Biology for the Informed Citizen with Physiology 1st edition Bozzone Test Bank

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Test Bank

Chapter 2: The Nature of Science

Multiple Choice

Case

1. (knowledge) In the 1800s, a woman might prefer to give birth at home or with the help of midwives because

a. There were no real medical schools yet, so no well-trained doctors.

b. I is more comfortable at home.

c. Hospitals and doctors somehow increased risk of childbed fever.

d. Childbed fever was easier to treat away from other patients.

e. Babies in hospitals were much less likely to die of childbed fever.

2. (knowledge) Why did women fear childbed fever so much in the 1840s?

a. At that time they didn't know any better.

b. At that time, it killed 1 of every 10 women who delivered babies with doctors.

c. At that time, babies were much more prone to getting the illness.

d. At that time, that illness was much more likely to actually kill a baby that got it.

e. At that time, every woman delivering a baby in a hospital got childbed fever.

2.1

3. (knowledge) Who was Dr. Semmelweiss?

a. The doctor who discovered that germs cause illness.

b. The doctor who figured out a cure for childbed fever.

c. The doctor who discovered how to reduce fevers.

d. The doctor who discovered how to prevent childbed fever in children.

e. The doctor who figured out how to prevent childbed fever.

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4. (knowledge) What data did Dr. Semmelweiss collect initially in his investigation of childbed fever?

a. He compared maternal death rates from childbed fever in the doctor's division of the hospital with those of the midwife's division.

b. He interviewed women about their experience giving birth in the hospital.

c. He tested maternal blood for bacterial infection.

d. He tested surgical tools and gloves for bacterial infection.

e. He compared birth rates in the doctor's division of the hospital with those of the midwife's division.

5. (knowledge) Why did Dr. Semmelweiss think that that improved ventilation at the hospital might help decrease incidence of childbed fever?

a. Everyone does better in fresh air.

b. Increased oxygen levels tend to decrease incidence of infection in general.

c. Miasma, a type of fly known to transmit disease, are attracted to bad odors and better ventilation might eliminate those.

d. Improved ventilation would more quickly remove miasma, or toxic vapors thought to be exhaled by sick people.

e. Diseases were thought to be transmitted by miasma, or sweat, so improved ventilation might cool patients, minimizing sweating.

6. (knowledge) Why did Dr. Semmelweis think that the doctors or medical students might be at fault in causing childbed fever?

a. Women treated by them were most likely to contract the disease.

b. Midwives were better trained than the medical students.

c. Doctors and medical students were men who couldn't possibly help with childbirth effectively.

d. Medical students and doctors were pretty rough on the women.

e. He was just guessing.

7. (knowledge) How did Dr. Semmelweis determine that childbed fever was actually caused by a germ or microorganism?

a. Process of elimination. He experimented with every other possibility and that was all that was left that worked as an explanation.

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b. He accidently stabbed a woman with a scalpel during childbirth, and she ended up dying of childbed fever.

c. He identified the bacteria in a blood sample from a woman who had died of childbed fever.

d. A midwife who had somehow figured it out pointed him in the right direction.

e. A colleague accidently stabbed himself with a scalpel during the autopsy of a woman who'd died of childbed fever, and he subsequently died of the fever.

8. (knowledge) What procedure did Dr. Semmelweis order in the hospital that led to an immediate reduction in cases of childbed fever?

a. Only midwives were allowed to assist in labor and delivery.

b. Only midwives were allowed to perform autopsies.

c. Doctors did deliveries in the morning, before the autopsies in the afternoon.

d. Everyone was required to scrub their hands with bleach prior to assisting with a delivery.

e. Everyone was required to scrub their hands with bleach prior to assisting with an autopsy.

2.2

9. (knowledge) Which sequence is most typical in the scientific method?

a. Hypothesize, predict, test, observe, evaluate results

b. Observe, hypothesize, predict, test, evaluate results

c. Hypothesize, predict, evaluate results, observe

d. Observe, predict, hypothesize, test, evaluate results

e. Observe, test, hypothesize, predict, evaluate results

10. (comprehension) Which of the following best describes Dr. Semmelweis's conclusive test of his hypothesis about what caused childbed fever?

a. If germs cause childbed fever, then getting accidently nicked with a scalpel from a childbed fever autopsy will lead to death by childbed fever.

b. If rough handling of patients by doctors results in childbed fever, then less handling should reduce the incidence of the fever.

