Understanding Biology 2026 Release 1st edition Mason Test Bank

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Correct Answers are located at the end of each chapter.

CHECK ALL THE APPLY. Choose all options that best completes the statement or answers the question.

1) Darwin's theory of evolution is supported by many modern pieces of evidence.
   A) New estimates of the history of life on Earth
   B) Human population growth
   C) Comparative studies of animal structures
   D) Similarities in DNA of related species

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

2) Science is subdivided into specific areas of study, called disciplines. These divisions are artificial but are helpful to narrow the massive scope of scientific knowledge to a manageable amount. Given the brief definition of each listed discipline, which is likely to provide the best answer to a question about how fluid dynamics affect blood pressure in mammals?
   A) Biochemistry—study of chemical reactions needed for life function, usually at the cellular level
   B) Bioinformatics—use of technology to study and store biological data
   C) Biophysics—study of biological processes through physics
   D) Biology—study of life

3) Based on hierarchical levels of biological organization, which represents the broadest level?
   A) Endocrine system
   B) Three-toed sloths
   C) School of piranhas
   D) Amazon Basin
   E) Jaguars, giant anteaters, macaws, capybaras

4) Experiments are carried out to test a hypothesis by changing one variable at a time and including an unchanged variable termed
   A) an experimental variable.
   B) an altered variable.
   C) a control.
   D) a stable variable.

Understanding Biology 2026 Release 1st edition Mason Test Bank

5) The method of reasoning that uses construction of general principles by careful examination of many specific cases is called
   A) deductive reasoning.
   B) theoretical reasoning.
   C) hypothetical reasoning.
   D) inductive reasoning.
   E) experimental reasoning.

6) Dr. Calvo was trying to determine the cause of a mysterious epidemic affecting fish in the gulf of New Mexico. His proposal that the deaths were caused by an organism called a protist is considered
   A) an experiment.
   B) a hypothesis.
   C) a conclusion.
   D) a theory.
   E) a data set.

7) After Darwin concluded his voyage on the *Beagle*, he proposed that the process of natural selection was a mechanism for
   A) artificial selection.
   B) evolution.
   C) sexual selection.
   D) speciation.
   E) overpopulation of finches on the Galapagos Islands.

8) A scientific theory is
   A) a suggested explanation that accounts for observations.
   B) a way to organize how we think about a problem.
   C) a concept that is supported by experimental evidence that explains the facts in an area of study.
   D) a way to understand a complex system by reducing it to its working parts.

Understanding Biology 2026 Release 1st edition Mason Test Bank

9) Although a computer is not alive, it shares which fundamental property of life?
   A) Energy utilization
   B) Cellular organization
   C) Homeostasis
   D) Reproduction
   E) Heredity

10) A yellow jacket, an insect in the order Hymenoptera, stung you. Then a wasp, an insect in Hymenoptera, stung you as well. A hornet, an insect in Hymenoptera, stung you last. It is an observable pattern that all insects in this order must have stingers. The type of reasoning this represents is
   A) inductive reasoning.
   B) deductive reasoning.
   C) reductionism.
   D) comparative reasoning.

11) Darwin hypothesized that Galapagos finches
   A) had beaks that were adapted to allow them to eat local foods.
   B) had migrated from South America at least 14 times to account for the variation in species.
   C) were hybrids of South American and African finches.
   D) looked the same but had learned different behaviors that allowed them to eat different foods.

12) A suggested explanation that might be true and is subject to testing by further observations is
   A) an experiment.
   B) a generality.
   C) a hypothesis.
   D) a scientific principle.
   E) a theory.

Understanding Biology 2026 Release 1st edition Mason Test Bank

13) You are interested in studying online versus in person lectures. You propose two hypotheses. Based on the literature, you hypothesize that students attending in person biology lectures will have the same grades as students in online biology lectures. You develop an alternate hypothesis, which is that in person students will achieve better grades than online students. You decide to test your hypothesis by comparing grades of students in in person and online biology lectures over a semester. As a result of the experiment, you observe that the grades in the in person lectures and the grades in the online lectures are not significantly different. What do these observations allow you to do?

