EOC - Unit 6 Review – Evolution

**Part A:**

Benchmark Standard SC.912.L.15.1 Explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observed evolutionary change.

Also Assesses: SC.912.L.15.10 Identify basic trends in hominid evolution from early ancestors six million years ago to modern humans, including brain size, jaw size, language, and manufacture of tools. SC.912.N.1.3 Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented. SC.912.N.1.4 Identify sources of information, and assess their reliability according to the strict standards of scientific investigation. SC.912.N.1.6 Describe how scientific inferences are drawn from scientific observations, and provide examples from the content being studied. SC.912.N.2.1 Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science). SC.912.N.3.1 Explain that a scientific theory is the culmination of many scientific investigations drawing together all the current evidence concerning a substantial range of phenomena; thus, a scientific theory represents the most powerful explanation scientists have to offer. SC.912.N.3.4 Recognize that theories do not become laws, nor do laws become theories; theories are well-supported explanations, and laws are well-supported descriptions.

**Benchmark Clarifications** Students will:
- identify evidence and/or explain how the scientific theory of evolution is supported by the fossil record, comparative anatomy, comparative embryology, biogeography, molecular biology, and observable evolutionary change.
- identify examples of and basic trends in hominid evolution from early ancestors to modern humans.
- identify ways in which a scientific claim is evaluated (e.g., through scientific argumentation, critical and logical thinking, and consideration of alternative explanations).
- assess the reliability of sources of information according to scientific standards.
- identify examples of scientific inferences made from observations.
- identify the criteria that differentiate science from nonscience and pseudoscience.
- explain the development of a theory.
- recognize the differences between theories and laws.

**Content Limits** Items assessing evolution will focus on a conceptual understanding of the supporting scientific evidence. Items will not require memorization of the names of specific human fossils or the names of the different hominin species. Items assessing the fossil record must focus on the fossil rather than geologic formations in isolation. Items assessing the fossil record will not require understanding of the specific mechanisms used for relative dating and radioactive dating. Items will not require the memorization of the geologic time scale, including era, period, and/or epoch. Items will not assess the origin of Earth. Items will not assess specific knowledge of the formation of microspheres or the evolution of RNA and DNA. Items will not address or assess the endosymbiotic theory. Items referring to adaptive radiation, convergent evolution, coevolution, or punctuated equilibrium should focus on the concepts rather than on the definition of the terms. Items referring to the development of language or the manufacturing of tools will relate this development to changes in the skull or brain size. Items referring to comparative anatomy and comparative embryology will assess anatomical similarities such as homologous structures and vestigial organs but will not require specific knowledge of embryologic stages or structures. Items will not require knowledge of changes to specific species or geographic location of those species. Items will not assess genes, alleles, genetic drift, or gene flow. Items may assess how the overall contributions of scientists such as Darwin, Lamarck, Lyell, Malthus, Mendel, or Wallace aided in the development of the scientific theory of evolution. Items will not assess the differences among intelligent design, creationism, and the scientific theory of evolution. Items assessing a scientific claim, the development of a theory, or the differences between theories and laws are limited to the scientific theory of evolution.

**Part A: Sample Questions**

1) **Which of the following correctly describes the general trend in hominid evolution?**
   - A. larger body size, broad forehead, smaller brains
   - B. increase in brain capacity, bipedalism, use of tools
   - C. thickening of the skull, protruding teeth, organized hunting
   - D. large canine teeth, small skulls, diet of coarse plant material

2) **Biogeography is the study of the location of organisms around the world. Which of the following best explains how biogeography can provide evidence for evolution?**
   - A. It shows that organisms have structures that serve no purpose but that resemble structural roles in related organisms.
   - B. It shows that there are similarities and differences among the DNA of different species.
   - C. It shows that organisms have changed gradually over millions of years.
   - D. It shows that some organisms that are unrelated have developed similar adaptations to similar environments.