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c. Better ventilation will decrease incidence of childbed fever.

d. Just allowing midwives to work with patients will decrease the incidence of childbed fever.

e. If germs cause childbed fever, having medical personnel scrub their hands with bleach prior to working with patients should decrease the incidence of the fever.

11. (comprehension) If you were going to study the effects of a certain fertilizer on plant growth, which list of variables would you most likely want to control (keep constant)?

a. Plant type, soil type

b. Plant type, soil type, water, light

c. Plant type and fertilizer

d. Fertilizer, soil type, water, light

e. Fertilizer, soil type , water, plant type

12. (comprehension) Which of the following would be the most effective experimental design for an experiment measuring the effect of a particular fertilizer on plant growth?

a. Treat one plant with the recommended dose of fertilizer and measure its growth over time.

b. Treat one plant with the recommended dose of fertilizer and measure its growth over time compared to the same type of plant without fertilizer.

c. As in "b," but treat several of the same type of plants with fertilizer and without and measure their growth rates over time.

d. Set up several different types of plants and apply several different types of fertilizer and measure growth rates over time.

e. As in "d," but also measure the same types of plants grown without fertilizer.

13. (comprehension) In your experiment in #9, if the plant(s) treated with fertilizer grew faster, would that prove plants grow faster with fertilizer?

a. Yes. Clearly that is the case.

b. No. It would support the hypothesis for that one plant type.

c. Yes. But you would have to then test whether that is true for other plants.

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d. No. There's no way to know if the fertilizer was making the difference.

e. Yes. Obviously everyone should use fertilizers when they grow this one type of plant.

14. (comprehension) Which of the following would a good scientist NOT do?

a. Collect only data that support his or her idea.

b. Try to answer a specific question.

c. Try to determine how a certain process works.

d. Investigate something he or she is just curious about.

e. Try to solve a particular problem.

15. (comprehension) How did Charles Darwin's original hypothesis that organisms evolved by natural selection become an important scientific theory?

a. He wrote a book about it and it was marketed well, so the public bought into it.

b. He was a famous scientist and so was respected enough by his colleagues that they believed what he said and accepted it.

c. He and other scientists in many fields of science have tested it over and over again and it's never been disproved, only supported by the evidence they've found.

d. It can't really be tested but it just makes sense

e. Good timing and luck. People were seeking an explanation for the diversity of life on Earth and Darwin happened to provide one that seemed reasonable.

16. (knowledge) Why is it important to repeat experiments or test hypotheses in different ways?

a. Because more people will believe the work

b. Because more grant funding will be sent

c. To make sure the predictions hold up in multiple situations

d. Because as long as there is enough data collected, results can be published.

e. Because that's what science students spend their time doing in order to learn.

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17. (comprehension) What is the difference between a " theory" as the word is commonly used, and a scientific theory?

a. An everyday theory can be wrong and a scientific theory never is.

b. An everyday theory is a guess and a scientific theory has been repeatedly tested.

c. An everyday theory is an idea and a scientific theory is a fact.

d. An everyday theory is a fact, and a scientific theory is an idea.

e. They are the same thing.

2.3

18. (comprehension) The following statement is not science because which of the four scientific assumptions is violated? If people die sudden deaths, their ghosts haunt the area where they died because they can't rest in peace.

a. Cause and effect

b. Consistency

c. Repeatability

d. Materialism

19. (comprehension) Which of the following assumptions of science is illustrated by this statement: Bacterial infections became much less of a problem when doctors began routinely practicing good hygiene.

a. Cause and effect

b. Consistency

c. Repeatability

d. Materialism

20. (comprehension) Which of the following assumptions of science is violated by this statement: Tall people live longer than short people.

a. Cause and effect

b. Consistency

c. Repeatability

d. Materialism

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21. (comprehension) Which of the following assumptions of science is illustrated by this statement: No matter what kind of plant you grow, it will need water.

a. Cause and effect

b. Consistency

c. Repeatability

d. Materialism

22. (comprehension) If a scientist does an experiment and gets a result, but no other scientists are able to repeat the experiment and get the same result, what does that mean?

a. The first scientist is a quack.

b. The other scientists don't know what they're doing.

c. Something about the hypothesis, prediction, or experimental design is wrong in the first experiment.

d. The first scientist's hypothesis is wrong.

e. There's no way to do the investigation.