A) Reject both hypotheses
B) Accept the hypothesis without further question
C) Develop a scientific theory
D) Reject the hypothesis that states that in person students will achieve higher grades

14) Your microwave will not turn on, and you speculate that a circuit breaker in the house has been tripped. In scientific terminology, the steps you would take to figure this out would be described as

A) forming conclusions from the results of experiments.
B) developing an observation based on a hypothesis.
C) developing a hypothesis based on an observation.
D) testing a prediction generated from a hypothesis.

15) A student poses the question: How does the presence of dissolved salt affect the freezing point of water? To answer this question, the student set up two conditions. In the first condition, the student added salt to water in a container and referred to this condition as the variable. In the second condition, the student did not add any salt to water in a second container and referred to this condition as the control. The student took both containers and attempted to freeze the water at various temperatures to assess the freezing point. Would this be a valid experiment?

A) Yes, because there is more than one variable
B) Yes, because there is one variable and a control
C) No, because there is not more than one variable
D) No, because there is only one variable and a control

Understanding Biology 2026 Release 1st edition Mason Test Bank

16) The proposal that one type of organism can change gradually into another type over a long period of time is known as
    A) evolution.
    B) natural history.
    C) preconception.
    D) preservation.

17) Darwin's ideas on evolution were advanced for his time. His approach to science and natural selection were supported by which main tenant?
    A) Various organisms and their structures resulted from a spontaneous action.
    B) Species were unchangeable over the course of time.
    C) The world is fixed and constant.
    D) Operation of natural laws produces constant change and improvement.

18) Besides Darwin, the theory of evolution by means of natural selection was also independently proposed by
    A) Alfred Wallace.
    B) Charles Lyell.
    C) Thomas Malthus.
    D) Karl Popper.

19) The term that Darwin used to describe the concept that organisms with superior strength, behavior, or other attributes are more likely to survive and pass their traits to the next generation than those that are not so well endowed is called
    A) biological diversity.
    B) geometric progression.
    C) natural selection.
    D) superior beings.
    E) survival of modifications.

Understanding Biology 2026 Release 1st edition Mason Test Bank

20) A key contribution to Darwin's thinking was the concept of limits put on the geometric growth of populations by nature, originally proposed by
A) Charles Lyell.
B) Thomas Malthus.
C) Karl Popper.
D) Russel Wallace.

21) Darwin's book in which he described his views on evolution is
A) *Principles of Geology.*
B) *On the Principle of Population.*
C) *On the Origin of Species.*
D) *Survival of the Fittest.*

22) Recent discoveries of microscopic fossils have extended the known history of life to about
A) 3.5 billion years ago.
B) 2 billion years ago.
C) 4.5 billion years ago.
D) 1 billion years ago.

23) In California, a species of salamanders were geographically separated over time. The group that lived in southern California relied heavily on large gold blotches on their skin that helped to camouflage them from predators. The group that lived along the coast adopted a color pattern that mimicked a poisonous, colorful newt common to that area. Instead of being camouflaged, these salamanders advertised their colors. What type of selection process has occurred over time?
A) Artificial selection
B) Natural selection
C) Experimental selection
D) Theoretical selection

Understanding Biology 2026 Release 1st edition Mason Test Bank

24) The same basic array of bones is modified to give rise to the wing of a bat and the fin of a porpoise. Such anatomical structures are called
A) analogous.
B) uniform.
C) homologous.
D) inherited.
E) evolutionary modifications.

25) Structures that have similar functions but different evolutionary origions are said to be
A) homologous.
B) analogous.
C) inherited.
D) uniform.
E) evolved.

