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Name:_____ Class:_____ Date:_____

Chapter 01 - The Nature of Life

1. The science of ____ explains the origin and persistence of life, and studies the changes in living things.
   a. nanotechnology
   b. biology
   c. pharmacology
   d. mathematics
   e. chemistry

ANSWER: b

2. The difference between living and nonliving matter depends not only on the kinds of atoms and molecules present but also on their ____ as well.
   a. chemical complexity
   b. electrons
   c. organization
   d. atomic profile
   e. energy levels

ANSWER: c

3. A cell is minimally defined by ____.
   a. a nucleus that contains DNA and directs cell activities
   b. an organized chemical system and specialized molecules and structures enclosed by a membrane
   c. an organized chemical system that harnesses and uses energy for cellular processes
   d. a membrane made of phospholipids that encloses and protects the cell
   e. specialized molecules that detect and respond to environmental changes

ANSWER: b

4. The lowest level of biological organization that can survive and reproduce is the ____.
   a. cell
   b. tissue
   c. proton
   d. nucleus
   e. DNA

ANSWER: a

5. Emergent properties are ____.
   a. characteristics of atoms but not molecules
   b. characteristics that depend on the level of organization and do not exist at lower levels
   c. characteristics of nonliving matter that depend on the level of organization
   d. dependent on higher levels of organization of living and nonliving matter
   e. characteristics of all multicellular organisms but not unicellular organisms

ANSWER: b

6. Bacteria and protozoans ____.
   a. are unicellular or multicellular organisms
   b. are solely found in oceans

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c. are multicellular organisms
d. are unicellular organisms
e. are precursors to cells

ANSWER: d

7. Every population of animals has an age structure, a graphical representation of the distribution of age groups within the population. While each individual in a population has a specific age, individuals themselves do not have an age structure. Age structure is therefore an example of a(n) ____ property.
a. emergent
b. hierarchical
c. environmental
d. organizational
e. cellular

ANSWER: a

8. A group of organisms of the same species that live together in the same place make up a(n) ____.
a. population
b. cell
c. biosphere
d. tissue
e. ecosystem

ANSWER: a

9. All of the populations of different organisms that live in the same place form a(n) ____.
a. ecosystem
b. community
c. biosphere
d. sample
e. organ

ANSWER: b

10. The highest level of the hierarchical classification of life is the ____.
a. biosphere
b. domain
c. ecosystem
d. population
e. cell

ANSWER: b

11. Which term describes a community and the nonliving environmental factors with which it interacts?
a. Ecosystem
b. Planet
c. Multicellular organism
d. Biosphere

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e. Community

ANSWER: a

12. Monkeys, trees, snakes, moss, birds, sunlight, rain, rocks, and bugs together would be considered a(n) ____.
a. population
b. ecosystem
c. biosphere
d. community
e. organism

ANSWER: b

13. Which group would be considered a community?
a. Fish, birds, alligators, water
b. A group of alligators
c. Polar bears, seals, fish
d. Pandas, bamboo, and mountains
e. A group of seaweed

ANSWER: c

14. The distribution of coat-color variants (e.g. black, brow, and gray), within a group of squirrels, is classified as a/an____.
a. organism
b. community
c. population
d. ecosystem
e. biosphere

ANSWER: c

15. The molecule that distinguishes living systems from nonliving matter is ____.
a. protein
b. DNA
c. fructose
d. water
e. glucose

ANSWER: b

16. The large, double-stranded, helical molecule that contains instructions for assembling a living organism from simpler molecules is ____.
a. RNA
b. DNA
c. ATP
d. protein
e. NADPH

ANSWER: b

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17. The information in DNA is copied into molecules of ____.
    a. RNA
    b. carbohydrates
    c. lipids
    d. oxygen
    e. hydrogen peroxide

ANSWER: a

18. The process by which information in genes guides the production of RNA and proteins is called ____.
    a. translation
    b. gene expression
    c. synthesis
    d. cellular respiration
    e. transcription

ANSWER: b

19. Photosynthesis and cellular respiration are examples of ____.
    a. catabolism
    b. cleavage
    c. anabolism
    d. synthesis
    e. metabolism

ANSWER: e

20. The process by which cells break down complex molecules in the presence of oxygen to release energy is called ____.
    a. anabolism
    b. photosynthesis
    c. metabolism
    d. translation
    e. cellular respiration

ANSWER: e

21. The steady internal state maintained by controlled responses in living organisms is called ____.
    a. metabolism
    b. photosynthesis
    c. cellular respiration
    d. development
    e. homeostasis