3) **In his trips to the Galapagos Islands, Charles Darwin observed that 4 of the 13 species of the islands’ finches have beaks adapted to eating specific foods. Which best explains how these facts provide evidence for divergent evolution?**
   - A. The finches were different species but resemble each other because of how they evolved in a similar environment.
   - B. The finches descended from similar ancestors and have evolved adaptations in response to each other’s influences.
   - C. The finches descended from the same ancestor but evolved along their own lines in isolation from each other.
   - D. The finches descended from a common ancestor but evolved differently in response to their environment.

4) **Which of the following statements correctly compares a scientific theory and a scientific law?**
   - A. A law is a fact and a theory is an opinion.
   - B. A law is a theory that has been proven to be true.
   - C. A law is a description and a theory is an explanation.
   - D. A law is always true and a theory is sometimes true.
5) Humans and chimpanzees have almost identical DNA and many similarities in anatomy. Which statement about the evolutionary relationship between modern humans and chimpanzees is supported by these facts?

A. Humans and chimpanzees are unrelated.  
B. Humans descended directly from chimpanzees.  
C. Humans are a more evolved version of chimpanzees.  
D. Humans and chimpanzees share a common ancestor.

6) Which best explains how the fossil record supports the theory of evolution?

A. It provides evidence for how genetic variation in organisms is determined by independent assortment.  
B. It explains the impact that humans have had on the evolution of organisms on Earth.  
C. It shows how the types and distribution of organisms on Earth have changed over time.  
D. It proves that some organisms developed behaviors that helped them to survive.

7) Many whales have tiny, unused hip and pelvis bones on their torsos. How does this evidence support theories about animal evolution?

A. It shows that many animals, including whales, evolved to have unused body parts.  
B. It shows that whales may have evolved from land-dwelling animals.  
C. It shows that whales evolved at the same time as other non-marine animals.  
D. It shows that marine animals, like whales, evolved much more slowly than land-dwelling animals.

8) The diagram below shows embryonic stages for a chimpanzee and a pig. How does this information support the theory of evolution?

A. It provides evidence that survival in one geographical area may not help survival in another area.  
B. It provides evidence that if some individuals in a species adapt well to an ecological niche, a new species can result over time.  
C. It provides evidence that these animals came from a common ancestor and have inherited similar phases of development.  
D. It provides evidence that heritable traits which help individuals to survive and reproduce will become more common in a species.

9) Which of the following does NOT describe observable trends in hominid evolution?

A. changes in hair and skin color  
B. development of tool use and language  
C. changes in jaw size and cranial capacity  
D. development of bipedal locomotion and increase in brain mass

10) Which statement best explains how the theory of evolution is supported by comparative embryology?

A. All vertebrate embryos have a biological mother and father.  
B. All vertebrate embryos need oxygen, water, and food to survive.  
C. All vertebrate embryos have blood, organs, and the same kinds of cells.  
D. All vertebrate embryos have similar genes and follow a similar developmental path.

Part B:

Benchmark Standard SC.912.L.15.8  Describe the scientific explanations of the origin of life on Earth.  
Also Assesses:  SC.912.N.1.3 Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.  SC.912.N.1.4 Identify sources of information, and assess their reliability according to the strict standards of scientific investigation.  SC.912.N.2.1 Identify what is science, what clearly is not science, and what superficially resembles science (but fails to meet the criteria for science).  
Benchmark Clarifications  Students will
- describe scientific explanations of the origin of life on Earth.  
- identify situations or conditions contributing to the origin of life on Earth.  
- identify ways in which a scientific claim is evaluated (e.g., through scientific argumentation, critical and logical thinking, and consideration of alternative explanations).  
- assess the reliability of sources of information according to scientific standards.  
- identify the criteria that differentiate science from nonscience and pseudoscience.  
Content Limits  Items may address the conditions required for the origin of life on Earth but may not require specific knowledge of the age of Earth or its eras, periods, or epochs. Items may assess how contributions of scientists such as Pasteur, Oparin, Miller and Urey, Margulis, or Fox aided in the development of the scientific explanation of the origin of life but will not assess what each scientist contributed. Items assessing the origin of organic molecules, chemical evolution, and/or eukaryotic cells should be conceptual. Items may refer to the endosymbiotic theory but may not assess the term in isolation. Items assessing a scientific claim are limited to the scientific explanations of the origins of life on Earth.
Part B: Sample Questions

