replication- _____ are replicated and DNA molecules are synthesized,

Key proteins associated with chromosomes are synthesized during the S Phase

G2 Phase: Cell Division Preparation/ Protein Synthesis- _____ required for cell division are produced

Tubulin is synthesized and used to manufacture spindle apparatus. Interphase is complete the cell is ready for Prophase

Meiosis I – Prophase I

Chromosomes form. _____ pair up forming a tetrad, in which crossing over occurs, and the pair exchanges genetic information. _____ develop spindle fibers. _____ breaks down.

Meiosis I – Metaphase I

_____ line up in the middle in particular. Genetic variation occurs.

Meiosis I – Anaphase I

Spindle fibers _____ & pull pairs away from each other

Meiosis I – Telophase and Cytokinesis I

Nuclear envelopes reform. Spindle fibers disappear. _____ follows to produce 2 cells
_____ begins shortly after

Meiosis II – Prophase II

A new set of _____ forms. Nuclear envelopes disappear again.

Meiosis II – Metaphase II



_____ in the 2 cells line up the middle

Meiosis II – Anaphase II

_____ separate as they as they are pulled by _____

(in both cells)

Meiosis II – Telophase and Cytokinesis II

Nuclear envelopes begin to redevelop. _____ disappear. Chromosomes de-
condense into chromatin. _____ occurs again

6

Meiosis Accessory Handout

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Name: _____

Punnett Squares

_____ are a visual diagram that show possible phenotypes and genotypes for the offspring of two individual organisms.

_____ are the physical traits exhibited by the offspring. _____ are the codings for the possible phenotypes.

Monohybrid Crosses

-First we will start by explaining a _____, which is the simplest form of a punnett square. They show the possibilities of a single trait

-For this punnett square, we are crossing Clark Kent and Lois Lane. We are trying to figure out the hair color for the possible offspring. Clark Kent has black hair, which is a dominant gene. Lois Lane has red hair, which is a recessive gene. _____ genes are represented by a capital letter, while _____ genes are expressed with a lowercase letter. In this example, we have used the letter h.

-Lois Lane is homozygous recessive (_____), and Clark Kent is homozygous dominant (_____).

-As you can see, Clark Kent and Lois Lane's children will all have black hair because they are _____ (Hh), and black hair is the dominant gene.

Dihybrid Crosses

-To start, take the genotypes. Tony Stark is heterozygous for hair, and homozygous dominant for eyes (_____). Pepper Potts is homozygous recessive for hair and eyes (_____).

-To start, you have to foil the genotype for each person. For Tony Stark, the different squares are _____, _____, _____, _____. For Pepper Potts, the different squares are _____, _____, _____, _____. Then, you combine the squares like in a monohybrid cross.

-This results in a _____ chance of dark hair, dark eyes (_____), and a _____ chance of light hair, dark eyes (_____).

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Alternate Patterns

WARM-UP:

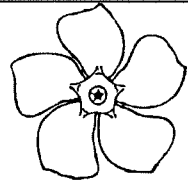
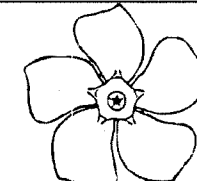
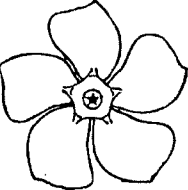
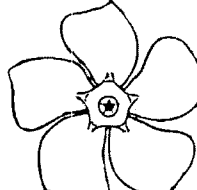
What is the difference between co-dominance and incomplete dominance?

NOTES:

Co-dominance- _____

Incomplete dominance- _____

Sex linked- _____

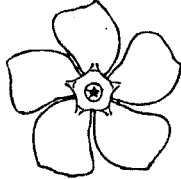
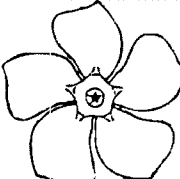
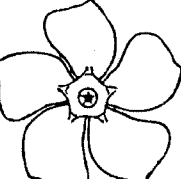
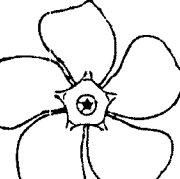
PUNNET SQUARE FOR CODOMINANCE	Q	Q
q		
q		

Name: _____

Date: _____

Period: _____

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PUNNET SQUARE FOR INCOMPLETE	Q	Q
q		
q		

PUNNET SQUARE FOR SEX-LINKED	X	Y
Xc		
X		

EXIT TICKET:

Based on the sex-linked Punnet square, why is it that colorblindness is most common in males?

