

Chapter 02 Test Bank: Principles of Science and Systems Key

1. Which of the following is not a basic principle of science?

- A. We can learn through observation
- B. Simpler explanations are preferable
- C. Nothing can be absolutely proven
- D.** All of these choices are correct

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Chapter: 02
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Section: 02.01
Topic: Scientific Method

2. Which of the following does not apply to manipulative experiments?

- A. Extraneous variables are held constant
- B. Most experiments are done in the laboratory
- C.** They are useful for studying large scale geologic forces
- D. They can be affected by experimenter bias

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Topic: Scientific Method

3. In science, a theory is

- A. speculative and unsupported by facts.
- B. a tentative explanation, comparable to a hypothesis.
- C.** an explanation supported by a substantial body of evidence.
- D. something that can never be proven wrong.

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4. The process of science is characterized by all of the following except

- A. that science attempts to keep explanations as simple as possible.
- B.** that science normally provides absolute proof.
- C. that science attempts to be objective.
- D. that science is inherently skeptical.

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Topic: Scientific Method

5. Scientific paradigms can be characterized by all of the following except

- A. once agreed upon remain unchanged forever.
- B. are broad patterns of thought that guide thinking.
- C. influence how we interpret evidence.
- D. determine which questions we understand to be relevant to issues at hand.

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Topic: Scientific Thinking

6. The process by which science works is useful to the general public as well as to scientists.

TRUE

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7. A person carefully gathering pieces of information to uncover a larger pattern is engaged in deductive reasoning.

TRUE

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8. Creating a generalization based on several observations is an example of deductive reasoning.

FALSE

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9. If something cannot be directly experimented upon, it is not considered to be a part of science.

FALSE

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10. Statistical tests

- A. provide us with raw numbers such as the number of people in a given city.
- B.** focus on determining the probability that observed phenomena occurred by chance.
- C. are only used in science to influence political decision-making.
- D. provide only fake numbers.

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11. Manipulative experiments

- A. are not useful to ecologists because they depend on the natural environment.
- B.** are most often conducted in a laboratory.
- C. do not allow the scientist to control variables.
- D. are not possible.

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Topic: Scientific Method

12. Ecological systems often undergo periodic disturbances

- A. such as floods and fires.
- B. and show resilience when they recover quickly.
- C. only in arid environments.
- D.** such as floods, fires, and show resilience when they recover quickly.

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Topic: Scientific Method

13. Positive feedback is a process

- A. that is self-perpetuating.
- B. where increases in a state variable lead to further increases.
- C. that suppresses change.
- D.** that is self-perpetuating and where increases in a state variable lead to further increases.

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Topic: Scientific Method

14. In an ecosystem, throughput can refer to

- A. matter that flows into the system but not out.
- B. energy that originates in the system and flows out.
- C.** something that can expand the size of state variables.
- D. the equilibrium state.

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Topic: Ecosystems

15. Homeostasis refers to

- A. a tendency to change.
- B.** equilibrium.
- C. spatial homogeneity.
- D. the environment.

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Topic: Ecosystems

16. Which of the following is not an example of a disturbance in an ecosystem?

- A. Fire
- B. Drought
- C. Flash flood
- D.** Shade

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Topic: Ecosystems

17. Sometimes severe disturbances can lead to a _____, in which conditions do not return to normal.

- A. paradigm shift
- B.** state shift
- C. feedback loop
- D. system

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Topic: Scientific Method

18. _____ is a process for producing knowledge methodically and logically.

- A. Universalism
- B. Science**
- C. Relativism
- D. Morality
- E. Parsimony

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Topic: Science

19. Ideally, science

- A. Always has the right answers
- B. Tells us what we expected to find
- C. Uses new technology
- D. Is orderly and methodical**
- E. Proves that our hypotheses are correct

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Topic: Science

20. Which of the following is not an important feature of science?

- A. Reproducibility
- B. Parsimony
- C. Empiricism
- D. Positive proof**

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Topic: Science

21. Generally, distinguished scientists

- A. Always agree if they really are expert scientists
- B. May have different interpretations of the same evidence**
- C. Never disagree once a theory is established
- D. Believe each other and support each other in their work
- E. Always disagree so they can prove theories

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Topic: Science

22. Proof in science is always

- A. Firmly established
- B. Beyond question
- C. An impossible goal
- D. constantly changing with little continuity between disciplines.
- E. Open to question or new evidence**

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Topic: Science

23. The statement, "Since every insect I have examined so far has six legs, I conclude that all insects must have six legs" is an example of

- A. Inductive reasoning**
- B. Deductive reasoning
- C. Hypothesis testing
- D. Reductive reasoning
- E. Parsimony

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24. From the following statements and questions, which is the best example of deductive reasoning?

- A. If all insects have six legs, then butterflies have six legs**
- B. In repeated tosses of a coin, there is a 50/50 chance of each toss resulting in a "head"
- C. How many times will the toss of coins turn "heads-up" if 100 times toss a coin?
- D. Since every insect I have examined so far has six legs, I conclude that all insects must have six legs
- E. All of these are examples of deductive reasoning

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25. Although your sister is not a scientist, she says that she uses scientific techniques in her everyday life. You do not believe her but she insists it is true. Which of the following examples could she use to best persuade you?