1) Geological evidence indicates that Earth is approximately 4.6 billion years old. For scientists to be able to accurately date organisms. One method that scientists use to date samples is called radioactive dating. Which of the following best describes radioactive dating?
A. Radioactive dating is a method of absolute dating.  B. Radioactive dating is a method of relative dating.
C. Radioactive dating uses index fossils to date rocks.  D. Radioactive dating is the use of a geological time scale.

2) The endosymbiotic theory proposes that eukaryotic cells arose from living communities formed by the merging of prokaryotic organisms and their hosts. Which of the following is the best evidence to support the endosymbiotic theory?
A. Mitochondria and chloroplasts contain DNA similar to bacterial DNA.
B. Both prokaryotic and eukaryotic organisms require oxygen in order to use energy.
C. Bacteria, mitochondria, and chloroplasts all divide by mitosis, while the cells containing them divide by binary fission.
D. Bacteria and mitochondria contain many features that are similar to each other but different from those of chloroplasts.

3) According to the hypothesis of Oparin and the subsequent experiments of Miller and Urey, which of the following situations contributed to the origin of life on Earth?
A. Organic compounds formed from meteorites that had fallen to Earth.
B. Cells evolved in an environment lacking oxygen.
C. Organic compounds formed from gases available in the atmosphere.
D. Cells evolved from large prokaryotic cells that engulfed smaller prokaryotic cells.

4) Science explains that different forms of life on Earth developed over a long period of time from a common ancestor. The process by which unrelated organisms come to resemble one another (e.g., birds, bats, and butterflies and butterflies having wings) is known as which term?
A. adaptive radiation  B. convergent evolution  C. genetic drift  D. punctuated equilibrium

5) Biologists have considered two different explanations to the rate of evolution: gradualism and punctuated equilibrium. Which of the following would indicate that an organism had evolved via punctuated equilibrium?
A. The fossil record would show a slow, steady rate of change from a common ancestor.
B. The fossil record would be incomplete, and numerous holes would exist within the ancestral record.
C. The fossil record would show rapid change over an extended period of time, with occasional periods of little change.
D. The fossil record would show little change over long periods of time, followed by a sudden, brief period of rapid change.

6) Fossils sometimes show that a single species or a small group of species has evolved into diverse forms that live in different ways. An example of this would be a group of present-day mammals all having a common ancestor. Which term describes this phenomenon?
A. adaptive radiation  B. convergent evolution  C. gradualism  D. mutualism

7) The fossil record indicates that some organisms have become extinct. However, some of these extinct organisms closely resemble organisms that are still alive today. Which of the following best describes why some extinct species in the fossil record are similar to living organisms?
A. All organisms have identical genetic codes and therefore produce similar features.
B. Organisms are related by a common ancestor that evolved over a very long period of time.
C. Organisms adapted the same way to their environments in order to produce beneficial traits.
D. Following mass extinctions, new organisms followed the genetic path of the previous extinct organisms.

8) Scientists theorize that it took a billion years or more for oxygen in the air to reach the levels of today. Based on this idea, the first cells could be classified as which of the following?
A. aerobic and photosynthetic  B. anaerobic and heterotrophic
C. photosynthetic and unicellular  D. heterotrophic and eukaryotic

9) In the 1950s, Stanley Miller and Harold Urey conducted experiments in which they fired electrical sparks in the presence of a mixture of different gases. How did these experiments contribute to the theory of the origins of life on Earth?
A. They proved that organic molecules formed from the accumulation of debris from space.
B. They showed that organic molecules could be formed from materials available in the Earth's early atmosphere.
C. They determined that the age of organic molecules can be measured by the half-life of isotopes.
D. They discovered that organic molecules would not have formed without the presence of oxygen in the atmosphere.