26) Which is the closest relative to a whale?
A) A shark
B) A hippopotamus
C) A goldfish
D) An eagle

27) Differences in domesticated animals over relatively short periods of time most likely occur through
A) natural selection.
B) adaptation.
C) evolution.
D) experimental selection.
E) artificial selection.

Understanding Biology 2026 Release 1st edition Mason Test Bank

28) If you were to design a long-term research study to determine why there are no human births in Lapland during the months of August, September, and October, you would need to also examine a comparison population of humans in which births took place every month. The primary reason for including a comparison population within the design of this experiment would be to
    A) accumulate more facts that could be reported to other scientists.
    B) test the effects of more than one variable at the same time.
    C) prove that there are no births in Lapland during August, September, and October.
    D) act as a control that would ensure that the results obtained are due to a difference in only one variable.

29) *Essay on the Principle of Population*, written by Thomas Malthus in 1798, influenced Darwin's thoughts as he struggled to understand what mechanisms could be at work to produce evolution. Malthus proposed that populations of animals and plants, including humans,
    A) increased arithmetically in numbers while the food supply only increased geometrically.
    B) increased geometrically in numbers while the food supply only increased arithmetically.
    C) decreased arithmetically in numbers while the food supply increased geometrically.
    D) increased geometrically in numbers while the food supply increased arithmetically.
    E) evolved from mainland to islands, thus explaining why the island flora and fauna resembled the mainland species so closely.

30) A student set up an experiment to test if plants give off water vapor. Fifty pea plants, growing in pots, were covered with individual glass containers and left overnight. The next morning, the inside of each lid was covered in droplets of water. The lab student concluded that plants generally give off water vapor. What critique would you make of the experimental design?
    A) There was no control so the water could have come from other sources such as air in the jar or the soil.
    B) There was not a large enough sample of pea plants used to get adequate data.
    C) The student did not have a clearly stated hypothesis before beginning the experiment.
    D) The experiment was not precise, meaning it was not reproducible.

Understanding Biology 2026 Release 1st edition Mason Test Bank

31) It is known that many trees lose their leaves in response to decreasing day length. As a result, you think that Gingko trees may also lose their leaves in response to decreasing day length. This statement is an example of
    A) deductive reasoning.
    B) an experiment.
    C) a hypothesis.
    D) a theory.

32) Multiple independent experiments have demonstrated that phytochrome helps trigger seasonal change responses in plants such as changing color and loosening of leaves. Plants have the ability to respond to seasonal changes in their surroundings. This statement is an example of
    A) deductive reasoning.
    B) an experiment.
    C) a hypothesis.
    D) inductive reasoning.
    E) a theory.

33) Plants are raised under artificial lights turned off and on by an electric clock. Some are given long periods of light, others short periods. This is an example of
    A) deductive reasoning.
    B) an experiment.
    C) a hypothesis.
    D) inductive reasoning.
    E) a theory.

34) Both walnut and Gingko trees lose their leaves in the fall when day length starts decreasing. Based on these observations, one may conclude that many tree species will lose their leaves in the fall in response to decreasing day length. This statement is an example of
    A) deductive reasoning.
    B) an experiment.
    C) inductive reasoning.
    D) a theory.

Understanding Biology 2026 Release 1st edition Mason Test Bank

35) Gingko trees are known to lose their leaves at a certain time each year throughout the United States. Based on this information, Gingko trees in China must behave the same way. These statements are an example of
   A) deductive reasoning.
   B) an experiment.
   C) inductive reasoning.
   D) a theory.

36) The primary difference between fungi and animals is that fungi
   A) digest their food externally.
   B) are photosynthetic.
   C) are multicellular.
   D) have nuclei.

37) Wings of birds and butterflies have similar functions, but different evolutionary origins. They are
   A) homologous structures.
   B) physiological structures.
   C) phylogenetic structures.
   D) analogous structures.

