

Name: Answer Key Date: _____ Period: _____

Evolution Test Study Guide

- Evolution is the development of new types of organisms from preexisting organisms over time.
- A fossil is a trace of a long-dead organism that is often found in **sedimentary** rock.
- The relative/approximate age of a fossil or rock can be determined by the law of Superposition. This law states that older fossils will be in deeper layers while younger fossils will be in surface layers.
- There are 4 major types of evidence that support evolution.
 - Fossil evidence** looks at "transitional fossils." These are the fossilized remains of intermediary forms of life. Scientists use these fossils to link new species with old species.
 - A second type of evidence is **anatomical** evidence. This compares the way organisms are put together.
 - If you examine the arm of a human and the fin of a dolphin you can see that the number and order of the bones in these limbs are very similar. Biologists would say that these limbs are homologous structures. These types of structure show that these organisms shared a common ancestor (ex. arms, wings, flippers).
 - A vestigial structure is one that has no function but is still found in the organism (whale pelvis/ human appendix).
 - Analogous structures show features that have the same function, but that are not structurally related. An example of this would be the wing of a bird and the wing of a fly. Both are used for flight, but they evolved separately.
 - The third type of evidence, embryological evidence, shows that in early development, human embryos and the embryos of all other vertebrates are strikingly similar.
 - The fourth type of evidence is biochemical evidence. The DNA of organisms is compared. Closely related species will show more similarities in the DNA sequences.
- Lamarck like Darwin thought that organisms evolved from a common ancestor. Unlike Darwin, Lamarck thought that traits acquired during a lifetime (ex: muscles) could be passed on to offspring. He also believed that if you didn't use it you would lose it (ex: snakes lost legs since they didn't use them).
- The mechanism for Darwin's theory of evolution is natural selection. Darwin came up with many of his ideas during his trip on the HMS Beagle. He visited the Galapagos islands where he studied finches.
← a boat!
- An adaptation is a genetic trait that helps an organism to survive and reproduce.
- Acclimation is a trait that you acquire during your lifetime like playing piano.
← any learned behavior works here
- Natural selection is the process by which individuals that are better adapted to their environment are more likely to survive and reproduce than other members of the same species.
- There are three patterns of evolution, divergent convergent and coevolution.
 - Divergent evolution is the process of two or more related species becoming more different. The two species came from a common ancestor.
 - Convergent evolution is when unrelated species become more similar in appearance as they adapt to the same kind of environment. The two species do not have a common ancestor.
 - Coevolution is when two species are totally dependent on each other and evolve together.

11. All of the genes or DNA available to a population is the populations gene pool.
12. Migration or gene flow, is any movement of genes from one population to another.
13. Genetic drift is the changing of the genes or DNA as a result of random events or chance.
14. As far as genetics is concerned the larger (*larger/smaller*) the population and the more (*more/less*) varied the genes/DNA the better.
15. There are three types of natural selection.
 - I. Stabilizing selection favors the average or intermediate trait/characteristic (ex: height)
 - II. Directional selection favors one extreme trait/characteristic (ex: ant eater with long tongue can get more ants).
 - III. Disruptive selection favors the two extreme traits/characteristics (white or brown shells selected for, tan is selected against)
16. A species is a group of organism that can interbreed and produce viable (living) offspring.
17. Speciation is the production of a new species. It can occur because of geographic isolation (the separation of species because of a river, mountain, etc.)
18. Life on Earth has continued even after devastating catastrophes. The reason for this is that with the wide variety of species that exist some were able to survive the "catastrophe."