10) Which of the following best explains the theory of how eukaryotic cells originated?
A. Eukaryotic cells developed from mutations in prokaryotic cells.
B. Eukaryotic cells originated from a combination of gases and heat in the atmosphere.
C. Eukaryotic cells were originally large prokaryotic cells that absorbed smaller prokaryotic cells.
D. Eukaryotic cells developed from organic compounds carried to Earth by debris from space.

11) One of the accepted scientific theories describing the origin of life on Earth is known as chemical evolution. According to this theory, which of the following events would need to occur first for life to evolve?
A. onset of photosynthesis  B. origin of genetic material
C. synthesis of organic molecules  D. formation of the plasma membrane
**Part C:**

**Benchmark Standard SC.912.L.15.13** Describe the conditions required for natural selection, including: overproduction of offspring, inherited variation, and the struggle to survive, which result in differential reproductive success.

**Also Assesses**

- SC.912.L.15.14 Discuss mechanisms of evolutionary change other than natural selection such as genetic drift and gene flow.
- SC.912.L.15.15 Describe how mutation and genetic recombination increase genetic variation.
- SC.912.N.1.3 Recognize that the strength or usefulness of a scientific claim is evaluated through scientific argumentation, which depends on critical and logical thinking, and the active consideration of alternative scientific explanations to explain the data presented.

**Benchmark Clarifications**

Students will explain and/or describe the conditions required for natural selection that result in differential reproductive success.

Students will explain and/or describe the scientific mechanisms, such as genetic drift, gene flow, and nonrandom mating, resulting in evolutionary change.

Students will explain and/or describe how mutation and genetic recombination increase genetic variation.

Students will identify ways in which a scientific claim is evaluated (e.g., through scientific argumentation, critical and logical thinking, and consideration of alternative explanations).

**Content Limits**

- Items will not address descent with modification or common descent.
- Items addressing mutation and genetic recombination in relation to increasing genetic variation must be assessed in the context of evolution.
- Items will not assess the Hardy-Weinberg principle or genetic equilibrium.
- Items may address how meiosis contributes to genetic variation but may not assess the steps or stages of meiosis.
- Items assessing a scientific claim are limited to the topics discussed in SC.912.L.15.13, SC.912.L.15.14, and SC.912.L.15.15.

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**Sample Questions**

1) A subspecies is a different group within a species that is able to interbreed but is usually prevented from doing so by geographical isolation. The Florida Panther is a subspecies of the American Cougar, and there are very few (less than 100) remaining in its population. When populations get this small, inbreeding results in low genetic diversity. The result is fewer beneficial adaptations that might help the animals survive environmental change, as well as an increase in the occurrence of genetic abnormalities. How can this subspecies of cougar be saved from extinction?
   - A. Keep the existing population in a controlled environment until their population increases.
   - B. Increase the genetic diversity by introducing other subspecies of cougar to the population.
   - C. Relocate remaining Florida Panthers to the larger populations of cougar subspecies in Texas and California.
   - D. Remove all the panthers with genetic abnormalities from the environment and leave only the healthy ones.

2) Speciation is the process by which a new species is formed. Which of the following conditions will most likely lead to the formation of a new species?
   - A. There is a limited population size of a species.
   - B. There is little struggle to survive within the population of a species.
   - C. Individuals within the population of a species undergo random mating.
   - D. There are no geographical barriers that restrict movement of the population of a species.

