CRT Science Review #7
Life Science: Diversity of Life

Standard: Diversity of Life – Evidence suggests that living things change over periods of time. These changes can be attributed to genetic and/or environmental influences. This process of change over time is called biological evolution. The diversity of life on Earth is classified using objective characteristics. Scientific classification uses a hierarchy of groups and subgroups based on similarities that reflect evolutionary relationships.

Indicators & Item Specifications:
L.8.D.1 Students know species can be identified and classified based upon their characteristics. E/S
- Understand how to classify species based on certain characteristics (e.g., DNA, skeletal structure, body covering, petal arrangement, and deciduous/coniferous) and behaviors.
- Given a group of organisms and a key, classify organisms based on observable characteristics.

L.8.D.2 Students know fossils provide evidence of how life and environmental conditions have changed throughout geologic time. E/S
- Know fossils provide evidence of how environments and organisms have changed over time.
- Given examples, predict the relative age of rock layers based on the types of fossils that they contain.
- Know the conditions necessary for fossil formation.

L.8.D.3 Students know an organism’s behavior is based on both experience and on the species’ evolutionary history. E/S
- Know some mechanisms of biological evolution (e.g., natural selection, competition and survival, variation and adaptation, and genetic mutation).
- Know that differences among individuals within a species can yield advantages and/or disadvantages in survival and/or reproduction.

Sample Multiple Choice CRT-Style Questions Related to Diversity of Life

1. When there are no more living members of a species, that species is said to be
   A. endangered.
   B. extinct.
   C. evolved.
   D. unchanged.

2. More than 1.5 million species of animals have been described, yet all of them have DNA that is made of the same building blocks. This is evidence that all animals have
   A. similar appearances.
   B. the same DNA sequence.
   C. common fossil records.
   D. a common ancestor.

3. A tool used by scientists to identify unknown organisms based on observable characteristics is called a
   A. dichotomous key.
   B. scientific name.
   C. taxonomic Tree.
   D. homologous structure.

4. Fossils are most commonly preserved in
   A. igneous rock.
   B. metamorphic rock.
   C. sedimentary rock.
   D. transitional rock.

5. The fossil record supports Darwin’s theory of evolution by demonstrating that plants and animals have changed over time.
   A. existed for only a few thousands of years.
   B. are the same in various environments.
   C. have changed over time.
   D. remain unchanged until extinction.

6. Scientists have discovered fossils of whale ancestors that have well developed hip and thigh bones, which are typically used for walking by mammals. Modern whales most likely evolved from ancestors who
   A. lived in the sea, and then became better adapted for land.
   B. lived on land, and then became better adapted for the sea.
   C. evolved in the sea and remained in the sea.
   D. evolved on land and remained on land.

7. Fossils of shellfish and snails are commonly found in the Las Vegas Valley. What can be inferred about the environmental conditions in the Las Vegas Valley millions of years ago?
   A. It was always a desert.
   B. It was once a forest.
   C. It once contained a glacier.
   D. It once contained a shallow sea.
8. Which term refers to the process by which organisms that are better adapted to their environment are more likely to survive and reproduce?
   A. Variation
   B. Competition
   C. Overproduction
   D. Natural selection

9. Which of the following provides the best evidence that organisms of two different species share a common ancestor?
   A. They live in similar environments.
   B. They have the same anatomy.
   C. They reproduce at the same time.
   D. They have similar DNA sequences.

10. European rabbits were introduced to Australia in 1859. The rabbits reproduced rapidly in their new environment, displaced other animals and overgrazed vegetation. In an attempt to reduce the rabbit population, a virus deadly to Europeans rabbits was introduced in 1951.

    When the virus was first introduced, the rabbits died in large numbers, but over time the death rate decreased. What statement best explains the decrease in the rabbit death rate?
    A. Young rabbits learned to avoid being infected by the virus.
    B. The virus had a short life span and died out with the rabbits.
    C. Natural selection favored rabbits that were resistant to the virus.
    D. The rabbits died of natural causes and the introduced virus did not work.

