Student name:_____

MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.

1) The property of living organisms that involves a unique and complex molecular organization is called

A) growth.
B) development.
C) metabolism.
D) reproduction.
E) chemical uniqueness.

2) A characteristic of science is

A) it is not explained by natural laws.
B) its hypotheses are testable.
C) its conclusions are final.
D) it is not falsifiable.
E) it seeks to define the vitalistic forces of life.

3) A cell dies and its complex organic molecules degrade into a mass of simple molecules no more organized than the nonliving matter outside the cell. This feature of life, which is now lost, is

A) growth and reproduction.
B) adaptability.
C) metabolism.
D) irritability.
E) complexity and hierarchical organization.

4) Which hierarchy of organization is seen in multicellular organisms such as animals, going from smallest to largest?

A) cell, organ, tissue, organism
B) cell, organ, organ system, tissue
C) cell, tissue, organ system, organism
D) organism,

organ system, organ, tissue

E) tissue, organ system, cell, organism

5) The structure of a brick does not predict the design of a home. Study of muscle tissues does not allow you to predict the design of a bird or snake. Such examples demonstrate

A) the essential properties found in all forms of life.

B) the hierarchy of organization from atom to biosphere.

C) deterministic philosophy or how all phenomena are predictable effects of causes.

D) emergent properties that cannot be predicted by examining component parts.

6) Which of the following characteristics is NOT required for the life of an individual organism to continue?

A) chemical uniqueness and organization

B) response to stimuli

C) evolution

D) a genetic program to control cell processes

7) Which statement about living things is FALSE?

A) Living things are made up of cells.

B) Living things obey the laws of chemistry and physics.

C) Living things show organization and other common characteristics of life.

D) Emergent properties arise from interactions among the components of a system.

E) Living things are composed only of organic elements, whereas nonliving things are made up of inorganic elements.

8) "Self-replicating molecular assemblage" is a classic definition of life. However, clay particles in clay soil contain aluminum and iron compounds that determine the pattern of particles in adjacent layers over time and, therefore, represent a self-replicating molecular assemblage. What can we conclude?

a simple repetitive process without the ability to evolve or respond to the environment.

A) Clay soil is living.
B) Clay soil is not living because there was no molecular change involved.
C) Clay soil is not living because no carbon is involved; otherwise, such replication would be living.
D) Clay soilis not living because what is described is

9) All of the chemical energy transformations that occur within a cell constitute

A) evolution.
B) metabolism.
C) adaptation.
D) homeostasis.

10) "Cryptobiosis" is a state of almost total water loss found in some roundworms, rotifers, and tardigrades and was previously considered a *near cessation* of metabolism. Recently, a British Museum botanist accidentally spilled fluid on a120+year-old herbarium mount of a lichen. Fearing damage to the specimen, he immediately inspected it under the microscope and found tardigrades "waking up." This observation

A) supports the claim that the tardigrades were dead but began respiring again at a very slow rate after the fluid was added.
B) makes it possible that we can bring most dead animals back to life.
C) contradicts both the cell theory and evolutionary theory.
D) indicates metabolism did not stop, and that organization and water made it sufficient to maintain the possibility for "life."

11) Reproduction of organisms involves the apparently contradictory phenomena of

A) cellular and noncellular structures.
B) catabolism and anabolism.
C) adaptation and evolution.
D) variation and heredity.

12) The main function of a genetic program is to

A) maintain metabolism in living systems.
B) respond to environmental stimuli.
C) provide fidelity of inheritance and allow for genetic variation.
D) regulate development of multicellular creatures.

13) A molecular pathway in the liver that is responsible for breaking down complex molecules into simple molecules for excretion as wastes is an example of

A) anabolism.
B) catabolism.
C) adaptation.
D) entropy.

14) Embryos, larvae, and metamorphosis are related to which characteristic of living systems?

A) development
B) metabolism
C) movement
D) environmental interaction

15) Irritability is related to which general property of living systems?

A) development
B) metabolism
C) evolution
D) environmental interaction

16) Which statement about environmental interaction is NOT correct?

A) The study of organisms and their interactions with the environment is called ecology.

B) To study ecology, we must separate living organisms from their environment.

C) The evolutionary history of a lineage is connected to the environment where it lived.

D) Organisms are intimately connected with their physical environment.

17) Which best describes the first law of thermodynamics?

A) Energy is neither created nor destroyed, but it can change from one energy form to another.

B) Energy can be created from matter or used to produce matter.

C) Useful energy is lost as heat whenever an energy transfer occurs.

D) Energy transfers are always 100% efficient in changing energy from one form to another.

18) The second law of thermodynamics, or entropy law, means that for living organisms

A) maintaining cellular organization requires continual energy input.

B) there is a tendency in nature to greater molecular organization.

C) energy stored by plants is unavailable for animals.

D) energy is of less concern than matter.

19) Which is consistent with the laws of physics governing energy?

A) As a car burns gasoline, 100% of the fuel energy goes into moving the car along the road.

B) You eat a "quarter-pounder" hamburger and assemble exactly a quarter pound of additional body weight on your body.