3) Genetic drift results in a change in the gene pool of a population, and can be described as a mechanism of evolution. How does genetic drift change a population's gene pool?
   - A. Individuals develop adaptations and pass them on to their offspring.
   - B. It causes random changes in allele frequencies in small populations.
   - C. Individuals at one end of a population growth curve have higher fitness.
   - D. It causes mutations in the DNA, which lead to a difference in the survival ability of organisms.

4) Natural selection is a process that results in change within a species over time. Which of the following is NOT a condition required for natural selection to result in speciation?
   - A. overpopulation of the species
   - B. genetic equilibrium of the species
   - C. genetic variation within the species
   - D. competition for survival within the species

5) In order for a new species to arise, inherited variations must make organisms more fit to survive in their environment. Which two processes within a population can lead to inherited variation?
   - A. genetic drift and gene flow
   - B. natural selection and evolution
   - C. stabilizing and disruptive selection
   - D. mutation and genetic recombination through sexual reproduction

6) Florida Panthers are an endangered species. Because the remaining population of Florida Panthers is quite small and fairly closely related, there are concerns that there is not enough genetic variability within the population. How does greater genetic variability within the population affect the Florida Panthers’ reproductive success?
   - A. It reduces the need to keep Florida Panthers alive in captivity.
   - B. It increases the rate of mutations that create helpful adaptations.
   - C. It reduces the expansion of harmful traits that result from inbreeding.
   - D. It increases the chance that the Florida Panther will be able to survive sea level rise.
7) Tuberculosis is a disease caused by a bacterium and can often be fatal. For several decades, antibiotics were very successful in killing tuberculosis bacteria, but now strains of the bacteria have developed that can only be killed when treated for long periods of time with multiple types of antibiotics. Why have the antibiotics become less effective against tuberculosis?

A. The antibiotics have a tendency to become weaker over time as they accumulate mutations.
B. Those bacteria that have once come in contact with antibiotics learn to avoid them and are difficult to kill.
C. Human immune systems have adapted to the presence of bacteria, causing antibiotics to be less effective.
D. Any bacteria with mutations protecting them from the antibiotics were more likely to live and pass on the mutations.

8) A small population of lizards lives on an island, while a much larger population of the same species of lizard lives in a similar habitat on the mainland. Most of the lizards are solid green, but about 5% of them have an allele that gives them brown speckles.

Which of the following is the BEST explanation for why the island population would lose the allele for brown speckles more quickly than the mainland population?

A. In the small population, only a few lizards would have to lose their speckles for the allele to disappear.
B. Speckled lizards would have more difficulty finding speckled mates on the island since there are fewer lizards.
C. The small population has fewer lizards with the speckled allele, so the possibility of not passing it on increases. (Right Answer)
D. It is more likely that the habitat will change on the island than on the mainland, favoring the solid allele over the speckled one.

9) In which of the following scenarios will natural selection most likely occur?

A. Very little genetic variation is present within the species.
B. Harsh environmental conditions result in competition for survival.
C. No reproductive isolation barriers exist within a species living in an area.
D. A geographical area has plenty of food to support all individuals within the species living in that area.

10) Which of the following best describes how independent assortment results in inherited variations within a species and how it contributes to evolution?

A. Independent assortment results from the binary fission of a single cell and causes mutations that can be beneficial or harmful to a species.
B. Independent assortment occurs during mitosis and causes uncontrolled cell division which is harmful to a species.
C. Independent assortment results from the copying of DNA during cell division and causes variations that are sometimes beneficial to a species.
D. Independent assortment occurs when chromosomes separate during meiosis and causes variations that can be beneficial or harmful to a species.

11) Over time, the climate of an island became drier, which resulted in changes to the populations of various island finch species. Finch populations with a certain beak shape thrived, while those not having that beak shape decreased. Which of the following describes a necessary condition for these changes in the finch populations to occur?