ANSWER: e

22. Maintaining your body's internal temperature within a narrow tolerable range is one example of ____.
    a. perspiration
    b. compensation

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c. homeostasis
d. respiration
e. hydrolysis

ANSWER: c

23. The process by which parents produce offspring is called ____.
a. feeding
b. homeostasis
c. compensation
d. artificial selection
e. reproduction

ANSWER: e

24. Inheritance is the process by which genetic information is ____.
a. transmitted to offspring in the form of RNA
b. transmitted to offspring in the form of DNA
c. transcribed from DNA into RNA
d. transmitted to offspring in the form of proteins
e. translated from RNA into proteins

ANSWER: b

25. A series of programmed changes encoded in DNA, through which a fertilized egg divides into many cells that ultimately are transformed into an adult organism, is known as ____.
a. transformation
b. development
c. inheritance
d. homeostasis
e. compensation

ANSWER: b

26. The sequential stages through which individuals develop, grow, maintain themselves, and reproduce are collectively known as the ____.
a. central dogma
b. catabolic reactions
c. anabolic reactions
d. transformation
e. life cycle

ANSWER: e

27. Populations of all organisms change from one generation to the next because their DNA changes over time. This is known as ____.
a. developmental selection
b. cellular respiration
c. experimental variables

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d. genomics
e. biological evolution

ANSWER: e

28. Our understanding of the evolutionary process reveals that ____.
a. favorable traits become less common in future generations
b. all populations are related through a shared ancestry
c. evolution has produced the spectacular diversity of life on Earth
d. all organisms change from generation to generation
e. development has produced the spectacular diversity of life on Earth

ANSWER: c

29. In the mid-nineteenth century, Charles Darwin and Alfred Russel Wallace observed many organisms. Based on these observations, they arrived at an explanation called ____ to explain how populations change over time.
a. creationism
b. natural evolution
c. natural selection
d. genetics
e. evolution

ANSWER: c

30. because bulldogs were bred to have a large head size, they can no longer give birth naturally. This change over time is known as____.
a. artificial breeding
b. artificial selection
c. artificial evolution
d. artificial engineering
e. artificial insemination

ANSWER: b

31. Which of the following statements are TRUE?
a. Mutations are bad for populations
b. Mutations are good for populations
c. Mutations are harmful for individuals
d. Mutations are the basis of homogeneity in a population
e. Mutations are the basis of variability among individuals

ANSWER: e

32. Which mutation is an example of an adaptation?
a. A mutation results in decreased sperm count in humans.
b. A mutation is found to be the cause of Alzheimer's disease.
c. A mutation results in hairless cats, reducing allergies in humans.
d. A mutation increases the size of tomato plants.
e. A mutation renders an individual immune to HIV infection.

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ANSWER: e

33. A group of organisms in which the individuals are so closely related in structure, biochemistry, and behavior that they can successfully interbreed is a(n) ____.
    a. class
    b. genus
    c. order
    d. species
    e. kingdom

ANSWER: d

34. A group of similar species that share recent common ancestry is a(n) ____.
    a. class
    b. order
    c. species
    d. kingdom
    e. genus

ANSWER: e

35. A randomly selected group of organisms from an order would show more genetic and anatomical variability than a similar group picked from a _____.
    a. kingdom
    b. genus
    c. domain
    d. phylum
    e. class

ANSWER: b

36. The scientific name of an organism is composed of two names. The first part identifies the ____ while the second part designates the ____.
    a. family; genus
    b. genera; genus
    c. genus; species
    d. species; genus
    e. phylum; species

ANSWER: c

37. Which of the following scientific names is written in the correct format?
    a. *canis Familiaris*
    b. *c. Latrans*
    c. *Canis Lupus*
    d. *Canis latrans*
    e. *Canis Familiaris*

ANSWER: d

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38. The most fundamental grouping in the classification of living organisms is the ____.
    a. family
    b. genus
    c. order
    d. species
    e. class

ANSWER: d

39. The group that is the most inclusive and has recently been added to the classification scheme is ____.
    a. animalia
    b. kingdom
    c. eukarya
    d. protista
    e. domain

ANSWER: e

40. Which pair of organisms would be classified as prokaryotes?
    a. Fungi and Plantae
    b. Bacteria, Archaea, and Fungi
    c. Animalia and Plantae
    d. Fungi, Plantae, and Animalia
    e. Bacteria and Archaea

ANSWER: e

41. A cell that is observed under the microscope is found to have its DNA enclosed in a nucleus and has other specialized internal compartments. The cell is a(n) ____.
    a. bacterium
    b. *E. coli*
    c. prokaryote
    d. eukaryote
    e. archaean