C) Sunlight that is absorbed on the earth eventually returns to space as dispersed heat.

D) Chemical bonds are an example of converting energy to matter; breaking the bonds converts matter to energy.

20) Science cannot yet describe "thinking" in physical terms. However, we know that it involves metabolism within brain cells. With positron emission tomography (PET) scan or activity nuclear magnetic resonance (NMR) it is possible to image the regions of the brain that are most metabolically active during various mental activities. For different mental functions, different regions and nerve cells become active. However,

A) the cellular energy expended in "thinking" must be less than the chemical bond energy supplied in food to these brain cells.

B) "thought" cannot be linked to cell processes because energy is not related to matter.

C) since thoughts can repeat, the requirement for a continual input of energy to prevent entropy does not apply to this cell activity.

D) "thinking" is beyond the scope of science to study.

21) Living organisms represent stored energy in the form of chemical compounds. When they die, what happens to this stored energy?

A) Chemical compounds immediately begin to lose their high energy bonds.

B) Chemical compounds immediately begin to degrade into basic elements.

C) Macromolecules in cells begin to lose their organization because there is no longer an input of energy to maintain the organized state.

D) Macromolecules in cells remain in place and ready for use unless digested by a consumer or decay organism.

22) Eventually the sun will swell to become a red giant star. This red giant will engulf the earth and then "burn out." All forms of energy will be dispersed in a final "heat death." Compared with conditions today, the total entropy of the universe then will

A) have increased only slightly.

B) have decreased greatly.

C) have increased greatly.

D) None of the choices are correct.

23) Which kingdom contains multicellular organisms that ingest their food?

A) protista
B) animalia
C) plantae
D) fungi

24) Which kingdom contains organisms that obtain their food by absorption through hyphae and never develop from embryos?

A) protista
B) animalia
C) plantae
D) fungi

25) During the creation court case in Arkansas, Judge Overton defined the essential properties of science. Which statement is NOT true about science?

A) Science is concerned about understanding the natural world.
B) Science approaches data in a personal or subjective manner.
C) Conclusions of science are subject to change based on new findings.
D) Science establishes hypotheses that have the potential to be tested and disproved.

26) Much of science is based on an approach known as the _____ method.

A) natural
B) inductive-deductive
C) hypothetical
D) hypothetico-deductive

27) What is a hypothesis?

A) A tentative statement, based on information or data, that explains a large number of observations and guides experimentation
B) A report of the findings of scientific experiments
C) A general

statement made to infer a specific conclusion, often in an "if . . . then" format

D) Using isolated facts to reach a general idea that may explain a phenomenon

28) Which statement about a hypothesis is NOT correct?

A) Experiments or observations are conducted to test a hypothesis.

B) A hypothesis can be tested many times using different methods.

C) Data that support a hypothesis actually prove the hypothesis to be true.

D) If data from experimentation does not lend support to a hypothesis, the hypothesis must be rejected or revised.

29) Which of the following terms best describes a conceptual scheme in science that is strongly supported, has not yet been found incorrect, and is based on the results of many observations?

A) a scientific paradigm

B) descriptive research

C) a scientific theory

D) experimental results

30) Powerful theories that guide a broad range of research are

A) scientific models.

B) scientific revolutions.

C) scientific principles.

D) scientific paradigms.

31) When the paradigms of science are shifted or replaced, we consider this a

A) scientific discovery.

B) scientific revolution.

C) change in scientific principles.
D) theoretical breakthrough.

32) Attempting to understand proximate or immediate causes in biology requires a(n) _____ approach.

A) evolutionary
B) descriptive
C) theoretical
D) experimental

33) What is the goal of using the experimental method to investigate proximate causes in biology?

A) to disprove biological principles or theories
B) to test our understanding of a biological system
C) to better mankind by inventing something unique
D) to prove or disprove the existence of God

34) To have a frame of reference against which to compare experimental findings, a scientist must

A) study two groups: a control group and an experimental group.
B) eliminate all expectations that might cause a biased interpretation of the results.
C) have other scientists look at the results.
D) do nothing; a "frame of reference" is not necessary.

35) Which statement is NOT correct about experimental design?

A) All conditions are held the same except for the condition being tested for in the experimental group.
B) It is best to use identical subjects (except for the treatment in the experimental group) in order to reduce the uncontrolled factors.
C) The condition being tested in an experiment is the "control".

D) Statistical comparisons are made between groups to determine if any difference is beyond random chance.

36) Which best describes a control group in an experiment?

A) a group with the condition that is being tested

B) a non-random sample taken through all experimental steps

C) a variable that is being deliberately varied in the experiment

D) a group that lacks the disturbance experienced by the experimental group

37) Some ecologists study complex interactions of animals and plants in forests. Such field research produces slightly different results for different researchers. In contrast, ecology experiments performed indoors with one organism in a terrarium usually produce results that are repeatable. What is the most likely explanation?

A) The scientific method is only useful in laboratory settings.

B) It is not possible to establish a control group outside of a laboratory.

C) It is easier to hold all but one variable constant in a laboratory.

D) Fieldwork is evolutionary; laboratory work is experimental.

