Biology 8e - Raven - Chapter 1

Instructions
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This assessment is worth 67 points.

1. **In science when general principles are arrived at from the examination of specific hypotheses (cases), it is called** (1 point)

   a. ◯ inductive reasoning.
   b. ◯ deductive reasoning.
   c. ◯ theory.
   d. ◯ controlled testing.
   e. ◯ scientific method.

2. **Which of the following characteristics are not necessary to being "alive"?** (1 point)

   a. ◯ order
   b. ◯ sensitivity
   c. ◯ growth, development, and reproduction
   d. ◯ regulation
   e. ◯ movement

3. **Science is not based on** (1 point)

   a. ◯ reasoning.
   b. ◯ observations.
   c. ◯ biased opinions.
   d. ◯ experimental testing.
   e. ◯ using results to rule out alternate hypothesis.

4. **After Darwin concluded his voyage on the *Beagle*, he proposed that the process of natural selection was the mechanism for** (1 point)

   a. ◯ artificial selection.
   b. ◯ evolution.
   c. ◯ sexual selection.
   d. ◯ speciation.
   e. ◯ overpopulation of finches on the Galapagos Islands.

5. **After making careful observations, scientists construct a(n)** (1 point)

   a. ◯ experiment.
   b. ◯ hypothesis.
   c. ◯ conclusion.
   d. ◯ theory.

e. ○ data set.

6. The area of science that studies life and its processes is called (1 point)

a. ○ biology.
b. ○ astronomy.
c. ○ geology.
d. ○ archeology.
e. ○ anthropology.

7. A hypothesis can be tested with (1 point)

a. ○ an observation.
b. ○ an experiment.
c. ○ inductive reasoning.
d. ○ deductive reasoning.
e. ○ a question.

8. The method of reasoning that uses construction of general principles by careful examination of many specific cases is called (1 point)

a. ○ deductive reasoning.
b. ○ theoretical reasoning.
c. ○ hypothetical reasoning.
d. ○ inductive reasoning.
e. ○ experimental reasoning.

9. Birth and death rates of populations are not constant with time. If the birth rate exceeds the death rate, then the population increases with time. If the death rate exceeds the birth rate, the population decreases with time. Death rates can change unexpectedly due to all of the following conditions except (1 point)

a. ○ disease.
b. ○ advances in medicine.
c. ○ fertility rates.
d. ○ war.

10. Why was the determination of the actual sequence of the human genome considered to be descriptive science? (1 point)

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.

11. 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 remarks that

all he sees is a single-celled blob with little internal structure. Assuming that life on Mars can be classified into similar domains and kingdoms as Earth, to which domain does your blob belong? (1 point)

a. ○ bacteria
b. ○ fungi
c. ○ protista
d. ○ archea

12. 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? (1 point)

a. ○ population, species, community
b. ○ population, community
c. ○ population, species, community, biosphere
d. ○ organism, population, species

13. 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 what type of mechanism? (1 point)

a. ○ energy utilization
b. ○ sensitivity
c. ○ homeostasis
d. ○ evolutionary adaptation

14. You are interested in studying the function of $GABA_A$ receptors and how certain deficits in $GABA_A$ receptor signaling result in anxiety-related behaviors in humans. Since many of the experiments you want to do cannot be performed on humans, you choose to study these processes in mice. In this case, mice can be considered what type of experimental organism? (1 point)

a. ○ a variable
b. ○ a control
c. ○ an applied
d. ○ a model

15. 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? (1 point)

a. ○ reductionism

b. ○deductive reasoning
c. ○inductive reasoning
d. ○ireirativism

16. The cell theory is one of the foundations of biology. Which of the following statements is not consistent with this theory? (1 point)

a. ○All organisms are made up of more than one cell.
b. ○Cells arise from other cells through the process of cell division.
c. ○Cells carry genetic material passed to daughter cells during cellular division.
d. ○Energy flow (metabolism and biochemistry) occurs within cells.

17. Phylogenetic analysis has revealed that in vertebrates and insects, eyes are analogous, rather than homologous, structures. Interestingly, however, more recent molecular genetic analysis determined that the homeodomain protein Pax6 is a key regulator of eye development in both vertebrates and insects.