A. fewer mutations  B. limited food resources  C. limited beak variations  D. overproduction of offspring

Part D: Additional Sample Questions

1. Scientists discovered fossilized skeletons of an animal with several features. Fossil evidence indicated that the animal not only had scales, fins, and gills, but also had lungs, a full set of ribs, and limb bones arranged to support the animal’s weight. The animal, called Tiktaalik was based on the fossil evidence. Which of the following statements best explains why these are an important pieces of evidence for evolution?

A. They include skeletons of both males and females.  B. They are complete skeletons of a carnivorous animal.
C. They allow scientists to estimate the animal’s lifespan.  D. They show a transitional form between fish and land-dwelling vertebrates

2. The bones that make up the fore limbs of monkeys, cats, whales, and birds are similar. Which of the following statements best supports the evolutionary relationship of these animals?

A. The animals have different ancestries but have adapted to similar environments.
B. The animals share a common ancestry but have adapted to different environments.
C. The animals at one time lived in different environments but now share an environment.
D. The animals use their forelimbs for identical activities but live in different environments.

3. According to fossil records, the horses that lived 50 million years ago were much smaller, weaker, and slower than modern horses. Which process is most likely responsible for the changes that have led to the increased size, strength, and speed in horses?

A. Commensalism  B. Inbreeding  C. migration  D. natural selection

4. A paleontologist is comparing the fossilized remains of two primates. Both animals had a prehensile tail. What can be concluded from this evidence?

A. They were not related.  B. They lived on the ground.
C. They evolved from a common ancestor.  D. They had bipedal locomotion

5. Which could be considered biochemical evidence of an evolutionary relationship?

A. absence of vestigial structures  B. presence of embryonic gill slits
C. similar anatomical structures  D. presence of identical proteins

6. Which is the best evidence of an evolutionary relationship between two organisms?

A. similarity in behavior  B. similarity in DNA
C. similarity in habitat  D. similarity in niche
7. Black snails population increased above light colored snails after a volcanic eruption. Prior to the volcanic eruption, the percentage of black snails was so much lower than the percentage of light brown snails because
A. The black color made them more likely to find food successfully.
B. The allele for black color is lethal in the homozygous condition.
C. The black snails were easier for predators to locate on the light-colored beach.
D. The light brown snails were better than the black snails at using all the available resources.

8. Scientists observe bone structures of the front limbs of four different animals. What do the similarities of the structures suggest about these organisms?
A. They grow at the same rate.
B. They live in the same environment.
C. They live for the same length of time.
D. They evolved from a common ancestor.

9. Scientists believe that a dinosaur called Hadrosaurus was a plant eater. Which one of the following evidence supports this conclusion.
A. Hadrosaurus fossils were found with fossils of other plant eating dinosaurs
B. The regions where Hadrosaurus fossils were found were heavily forested
C. The fossilized teeth of Hadrosaurus were flat like the teeth of other herbivores
D. Fossilized plant were found with remains of Hadrosaurus

10. A distinctive fossil used to compare the relative ages of fossils is known as -
A. index fossil
B. geologic time scale
C. half life
D. period

11. The length of time required for half of the radioactive atoms in a sample to decay is a sample's
A. era
B. index fossil
C. geologic time scale
D. half life

12. The technique in which scientists calculate the age of a sample based on the amount of meaning radioactive isotopes it contains is called:
A. fossil record
B. relative dating
C. Miller-Urey experiment
D. radioactive dating

13. The process by which two species evolve in response to changes in each other is:
A. macroevolution
B. convergent evolution
C. coevolution
D. adaptive radiation

14. The pattern of evolution where long stable periods are interrupted by brief periods of more rapid change:
A. Punctuated equilibrium
B. Macroevolution
C. Convergent evolution
D. Coevolution

15. The idea that nature selects from existing variation those species best adapted to their environment
A. acquired inheritance
B. uniformitarianism
C. natural selection
D. speciation

16. Natural Selection proceeds
A. only when individuals within a population vary
B. only every 2 million years
C. only in intervals of 100 years
D. when the earth stops spinning