38) While you are riding the ski lift up to the top of the mountain on a very cold day, you start to shiver involuntarily. You know that the shivering is your body′s attempt to help regulate your body temperature and is an example of which type of mechanism?
   A) Energy utilization
   B) Sensitivity
   C) Homeostasis
   D) Evolutionary adaptation

Understanding Biology 2026 Release 1st edition Mason Test Bank

39) An alien from another planet landed on earth. He is fascinated by cars and is determined to figure out how they work. He decides to disassemble one of them and examine each part independently. He removes one of the tires and proceeds to learn all he can about the tire. He then removes one of the headlights and proceeds to learn all he can about the headlight. What type of approach is this alien taking to learn about the car?

A) Reductionism
B) Deductive reasoning
C) Inductive reasoning
D) Emergent properties

40) You have been assigned to address a problem of overpopulation of species X in a nearby county. One of the members of your team suggests introducing species Y, which is a natural predator of species X, but not normally found in the area. After some discussion, you go ahead and introduce species Y. What aspects of the hierarchical organization may be affected within a period of a several years?

A) Population, species, community
B) Population, community
C) Population, species, community, biosphere
D) Organism, population, species

41) You have been assigned to analyze some extraterrestrial material recently collected from Mars. After examining a sample using a microscope, you jump up excitedly and shout to your colleagues that you have confirmed the existence of life on Mars. One of your colleagues takes a look at your sample and says she sees a single-celled "body" with little internal structure. Assuming that life on Mars can be classified into similar domains and kingdoms as Earth, to which domain or kingdom does your "blob" most likely belong?

A) Eukarya
B) Fungi
C) Protista
D) Archaea
E) Animalia

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42) Why was the determination of the actual sequence of the human genome considered to be descriptive science?
   A) It involved hypothesis-driven research.
   B) It did not involve hypothesis-driven research.
   C) It involved deductive reasoning.
   D) It did not involve deductive reasoning.

43) You look outside and realize that your grass needs to be mowed. You pick up the container of gasoline and see that you have approximately a third of a gallon left. You hypothesize that this amount will be enough to mow your entire lawn. Unfortunately, half way through mowing your lawn you run out of gasoline. You grumble and think to yourself that the next time you mow the lawn, you hypothesize that you will need to have at least two-thirds of a gallon of gasoline available. How did the results of your lawn-mowing experience influence the validity of your new hypothesis for future gasoline needs?
   A) Your prediction of future gas needs is based on experimental data and therefore increases the validity of your hypothesis.
   B) The hypothesis was invalidated by your experimental evidence.
   C) Your hypothesis was supported by trial and error. One more trial added to your data set.
   D) Your prediction proved that your hypothesis is correct.

44) A plant and animal would be most similar at which level of organization?
   A) Cell
   B) Organelle
   C) Tissue
   D) Organ

Understanding Biology 2026 Release 1st edition Mason Test Bank

45) How does review by other scientists influence the development of scientific theories?

A) Review by other scientists allows other scientists to know what is current in their field.
B) Careful evaluation of research results by other scientists ensures that only solid and legitimate research results are published, and helps prevent faulty research or false claims from being viewed as scientific fact.
C) Review by other scientists increases competition among scientists and thus increases the quality of the published work.
D) Review by other scientists makes it extremely difficult for work to be published other than earth-shattering scientific theories.

46) Amanda was studying turtles based on DNA analysis. Under the current classification scheme, which of the following turtle species are thought to be most closely related?

1. Graptemys ouachitensis
2. Trachemys scripta
3. Apalone spinifera
4. Graptemys kohni

A) 1 and 3 due to inductive reasoning
B) 1 and 3 due to deductive reasoning
C) 2 and 3 due to inductive reasoning
D) 1 and 4 due to inductive reasoning
E) 2 and 3 due to deductive reasoning
F) 1 and 4 due to deductive reasoning

47) Marceau is studying small single-celled organisms that lack nuclei. These organisms can be broadly classified into the domain

A) Bacteria.
B) Protista.
C) Animalia.
D) Fungi.

