

Webster County Schools

95 CLARK AVENUE – EUPORA, MS 39744

Office of Curriculum

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8th Grade Science

Packet 2

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For Additional Online Resources, please see the Link to the following resources on the Curriculum page on www.webstercountyschools.org:

MDE Learning-at-Home Resources for Districts

The resources contained on this website contain materials and tools that may be used to provide additional resources to parents or students. This information is only intended to be a general summary of information provided to the public. The Mississippi Department of Education does not endorse or promote any commercial products or services. The views and opinion of authors expressed do not necessarily reflect those of the MDE, and they may not be used for advertising or product endorsement purposes. Please make sure that you choose the tool(s), resource(s) or material(s) that are developmentally appropriate and best fit the needs of your students, school, or district.

Resources have been divided into the following categories:

- Internet Services
- Multiple Content Area Resources
- Arts (Dance, Music, Theatre, Visual Arts) Resources
- Career Pathway Experiences (CPE) Alternative Resources
- English Language Arts Resources
- Mathematics Resources
- Science Resources
- Social Studies Resources
- World Language Resources
- Counselor Resources
- English Learner Resources
- Virtual Learning Resources

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At-Home Learning Packet Schedule:

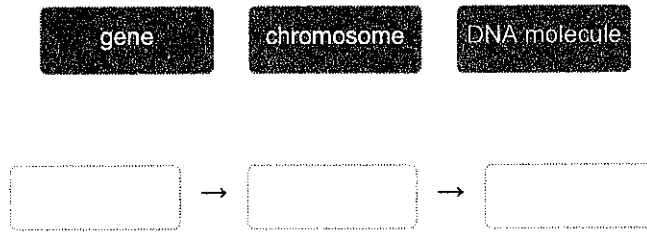
- Packet 2- April 20, 2020
- Packet 3- May 4, 2020
- Packet 4- May 18, 2020

Genes, Chromosomes & DNA

Question 1 .

Directions: Drag each file to the correct box.

What is the hierarchical relationship of the following genetic components, from smallest to largest?



Question 2 .

A _____ is a segment of DNA that contains a single unit of information.

- A. atom
- B. fossil
- C. molecule
- D. gene

Question 3 .

All organisms need instructions to specify their traits. The instructions, or code, that is responsible for all the inherited traits of an organism

- A. is passed from the offspring to the parent.
- B. is held in genetic material called DNA.
- C. is formed after an organism is fully grown.
- D. is stored within the mitochondria of cells.

Question 4 .



Attached
Ear Lobe



Free
Ear Lobe

Some people have attached ear lobes and some people have free ear lobes. The differences in these traits are caused by

- A. differences in environment.
- B. differences in personality.
- C. differences in diet.
- D. differences in genes.

Question 5 .

Which of the following statements is true?

- A. Genes make up cells.
- B. Chromosomes make up genes.
- C. Chromosomes make up proteins.
- D. Genes make up chromosomes.

Question 6 .

The function of a chromosome is to

- A. produce cellular energy.
- B. provide structural support.
- C. transport cellular wastes.
- D. store genetic material.

Question 7 .

A _____ is a segment of DNA that carries a single unit of hereditary information.

- A. chromosome
- B. gene
- C. sugar
- D. nucleic acid

Question 8 .

The image below shows the genetic material within a eukaryotic cell.



Which of the following correctly describes the hierarchy of genetic material within a cell?

- A. Molecules of DNA are made up of chromatids, which are each made up of two chromosomes.
- B. Molecules of DNA are made up of two chromosomes, which are each made of one chromatid.
- C. Each chromatid in a cell is made up of two chromosomes, which are each made up of molecules of DNA.
- D. Each chromosome in a cell is made up of two chromatids, which are each made up of molecules of DNA.

Question 9 .

Which of the following is true about genes?

- A. In humans, genes are passed to an offspring from two parents.
- B. Genes are responsible for all the traits of an organism.
- C. Genes are made up of smaller molecules known as chromosomes.
- D. The genes of a particular organism can never change throughout its lifetime.

Question 10 .

Directions: Select ALL the correct answers.

Which of the following statements about genes and traits is true?

