EVOLUTION REVIEW SHEET

Name: ___________________________ Date: ___________________________

What to study?  |  What to expect on the TEST?
----------------|-----------------------------
• Class notes  |  • Multiple choice
• Graphic organizers with group notes
• Review sheets |  • Short answers

STRATEGIES

• Circle key words
• Analyze and eliminate answers
• Bullet short answers
• Be aware of words like: not, all

CONCEPTS

1. Evolution: gradual change in a species over a long period of time

 Individuals cannot change, but a species can

2. Overproduction: More species are produced than can possibly survive

3. How does change happen?

VARIATION (2 ways to get variation)

• DNA RECOMBINATION: genes cross over on chromosomes during sexual reproduction
• MUTATION: change, difference, diversity in DNA (genetic sequence) caused by radiation (UVrays, X-rays) or chemicals
4. **SEXUAL REPRODUCTION**: Increased chance for variations (more variations due to genetic recombination + chance of mutation)

5. **ASEXUAL REPRODUCTION**: Very little chance for variations (only chance of variation is due to mutation).

6. **Natural Selection**: Organisms best suited (could be fast organisms, slow organisms, smart, big or tiny organisms) for the environment survive.
   
a. If they survive they pass on their genes to their offspring.

   Ex: fast lion has a better chance for survival-able to more successful hunters due to speed. Fast lion survives pass on “fast” genes to offspring (baby lions)

   Slow lions may not be able to hunt as well - may die. If they die, they won’t reproduce “slow genes” will not get passed on.

7. **Factors that effect Evolution**
   
a. Resources (food, water, shelter) are limited in the environment
   Some organisms may die due to lack of food. If they die, traits will not be passed on.

8. **Artificial Selection**
   Humans determine which two organisms will reproduce
   Selective breeding for race horses or dogs

9. **Adaptation**
   
a. Something that gives an organism a better chance to survive
10. **Bacterial Resistance**

bacteria before exposure to antibiotic  

bacteria AFTER exposure to antibiotic  

bacteria (resistant) after a week (reproduction occurred)  

bacteria (resistant) treated with antibiotic 

**QUESTIONS**

Rank in order from greatest (1) to lowest (4) chance for variation:

_____ sexual reproduction, few mutations  

_____ asexual reproduction, many mutations  

_____ asexual reproduction, few mutations  

_____ sexual reproduction, many mutations

Rank in order from simplest (1) to complex (4):

_____ complex single celled organism  

_____ complex multi-cellular organism  

_____ simple single celled organism  

_____ simple multicellular organism

False Statements: These statements are false. Please change them and make a correct statement on the line provided.

1. Genes of an individual adapt to a changing environment.
2. Acquired physical characteristics (characteristics acquired after birth) can be passed on to their offspring.

3. Genes, responsible for new traits that help a species survive will decrease in frequency.

Questions to model:

A large population of cockroaches was sprayed with a newly developed, fast-acting insecticide. The appearance of some cockroaches that are resistance to this insecticide supports the concept that
(1) species traits tend to remain constant
(2) insecticides cause mutations
(3) variation exists within a species
(4) the environment does not change
Base your answer to the next question on one of the cartoons below, which refer to certain concepts of natural selection, and on your knowledge of biology.

Choose one cartoon and write its number in the space below. Identify one concept represented in that cartoon, and explain how this concept supports the theory of natural selection. Your answer must:
• identify one concept represented in the cartoon you choose
• briefly explain the concept you identified
• explain the relationship between this concept and the process of natural selection

Cartoon Number:_________
3. A  The DNA sequences found in two different species are 95% the same. This suggests that these species  
   (1) are evolving into the same species  
   (2) may have similar evolutionary histories  
   (3) contain identical proteins  
   (4) have the same number of mutations

4. A  Which situation would most likely result in the highest rate of natural selection?  
   (1) reproduction of organisms by an asexual method in an unchanging environment  
   (2) reproduction of a species having a very low mutation rate in a changing environment  
   (3) reproduction of organisms in an unchanging environment with little competition and few predators  
   (4) reproduction of organisms exhibiting genetic differences due to mutations and genetic recombinations in a changing environment