The function of Pax6 in eye development can be viewed as an example of (1 point)

a. ○an emergent property.
b. ○evolutionary conservation.
c. ○comparative anatomy.
d. ○natural selection.

18. Phylogenetic analysis has revealed that in vertebrates and insects, eyes are analogous, rather than homologous, structures. Interestingly, however, more recent molecular genetic analysis determined that the homeodomain protein Pax6 is a key regulator of eye development in both vertebrates and insects.

Analogous structures (1 point)

a. ○have the same evolutionary origin, structure and function.
b. ○have similar functions and evolutionary origins, but differ in structure.
c. ○have the same evolutionary origin, but now differ in structure and function.
d. ○have similar functions, but different evolutionary origins.

19. Which of the following is an example of applied scientific research? (1 point)

a. ○Development of alternative fuels.
b. ○Identification of a new species of plant that may have medicinal purposes.
c. ○Characterization of a novel protein later found to be involved in the development of a neurological disease.
d. ○Documentation of fossils found in a specific archeological expedition.

20. Which of the following is an example of hypothesis-driven research? (1 point)

a. ○You are interested in studying the effect of chocolate consumption on test grades. You hand out a chocolate bar to half of the people in the class and instruct them to eat it immediately prior to taking the test. After the test you analyze the grade distribution to see how grades were affected by chocolate consumption.

b. ○ You are interested in studying the effect of chocolate consumption on test grades. You hand out a chocolate bar to everyone in the class and instruct them to eat it immediately prior to taking the test. After the test you analyze the grade distribution to see how these grades differed from the last exam when no one ate any chocolate.

c. ○ You propose that the consumption of chocolate immediately prior to taking the biology midterm will result in a high grade. You hand out a chocolate bar to half of the people in the class and instruct them to eat it immediately prior to taking the test. After the test you analyze the grade distribution to determine if students who ate chocolate got higher grades than students who did not eat chocolate.

d. ○ You decide that the consumption of chocolate immediately prior to taking the biology midterm will impact grades. You hand out a chocolate bar to half of the people in the class and instruct them to eat it immediately prior to taking the test. After the test you analyze the grade distribution to determine if students who ate chocolate got higher or lower grades than students who did not eat chocolate.

21. Hierarchical organization in living organisms goes from lowest to highest in which of the following statements. (1 point)

a. ○ molecule; cell; organ; population; community

b. ○ organelle, organism; community; population

c. ○ atoms; cell; organism; ecosystem; species

d. ○ ecosystem; population; organism; cell

e. ○ cell; organ; tissue; species

22. The scientific method involves making careful observations, asking questions, formulating hypotheses, collecting data, testing, and making conclusions about the collected data. Of the following statements about toxic wastes, select the choice that science cannot address. (1 point)

a. ○ Science can test for the presence of toxin in a river.

b. ○ Science can determine the level of toxin that is lethal to fish in the river.

c. ○ Science can say that a river should not be polluted.

d. ○ Science can formulate hypotheses about how a river was polluted.

e. ○ Science can determine the rate of mutations caused by toxins in a river.

23. Darwin was a self-taught naturalist who gained much field experience during his five-year voyage on the HMS *Beagle*. Darwin's success as a naturalist can be attributed to (1 point)

a. ○ his disagreements with Alfred Russell Wallace about Wallace's ideas on evolution.

b. ○ his immediate publication of his ideas on evolution after returning from his voyage on the HMS *Beagle.*

c. ○ his ability to ask questions about his observations and to seek unifying principles to answer these questions.

d. ○ his knowledge of the principles of genetics.

24. *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, (1 point)

a. ○ increased arithmetically in numbers while the nutrients available only increased geometrically.
b. ○ increased geometrically in numbers while the nutrients available only increased arithmetically.
c. ○ decreased arithmetically in numbers while the nutrients available increased geometrically.
d. ○ increased geometrically in numbers while the nutrients available increased arithmetically.
e. ○ evolved from mainland to islands, thus explaining why the island flora and fauna resembled the mainland species so closely.