17. The critical arguments for Darwin's theory include all of these except
A. body size
B. struggle for existence
C. survival of the fittest
D. adaptation

18. Scientists found the fossilized remains of a canine's jaw and leg. What information must first be obtained before the scientists can place the fossils in the ancestral time line of the dog?
A. The continent where the fossils were found
B. The age of the fossils
C. The rest of the skeleton
D. The population trends for the species

19. A population is separated into two groups by a geographic barrier. Over time, enough differences develop between the two groups that they do not interbreed when reunited. Which of the following terms best describes the process that has occurred?
A. Extinction
B. hybridization
C. immigration
D. Speciation

20. In a population of herbivorous tortoises, a shift in the frequency of different shell heights is observed over time. A set of graphs representing the change in frequency of the different shell heights is shown below. Which of the following selection pressures most likely produced the shift in frequency?

A. lack of vegetation at ground level
B. dry, hot weather conditions for several years
C. habitat changes that forced nesting sites farther inland
D. intense competition with other species of tortoises with high shells

21. Which would most likely favor species survival in changing environmental conditions?
A. genetic recombination
B. energy involvement in gamete production
C. length of life cycle
D. number of offspring produced

22. Variety within a species is most likely to result from which situation?
A. severe weather conditions that might occur, such as hurricanes or blizzards
B. adaptation to local environmental characteristics by isolated populations of the species
C. the extinction of competing species over a broad range of habitats
D. sex-specific coloring differences
23. Until recently, the myrtle warbler and the Audubon’s warbler were thought to be separate species of birds because the males have very different appearances. Which of the following observations most likely led to the reclassification of these warblers as one species?
A. The myrtle warbler and the Audubon’s warbler have the same diet.
B. The myrtle warbler and the Audubon’s warbler lay the same number of eggs.
C. The myrtle warbler and the Audubon’s warbler have overlapping geographical ranges.
D. The myrtle warbler and the Audubon’s warbler interbreed and produce fertile offspring.

24. In the deserts of rock made from lava flows are found scattered across the sand. The rock pocket mouse, which has dark fur, lives on the black lava rocks. The Apache pocket mouse, which has light fur, lives on the tan sand. Which of the following statements best explains how these two types of mice could have evolved from a common ancestor?
A. Individual mice changed their fur color to escape their predators.
B. Natural selection favored different fur colors in the different habitats.
C. The emigration of mice changed the gene pools in the original population.
D. The original population of mice spread out geographically to relieve overcrowding.

25. The willow flycatcher is a bird species with a summer range throughout much of the United States. Which of the following would directly decrease the size of a willow flycatcher population in a given year?
A. the disappearance of a species that preys on willow flycatchers
B. the arrival of migrating willow flycatchers from populations in other areas
C. the emigration of male willow flycatchers that did not secure territories
D. the hatching of a larger percentage of eggs in the willow flycatcher population

26. Over many generations unrelated or distantly related species may come to resemble each other because of:
A. competition with each other    B. similar genetic mutations
C. homologous structural adaptations    D. similar environmental factors

27. Which of the following helped convince Darwin in the evolution of species?
A. the fossil record    B. only a and b helped to convince Darwin in the evolution of species
C. patterns of life he observed on the voyage of the Beagle    D. all of the above helped to convince Darwin in the evolution of species

28. What was especially profound about the differences Darwin observed in his "finches"?
A. They allowed each bird to successfully inhabit several niches on the island.    B. Each beak type was seen on only one island.
C. The beak type changed over the lifetime of each bird.    D. This incredible diversity occurred in a closely related group of birds.