Understanding Biology 2026 Release 1st edition Mason Test Bank

48) A dental student wants to test if fluoride is an effective additive against tooth decay. The student studies tooth decay in a population of people who live in neighborhoods supplied with fluoridated water. This student would like to ask whether access to fluoridated water prevents tooth decay. What would be an effective control group to ask this question?
A) Individuals with access to fluoridated water
B) Individuals with access to differing amounts of fluoride in the water
C) Individuals who have fluoride added to their toothpaste but not their water
D) Individuals with access to water with no fluoride added

49) Which statement is true about the development of the theory of evolution?
A) Evolution from a common ancestor was proposed 100 years before Darwin's *Origin of Species*.
B) Darwin was the first to propose evolution.
C) Initial experiments performed by Darwin did not support his hypothesis.
D) In Darwin's time most people believed that different organisms evolved from a common ancestor, but they did not know how.

50) Osmometer cells in the brain sense an increase in the salt concentration of plasma. This information is sent to the hypothalamus, which notifies the pituitary gland to release the hormone, ADH. ADH causes the kidney to save water, which lowers the salt concentration of the plasma. What characteristic of life does this overall pathway represent?
A) Cellular organization
B) Sensitivity
C) Energy utilization
D) Evolutionary adaptation
E) Homeostasis

51) A chemical imbalance in the blood can cause the heart to stop pumping blood, which will have a detrimental effect on other organs. This observation can be attributed to
A) reductionism.
B) emergent properties.
C) equilibrium state.
D) evolutionary conservation.

Understanding Biology 2026 Release 1st edition Mason Test Bank

52) Dr. Edward Jenner realized that cows have a disease called cowpox, which is like a disease that infects humans called smallpox. Jenner noticed that milkmaids whose hands were infected with cowpox were not contracting smallpox. Jenner infected a child with the pus from a cowpox blister and found that the child did not contract smallpox. Which statement represents a hypothesis supported by evidence?

A) The cowpox virus prevented the smallpox virus from entering the child's immune system.
B) The smallpox virus was so similar to the cowpox virus that the child's immune system ignored the smallpox virus.
C) The cowpox infection will prevent the child from being infected by the smallpox virus.
D) The cowpox infection will have no effect on the child's immunity to the smallpox virus.

53) A beautiful wood desk you may do your homework on was once a living tree, but after being cut down its tissues died. Now, it only exhibits which of the following properties of life?

A) Growth, development, and reproduction
B) Homeostasis
C) Energy utilization
D) Organization

54) Based on hierarchical levels of biological organization, which represents the lowest level?

A) Water
B) Oxygen
C) Mitochondria
D) Nucleus

55) A group of organisms of the same species living in the same place represents which hierarchical level?

A) Population
B) Ecosystem
C) Species
D) Community

Understanding Biology 2026 Release 1st edition Mason Test Bank

56) Students in a biology class debate whether viruses are alive or not. Using the characteristics of life, which of the following characteristics of viruses supports the idea that they are not alive?

A) Viruses have genetic material, either DNA or RNA.
B) Viruses can replicate.
C) Viruses can evolve.
D) Viruses lack cells.

SECTION BREAK. Answer all the part questions.

57) As part of your research project, you travel to an island to learn more about the habitats and relationships of spiders, centipedes, and flies. The published research suggests the following relationships:

Flies—are prey for spiders

Spiders—are prey for centipedes and predators of flies

Centipedes—are predators of flies and spiders

You and your assistant plot out five different areas of the island and count the numbers of spiders, centipedes, and flies living in each plot. Your results show the following:

Plot 1: Flies 300, Spiders 25, Centipedes 4
Plot 2: Flies 226, Spiders 17, Centipedes 10
Plot 3: Flies 147, Spiders 15, Centipedes 21
Plot 4: Flies 739, Spiders 78, Centipedes 0
Plot 5: Flies 79, Spiders 13, Centipedes 93

57.1) Because you are studying the relationships between these three animal groups, the most plausible explanation for the high number of spiders in plot 4 is

A) there are too many flies overall.
B) there are no centipedes to prey on the spiders and there are abundant flies upon which to feed.
C) the spiders preyed on the centipedes and ignored the flies.
D) the flies and spiders worked together to eliminate the centipedes.