5. C  Farmers or animal breeders sometimes use artificial insemination to produce new animals. In this process,  
   sperm is collected and used later to fertilize eggs. Often the sperm samples are frozen and stored in a  
   sperm bank until needed. The process involves placing the sperm into the female’s body and allowing fertilization to occur in the normal manner. State one benefit that using artificial insemination provides to farmers or animal breeders. [1]

   __________________________________________________________________________________________
   __________________________________________________________________________________________
6. A Sexual reproduction is important to evolution because sexual reproduction
   (1) occurs only in more recently evolved forms of animal life.
   (2) decreases the chances for survival of the species.
   (3) increases the chances for variations.
   (4) is the more usual kind of reproduction.

7. A The diagrams below show the bones in the forelimbs of three different organisms.

   Differences in the bone arrangements support the hypothesis that these organisms
   (1) are members of the same species
   (2) may have descended from the same ancestor
   (3) have adaptations to survive in different environments
   (4) all contain the same genetic information

8. C In the past, a specific antibiotic was effective in killing a certain species of bacteria. Now, most members
   of this bacterial species are resistant to this antibiotic. Explain how this species of bacteria has become
   resistant. Your answer must include at least the concepts of:
   • overproduction [1]
   • variation [1]
   • natural selection [1]
   • adaptation to the environment [1]
Base your answers to the next three questions on the diagram below and on your knowledge of biology. The diagram shows an interpretation of relationships based on evolutionary theory. The letters represent different species.

Explain why species B and C are more closely related than species A and C are. [1]

_______________________________________________________________________________________________

_______________________________________________________________________________________________

_______________________________________________________________________________________________

The diagram indicates that a common ancestor for species C and E is species

(1) F  
(2) G  
(3) H  
(4) K

Which species are least likely to be vital parts of a present-day ecosystem?

(1) A and E  
(2) C and D  
(3) E and J  
(4) B and F

State what could happen to a species in a changing environment if the members of that species do not express any genetic variations. [1]

_______________________________________________________________________________________________

_______________________________________________________________________________________________
9. A When the antibiotic penicillin was first introduced, it was immediately effective in combating staphylococcus bacterial infections. After a number of years, there were outbreaks of staphylococcal infections that did not respond to treatment with penicillin. The best explanation for this situation is that
(1) members of the original population of bacteria that were penicillin resistant survived and reproduced, creating a more resistant population
(2) the bacteria that survived exposure to penicillin learned to avoid it
(3) the bacteria that caused the new outbreaks were from populations that had never been exposed to penicillin
(4) during each generation, the bacteria modified their own DNA to increase their ability to resist penicillin and passed this ability on to their descendants

10. A Which statement about the rates of evolution for different species is in agreement with the theory of evolution?
(1) They are identical, since the species live on the same planet.
(2) They are identical, since each species is at risk of becoming extinct.
(3) They are different, since each species has different adaptations that function within a changing environment.
(4) They are different, since each species has access to unlimited resources within its environment.

11. C A European species of rabbit was released on a ranch in Victoria, Australia. The species thrived and reproduced rapidly. The rabbits overgrazed the land, reducing the food supply for the sheep. The Myxoma sp. virus was used to kill the rabbits. The first time this virus was applied, it killed 99.8% of the rabbits. When the rabbits became a problem again, the virus was applied a second time. This time, only 90% of the rabbits were killed. When the rabbits became a problem a third time, the virus was applied once again, and only 50% of the rabbits were killed. Today, this virus has little or no effect on this species of rabbit.

Explain what happened to the species of rabbit as a result of the use of this virus. You must include and circle the following terms in your answer. [4]
• gene
• adaptive value or adaptation or adapted
• variation
• survival of the fittest

_____________________________________________________________________________________

_____________________________________________________________________________________
12. A Which concept is not a part of the theory of evolution?
   (1) Present-day species developed from earlier species.
   (2) Some species die out when environmental changes occur.
   (3) Complex organisms develop from simple organisms over time.
   (4) Change occurs according to the needs of an individual organism to survive.

