Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading

Section: How Did Life Begin?

Complete each statement by writing the correct term or phrase in the space provided.

1. Scientists use _____ _____ to calculate the age of an object by measuring the proportions of the radioactive isotopes of certain elements.
2. Unstable isotopes that slowly change and give off energy in the form of charged particles are called _____ .
3. A radioisotope's _____ _____ is the time it takes for one-half of a given amount of a radioisotope to change.

Read each question, and write your answer in the space provided.

4. What is the primordial soup model?

_____

_____

5. Explain why the results of the Miller-Urey experiment have recently been reevaluated.

_____

_____

_____

6. What is the bubble model?

_____

_____

In the space provided, write the letter of the term or phrase that best completes the statement.

_____ 7. RNA molecules can catalyze
   - **a.** primordial soup.
   - **b.** protein synthesis.
   - **c.** ultraviolet radiation.
   - **d.** coacervate development.

_____ **8.** It is possible that cellular life began with
- **a.** oil and vinegar.
- **b.** water and lightning.
- **c.** large organic molecules.
- **d.** microspheres made of amino acids.

_____ **9.** Microspheres could not be considered true cells unless they could
- **a.** form cellular membranes.
- **b.** originate spontaneously in water.
- **c.** incorporate molecules and energy.
- **d.** pass their characteristics to offspring.

_____**10.** Most scientists agree that double-stranded DNA evolved
- **a.** after RNA.
- **b.** before RNA.
- **c.** before microspheres.
- **d.** after hereditary mechanisms.

_____**11.** Most scientists agree that RNA first formed
- **a.** inside ammonia.
- **b.** outside the atmosphere.
- **c.** spontaneously in water.
- **d.** gradually in microspheres.

_____**12.** The simple chemical reactions on the early Earth were energized by
- **a.** enzymes.
- **b.** organic molecules.
- **c.** the sun and volcanoes.
- **d.** lightning.

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading

Section: The Evolution of Cellular Life

Read each question, and write your answer in the space provided.

1. What are the oldest fossils, and what have they told us about the first organisms?

_____

_____

2. How do eubacteria and archaebacteria differ?

_____

_____

Complete each statement by writing the correct term or phrase in the space provided.

3. The first eukaryotic cells are more likely to have evolved from _____ than from eubacteria.

4. The group _____ includes many bacteria that cause disease and decay.

Read each question, and write your answer in the space provided.

5. What is the theory of endosymbiosis?

_____

_____

6. What are chloroplasts?

_____

_____

In the space provided, write the letter of the term or phrase that best completes each statement.

_____ **7.** The kingdom Protista consists of
- **a.** only unicellular prokaryotes.
- **b.** only multicellular eukaryotes.
- **c.** multicellular and unicellular prokaryotes.
- **d.** multicellular and unicellular eukaryotes.

_____ **8.** An advantage of multicellularity is that
- **a.** cells can contain genetic material.
- **b.** organisms can live in many types of environments.
- **c.** cells can specialize to carry out specialized functions.
- **d.** organisms can be less complex than unicellular organisms.

_____ **9.** Seaweed is classified as a
- **a.** plant.
- **b.** fungi.
- **c.** protist.
- **d.** prokaryote.

_____**10.** The kingdoms Fungi, Plantae, and Animalia each evolved independently from
- **a.** a single kind of protistan ancestor.
- **b.** a different kind of protistan ancestor.
- **c.** a single-celled prokaryote.
- **d.** a multicellular prokaryote.

_____**11.** The oldest known fossils of multicellular organisms were found in rocks
- **a.** older than the Cambrian period.
- **b.** formed in the Silurian period.
- **c.** formed in the early Precambrian era.
- **d.** younger than the Ordovician period.

Read each question, and write your answer in the space provided.

12. Why have mass extinctions changed the evolution of surviving species?

_____

_____

13. Why do some scientists think that another mass extinction is occurring today?

_____

_____

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading

Section: Life Invaded the Land

Study the following steps in the evolution of life on land. Determine the order in which the steps took place. Write the number of each step in the space provided.

_____ **1.** The sun's rays caused some molecules of oxygen, O_2, to form molecules of ozone, O_3, in the upper atmosphere.

_____ **2.** There were no living things on the dry, rocky surface of Earth.

_____ **3.** Photosynthesis by cyanobacteria began adding oxygen to Earth's atmosphere.

_____ **4.** Enough ozone had accumulated to make Earth's land a safe place to live.

_____ **5.** In the upper atmosphere, ozone blocked the ultraviolet radiation of the sun.

Complete each statement by writing the correct term or phrase in the space provided.

6. Plants use the energy from sunlight to make their own

_____ .

7. Plants cannot obtain _____ from bare rock.

8. Fungi cannot make _____ from sunlight.

9. Fungi are able to absorb _____ from bare rock.

10. Associations between fungi and the roots of plants are called

_____ .

11. A relationship in which both organisms benefit is called

_____ .

Read each question, and write your answer in the space provided.

12. Why was it necessary for plant life on land to evolve before animal life on land?

_____

_____

13. Describe the features of arthropods.

_____

_____

Complete each statement by writing the correct term or phrase in the space provided.

14. Early amphibians had moist breathing sacs called _____ .

15. Frogs, toads, and salamanders are examples of _____ .

16. Snakes, lizards, turtles, dinosaurs, and crocodiles are examples of

_____ .

17. The movement of Earth's land masses over geologic time is commonly called

_____ _____ .

Determine the order in which the following groups of animals evolved. Write the number of each step (1–4) in the space provided.