Questions

1. What is a pedigree? Why is it important?
2. What letters are used to represent males and female sex-linked traits?
3. How many chromosomes are in Autosomes?
4. In a Pedigree what does shading represent?
5. How can you determine is a trait is dominant or recessive by looking at a Pedigree

Overall

Study how a trait is passed from one generation to the next

Infers Genotypes of family members

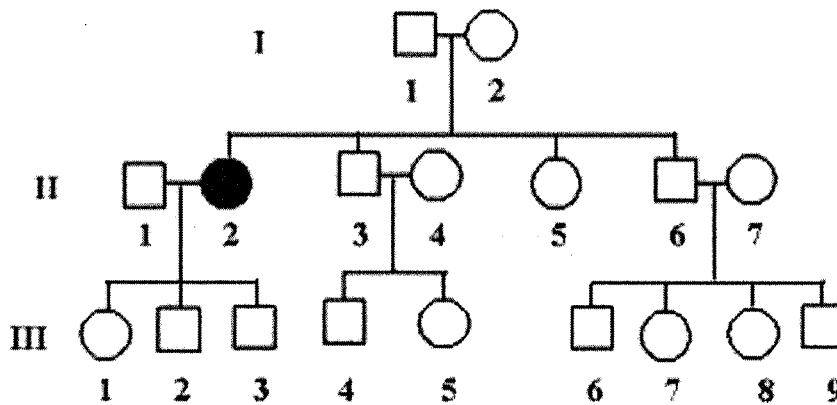
Disorders can be carried on

- Autosomes (22 pairs of chromosome)
- Sex chromosomes (x or y)
- # Of chromosomes ($x > 4b > x$)

Interpreting Pedigrees

1. Determine if the trait is Dom or Rec
 - Every other: rec
 - Every: dom

Example of pedigree



2. Determine if its Autosomal/ Recessive
 - Affects males and females equally: Autosomal
 - Affects one sex more than the other (especially males) sex linked!
($x^c x^c$ or $x^c y$)
3. Typically sex-linked disorders or traits are carried on the X chromosome
 - Females tend to "carry" a trait and effect their sons
 - Females get the trait from their affected mother/father
 - Affected males get it from their mother

Accessory Handout

Jean Baptiste LaMarck

- Lamarck was one of the first scientists to understand that changes occur over time.
- Lamarck believed in the inheritance of _____.
 - Ex amples of this include giraffes and their neck length as well as crabs and their claws.
- The Law of Use and Disuse:
 - If a body part was used frequently, then it got _____.
 - If a body part was used infrequently, then it got _____.
- Ex amples include:
 - Pierced ears
 - Blacksmiths and their son's muscular arms
 - The length of giraffe's necks
- The _____ of Acquired Traits- Traits acquired during one's lifetime will be passed to their _____.
- Why Lamarck was _____
 - Traits are passed through _____.
 - Lamarck didn't know that _____ were inherited through genes.

Charles Darwin

- Charles Darwin was a naturalist that went on a five year voyage around the world.
- He came up with the Theory of _____ Selection, where limited _____ leads to _____, _____, or having different traits, gives different advantages and _____ to organisms.
- Those without characteristics fitting for their environment will die, or _____
_____. Those with _____ best suited to their environment survive and pass them on to their offspring.
- Because of this, _____ change over time, and new species appear, while others disappear. Today, the species we know have descended, with _____, from species in the past.
- Darwin also believed all species were united by _____.

Name: _____

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Natural Selection Rap Worksheet

- 1). What famous scientist developed the concept of natural selection?

- 2). Other than birds what other animal species was used as an example of naturel selection, and how has the animal physically changed due to the process of natural selection?

- 3). Name one of the species of finches used as examples of natural selection.

- 4). Name an unfavorable trait that did not help the animal survive.

- 5). How did natural selection help insects survive?

