

Chapter 02 - Principles of Science and Systems

Chapter 02
Principles of Science and Systems

Multiple Choice Questions

1. _____ is a process for producing knowledge methodically and logically.
- A. Universalism
 - B. Science**
 - C. Relativism
 - D. Morality
 - E. Parsimony

Bloom's: 1. Remember
Section: 02.01
Topic: Science

2. 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

Bloom's: 1. Remember
Section: 02.01
Topic: Science

3. Which of the following is not an important feature of science?
- A. Reproducibility
 - B. Parsimony
 - C. Empiricism
 - D. Positive proof**

Bloom's: 2. Understand
Section: 02.01
Topic: Science

4. 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

Bloom's: 2. Understand
Section: 02.01
Topic: Science

5. 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

Bloom's: 2. Understand
Section: 02.01
Topic: Science

6. 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

Bloom's: 2. Understand
Section: 02.01
Topic: Science

7. 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

Bloom's: 2. Understand
Section: 02.01

8. 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

Bloom's: 2. Understand
Section: 02.01
Topic: Science

9. 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

Bloom's: 1. Remember
Section: 02.01
Topic: Science

10. 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

Bloom's: 1. Remember
Section: 02.01
Topic: Science

11. 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.

Bloom's: 2. Understand
Section: 02.01
Topic: Science

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

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

Bloom's: 1. Remember

Section: 02.01

Topic: Science

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

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

Bloom's: 2. Understand

Section: 02.01

Topic: Science

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.

Bloom's: 2. Understand

Section: 02.01

Topic: Science

14. 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

Bloom's: 2. Understand
Section: 02.01
Topic: Science

15. 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.

Bloom's: 2. Understand
Section: 02.01
Topic: Science

16. 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.

Bloom's: 2. Understand
Section: 02.01
Topic: Science

17. Networks of interactions among interdependent factors are known as

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

Bloom's: 1. Remember

Section: 02.02

Topic: Science

18. 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

Bloom's: 1. Remember

Section: 02.02

Topic: Science

19. 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

Bloom's: 2. Understand

Section: 02.02

20. 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

Bloom's: 1. Remember

Section: 02.02

Topic: Science

21. 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 preyed 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-swarmed 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.

Bloom's: 2. Understand

Section: 02.02

Topic: Science

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

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

Bloom's: 1. Remember

Section: 02.02

Topic: Science

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23. 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.

Bloom's: 1. Remember
Section: 02.03
Topic: Science

True / False Questions

24. An important value of science is that it provides the methodology to prove that a theory is correct.
- FALSE**

Bloom's: 2. Understand
Section: 02.01
Topic: Science

25. The progress of science is mainly happens when a scientist working in isolation and discovers something very important.
- FALSE**

Bloom's: 1. Remember
Section: 02.03
Topic: Science

26. Paradigm shifts occur when ethical considerations are incorporated into scientific theory.
- FALSE**

Bloom's: 1. Remember
Section: 02.03
Topic: Science