- A single trait can be controlled by multiple genes.
- A single trait can alter multiple genes.
- A single gene can influence multiple traits.
- A single gene can control a single trait.

Explanations

1. The correct hierarchical relationship from smallest to largest is:

gene → DNA molecule → chromosome

Genes are segments of DNA that code for a particular trait. One DNA molecule may contain hundreds or even thousands of genes. Chromosomes are made up of a DNA molecule wound around proteins called histones, much like thread wound around a spool.

2. Cells within living organisms contain genes. A **gene** is a segment of DNA that contains a single unit of information.

The information contained in genes determines an organism's traits. Also, this information plays a role in the determination of the traits of the organism's offspring, since genes are inherited through reproduction.

3. The instructions, or code, that is responsible for all the inherited traits of an organism is held in genetic material called **DNA**. The DNA is passed from the parent or parents to the offspring and may be found stored in the nucleus or floating freely within the organism's cell(s).

4. Ear lobe types are controlled by **genes**. Your genes determine whether you will have attached ear lobes or free ear lobes.

5. **Genes are strung together on chromosomes**. Chromosomes are found in the nucleus of the cell. Different organisms have different numbers of chromosomes.

6. In multicellular organisms, cells repeatedly divide to produce more cells for the organisms' growth and repair. *Chromosomes* are structures in cells that **store genetic material**. Chromosomes act as templates for making new cells which are identical copies of existing ones.

7. *Nucleic acids*, such as DNA and RNA, are large molecules that carry genetic information in cells.

A **gene** is a segment of DNA that carries a single unit of hereditary information. This information can influence one trait or multiple traits.

Genes are located on *chromosomes*. Chromosomes are made up of proteins and DNA. Each strand of DNA carries many genes.

8. A macromolecule is a large molecule that is made of many smaller units. Chromosomes are macromolecules that contain all of the genetic information in a cell. Chromosomes are each made of two smaller units called chromatids. Chromatids are each made up of molecules of DNA. Therefore, the correct description of the hierarchy of genetic material in a cell is that **each chromosome in a cell is made up of two chromatids, which are each made up of molecules of DNA**. The structures become more and more microscopic as one moves down the hierarchy.

9. In humans and many other sexually-reproducing organisms, genes are passed to an offspring from two parents. Half of a child's genetic information comes from his/her mother and the other half comes from his/her father.

Genes are *not* responsible for all the traits of an organism. Some of the traits of an organism are a result of environmental factors, such as diet, for example. Genes are responsible for all the *inherited* traits of an organism.

The genes of a particular organism *can* change throughout its lifetime. Such a change is known as a *mutation*.

Genes are *not* made up of chromosomes. Chromosomes are made up of genes.

10. A single gene can control a **single trait** or influence **multiple traits**. Also, a single trait can be controlled by **multiple genes**.

Principles of Natural Selection

Question 1 .

Over time, the climate of a region becomes cooler. How will this most likely affect the species living in that region?

- A. All of the current species living in the area will become extinct, and new species better adapted to the climate will form and populate the region.
- B. All of the current species living in the region will migrate to warmer areas, while species adapted to cold-weather climates will migrate into the region.
- C. Some species that already have or that develop cold-weather adaptations through natural selection will survive, while species without cold-weather adaptations may go extinct.
- D. Most of the current species living in the area will develop beneficial mutations, which will lead to adaptations that help them survive in the new climate.

Question 2 .

An octopus reproduces only once in its life, but it may have more than 100,000 offspring, depending on the species. Certain species of penguin, by contrast, have only one chick at a time. If some species can reproduce as rapidly as the octopus (100,000 offspring every 3 or 4 years), how is it possible that a species that has only one young at a time is equally successful?

- A. Having a large number of offspring assures that at least some of them will escape being killed by predators.
- B. The success of a species depends on the number of offspring that survive long enough to reproduce.
- C. Baby penguins are left to fend for themselves from the time they hatch, so they quickly become self-sufficient.
- D. An octopus only reproduces one time, but penguins may reproduce between 4 and 12 times in their lives.

Question 3 .

The process of natural selection favors certain characteristics in organisms, while it selects against other characteristics.