NAME _____

Evidence of Evolution

A. Match the terms with the matching definition:

- | | |
|----------------------------|---|
| 1. ___ Homologous | a. Evidence that biologists use to support that species change over time |
| 2. ___ Analogous | b. Unrelated animals with organs with similar function but are different in structure |
| 3. ___ Vestigial | c. Formed similar ways as embryos and share similar arrangements |
| 4. ___ Embryology | d. Structures that lost function or reduced in size |
| 5. ___ Fossil records | e. Preserved remains of the traces of animals and plants that once lived within an area |
| 6. ___ Coevolution | f. Similarities in the development and early growth of living organisms |
| 7. ___ Comparative anatomy | g. Resemblance and differences of related organisms resulting from the interaction of their genes |
| 8. ___ Evolution | h. slow, gradual change in a population overtime |
| 9. ___ Genetic Comparison | i. Process by which two species evolve in response to each other over time |

B. Answer the following questions in complete sentences:

1. What is the difference between **analogous** and **homologous** structures?

2. Why do **vestigial** structures form?

3. What could be a reason to why an organism would **evolve**?

ZAZU'S CLASS ON CLASSIFICATION ACCESSORY HAND-OUT

1) Match the levels of classification with the corresponding description please:

Domain

Kingdom

Phylum

Class

Order

Family

Genus

Species

- a. A group of similar organisms that can breed & produce fertile offspring
- b. A group of closely related species; the first part of the scientific name of binomial nomenclature
- c. A group of similar genera (plural of genus)
- d. A group of similar families
- e. A group of similar orders
- f. Group of closely related classes (organisms that share important bodily features & functions)
- g. Largest taxonomic (classification) group; larger than a kingdom
- h. Second largest classification group of closely related phyla (contains Animalia and Plantae)

2) Write down the lion's different classifications levels if you don't mind:

Species-

Genus-

Family-

Order-

Class-

Phylum-

Kingdom-

Domain-

Name: _____

Directions: Match the definitions to the proper terms.

_____ Mutualism

_____ Commensalism

_____ Competition

_____ Predation

_____ Parasitism

_____ Symbiosis

- 1) Predator and Prey
- 2) Winner vs Loser
- 3) The act of living together
- 4) Both organisms benefit
- 5) One organism benefits, the other is unaffected
- 6) One organism benefits, one is harmed

Directions: Answer the following questions based on the film.

- 1) What is the name of parasite that infects Ziggy?
- 2) What is the symbiotic relationship between Ziggy and Benny?
- 3) Who benefits in the relationship between Ellie and Ziggy? What is their symbiotic relationship?
- 4) Who is Ziggy's main competitor?
- 5) Who benefits from the relationship between Lenny and Ziggy? Who is harmed? What type of relationship is this?

Name:
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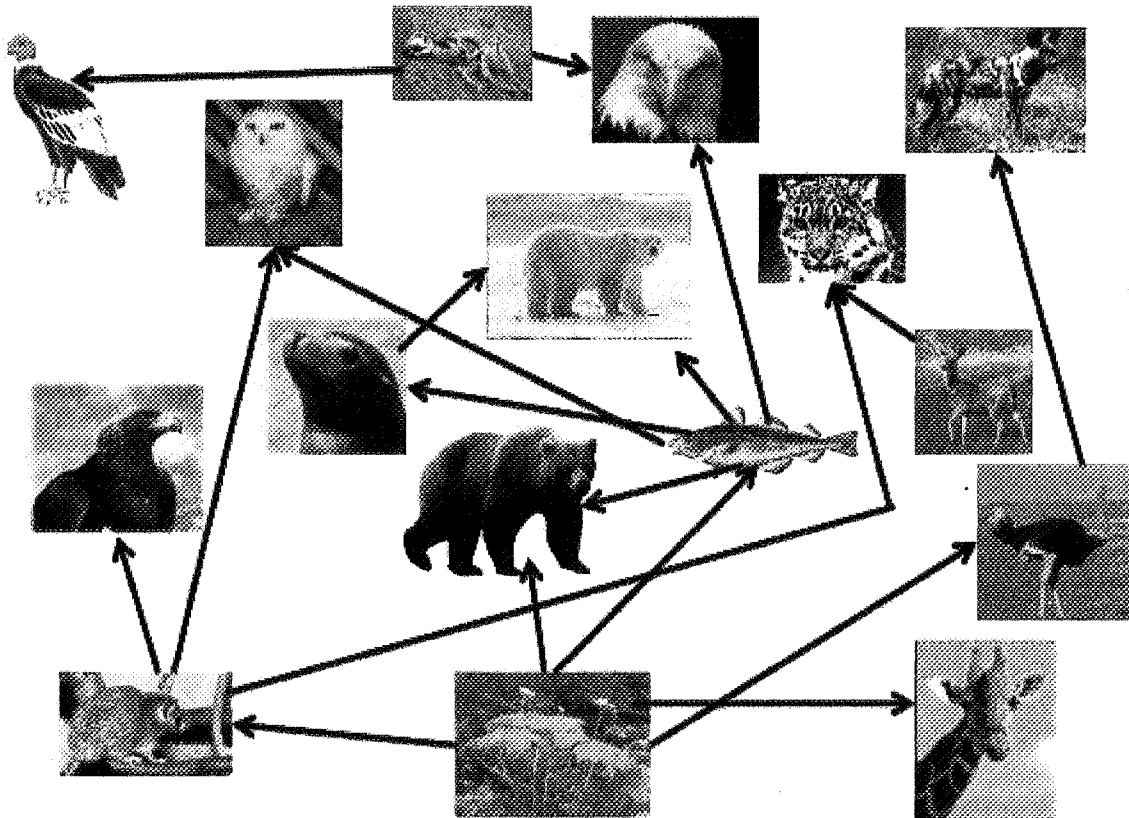
Trophic Levels Review Sheet