25. 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 (1 point)

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.

26. The nature of science implies that (1 point)

a. ○ new scientific findings never change current thinking in society.
b. ○ scientists are never sure of their findings and how to present these ideas to society.
c. ○ new scientific findings may cause a change in current thinking in society.
d. ○ science has much improvement to make before it can be used to change current thinking in society.

27. As part of your research project, you travel to an island to learn more about the habitats and relationships of spiders, centipedes and insects. You and your assistant plotted out five different areas of the island and counted the numbers of spiders, centipedes, and insects living in each plot. Here are your results:

Plot	Spiders	Insects	Centipedes
1	300	25	4
2	426	17	10
3	147	15	21
4	739	78	0
5	79	13	93

One testable hypothesis that the investigators could examine is that (1 point)

a. ○ herbivorous insects prefer islands where spiders and centipedes live.
b. ○ herbivorous insects are not particular about where they live.
c. ○ the number of centipedes feeding on them influences herbivorous insects and spider numbers.
d. ○ spiders are effective at avoiding herbivorous insects.

28. As part of your research project, you travel to an island to learn more about the

habitats and relationships of spiders, centipedes and insects. You and your assistant plotted out five different areas of the island and counted the numbers of spiders, centipedes, and insects living in each plot. Here are your results:

Plot	Spiders	Insects	Centipedes
1	300	25	4
2	426	17	10
3	147	15	21
4	739	78	0
5	79	13	93

Based in the information provided, the best explanation for the low numbers of spiders and insects in plot 5 is (1 point)

a. ◯ centipedes are actively consuming insects and spiders.
b. ◯ there were not enough insects to support a large centipede population.
c. ◯ centipedes prefer spiders to insects.
d. ◯ there were not enough spiders to catch and consume all the insects.

29. As part of your research project, you travel to an island to learn more about the habitats and relationships of spiders, centipedes and insects. You and your assistant plotted out five different areas of the island and counted the numbers of spiders, centipedes, and insects living in each plot. Here are your results:

Plot	Spiders	Insects	Centipedes
1	300	25	4
2	426	17	10
3	147	15	21
4	739	78	0
5	79	13	93

The plots that were staked out on the island were part of the (1 point)

a. ◯ question.
b. ◯ observation.
c. ◯ hypothesis.
d. ◯ experimental design.
e. ◯ conclusion.

30. As part of your research project, you travel to an island to learn more about the habitats and relationships of spiders, centipedes and insects. You and your assistant plotted out five different areas of the island and counted the numbers of spiders, centipedes, and insects living in each plot. Here are your results:

Plot	Spiders	Insects	Centipedes
1	300	25	4
2	426	17	10
3	147	15	21
4	739	78	0

5 79 13 93

The best explanation for the high number of spiders in plot 4 is (1 point)

a. ○ there are too many insects.
b. ○ there are no centipedes to eat the spiders and there are abundant insects upon which to feed.
c. ○ the spiders ate the centipedes and ignored the insects.
d. ○ the insects ate the centipedes and avoided the spiders.

31. A medical scientist is designing an experiment to test the results of a new drug that she hypothesizes will greatly reduce and possibly eliminate the side effects of a new cancer treatment. If this experiment is to be set up correctly, she must (1 point)

a. ○ divide the patients into two groups and give each group the same amount of the new drug.
b. ○ divide the patients into two groups and give one group the new drug and give the other group nothing.
c. ○ divide the patients into two groups and give one group the new drug and the other group a drug that has no effect (for example, a tablet that only contains sugar).
d. ○ divide the patients into two groups and give one group the new drug for one week and the other group a different drug for one week.
e. ○ divide the patients into two groups and give one group one-half of the dosage of the new drug and the other group nothing.

32. One morning on your way to work your vehicle will not start. You swear at the car, but nothing happens. After recognizing that those types of words will not cause the car to start, you say to yourself, "I wonder if I left the lights on last night when I came home from work?"

The fact that your vehicle did not start when you tried to leave for work is best described as (1 point)

a. ○ an observation.
b. ○ a hypothesis.
c. ○ an experiment.
d. ○ data.
e. ○ a question.