ANSWER: d

42. A researcher in a lab finds a microscopic organism that has no nucleus, but has distinctive structural molecules and mechanisms of photosynthesis. The organisms are abundant in virtually every habitat on Earth. What hierarchy does the researcher state this organism belongs to?
    a. Bacteria
    b. Animalia
    c. Eukarya
    d. Protist
    e. Amoeba

ANSWER: a

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43. A researcher in a lab finds a unicellular organism without a nucleus thriving in hot springs. The researcher will correctly identify this organism as belonging to the ____.

a. Domain amoeba
b. Domain Eukarya
c. Domain Archaea
d. Kingdom Animalia
e. Kingdom Protists

ANSWER: c

44. A student encounters an organism whose cells contain a nucleus is classified as a(n) ____.

a. bacteria
b. archaea
c. eukarya
d. amoeba
e. animalia

ANSWER: c

45. The algae used to make sushi rolls are classified as ____.

a. bacteria
b. animals
c. plants
d. fungi
e. protists

ANSWER: e

46. The pages of your textbook consist mainly of material made by multicellular, photosynthetic organisms that function as producers in ecosystems. These organisms belong to the kingdom ____.

a. fungi
b. bacteria
c. protista
d. plantae
e. animalia

ANSWER: d

47. Shitake mushrooms are decomposers that break down biological molecules from dead organisms. These organisms belong to the ____ kingdom.

a. protista
b. animalia
c. bacteria
d. fungi
e. plantae

ANSWER: d

48. Cats, dogs, and fish are consumers that have the ability to move actively from one place to another. These organisms

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belong to the ____ kingdom.

a. animalia
b. bacteria
c. protista
d. fungi
e. plantae

ANSWER: a

49. What step of the scientific method requires the use of deductive reasoning to outline what you expect to observer if your observations are correct?.

a. Observation
b. Hypothesis statement
c. Statement of prediction
d. Experimentation
e. Interpretation

ANSWER: c

50. The observations you make and experimental data you collect in your biology investigation are examples of ____.

a. biological research
b. statistical analysis
c. hypothesis building
d. biological dogma
e. model systems

ANSWER: a

51. A biologist who searches for explanations about natural phenomena related to living systems practices ____.

a. artificial science
b. basic research
c. general research
d. applied research
e. simple research

ANSWER: b

52. Applied researchers conduct their work to ____.

a. answer all questions
b. prove hypotheses
c. solve any problem they face
d. solve specific practical problems
e. advance our collective knowledge of living systems

ANSWER: d

53. When conducting descriptive research, a scientist primarily uses ____.

a. experiments
b. experimental data

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c. control data
d. observational data
e. speculation

ANSWER: d

54. A structured approach in which scientists make observations about the natural world, develop tentative explanations about what they observe, and then test those explanations by collecting more information is referred to as ____.
a. science
b. the biological method
c. education
d. the scientific method
e. biology

ANSWER: d

55. You are studying an ecosystem on your campus. After a solid base of carefully observed and described facts, your next step would be to ____.
a. make more observations
b. make a hypothesis
c. share your data with others
d. wait for instructions
e. design an experiment

ANSWER: b

56. What is the correct order of the basic steps of the scientific method?
a. Observe→hypothesize→predict→experiment→interpret
b. Predict→hypothesize→experiment→observe→interpret
c. Hypothesize→observe→predict→experiment→interpret
d. Observe→predict→hypothesize→experiment→interpret
e. Hypothesize→predict→experiment→observe→interpret

ANSWER: a

57. What is it called when researcher expects to happen to one variable if another variable changes ?
a. Observational variable
b. Hypothesis
c. Experimental variable
d. Theory
e. Scientific research

ANSWER: b

58. When a student manipulates a system under study, they are collecting ____.
a. factual data
b. analytical data
c. experimental data
d. empirical data

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e. observational data

ANSWER: c

59. In order to determine where a protein is expressed within a cell, a researcher tags the protein with a fluorescent label and then views the cell using a fluorescence microscope. The location of the protein within the cell as determined by the researcher is considered the ____.

a. experimental data
b. predicted data
c. observational data
d. replicate data
e. experimental variable

ANSWER: c

60. Scientists want to determine whether chemical X, a component of fertilizer, is harmful to fish. They treat fish in the laboratory with increasing amounts of the chemical for one week and then measure their viability. Fish that are not treated with chemical X are considered ____.

a. experimental data
b. controls
c. replicates
d. experimental variables
e. the null hypothesis

ANSWER: b

61. Scientists want to determine whether chemical X, a component of fertilizer, is harmful to fish. They treat fish in the laboratory with increasing amounts of the chemical for one week and then measure their viability. What is the independent variable for this experiment?