1. Where are the producers located on the food chain?
2. What is a primary consumer? Give two examples.
3. What is a secondary consumer? Give two examples.
4. What is a tertiary consumer? Give two examples.
5. What is an apex predator? Give two examples.
6. What is a decomposer? Give two examples.
7. What is the ultimate source of energy?
8. How much energy is transferred from each trophic level to the next?

Name: _____ Class: _____ Date: _____

Food Webs: What Eats Me?

Directions: Analyze the food web and answer the questions on the front and back.



"Food Web." sites.google.com, 2014. Diagram. 4 June, 2014.

Questions

1. What is the plant? (Circle one) decomposer primary consumer producer
2. What do the arrows represent? _____
3. What is the relationship between the mouse and the hawk? (Circle one)
4. 1° consumer → 3° consumer 2° consumer → 3° consumer 1° consumer → 2° consumer
5. Where do plants get their energy? _____
6. What would happen to the population of bears if the amount of grass decreased?

Biome Accessory Handout

Questions: List 3 for each except 2nd	What are some biotic and abiotic factors?	What is the climate like?	Where is the biome located?
Rainforest			
Grasslands			
Deciduous Forest			
Tundra			
Desert			
Taiga			
Savanna			

Biome Accessory Handout

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1. Which biome is the most diverse?
 2. Which biome is temperate yearly?
 3. Which biomes are located in the Eastern Hemisphere? Western? Northern? Southern?
 4. How have plants evolved in Desert like climates?
-
5. Based off of the presentation, which biome do we live in?
 6. If you were an animal which biome would you want to live in? and why?

Accessory Handout

1. What are examples of abiotic factors?
 - a.Monkeys
 - b.Lions
 - c.Pigs
 - d.Soil

2. What kind of wildlife is in the Tropical Rainforests?
 - a. Golden Eagles
 - b.Rhinos
 - c.Toucans, parrots, and parakeets
 - d.coyotes

3. True or False: Winters are long in the Taiga.

4. True or False: The Tundra has long hot summers.

5. The Tropical Savanna is located in...
 - a.Middle East
 - b.Eastern Africa
 - c.India
 - D.Alaska

6. In the Grasslands there are _____ bears.

7. There are _____ squirrels found in the Northwestern Forest.

8. The _____ has warm temperatures and seasonal rainfall.

9. In the _____ there are high amounts of rain and hot humid summers.

10. What are examples of biotic factors?

- a. soil
- b. precipitation
- c. hawks
- d. fires

11. The _____ is located mainly in North America, Asia, and Northern Europe.

12. The _____ is a very dry place with extreme temperature changes.

13. In the _____ the frozen plants rarely grow because of temperatures and high winds.

14. What abiotic factors are located in the Grasslands? Circle all that apply

- a. warm to hot summers
- b. warm winters
- c. fertile soil
- d. moderate seasonal precipitation
- e. strong winds