23. (comprehension) Certain mushrooms tend to appear suddenly in circles on lawns. Which of the following might be an appropriate scientific hypothesis about this.

a. Mushrooms grow only in association with grass.

b. Mushrooms grow only in the summer time.

c. The circle shape is random, even though it's almost always how these mushrooms are oriented on the lawn.

d. Mushrooms mostly grow underground from a central root structure.

e. There are some things too odd to try to explain scientifically. There's no way to know.

24. (comprehension) In science, there is a system of peer-review, where nothing gets published until several other scientists have looked over the work. What is the purpose of this?

a. To give scientists something to do in their spare time.

b. To ensure that everything gets published.

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c. To ensure that everything that gets published is as accurate and repeatable as is possible.

d. To ensure no one scientist has too much power.

e. To ensure that everyone agrees on the ideas of science.

2.4

25. (comprehension) Which of the following is a scientific statement?

a. Unicorns used to exist because there are paintings of them from years ago.

b. A shark can jump as high as a low flying helicopter as shown in pictures on the internet.

c. Dinosaurs were killed off by a great flood as described in the Bible.

d. According to DNA comparisons, humans share a common ancestor with chimpanzees.

e. Dogs are smarter than cats because it's easier to train them.

26. (knowledge) What is empirical evidence?

a. Information from direct observation or experimental results

b. Informed, expert opinion

c. Only things which can be directly observed

d. Results from a controlled experiment

e. Information from any reliable source

27. (comprehension) Why is this a poor hypothesis: Leprechauns plant 4-leaf clovers in lawns to bring good luck.

a. It's wrong.

b. It's silly.

c. It's falsifiable.

d. It's not testable.

e. It's empirical.

28. (knowledge) What are the three main features of science?

a. It's based on opinion, it's testable, and it can be applied generally.

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b. It's based on empirical evidence, it's testable, and it can be applied to just very specific situations.

c. It's based on empirical evidence, it's testable, and it can be applied to general situations.

d. It's based on scientific belief, it's falsifiable, and it can be applied to general situations.

e. It's based on empirical evidence, it's not always testable, and it can be applied to general situations.

29. (comprehension) What was one example of empirical evidence used by Dr. Semmelweis to determine the cause of childbed fever?

a. Women who dealt with doctors and medical students at the hospital were more likely to contract childbed fever.

b. Miasma was thought to cause disease.

c. Women who spent their labor on their sides were less likely to contract childbed fever.

d. Stopping all autopsies stopped the incidences of childbed fever.

e. Medical students were too rough on women in labor.

30. (comprehension) In what way was Dr. Semmelweis's finding about preventing childbed fever generalized to other areas?

a. Midwives are better at assisting women give birth than doctors are.

b. Letting medical students treat patients with doctors leads to an increase in disease incidence.

c. All hospitals of the day improved their ventilation systems.

d. it has turned out that lack of sterilization can cause many diseases

e. When people get frustrated trying to solve medical mysteries, they now routinely go on vacation.

31. (comprehension) A good scientific explanation is generalizable. What does that mean?

a. It applies to applies to one specific situation or place.

b. It is generally correct but not always.

c. It explains everything about a subject.

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d. It applies in any similar circumstance, not just one experiment.

e. Any scientist can understand it.

32. (comprehension) In what way are Dr. Semmelweis's findings repeated even now?

a. People who accidently stab themselves with scalpels still often die.

b. Midwives still help women give birth.

c. People still die in hospitals.

d. Hospitals with better procedures for maintaining sterility see fewer infections.

e. Doctors still solve mysteries.

2.5

33. (knowledge) What kind of questions can science answer?

a. Questions about what it means to be happy.

b. Questions about whether a particular book is good.

c. Questions about how the natural world works.

d. Questions about why God works as He does.

e. Science can answer any kind of question.

34. (knowledge) A person studying foods of ancient human populations might want to consult with a scientist because

a. Both fields deal with time.

b. Science has always been around.

c. Scientists know a lot more about things than historians do.

d. A scientist might be able to tell about the habitat the ancient humans were dealing with and therefore what kind of food to which they might have access.

e. A scientist might be able to experiment with the foods of ancient humans.

35. (comprehension) Why doesn't science work as a way of seeking answers about faith?

a. Religion is a much broader subject than science.

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b. Faith, by definition, isn't testable. It's a personal belief.

c. Scientists are all atheists.

d. It's a myth that it doesn't. One can test God.

e. No one knows, but it doesn't work.