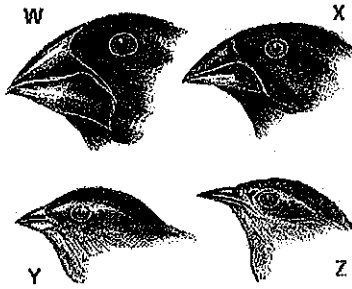
What would happen if there was zero variation between all of the organisms on Earth?

- A. Natural selection would operate faster.
- B. Evolution through natural selection would not occur.
- C. Organisms would evolve to increase variety.
- D. Less food would be available.

Question 4 .

While visiting the Galapagos Islands, Charles Darwin noticed several species of birds, which he called finches. These finches were similar in some ways but different in others.

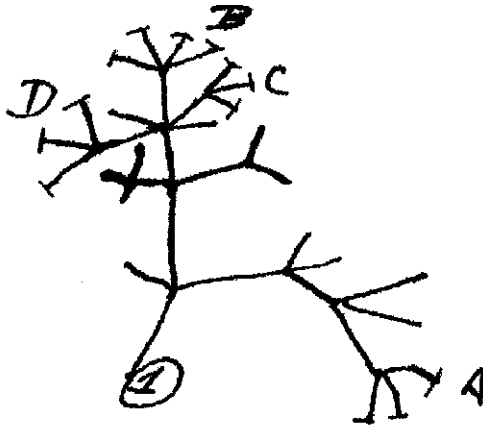
Some of the finches that Charles Darwin observed on the Galapagos Islands fed on tiny insect parasites living on the skin of tortoises and lizards. These finches would reach their beaks into small, narrow folds in the animals' skin to catch their insect prey. Which finch below most likely fed on the smallest insects?



- A. finch X
- B. finch W
- C. finch Y
- D. finch Z

Question 5 .

One of Charles Darwin's most famous sketches is shown below. He drew it after he returned from his voyage around the world. On that trip, he had studied numerous species and began to develop his theory of evolution by natural selection.



The diagram is Darwin's initial idea of an evolutionary tree. Each branch represents a particular species and the tree shows how the species are related.

Which principle of natural selection is best represented by Darwin's diagram?

- A. Mutations are responsible for introducing new traits and new versions of traits into a population, increasing the total variability of the population.
- B. Individuals within populations tend to produce more offspring than can survive in a given environment.
- C. Populations with individuals that are well adapted to their environment will survive, while those that do not will eventually go extinct.
- D. Because resources are limited, there is competition for those resources among individuals in a population.

Question 6 .

Natural selection is defined as

- A. the changes that occur in an organism over its lifespan.
- B. the changes that occur in a population that do not affect survival.
- C. the changes in the characteristics within a population that lead to survival.
- D. the process by which humans select the most desirable organisms in a population.

Question 7 .

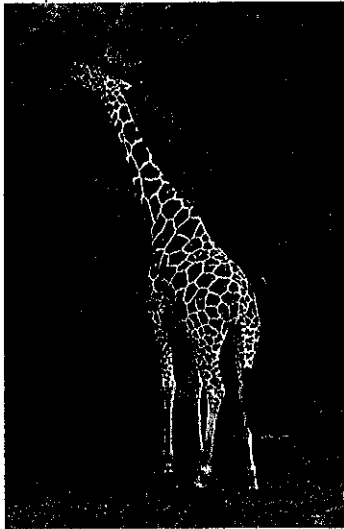
Trees need water so they can make their own food. Trees take in water using their roots. If a drought occurred reducing the amount of available water, some trees, such as those with deep roots that can reach the water table, would be naturally selected over other trees. If the drought continued for an extended period of time, the trees would likely evolve until most of the trees possessed drought-resistant characteristics.

Which of the following allows natural selection and evolution to occur?

- A. using other plant parts instead of roots to absorb water
- B. having an identical genetic make-up
- C. increasing the height of the water table
- D. differences in the characteristics of individual trees

Question 8 .

Giraffes eat the twigs and leaves off of plants and trees.



Now, imagine an area in which there are only very tall trees. Only the giraffes with the longest necks survive, and these giraffes reproduce with each other to produce offspring that also have longer necks. This is an example of _____.