15. In the _____ forest there are cold winters and warm summers.

16. What are some examples of animals located in the desert? Circle all that apply

- a. mule deer
- b. owls
- c. lynx

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d.kangaroos
e.monkeys

17. What are abiotic factors?

18. What are biotic factors?

Ecological Succession Accessory Handout

- Ecological Succession is the observed process of change in the species structure of an ecological community over time.
 - Ecological succession is what causes the development of ecosystems over time.
 - Ecological succession is divided into two stages, primary succession and secondary succession.

- Primary Succession
 - An exposed rock surface emerges from beneath a retreating glacier or forms due to a volcanic eruption.
 - This is part of the pioneer stage.
 - Low-growing plants begin to colonize.
 - These low-growing plants include mosses, ferns, and lichens.
 - This is also part of the pioneer stage.
 - Fast-growing grasses, flowering plants, small shrubs, and a thin layer of soil begin to develop.
 - This is part of the seral stage.
 - Fast-growing trees form a low forest, preventing low-growing grasses and plants from receiving direct sunlight.
 - These fast-growing trees include birch and mountain ash.
 - This is part of the seral stage.
 - Decades after initial colonization, large, slow-growing trees begin to appear.
 - Large hardwood trees, such as oak, begin to grow and develop.
 - The community that forms is known as a climax community.

- Secondary Succession
 - The established climax community experiences a setback event.
 - A forest fire is an example of a setback event.
 - The disaster results in the destruction of much of the ecosystem.
 - The vegetation is destroyed.
 - Animals have fled the burned area.
 - A thin layer of ash covers the soil.
 - Three to five years after the setback event, small amounts of vegetation begin to reappear.
 - Grasses and low-growing shrubs colonize the land.
 - Approximately twenty years after the disaster, young trees begin to appear.
 - A small woodland is formed.
 - Fifty to one hundred years after the event, large, slow-growing trees begin to reappear.
 - The mature oak woodland is restored.



Dona Ann Thomas,
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Group 4

Carbon -The cycle

The Carbon Cycle is based on the _____ carbon encounters and not how it's made.

The carbon first starts off in the _____ in the gas of CO₂ or _____. And many things could happen after that. The possibilities are endless...One option is that the carbon could enter a plant during the process of _____.

The carbon returns to the atmosphere from the _____ in a process called _____.

There is another option. From the plant the carbon goes inside an _____. And this happens by the animal eating the plant of course.

Anyways, the animal dies and _____. This very decomposition will release the carbon back into that atmospheric region.

There is one more option.

When that plant that holds the carbon turns into a _____ over the course of many, many, millions of years it turns into oil in the ground. And the _____ take this oil, turn it into a fuel and use it for things like power cars, buses, lawn mowers, and ect. And as this fossil fuel fueled _____ devices are being use carbon is simultaneously being released back into the atmosphere.

Nitrogen Cycle Notes

By Chauncey, Maaz, and Saad

In the nitrogen starts its life cycle in the atmosphere. Well air is mostly made of _____ which together constitute the major gases of the atomsphere

Nitrogen Fixing Bacteria takes in Nitrogen then either sends it into plants where it could go back into the atmosphere or nitrogen will combine with aerobic and anaerobic bacteria and Fungi form Decomposers to make Ammonium.

Then nitrogen meets _____ and goes through nitrification becomes nitrate.

Nitrate is a salt or ester of nitrous acid containing the anion NO_2^- or the group - NO_2 .

Then the nitrite becomes _____. Nitrate which is a salt or ester to nitric acid, containing the anion NO_3^- , or the Group - NO_3 .

In this stage Nitrogen can meet Denitrifying bacteria which could take it back to stage one back into the atmosphere. While on the other hand the lil' Nitrogen also can choose to be assimilated where they could be eaten by animals like us. We consume nitrogen through many things and our body consumes it.

Here _____ can go to decomposers and go back to Stage 3 where the aerobic and anaerobic bacteria and fungi which goes to stage 3 where it combines with nitrogen to make ammonium.