11. What organism is not correctly labeled with its kingdom?
    A. 
    B. 
    C. 
    D. 

12. The table below shows the taxons of four different animal species.

<table>
<thead>
<tr>
<th>Kingdom</th>
<th>Species 1</th>
<th>Species 2</th>
<th>Species 3</th>
<th>Species 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animalia</td>
<td>Animalia</td>
<td>Animalia</td>
<td>Animalia</td>
<td>Animalia</td>
</tr>
<tr>
<td>Chordata</td>
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<tr>
<td>Mammalia</td>
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</tr>
<tr>
<td>Carnivora</td>
<td>Carnivora</td>
<td>Artiodactyla</td>
<td>Carnivora</td>
<td>Carnivora</td>
</tr>
<tr>
<td>Felidae</td>
<td>Otariidae</td>
<td>Cetidae</td>
<td>Felidae</td>
<td></td>
</tr>
<tr>
<td>Felis</td>
<td>Zalophus</td>
<td>Odosolenus</td>
<td>Panthera</td>
<td></td>
</tr>
<tr>
<td>catus</td>
<td>californianus</td>
<td>virginianus</td>
<td>pardus</td>
<td></td>
</tr>
</tbody>
</table>

   Based upon the information in the table, which two species are most closely related?
   A. Species 1 and 2
   B. Species 1 and 4
   C. Species 2 and 3
   D. Species 2 and 4

Sample Constructed Response Question Related to Diversity of Life

13. The graph shows the number of gray squirrels in a small population and their coat colors. This squirrel population has been separated from other squirrel populations by a new highway and several construction sites. The main predators of these squirrels are cats and hawks.

    A. Assume that dark gray squirrels are very visible in this new environment. What is likely to happen to the distribution of coat color in this squirrel population over several generations?
    B. Using graph paper, sketch a graph to show the predicted distribution, and explain your answer.
    C. Assume that dark gray squirrels are very visible on the ground, and light gray squirrels are very visible in the trees. Explain what is likely to happen to the distribution of coat color in the squirrel population over several generations.
CRT Science Review #7 Key
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Answer Key
1. B, DOK Level 1
2. D, DOK Level 1
3. A, DOK Level 1
4. C, DOK Level 1
5. A, DOK Level 1
6. B, DOK Level 2
7. D, DOK Level 2
8. D, DOK Level 1
9. D, DOK Level 1
10. C, DOK Level 2
11. C, DOK Level 2
12. B, DOK Level 2

Constructed Response Answers
13. DOK Level 3

<table>
<thead>
<tr>
<th>3 points</th>
<th>Response addresses all parts of the question clearly and correctly.</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td>If gray squirrels are more visible in the new environment, then the gray squirrel population will decrease over generations due to predation by the cats and hawks.</td>
</tr>
</tbody>
</table>

| B.       | Student draws a correctly labeled bar graph showing a directional shift of the squirrel population from the dark gray to a medium/light gray color. If the dark gray squirrels are not as camouflaged in their new environment, then they will be less likely to reproduce and there will be less dark gray squirrels in the population over time. |

| C.       | If the squirrels are more fit in different environments, then they will most likely inhabit areas where they are more camouflaged. The dark squirrels will not live on the ground and light gray squirrels will spend less time in the trees. Due to their behaviors, it is possible that a disruptive selection pattern will result where the light gray and dark gray squirrel populations increase, but the intermediate color decreases. This type of natural selection may lead to the formation of two different squirrel populations over time. |

<table>
<thead>
<tr>
<th>2 points</th>
<th>Response addresses all parts of the question and includes only minor errors.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 points</td>
<td>Response does not address all parts of the question.</td>
</tr>
<tr>
<td>0 points</td>
<td>Response is totally incorrect or no response provided.</td>
</tr>
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</table>

Visit RPDP’s Middle School TIPS website for additional sample CRT questions: [http://rpdp.net/sciencetips_v3/](http://rpdp.net/sciencetips_v3/)