36. (comprehension) Is it possible for a scientist to determine what constitutes a good life?

a. Yes. The scientist can measure things that make life good.

b. No. What is "good" is more of a philosophical question.

c. Yes. Everything is measurable in some way.

d. No. "Good" mainly has to do with faith.

e. Yes, and whatever science found would be correct.

2.6

37. (acomprehension) Which of the following claims about French fries are NOT examples of pseudoscience?

a. The majority of people eating French fries in a restaurant look sickly, so French fries must not be good for you.

b. People who order French fries are usually high school graduates, so French fries must improve intelligence.

c.. Most people who eat French fries also eat catsup which is a vegetable, so French fries are good for you.

d. Most French people are healthy, so French fries must be good for you.

e. Foods high in fat are not good for you, and French fries are high in fat.

38. (knowledge) Pseudoscience is just like science except

a. There are no controlled experiments or facts behind it.

b. People tend to believe it more than science.

c. A pseudoscientist always works in a lab.

d. Pseuodscientists tend to make more money than regular scientists.

e. Publishing pseudoscientific results is more difficult.

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39. (knowledge) Creationism, or the idea that all species now on Earth were created just as they are now, is pseudoscience because

a. Scientists say so.

b. More than half the U.S. population believes it.

c. Scientists don't believe in God.

d. There's no evidence and no way to test it.

e. People learn it in church.

40. (knowledge) What is your best defense against quackery?

a. Never believe anything you read on the internet.

b. Become a scientist.

c. Be skeptical and get your information from a reliable source.

d. Distrust everyone.

e. Don't go to doctors.

41. (comprehension) If you accept that science is a reliable way of learning about the natural world, why is it unreasonable for you to accept the idea that all life on earth was created in a week, a few thousand years ago?

a. Because it's religious and all scientists can't be religious.

b. Because the Bible is full of crazy ideas.

c. Because you would have to ignore so much evidence geology, fossils, and DNA.

d. Because scientists are always right.

e. It is reasonable because scientists can be religious.

"Biology in Perspective"

42. (knowledge) Science uses inductive reasoning to advance knowledge. This means that

a. Scientists have to be incredibly smart.

b. Scientists make predictions and test them.

c. Scientists can always figure out what's going on.

d. Scientists can make things up if they can't test them.

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e. Science isn't necessarily right.

43. (knowledge) Science depends on _____.

a. evidence

b. beliefs

c. practice

d. reasoning

e. luck

"Scientist Spotlight"

44. (knowledge) How did Robert Koch determine that it was bacteria that caused the disease anthrax?

a. Everybody at the time knew anthrax was caused by bacteria.

b. He injected mice with anthrax infected material, and they all came down with anthrax, while those injected with healthy material did not.

c. He put mice in close proximity to healthy and to anthrax-infected animals and only those near the sick animals contracted anthrax.

d. He photographed the anthrax bacteria.

e. He infected himself with anthrax bacteria and contracted the disease.

45. (comprehension) Why is anthrax potentially such a problem on farms?

a. It's deadly for humans.

b. It's associated with cattle feed.

c. It can exist as long-lasting spores in the soil so it's hard to eradicate.

d. It makes animals and crops inedible.

e. It's a potent biological weapon.

46. (knowledge) What is Dr. Robert Koch generally most famous for?

a. Discovering anthrax in farm animals

b. The research lab he set up in his house

c. Discovering that anthrax can be used as a biological weapon

d. His work toward the idea (germ theory) that many infectious diseases are caused by bacteria

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e. His work with bacterial spores

"Technology Connection"

47. (knowledge) What does strep throat and childbed fever have in common?

a. Both infections come from hospitals.

b. Both cause a sore throat as an early symptom.

c. Both are caused by similar viruses.

d. Both are caused by similar bacteria.

e. Both predominantly infect women.

48. (knowledge) If strep throat isn't really dangerous, why is it important to test for it?

a. It's important to minimize even less dangerous infections

b. It's very contagious.

c. It's related to childbed fever, so it can be very serious.

d. It can kill you in rare cases.

e. It can cause rheumatic fever in rare cases, which is very serious.

49. (comprehension) The culture test for strep throat takes a day or two but is 95% sensitive and accurate, so it's better than the rapid test. Why do doctors do both?

a. So they can charge you more.

b. Because the rapid test is less accurate, but the bacteria is so contagious it's best to get the patient started on antibiotics as quickly as possible, even if it turns out they don't have strep.

c. Because it's okay to use antibiotics, even when you don't really need them.

d. Because strep throat is often deadly if left untreated for more than 24 hours.

e. Because the culture test is less accurate but the bacteria is so contagious it's best to get started on antibiotics as quickly as possible, even if it turns out the patient doesn't have strep.