a. Chemical X
b. Fish
c. River
d. Farming
e. Water

ANSWER: a

62. Scientists want to determine whether chemical X, a component of fertilizer, is harmful to fish. They treat fish in the laboratory with increasing amounts of the chemical for one week and then measure their viability. When researchers designed this experiment, they wrote "chemical X is toxic to fish" in their lab notebook. This statement is a(n) ____.

a. interpretation
b. prediction
c. hypothesis
d. result
e. theory

ANSWER: c

63. Scientists want to determine whether chemical X, a component of fertilizer, is harmful to fish. They treat fish in the laboratory with increasing amounts of the chemical for one week and then measure their viability. When researchers

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designed this experiment, they wrote "If chemical X is toxic, the fish will begin to look sick and die." This statement is a(n) ____.

a. interpretation
b. theory
c. hypothesis
d. result
e. prediction

ANSWER: e

64. Scientists structure hypotheses in such a way that if they are wrong, researchers will be able to demonstrate that the hypothesis is wrong. This is the principle of ____.

a. falsifiability
b. the null hypothesis
c. fallibility
d. hierarchy
e. errors

ANSWER: a

65. Why are model organisms favored in biological research?

a. They are difficult to rear in laboratory settings.
b. They evolve slowly compared with most species.
c. They develop rapidly and have short life cycles.
d. They have minimal molecular processes in their cells.
e. They have unique molecular processes compared to other organisms.

ANSWER: c

66. When controlled experiments are not feasible, research scientists test hypotheses using ____.

a. philosophy and logic based on limited empirical data
b. descriptive speculation without measuring anything
c. observation-based research methods
d. randomized guessing and informal opinions
e. unfalsifiable predictions that cannot be tested

ANSWER: c

67. Within an organism, all cells have the same ____, whereas different cell types contain different ____.

a. RNA; genes
b. protein; RNA
c. genes; proteins
d. RNA; protein
e. proteins; genes

ANSWER: c

68. In the scientific method, which step compares experimental results with predictions?

a. Observe

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b. Interpret
c. Experiment
d. Hypothesize
e. Predict

ANSWER: b

69. Which level of biological organization do the *Culex* mosquitos living in a marshland habitat represent?
a. Community
b. Population
c. Ecosystem
d. Organism
e. Biosphere

ANSWER: b

70. Which level of biological organization involves studying how land-use changes affect animal behavior?
a. Population
b. Community
c. Ecosystem
d. Organism
e. Cell

ANSWER: c

71. A research scientist studies the mortality rate of women with breast cancer, ages 35–45. In this example, what level of organization is the research focus?
a. Population
b. Community
c. Ecosystem
d. Biosphere
e. Organism

ANSWER: a

72. Which level of biological organization is studied when analyzing the global impacts of greenhouse gases?
a. Biosphere
b. Community
c. Ecosystem
d. Population
e. Organism

ANSWER: a

73. At which level of organization do mechanisms of human learning occur?
a. Biosphere
b. Community
c. Ecosystem
d. Organism

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e. Population

ANSWER: d

74. What of the three highest levels of classification is comprised of unicellular and multicellular organisms that contain a nucleus?

a. Domain Eukarya
b. Domain Bacteria
c. Protist
d. Kingdom Plantae
e. Kingdom Fungi

ANSWER: a

75. Which multicellular organism functions as a producer?

a. Domain Eukarya
b. Domain Bacteria
c. Protist
d. Kingdom Plantae
e. Kingdom Fungi

ANSWER: e

76. Which domain includes unicellular organisms with unique structural molecules and primitive photosynthesis?

a. Domain Eukarya
b. Domain Archaea
c. Domain Bacteria
d. Kingdom Plantae
e. Kingdom Fungi

ANSWER: b

77. Which domain includes multicellular organisms that function as consumers and can move?

a. Domain Eukarya
b. Domain Archaea
c. Protist
d. Kingdom Animalia
e. Kingdom Plantae

ANSWER: d

78. Which kingdom includes species that can be producers, consumers, or decomposers and may be unicellular or multicellular?

a. Domain Eukarya
b. Domain Archaea
c. Protist
d. Kingdom Plantae
e. Kingdom Fungi

ANSWER: c

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79. Which domain includes prokaryotic organisms that inhabit extreme environments?
    a. Domain Eukarya
    b. Domain Archaea
    c. Protist
    d. Kingdom Plantae
    e. Kingdom Fungi