13. A According to the theory of natural selection, why are some individuals more likely than others to survive and reproduce?
   (1) Some individuals pass on to their offspring new characteristics they have acquired during their lifetimes.
   (2) Some individuals are better adapted to exist in their environment than others are.
   (3) Some individuals do not pass on to their offspring new characteristics they have acquired during their lifetimes.
   (4) Some individuals tend to produce fewer offspring than others in the same environment.

14. C When Charles Darwin was developing his theory of evolution, he considered variations in a population important. However, he could not explain how the variations occurred. Name two processes that can result in variation in a population. Explain how these processes actually cause variation. [4]

_____________________________________________________________________________________
_____________________________________________________________________________________
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________________________
ANSWERS

Rank in order from greatest(1) to lowest (4) chance for variation:

___2___ sexual reproduction, few mutations
___3___ asexual reproduction, many mutations
___4___ asexual reproduction, few mutations
___1___ sexual reproduction, many mutations

Rank in order from simplest (1) to complex (4):

___2___ complex single celled organism
___4___ complex multi-cellular organism
___1___ simple single celled organism
___3___ simple multicellular organism

FALSE STATEMENT CORRECTIONS

1. Genes of an individual CANNOT adapt to a changing environment. The genes are what they are.

2. Only changes in the DNA of the sperm and egg can be passed on to the offspring.

3. Genes responsible for new traits that help a species survive will INCREASE in frequency.

Questions to model

1. wrong: species traits do not always remain constant
2. wrong: mutations just happen
3. right: variation does exist
4. wrong: the environment does change
* Cartoon 1

*In survival of the fittest, organisms that are best suited for the environment survive and pass on their genes to their offspring.

* In natural selection, nature decides who survives based upon the environmental conditions and availability of resources (food, water, shelter). The organisms best suited for the environment survive and pass on those genes to their offspring.

**Group #1**

3. 2
4. 4
5. Farmers can use selective breeding to get desired traits. Farmers can choose the best female and male animal to mate as opposed to letting nature decide. Nature may not choose the best of each species to mate.

**Group #2**

6. 3
7. 2
8. * Bacteria overproduce which means they make more bacteria (during reproduction) than can survive.
   * In the population of bacteria there are many variations within the species. Some bacteria are naturally resistant to the antibiotic and other bacteria are not resistant to the antibiotic.
   * Those bacteria that are resistant to the antibiotic survive and pass on those genes to the offspring.
   * For whatever reason, certain bacteria have an adaptation (resistance to bacteria) that enables them to survive the antibiotic treatment.

**Group #3**

- B and C are more related than A and C, because B and C come from the same branch (F)
- 4
- 3
- If a species does not express any genetic variation in a changing environment they may not survive. The greater the variation in a species the greater the chance for survival.
Group #4
9. 1
10. 3
11.

- Some rabbits have a gene that makes them resistant to the virus and other rabbits do not have the gene that makes them resistant to the virus.
- The rabbits that have the resistant gene have a beneficial adaptation.
- Variation exists within the rabbit population. Some rabbits are resistant to the virus and other rabbits are not resistant to the virus.
- The rabbits that are the most fit for the environment (those resistant) to the virus survive and pass on their genes to their offspring.

Group #5

12. 3, (#4 cannot be the correct choice-REMEMBER that individuals cannot change based on need. The only way change can occur is through mutation and genetic recombination in sexual reproduction. These changes in the DNA must be present in the sex cells [sperm,egg] in order for the change to be passed on to the next generation.)

13. 2 (#1 cannot be the correct answer because characteristics acquired in the life of an individual CANNOT be passed on to the offspring. Example: Mr. Douglas's mom's two fingers were cut off in an accident, but Mr. Douglas has all 10 of his fingers)

14.

- One process that causes variation in a population is mutations. Mutations are a change in the DNA. Mutations just happen or they could be caused by exposure to excessive radiation or certain chemicals.
- Another process that causes variation in a population is genetic recombination through sexual reproduction. In sexual reproduction, the offspring receives half of the chromosomes from the mother and half of the chromosomes from the father.