Understanding Biology 2026 Release 1st edition Mason Test Bank

57.2) The plots that were staked out on the island were part of the
A) applied research.
B) basic research.
C) constructed model.
D) experimental design.

57.3) Based in the information provided, the best explanation for the low numbers of spiders and flies in plot 5 is
A) centipedes are actively consuming flies and spiders.
B) there were not enough flies to support a large centipede population.
C) centipedes prefer spiders to flies.
D) there were not enough spiders to catch and consume all the flies.

57.4) The hypothesis that closely matches the data provided is
A) flies survive best on islands where spiders and centipedes live.
B) flies feed on spiders and centipedes.
C) fly and spider populations are decreased by centipedes.
D) spiders are the top predators on all islands.

58) Phil is conducting a seed germination experiment. He places three groups of lettuce seeds in a 34° Celsius incubator with adequate moisture. One set of seeds is placed in a dark area with no light source. A second set is placed under artificial light, and a third set of seeds is placed in direct sunlight. This experiment is intended to test Phil's hypothesis that light is necessary for lettuce seed germination.

58.1) Based on the experimental design, which variable was the control?
A) Seeds in the dark
B) Type of light
C) Germination rate
D) Temperature
E) Moisture

Understanding Biology 2026 Release 1st edition Mason Test Bank

58.2) Based on the experimental design, which variable was the dependent variable?

A) Seeds in the dark
B) Type of light
C) Germination rate
D) Temperature
E) Moisture

59) Turtle hatchling survivorship rate is low in many turtle species due to predation. Amanda researched the predatory rate on a species of turtle eggs in the Red River. Research suggests that predators use the female's cloaca scent to locate the eggs. The researchers hypothesize that eggs with no cloaca film will not be subject to predation. The eggs were harvested from trapped turtles, and the egg's cloaca film (reproductive discharge) was either washed off or left on once gathered. The eggs were only handled when wearing gloves and then reburied along islands where the turtles were trapped. The nests were monitored by cameras and manually on foot, and data on nest predation was recorded.

59.1) Based on the experimental design, what is the dependent variable?

A) Number of hatchlings
B) Cloaca film on eggs
C) Eggs without cloaca film
D) Time eggs spent in ground

59.2) Based on the experimental design, what is the independent variable?

A) Number of hatchlings
B) Cloaca film presence or absence
C) Inducing egg laying
D) Time eggs spent in ground

59.3) Based on the experimental design, what is the control?

A) Hatchling survival rate
B) Cloaca scent on eggs
C) No cloaca scent on eggs
D) Time eggs spent in ground

Understanding Biology 2026 Release 1st edition Mason Test Bank

Answer Key

Test name: Chapter 01

1) [A, C, D]
2) C
3) D
4) C
5) D
6) B
7) B
8) C
9) A
10) A
11) A
12) C
13) D
14) C
15) B
16) A
17) D
18) A
19) C
20) B
21) C
22) A
23) B
24) C
25) B
26) B
27) E
28) D
29) B
30) A
31) C
32) E
33) B
34) C
35) A
36) A
37) D

Understanding Biology 2026 Release 1st edition Mason Test Bank

38) C
39) A
40) A
41) D
42) B
43) A
44) B
45) B
46) D
47) A
48) D
49) A
50) E
51) B
52) C
53) D
54) B
55) A
56) D
57) Section Break
57.1) B
57.2) D
57.3) A
57.4) C
58) Section Break
58.1) A
58.2) C
59) Section Break
59.1) A
59.2) B
59.3) B

Understanding Biology 2026 Release 1st edition Mason Test Bank