33. One morning on your way to work your vehicle will not start. You swear at the car, but nothing happens. After recognizing that those types of words will not cause the car to start, you say to yourself, "I wonder if I left the lights on last night when I came home from work?"

What you said to yourself could be called a(n) (1 point)

a. ○ observation.
b. ○ hypothesis.
c. ○ experiment.

d. ○data.
e. ○question.

34. Which of the following is not required for evolution to take place? (1 point)

a. ○natural selection
b. ○adaptation
c. ○genetic variation
d. ○change over time
e. ○artificial breeding

35. The rate at which evolution is occurring cannot be estimated by (1 point)

a. ○studying comparative anatomy.
b. ○inferring that apes are related to humans.
c. ○measuring the degree of difference in genetic coding.
d. ○interpretation of the fossil record.

36. Structures that have similar structure and function but different evolutionary origins are called (1 point)

a. ○homologous.
b. ○analogous.
c. ○inherited.
d. ○uniform.
e. ○evolutionary modifications.

37. 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 (1 point)

a. ○analogous.
b. ○uniform.
c. ○homologous.
d. ○inherited.
e. ○evolutionary modifications.

38. A critical requirement of Darwin's theory is (1 point)

a. ○an uncontrolled growth in all species.
b. ○that the earth is relatively young.
c. ○all individuals of any given species be identical.
d. ○genetic variation is possible in nature.
e. ○all species are made at the same time.

39. Modern pieces of evidence that corroborate Darwin's theory of evolution include all of the following except (1 point)

a. ○new measurements of the age of the earth.
b. ○an understanding of the mechanism of heredity.

c. ○comparative studies of animal structures.
d. ○similarities in DNA of related species.
e. ○human population growth.

40. Recent discoveries of microscopic fossils have extended the known history of life to about (1 point)

a. ○2 billion years ago.
b. ○4.5 billion years ago.
c. ○a few thousand years ago.
d. ○10-15 billion years ago.
e. ○a few million years ago.

41. Darwin's book in which he described his views on evolution is (1 point)

a. ○*Favoured Races.*
b. ○*Principles of Geology.*
c. ○*On the Principle of Population.*
d. ○*On the Origin of Species.*
e. ○*Survival of the Fittest.*

42. A key contribution to Darwin's thinking was the concept of limits put on the geometric growth of populations by nature, originally proposed by (1 point)

a. ○Charles Lyell.
b. ○Thomas Malthus.
c. ○Karl Popper.
d. ○Peter Raven.
e. ○Russel Wallace.

43. Darwin described which of the following as "those individuals that possess superior physical, behavioral, or other attributes are more likely to survive than those that are not so well endowed," and thus more likely to pass their traits to the next generation? (1 point)

a. ○biological diversity
b. ○geometric progression
c. ○natural selection
d. ○superior beings
e. ○survival of modifications

44. Besides Darwin, the theory of evolution by means of natural selection was also independently proposed by (1 point)

a. ○Alfred Wallace.
b. ○Charles Lyell.
c. ○Thomas Malthus.
d. ○Karl Popper.
e. ○Peter Raven.

45. Darwin studied the different species of finches (1 point)

a. ◯ on the Galapagos islands.
b. ◯ in southern South America.
c. ◯ in Great Britain.
d. ◯ in North America.
e. ◯ in the fossil beds.

46. Which of the following was not one of the beliefs of Darwin's time? (1 point)

a. ◯ Various organisms and their structures resulted from a creator's actions.
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.
e. ◯ A divine creator exists.

47. The proposal that one type of organism can change gradually into another type over a long period of time is known as (1 point)

a. ◯ creativity.
b. ◯ evolution.
c. ◯ natural history.
d. ◯ preconception.
e. ◯ preservation.

48. The naturalist on the ship HMS *Beagle* was (1 point)

a. ◯ Bacon.
b. ◯ Darwin.
c. ◯ Johnson.
d. ◯ Wallace.
e. ◯ Lyell.