ANSWER: b

80. Which kingdom includes decomposers that do not carry out photosynthesis?
    a. Domain Eukarya
    b. Domain Archaea
    c. Protist
    d. Kingdom Plantae
    e. Kingdom Fungi

ANSWER: e

Read the description of an experiment below, then answer the multiple-choice questions.
Previously, an anticholesterol drug was reported by a few patients as potentially alleviating the symptoms of Alzheimer's disease.
Hypothesis: Drug X will alleviate signs of Alzheimer's disease.
Experimental design: Patients with Alzheimer's disease are split into two groups: one group will receive Drug X and the other will receive a placebo (sugar pill).
Patients: A total of 400 patients with Alzheimer's disease were recruited for this study and randomly assigned to either the treatment or placebo group.
Treatment: Patients were treated for 90 days with either Drug X or a placebo.
Study measurements: Patients were assessed using a memory test before and after the treatment period.
Result: Patients given Drug X scored higher on the memory test.
Conclusions: Drug X can enhance memory in patients suffering from Alzheimer's disease.

81. In the experiment, what term describes multiple subjects tested under the same conditions?
    a. Control group
    b. Experimental variable
    c. Replicates
    d. Experimental group
    e. Hypothesis

ANSWER: c

82. What term refers to the patients treated with a placebo?
    a. Control group
    b. Experimental variable
    c. Replicates
    d. Experimental group
    e. Hypothesis

ANSWER: a

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83. What term reflects the patients who were assessed using a memory test?
a. Control group
b. Experimental variable
c. Replicates
d. Experimental results
e. Hypothesis
ANSWER: c

84. What is Drug X identified as in this study?
a. Control group
b. Experimental variable
c. Replicates
d. Experimental results
e. Hypothesis
ANSWER: b

85. What term refers to the patients who were on an anticholesterol drug?
a. Experimental group
b. Control group
c. Replicates
d. Experimental results
e. Hypothesis
ANSWER: a

86. You are at the stage in your research when you must design an experiment to test your hypothesis. Which factors must you include to ensure that you obtain valid data?
ANSWER: A valid experimental design must include a control group that does not receive the treatment, an experimental group exposed to the independent variable, and sufficient replicates to ensure reliable and reproducible results.

87. Explain the need for a null hypothesis, especially in ecology and evolution. What does a null hypothesis accomplish?
ANSWER: A null hypothesis is a statement of what a researcher would see if the hypothesis being tested is wrong. Ecologists usually tackle systems that are too complex to control, so a null hypothesis confirms there is no effect on the relationship, while an alternative hypothesis confirms a relationship exists.

88. Why do scientists use model organisms?
ANSWER: Model organisms have rapid development, short life cycles, and small adult sizes, making them ideal to work with in a laboratory setting. Many forms of life share similar molecules, structures, and processes; thus, research on these small and often simple organisms provides insights into biological processes that operate in larger and more complex organisms.

89. List the Darwin's and Wallace's observations and conclusions explaining biological evolution.
ANSWER:
1. Most organisms can produce numerous offspring, but environmental factors limit the number that actually survive and reproduce.
2. Heritable variations allow some individuals to compete more successfully for space, food, and mates.
3. These successful individuals somehow pass the favorable characteristics on to their offspring.

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4. As a result, the favorable traits become more common in the next generation, and less successful traits become less common.

90. Scientific theories are of fundamental importance in science. Explain the difference between the term "theory" as employed in science versus "theory" as employed in everyday language.
ANSWER: Scientific theories have withstood the test of time and have been extensively confirmed by repeated experiments. The term as used in science has validity, whereas in everyday contexts, it takes the form of an opinion or a guess that is not confirmed as extensively.

91. Populations can be described in terms of their diversity and stability.
ANSWER: False - Communities

92. The process by which RNA is converted into protein is called transcription.
ANSWER: False - translation

93. The process by which producers harness electromagnetic energy and convert it into chemical energy is cellular respiration.
ANSWER: False - photosynthesis

94. Although Darwin and Wallace understood the central importance of heritability among organisms to the process of evolution, they could not explain how new variations arose or how they were passed to the next generation.
ANSWER: True

95. Genetic differences that increase reproductive success spread through populations over generations.
ANSWER: True

96. Internal body temperature in humans is regulated primarily by behavioral mechanisms.
ANSWER: False - homeostatic

97. Favorable mutations may produce adaptations.
ANSWER: True

98. Protists do not constitute a kingdom because they do not share a unique common ancestor.

ANSWER: True

99. Much of our understanding of how large organisms respond to environmental variation is based on observations of model species.
ANSWER: True

100. Researchers who study the impact of nitrogen-based fertilizers on increasing crop growth use applied research methods.
ANSWER: True

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