29. Shape of Darwin’s finches was influenced by the:
A. number of offspring produced in a given year    B. carrying capacity of the environment
C. response to the nature of the food supply    D. predators preying on a particular species of bird

30. Clusters of species evolved relatively recently from a common ancestor are an example of:
A. adaptive radiation    B. divergent radiation
C. ecological selection    D. artificial selection

31. The variations in Galápagos tortoises Darwin saw could be distinguished based on:
A. differences in the structures of their shells    B. modifications of their beaks which allowed them to take advantage of different foods.
C. distinctive markings on the shells of their eggs    D. the length of time their eggs required for incubation
E. their size.

32. The method of determining the age of fossils by comparing its placement with that of fossils in other layers of rock is known as:
A. relative dating    B. Miller-Urey experiment
C. radioactive dating    D. endosymbiotic theory

33. The nonpoisonous eastern scarlet snake has colored bands that closely resemble the poisonous coral snake. This selective adaptation provides the eastern scarlet snake with:
A. a method of avoiding predation    B. the ability to attract prey
C. increased breeding opportunities    D. increased feeding opportunities

34. The process by which a single species or small group of species evolves into several different forms that live in different ways; rapid growth in the diversity of a group of organisms is known as:
A. Coevolution    B. Adaptive radiation
C. Punctuated equilibrium    D. Macroevolution

35. An event in which many types of living things become extinct at the same time is known as:
A. punctuated equilibrium    B. macroevolution
C. convergent evolution    D. mass extinction

36. A large-scale evolutionary change that takes place over long periods of time is known as:
A. adaptive radiation    B. punctuated equilibrium
C. macroevolution    D. convergent evolution

37. The 14 different species of finches in the Galapagos Islands originated from a single ancestral species. What is it about these islands that is responsible for the diversity of finch species?
A. Each island has a different climate.    B. Each island has different food sources.
C. The islands are made of volcanic peaks.    D. The islands are clustered near each other

38. The movement of new genes into a population as a result of migration or hybridization is called:
A. founder principle    B. selection
C. gene flow    D. bottleneck effect
E. adaptation

39. The lack of allele variation in the northern elephant seal population is an example of:
A. mutations    B. founder effect
C. artificial selection    D. bottleneck effect
E. outcrossing

40. In the seventeenth and eighteenth centuries, the hypothesis of spontaneous generation used to explain:
A. how new life started    B. how simple organic compounds formed
C. how coacervates and microspheres formed    D. how eukaryotes evolved
41. Redi’s experiment was important because it showed that:
A. maggots give rise to microorganisms   B. flies swarm on rotting meat
C. flies do not form from rotting meat   D. air contains a “vital force”

42. The absolute age of a rock is the approximate number of years ago that the rock formed. The absolute age of an igneous rock can best be determined by:
A. comparing the amounts of decayed and undecayed radioactive isotopes in the rock
B. comparing the sizes of the crystals found in the upper and lower parts of the rock
C. examining the rock’s relative position in a rock outcrop
D. examining the environment in which the rock is found

43. Which radioactive isotope is most useful for determining the age of mastodon bones found in Pleistocene sediments?
A. uranium-238   B. carbon-14   C. potassium-40   D. rubidium-87

44. Which of the following is not a characteristic of the first cells?
A. heterotroph   B) single-celled   C) genome composed of RNA   D) anaerobic   E) prokaryotic

45. Primates are adapted to
A. a marine life   B) living in trees   C) killing others of their own kind   D) cold weather

46. Opposable thumbs make grasping possible
A. In all animals   B) only in primates   C) only in mammals   D) in knuckle-walking animals

47. The ability to learn in primates is primarily associated with
A. good vision   B. a large forebrain   C. a keen sense of smell   D. walking erect

48. Humans and not apes are in the family
A. Pongidae   B. Hominidae   C. Hylobatidae

49. This hominid is dated as early as 2 MYA, the name means “handy man,” and was found accompanied by tools.
A. Homo habilis   B. Homo erectus   C. Homo sapiens   D. Homo afarensis

50. Homo erectus
A. made advanced tools   B. had knowledge of fire   C. fossils were found in Africa and Europe   D. All of above