49. Karl Popper suggested that scientists use "imaginative preconception," which means that successful scientists (1 point)

a. ◯ often predict the outcome of experiments.
b. ◯ cannot predict the outcome of experiments.
c. ◯ do not need to do experiments to test their ideas.
d. ◯ do not keep records of experiments that fail.
e. ◯ only perform applied research.

50. To be valid, an experiment must not include (1 point)

a. ◯ a variable that is altered in a specific way.
b. ◯ a control.
c. ◯ both a control and a variable, which are treated in parallel.
d. ◯ only one variable.

e. ◯more than one variable.

51. The scientific process involves (1 point)

a. ◯the acceptance of all hypotheses.
b. ◯rejection of hypotheses that are inconsistent with experimental results.
c. ◯the acceptance of only data consistent with the hypothesis.
d. ◯the acceptance of hypothesis as a fact even after subsequent non-confirmation with experimental results.
e. ◯the formulation of theories without experimentation or obtaining proof.

52. Hypotheses which are consistent with the results of experimental testing are (1 point)

a. ◯accepted as scientific principles.
b. ◯accepted without further question.
c. ◯conditionally accepted.
d. ◯modified and reworked until true.
e. ◯rejected.

53. A suggested explanation that might be true and is subject to testing by further observations is a(n) (1 point)

a. ◯experiment.
b. ◯generality.
c. ◯hypothesis.
d. ◯scientific principle.
e. ◯theory.

54. Which of the following statements is not true about a hypothesis? (1 point)

a. ◯It is an explanation that accounts for careful observations.
b. ◯It is a proposition that might be true.
c. ◯It fits the known facts.
d. ◯It always withstands the test of experiments.
e. ◯It might be rejected in future in light of new information.

55. Choose the letter of the best match from the following:
A. deductive reasoning
B. experiment
C. hypothesis
D. inductive reasoning
E. theory

***Gingko* trees are known to lose their leaves at a certain time each year throughout the United States. They must behave the same way in China.** (1 point)

[ ] **(* 4000 character limit)**

56. Choose the letter of the best match from the following:
A. deductive reasoning
B. experiment
C. hypothesis
D. inductive reasoning
E. theory

Walnut trees may respond to the advancing season in the same way that *Gingko* trees do. (1 point)

(* 4000 character limit)

57. Choose the letter of the best match from the following:
A. deductive reasoning
B. experiment
C. hypothesis
D. inductive reasoning
E. theory

Plants are raised under artificial lights turned off and on by an electric clock. Some are given long periods of light, others short periods. (1 point)

(* 4000 character limit)

58. Choose the letter of the best match from the following:
A. deductive reasoning
B. experiment
C. hypothesis
D. inductive reasoning
E. theory

Plants adapt to seasonal changes in their surroundings. (1 point)

(* 4000 character limit)

59. Choose the letter of the best match from the following:
A. deductive reasoning
B. experiment
C. hypothesis
D. inductive reasoning
E. theory

***Gingko* trees may lose their leaves in response to decreasing day length.** (1 point)

(* 4000 character limit)

60. **From the time of the Greek Eratosthenes to the present day, scientists have been using the method of _____ reasoning, in which general principles are applied to the analysis of specific cases.** (1 point)

(* 4000 character limit)

61. **Biological order can be seen in a _____ organization, from the level of highly structured organic molecules in the cells to the highest level of populations and communities in biomes and biosphere.** (1 point)

(* 4000 character limit)

62. **The knowledge of _____ is becoming increasingly essential for any educated citizen of the world.** (1 point)

(* 4000 character limit)

63. **Specimens of rock strata which show progressive changes in characteristics of earlier organisms are called _____.** (1 point)

(* 4000 character limit)

64. **Experiments are carried out to test the hypothesis by changing one variable at a time and including a(n) _____ condition in which the variable is unaltered.** (1 point)

(* 4000 character limit)

65. **Why is it necessary take an interdisciplinary approach to studying biology?** (1 point)

66. **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 next time you mow the lawn, you will make sure to have at least two-thirds of a gallon of gasoline available. How did the results your lawn-mowing experience influence the validity of your hypothesis of gasoline needs in the future? (1 point)

67. How does peer review influence the development of scientific theories? (1 point)