- A. natural selection
- B. genetic engineering
- C. extinction
- D. selective breeding

Question 9 .

Directions: Select the correct answer from each drop-down menu.

Individuals within populations exhibit some diversity. As a result of possessing slightly different traits, some individuals are better able to survive and reproduce than others.

If these individuals changes in the characteristics of the population may occur over time. The cumulative change in these characteristics is known as .

Question 10 .

Directions: Select the correct answer from each drop-down menu.

Favorable traits are traits that promote an organism's success in a particular environment. Organisms with favorable traits are more likely to thrive, survive, and reproduce than organisms without favorable traits.

Over time, favorable traits are likely to within a population and unfavorable traits are likely to within a population.

Explanations

1. As the climate in a region changes, **organisms that have adaptations that help them survive the change will pass the traits for the adaptations on to their offspring.** New traits may also form through genetic mutations.

Organisms that do not have adaptations that help them survive in the changing climate **will either migrate to new areas or die out (become extinct).**

2. **The success of a species depends on the number of offspring that survive long enough to reproduce,** not just the number of offspring produced at a time or even in a lifetime. A penguin who has only one young can devote a lot of time, attention, and care to it, greatly increasing its chances of surviving long enough for it, too, to reproduce. An octopus, on the other hand, usually dies shortly after reproducing. A young octopus has no parent to protect or teach it, so the vast majority of octopi do not survive long enough to reproduce.

3. *Variation* from one animal to the next and from one generation to the next *is what makes evolution through natural selection possible.*

If there was zero variation between all of the organisms on Earth, then **evolution through natural selection would not work**; it would either select for all of Earth's organisms to survive equally, or for all of them to die.

4. **Finch Z**, known as the warbler finch, has a beak that is ideally suited for hunting small insects. Its long, thin, and narrow beak allows it to dig its prey out of small crevices. Many of the other finches that Darwin observed on the islands had beaks that were adapted to feed on different foods.

5. The principle of natural selection that is best demonstrated in the diagram is that **populations with individuals that are well adapted to their environment will survive, while those that do not will eventually go extinct.**

The branches of the tree that lead to other branches are those populations who were successful. They were able to survive and pass on their genetic information to the next generation. Those populations may have had to eventually adapt to a variety of environments, which is represented in the separating branches.

The branches of the tree that do not lead to others are those populations that went extinct. Those populations were unable to adapt to their environment to survive and reproduce.

6. Natural selection is defined as **the changes in the characteristics within a population that lead to survival.**

The organisms in any population vary from one another to some extent. These differences often have an impact on each organism's ability to survive and reproduce. Over generations, certain traits tend to be favored while other traits are not. The traits that are favored are said to be "selected" by natural selection.

7. Natural selection and evolution can only occur if there are **differences in the characteristics of individual organisms.** Organisms with advantageous adaptations, such as deep roots, are more likely to survive and reproduce than organisms without the advantageous adaptations. Continuous natural selection of one trait over another causes organisms to evolve so the advantageous trait eventually becomes more common in a population.

8. Individuals within a population exhibit some diversity. As a result of possessing slightly different traits, some individuals are better able to survive and reproduce than others. When individuals with more advantageous traits have an increased rate of survival and reproduction, they are said to be **naturally selected** over individuals with less advantageous traits.

Over time, as more and more individuals with the advantageous traits continue to produce offspring that also display the advantageous traits, *evolution* occurs. Evolution is the cumulative change in the characteristics of a population over time.

9. **Natural selection** is the primary mechanism for **evolution.**

As individuals with favorable adaptations survive and reproduce at a greater rate than individuals without the favorable adaptations, characteristics of populations can change over time—from generation to generation.

Note that only populations can develop adaptations or undergo evolution. Individual organisms can only have the adaptations they already possess selected for or against.

10. If an organism dies before reproducing, then its unique traits will be eliminated from the population. On the other hand, if an organism has favorable traits that allow it to survive and produce many offspring, then its traits will be more prevalent within the population. So, over time, favorable traits are likely to **increase** within a population and unfavorable traits are likely to **decrease** within a population. In this way, natural selection plays an important role in the way species evolve over time.