Multiple Choice

19. If Larmarck's hypothesis of species modification were true, the children of a person who developed large muscles by lifting weights would be born with
 - A. smaller-than-average muscles.
 - B. normal-sized muscles
 - C. normal-sized muscles that would become larger only when the children lifted weights
 - D. larger-than-average muscles
20. According to Darwin's theory of natural selection
 - A. individuals are modified by adverse environmental conditions
 - B. the environment affects all organisms in a population in the same way
 - C. populations of all organisms grow unchecked under natural conditions
 - D. organisms that have more favorable traits tend to leave more offspring
21. In an evolutionary sense, an individual organism has high fitness if it:
 - A. has a large number of acquired traits
 - B. can run long distances without becoming exhausted
 - C. reproduces more successfully than other individuals
 - D. evolves into another organism rather than becoming extinct.
22. The wing of a bat and the foreleg of an alligator are
 - A. analogous features
 - B. homologous features
 - C. vestigial features
 - D. artificially selected
23. Features that were useful to an ancestral organism, but are not useful to the modern organism that inherited them are said to be:
 - A. analogous
 - B. homologous
 - C. vestigial
 - D. artificially selected.
24. What is the name of the process by which different species evolve similar traits?
 - A. coevolution
 - B. convergent evolution
 - C. divergent evolution
 - D. adaptive radiation
25. The evolutionary pattern illustrated by the finch species on the Galapagos Islands is an example of
 - A. coevolution
 - B. convergent evolution
 - C. divergent evolution
 - D. artificial selection
26. Length, weight, and many other quantitative traits in a population tend to show variation that, when plotted on a graph, looks like:
 - A. a population wave
 - B. a gene pool
 - C. a bell curve
 - D. a kingdom

27. Divergent evolution would be most likely in which of the following situations?
- a group of organisms is isolated from the main population on three isolated islands with different environmental conditions.
 - individuals in a large population experience the same environmental conditions
 - individuals in a small population experience the same environmental conditions
 - a group of organisms which are well adapted to the environment
28. For a population to be in genetic equilibrium,
- individuals must not enter or leave the population
 - the population must be evolving
 - the population must be small
 - selection must occur
29. Any violation of the conditions necessary for Hardy-Weinberg equilibrium can result in
- independent assortment
 - disorganising selection
 - evolution
 - eventual extinction
30. Fish populations that do not interbreed since they live in different ponds may evolve into separate species due to
- ecological isolation
 - geographic isolation
 - prezygotic
 - postzygotic

Short Answer

31. If Lamarck and Darwin had debated why giraffes have such long necks, how would their explanations have differed?

Lamarck would say that giraffes stretch their necks during their lifetime and pass on the longer necks to their offspring. Darwin would say that giraffes born with slightly longer necks would be more likely to reach food and therefore survive and reproduce. Their offspring would also have long necks.

32. Does a gene pool include the genes of individuals that cannot reproduce? Explain your answer.

Like the breeding bunnies lab, the genes that "count" are the genes of the reproductive animals. If the genes aren't passed on to children (fitness) then they are useless!

33. If a cow develops a preference for eating white flowers and ignoring pink and red flowers, what type of selection is being demonstrated? Would the cow eventually eliminate all white flowers from the population on which it feeds?

This is directional selection. It is very possible that the white allele could diminish to the point of extinction if it continued for enough generations.



34. Some scientists predict that if global warming continues over the next few centuries, melting of the polar ice caps will raise the level of the oceans, causing some peninsulas to become islands. How might this change eventually affect the species that live on these peninsulas?

Species on the peninsulas may eventually have different characteristics from those on the mainland because of geographic isolation. This is a type of speciation.

35. Draw a cladogram showing the closest ancestors to the bird using the amino acid sequences from a section of hemoglobin. Count the differences between bird and others.

Bird: met lys gly gly pro leu gly pro val cys ser ser try met ser pro glu
 3 Primates: met lys gly gly pro leu gly his val cys ser ser glu met ser pro val
 3 Rodents: met lys gly gly pro leu gly his val cys ser ser glu met ser pro his
 2 Crocodiles: met lys gly gly pro leu gly pro ser cys ser ser try gly ser pro glu
 ↳ mutations from bird sequence