38) A person goes around banging a drum each day. You ask him why. He replies, "To drive off the tigers!" You reply "But there aren't any tigers around here." He replies, "See, it works!" From a science viewpoint, this conclusion

A) is science because it is predictive of what will happen tomorrow morning.

B) is scientifically valid because there is probably a connection between loud noise and absence of tigers.

C) is not valid unless there is the potential for tigers to be here, or a test is run with tigers.

D) cannot be scientifically treated because it involves human behavior.

39) From Missouri to central Ohio to Pennsylvania, many people believe that they have water moccasins ("cottonmouth snakes") in their farm ponds. Many have "seen them" although they are not so foolish as to try to capture one alive. Meanwhile, the wildlife officers and the range maps in the herpetology books say that cottonmouths do not breed this far north. What is the most scientific attitude to assume on this issue?

A) Observations by both the public and the fish and game officers are subjective, so this is not possible to resolve objectively.

B) A field trip to the pond locations to confirm the identity of the snakes would settle the matter.

C) Scientific books with range maps are based on field research and, therefore, determine the truth in this case.

D) Because living organisms are active, scientific theories in biology always change and the older books are therefore wrong.

40) Which of the following questions addresses an ultimate cause in biology that could be studied using the comparative method?

A) How does an animal maintain a constant body temperature in different environmental conditions?

B) What are the evolutionary factors that caused some species of birds to acquire complex patterns of seasonal migration between North and South America?

C) What are the environmental factors that signal the birds of a particular species to begin their seasonal migration?

D) What are the receptors for geomagnetism in Monarch butterflies?

41) The theory of evolution, along with all other theories in science

A) has been proven in a mathematical sense.

B) is mere speculation.

C) is testable, tentative, and potentially falsifiable.

D) is so powerful that no conceivable evidence could possibly refute it.

42) The theory that all

forms of life descended from a common ancestor through a branching of lineages constitutes Darwin's theory of

A) perpetual change.
B) common descent.
C) multiplication of species.
D) natural selection.

43) The statement that the large anatomical differences that separate the major groups of animals originated through the accumulation of many small incremental changes over long periods of time illustrates Darwin's theory of

A) perpetual change.
B) multiplication of species.
C) gradualism.
D) All of the choices are correct.

44) The principle of natural selection is founded in which of the following statements?

A) Organisms vary, and some variations provide an advantage for survival.
B) All organisms tend to overproduce their kind.
C) There is a struggle for existence among varying organisms in a population.
D) All of these choices together represent the principle of natural selection.

45) Which of these is a variation of form, function, or behavior that promotes the likelihood of a species' continued existence?

A) evolution
B) metabolism
C) adaptation
D) homeostasis

46) What was the major obstacle that Darwin's theory of natural selection faced when first proposed in 1859?

structures.

A) It lacked a valid theory of heredity.
B) It was unable to explain adaptation.
C) It could not explain the origins of new anatomical
D) It required unreasonably long periods of time to operate.

47) Although antibiotics are a very valuable resource in fighting infection, sometimes their use results in gastrointestinal upsets such as diarrhea. Why might this upset occur?

intestine.

A) They may kill components of the microbiome which aid digestion.
B) They may block absorptive sites in the intestine.
C) They may kill protozoan colonists of the
D) They may act on muscle tissue to increase the rate of peristalsis of the intestine.

48) Which is an illustration of heritability without variability?

laboratory on a meat-based diet are brown in color, while tadpoles from the same clutch of eggs that are reared on a plant-based diet are tan in color.

A) A wood frog has a white stripe under her eye, and her offspring also have white stripes under their eyes.
B) An albino wood frog produces offspring without albinism.
C) A population of wood frogs in a pond increases in size over time.
D) Wood frog tadpoles that are reared in the

FILL IN THE BLANK. Write the word or phrase that best completes each statement or answers the question.

49) A group within an experimental design that is subjected to all the conditions except the experimental variable is called the _____.

50) A broad concept in science that is strongly

supported by many forms of evidence, is accepted by an overwhelming number of scientists, and has not yet been found to be incorrect is a _____.

51) The appearance of new characteristics at a given level of biological organization is known as emergence, and these characteristics are known as _____ properties.

52) Physiological sciences ask questions about the _____ causes underlying a biological system whereas the evolutionary sciences ask questions about the ultimate causes that have produced the system.

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

53) Explain Darwinian evolution as an emergent property of the population level of biological organization.

Answer Key

Test name: CH-01: Test Bank

1) E

2) B

3) E

4) C

5) D

6) C

7) E

8) D

9) B

10) D

11) D

12) C

13) B

14) A

15) D

16) B

17) A

18) A

19) C

20) A

21) C

22) A

23) B

24) D

25) B

26) D

27) A

28) C

29) C

30) D

31) B

32) D

33) B

34) A

35) C

36) D

37) C

38) C

39) B

40) B

41) C

42) B

43) C

44) D

45) C

46) A

47) A

48) A

49) control

50) theory

51) emergent properties

52) proximate

53) Answers will vary but should reflect the lack of ability to predict evolution from population level features.