"Life Application"

50. (knowledge) As soon as Dr. Semmelweis figured out that sterilization of hands dramatically reduces incidences of childbed fever, why didn't all hospitals adopt the practice?

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a. Many doctors don't trust science.

b. Many doctors refused to believe they could possibly be transmitting a disease to their patients.

c. Bleach was very expensive and hard to get.

d. Prior to the 1900s, it was nearly impossible to spread news like this from one hospital to another.

e. Dr. Semmelweis was not well respected by the medical community.

51. (knowledge) About 20% of the human population has the bacteria that causes childbed fever living on their skin, and yet death from it is very rare. Why?

a. People are now resistant to the bacteria.

b. The bacteria has evolved such that it never causes disease.

c. With all the antibacterial soaps available, most humans don't come in contact with bacteria.

d. The bacteria is only dangerous if it gets in the bloodstream and now it can be treated by antibiotics.

e. Doctors now routinely wash their hands.

"How do we know?"

52. (comprehension) Since a hypothesis can't be proven, science can't ever prove anything. True or False?

a. True, because something can always be wrong.

b. False, because if a hypothesis makes predictions that are correct in many different circumstances, it is considered correct until contradictory evidence arises—which may never happen.

c. True, because there is always some situation where a hypothesis will hold up and a prediction will be shown to be wrong

d. False, because if a hypothesis results in a prediction that is shown to be correct by just one test, it's proven.

e. True, because science is really not the best way to learn things about how nature works.

Short Answer

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1. (knowledge) True or False. The natural world mostly works in a regular, repeatable, predictable way.

True

2. **(**knowledge) True or False: It has always been safest to deliver a baby with a doctor's assistance.

False

2.1

3. (knowledge) Dr. Semmelweis eliminated ventilation, delivery positions, and patient handling as causes of childbed fever before rather accidently determining what was actually the cause. What was the cause?

Germs or microorganisms transferred from autopsies to patients

4. (knowledge) What hospital procedure did Dr. Semmelweis find mostly prevented childbed fever?

Scrubbing and bleaching hands

2.2

5. (knowledge) What do you call a possible cause or mechanism that could explain an observation?

Hypothesis

6. (knowledge) How do you test a hypothesis in general?

Test a prediction (if….then…) based on the hypothesis

7. (knowledge) Is it okay to do an experiment just once? Why or why not?

No—a prediction has to hold up to repeated testing.

8. (comprehension) Is this statement an observation, hypothesis, or theory: dogs pant when they are hot.

Observation

9. (comprehension) Is this statement an observation, hypothesis, or theory: People who get enough sleep do better on exams.

Hypothesis

2.3

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10. (comprehension) Exorcisms as a way to cure disease cannot be considered scientific because they violate which of the four assumptions of science?

Materialism

11. (comprehension) Why is it important that experiments be repeated?

To make sure results are repeatable

2.4

12. (knowledge) The idea of man-made climate change has been very unpopular, so despite the empirical evidence, it must not be happening. True or false?

False

13. (knowledge) What is one important feature of a scientific hypothesis?

It must be testable.

2.5

14. (knowledge) Scientists always work only with other scientists because no other field of study really applies to science.

False

15. (knowledge) Science is good at answering questions related to what subject?

The natural world

2.6

16. (knowledge) If I tell you the potion I have made from bee pollen will cure cancer, but I don't provide any evidence of this, this is an example of_____.

Quackery

17. (knowledge) What does science require that pseudoscience does not?

Empirical evidence or testing

18. (knowledge) Robert Koch discovered how anthrax bacteria is able to infect animals even when they don't come in contact with other sick animals. How does it do that?

Survives as spores in the soil

19. (knowledge) Why do doctors use the culture test for strep when they have the more rapid test to use?

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The culture test is more accurate.

20. (knowledge) What actually causes childbed fever?

A bacteria

21. (comprehension) If your prediction based on your hypothesis is tested and shown to be correct, does that mean your hypothesis is proven? Why?

No---there is always room for more information.

22. (knowledge) In our modern day and age, the bacteria that causes childbed fever has been completely eliminated. True or False?

False

23. (comprehension) If more and more empirical observations tend to support your hypothesis, what can you probably conclude?

Your hypothesis is correct.

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