- A. When she cooks, she measures ingredients and puts them together to form something else (e.g., a cake)
- B. When she drives in her car, she hypothesizes about things (e.g., when the red light will turn green)
- C. She put some tomatoes in the sun and some in the shade to see if the sun causes them to ripen faster**
- D. She buys a brand of toothpaste based on statistical data (four out of five dentists recommend it)
- E. All of these are examples of using scientific techniques in her everyday life

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26. Experiments in which conditions are deliberately altered and all other variables are held constant are known as _____ experiments.

- A.** Manipulative
- B. Natural
- C. Hypothetical
- D. Probability
- E. Double-blind

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Topic: Science

27. Double-blind studies are especially useful in

- A. Genetic experiments
- B.** Health studies
- C. Statistical analysis
- D. Opinion surveys
- E. Double-blind studies are not useful in any situation

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Topic: Science

28. Which of the following scenarios are free from bias?

- A.** A scientist is conducting an experiment on liver disease that is funded by a university, and has set up the experiment as a double-blind study testing of a new medication.
- B. A scientist is conducting an experiment on liver disease that is funded by a pharmaceutical company, and has set up the experiment as a double-blind study testing of a new medication.
- C. A scientist is conducting an experiment on liver disease that is funded by a university, and has set up the experiment study testing of a new medication and only give the medicine to the healthiest patitents.
- D. A scientist is conducting an experiment on liver disease that is funded by a pharmaceutical company, and has set up the experiment as a double-blind study testing of a new medication on people without liver disease as well as those with liver disease.

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29. In experimentation, dependent variables are also known as _____ variables.

- A. Conventional
- B. Blind
- C. Response**
- D. Model
- E. Distribution

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30. _____ allow scientists to gather information about complicated and interrelated environmental systems.

- A. Charts
- B. Graphs
- C. Models**
- D. Figures
- E. Paradigm shifts

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Susan is conducting an experiment to see if plants will grow better with application of fertilizer. She separates 50 plants into two groups of 25. One group receives a liquid fertilizer when watered every other day, and the other group receives only water on the same days. The plants are kept in a greenhouse with constant and equal amounts of sunlight, and a constant temperature. She measures the plants once a week for 12 weeks. At the end of 12 weeks, the plants with the fertilizer grew an average of 9 inches, and the ones that were not given the fertilizer grew an average of 5 inches.

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31. In the scenario described above, the plants that received fertilizer are the _____ group, and the plants that did not receive fertilizer are the _____ group.

- A. treatment; control**
- B. control; treatemnt
- C. treatment; exposed
- D. controlled; non-treatment

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32. In the above scenario, why did Susan place the plants in a greenhouse and control the amount of sunlight and temperature?

- A.** Keeping any factor that can influence a plant's growth, other than fertilizer, equal to all plants, ensures that if there is a difference at the end, it will most likely be due to the fertilizer.
- B. It was an easy place to keep the plants.
- C. It did not make a difference. The fertilizer would have influence growth even if the plants were part in sunlight and part in shade.
- D. The plants would have adapted to the situation no matter if the temperatures is different.

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33. When referencing the above scenario, why did Susan average the resulting heights of the plants?

- A.** To account for the genetic variation in the plants.
- B. Because two numbers are easier to compare than 50.
- C. She liked showing off her knowledge of simple statistical analysis.
- D. To account for differences in temperature and sunlight between the groups.

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Topic: Science

34. Networks of interactions among interdependent factors are known as

- A. Science
- B. Ecology
- C.** Systems
- D. Processes
- E. Negative feedback loops

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Section: 02.02
Topic: Science

35. The damage to an ecosystem caused by a hurricane or flood can be referred to as

- A. An open system
- B. An emergent property
- C. Equilibrium in nature
- D.** A disturbance
- E. Negative feedback loop

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Topic: Science

36. In a food chain, grass absorbs sunlight to make sugar, the grass is eaten by a rabbit, and the rabbit is eaten by a fox. What is a throughput that connects this system?

- A.** energy
- B. sugar
- C. the will to survive
- D. ATP

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Gradable: automatic
Section: 02.02

37. Which of the following is a closed system?

- A.** A cave with abundant life that was sealed off from the outside world during a landslide 100 years ago.
- B. An underwater ocean cave
- C. an aquarium
- D. a forest habitat

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Topic: Science

38. Which of the following is an example of a negative feedback loop?

- A.** A small island is home to both wolves and deer. When the deer have high numbers, the wolves have plenty of prey to feed pups and their numbers increase. When the deer are heavily predated upon, the deer numbers decrease causing some of the wolves to starve.
- B. Grass begins to grow on a recently plowed field.
- C. Locusts begin to swarm, and when they encounter other non-swarving locusts, they too begin to swarm.
- D. A person is driving and is cut off by another driver, this causes the person to become angry and they begin to drive more aggressively, cutting off other drivers.

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Topic: Science

39. The ability of an ecosystem to recover from a disturbance is known as

- A.** resilience
- B. stability
- C. fitness
- D. emergence

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Gradable: automatic
Section: 02.02
Topic: Science

40. A scientific consensus

- A. is typically broad in its statements.
- B. uses feedback from many scientists.
- C. can lead to paradigm shifts.
- D.** All of these answers are correct.

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Section: 02.03
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41. An important value of science is that it provides the methodology to prove that a theory is correct.

FALSE

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42. The progress of science is mainly happens when a scientist working in isolation and discovers something very important.

FALSE

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43. Paradigm shifts occur when ethical considerations are incorporated into scientific theory.

FALSE

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Chapter 02 Test Bank: Principles of Science and Systems Summary

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