_____**18.** amphibians

_____**19.** mammals and birds

_____**20.** fishes

_____**21.** reptiles

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading

Section: The Theory of Evolution by Natural Selection

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

_____ **1.** Some individuals of a population or species are better suited to
- **a.** evolve than other individuals.
- **b.** survive and reproduce.
- **c.** become extinct.
- **d.** achieve punctuated equilibrium.

_____ **2.** Charles Darwin is credited with the theory of
- **a.** evolution by natural selection.
- **b.** populations.
- **c.** evolution by gradualism.
- **d.** gravitation.

_____ **3.** In science, evolution is referred to as
- **a.** mere speculation.
- **b.** an explanation of why species become extinct.
- **c.** change over time.
- **d.** an explanation for the rates of population growth.

_____ **4.** Darwin learned that there were resemblances between the plants and animals of South America and
- **a.** Ecuador.
- **b.** the Gal pagos Islands.
- **c.** Australia.
- **d.** the English countryside.

Read the question, and write your answer in the space provided.

5. What was the mechanism for evolution proposed by Jean Baptiste Lamarck?

_____

_____

In the space provided, explain how the terms in each pair differ in meaning.

6. population, species

_____

_____

7. adaptation, natural selection

_____

_____

Complete each statement by underlining the correct term or phrase in the brackets.

8. Traits of individuals best suited to survive will become [more / less] common in each new generation.

9. [Genes / Natural selection] is (are) responsible for inherited traits.

10. [Natural selection / Genes] cause(s) the frequency of certain alleles in a population to vary over time.

11. [Isolation / Extinction] is the condition in which two populations of the same species cannot breed with one another.

12. Generally, when the individuals of two related populations can no longer breed with one another, the two populations are considered to be different [organisms / species].

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading

Section: Evidence of Evolution

In the space provided, write the letter of the term or phrase that best completes each statement or best answers each question.

_____ **1.** One hypothesized link between modern whales and hoofed mammals are
- **a.** fish.
- **b.** mesonychids.
- **c.** penguins.
- **d.** alligators.

_____ **2.** Links between major classes of vertebrates have been established by
- **a.** radiometric dating.
- **b.** inherited traits.
- **c.** the fossil record.
- **d.** patterns of development.

_____ **3.** Most scientists agree that
- **a.** Earth is 4.5 billion years old.
- **b.** Earth has supported life for most of its history.
- **c.** Living organisms share ancestry with earlier, simpler life-forms.
- **d.** All of the above

_____ **4.** The fossil record
- **a.** proves the existence of every species that has ever lived.
- **b.** cannot show patterns of development from ancestors to descendants.
- **c.** shows strong evidence that evolution takes place.
- **d.** cannot show change over time in species.

_____ **5.** A paleontologist is a scientist who studies
- **a.** fossils.
- **b.** theories.
- **c.** anatomy and development.
- **d.** biological molecules.

_____ **6.** Fossils form when organisms are rapidly buried in
- **a.** sand.
- **b.** grass.
- **c.** leaf litter.
- **d.** fine sediment.

Directed Reading *continued*

In the space provided, write the letter of the description that best matches the term or phrase.

_____ **7.** vestigial structures

_____ **8.** homologous structures

_____ **9.** vertebrate embryos

a. structures that have no use or little use and are evidence of an organism's evolutionary past

b. pharyngeal pouches and tails are evidence of evolution

c. structures that share a common ancestry

Complete each statement by writing the correct term or phrase in the space provided.

10. Species that diverged recently have _____ genetic differences than those species that are not closely related.

11. There is (are) _____ difference(s) between the amino acid sequences of the hemoglobin in humans and the hemoglobin in gorillas.

12. There is (are) _____ difference(s) between the amino acid sequences of the hemoglobin in humans and the hemoglobin in frogs.

13. There is (are) _____ difference(s) between the amino acid sequences of the hemoglobin in humans and the hemoglobin in rhesus monkeys.

14. Scientists are able to determine the exact amino acid sequence of a(n) _____ .

Read each question, and write your answer in the space provided.

15. How do scientists estimate the number of nucleotide changes that have taken place in a gene since two species diverged from a common ancestor?

_____

_____

16. How does comparison of amino acid differences between species provide evidence of evolution?

_____

Name _____ Class _____ Date _____

Skills Worksheet

Directed Reading

Section: Examples of Evolution

Complete each statement by writing the correct term or phrase in the space provided.

1. The _____ presents many different challenges to an individual's ability to reproduce.
2. Organisms tend to produce more _____ than their environment can support.
3. All populations have genetic _____ .
4. Individuals of a species often _____ with one another to survive.
5. Individuals within a population that are better able to cope with the challenges of their environment tend to leave _____ offspring than those less suited to the environment.

Read each question, and write your answer in the space provided.

6. What is antibiotic resistance?

_____

_____

7. Describe the study conducted by Peter and Rosemary Grant.

_____

_____

8. What was the environmental challenge in the Grants' study?

_____

_____

9. What was the effect of natural selection on beak size in the Grants' study?

_____

_____

In the space provided, explain how the terms in each pair differ in meaning.

10. divergence, speciation

_____

_____

11. subspecies, species

_____

_____

Complete each statement by writing the correct term or phrase in the space provided.

12. In frogs, different mating seasons are a(n) _____ to reproduction.

13. Reproductive _____ is the inability of formerly interbreeding groups to mate or produce fertile offspring.

14. The way that natural selection leads to the formation of new _____ has been thoroughly documented.