CHAPTER 2

The Nature of Science

Multiple Choice

1. According to the text, when students think of "scientists," they rarely think of

   a. chemistry and physics.
   b. white lab coats and test tubes.
   c. research activities.
   d. the formulation of theory.*

2. According to the authors of your textbook, the natural sciences and social sciences

   a. have nothing in common.
   b. share common philosophical and logical foundations.*
   c. differ primarily in how each defines the concept of "objectivity."
   d. differ insofar as the natural sciences are based on empiricism, whereas the social sciences are not.

3. The authors of the textbook take the position that

   a. social research is fundamentally scientific.*
   b. the general scientific method may be applied to some social science topics but not to others.
   c. the social sciences should model themselves after the natural sciences in terms of the structure of scientific theory but not in terms of the scientific "process."
   d. the social sciences are less scientific than the natural sciences because they cannot be as objective.

4. The most essential, defining "product" of science is

   a. ideas in the form of principles and theories.*
   b. technological advances such as telecommunications, laser beams, and computer chips.
   c. precise measurement and accurate prediction.
   d. discoveries such as new planets, new organisms, and medical cures.

5. Which of the following is an example of a scientific question?

   a. To what crimes should capital punishment apply?
   b. Should clinical abortions be government funded?
   c. Should intelligence tests be used in the schools?
   d. Is political corruption a serious problem in the United States?
   e. Why do women have abortions?*

6. Which of the following is *not* a rule about language usage in science?

a. One word, one concept.
b. Concepts must be linked to observable objects and events.
c. Concepts should stand the test of time.*
d. Concepts should be judged by their usefulness.

7. Social scientists have found consistent, substantial empirical support for the following proposition: As the size of a group increases, its complexity increases. This conclusion best represents a

a. theory.
b. law.*
c. hypothesis.
d. concept.
e. paradigm.

8. Which of the following statements is *true* of scientific theory?

a. Scientific theories can be proven logically.
b. There can be one and only one true theory of any social phenomenon.
c. Theories are less abstract than hypotheses.
d. Theories can be expressed as a logically interconnected set of propositions.*

9. Freud's death wish is an example of

a. explanation without prediction.*
b. prediction without explanation.
c. neither explanation nor prediction.
d. an objectively testable proposition.

10. The ultimate goal of scientific inquiry is

a. the accumulation of facts.
b. the advancement of technology.
c. prediction and control.
d. hypothesis testing.
e. understanding.*

11. Scientific theories provide a sense of understanding by

a. introducing a unique set of concepts.
b. making accurate predictions.
c. describing the causal process that connects events.*
d. connecting one set of generalizations to another.

12. Which statement most accurately describes scientific knowledge or theory?

a. It is the best understanding that we have been able to produce thus far.*
b. When perfected, it is a statement of what is ultimately real.
c. A theory is accepted as "scientific" when objective tests confirm its predictions.

d. Theory in a scientific discipline is essentially an inventory of the currently most accurate predictions.

13. The textbook describes science as both a product and a process. The "process" consists of

a. the development of scientific theory.
b. the continuous interaction of theory and data.*
c. logical reasoning.
d. the application of precise scientific instruments.

14. The most accurate depiction of the scientific process is that it

a. always begins with theory and ends with research.
b. involves a continuous interplay between theory and data.*
c. consists of the logical and empirical proof of hypotheses.
d. is an orderly procedure for making systematic observations.

15. In his study *Suicide*, Durkheim

a. developed a comprehensive theory of suicide that included climatic, psychological, and social causes.
b. attempted to explain individual differences in types of suicide.
c. examined variation in suicide rates among different nations and groups.*
d. did not produce a single finding that has stood the test of time.

16. Why is Durkheim's study *Suicide* a model of social scientific inquiry, even today?

a. It provided the first extensive quantitative analysis of suicide.
b. It presented the first truly scientific theory of suicide.
c. Virtually all of its predictions have been confirmed repeatedly by other investigators.
d. It showed how scientists use data to test theory and develop theories from data.*

17. To say that scientists follow principles of logical reasoning is to say that

a. logical proof is the primary means of verifying hypotheses.
b. logic provides the criteria for evaluating scientific reasoning.*
c. scientists use logical rules to infer theory from observations or data.
d. logic suggests how to test scientific theory.

18. What is the objective of logic or logical analysis?

a. to describe human thought processes
b. to facilitate creativity and imagination
c. to empirically validate scientific theory
d. to evaluate reasoning*

19. What is the primary difference between deductive and inductive logic?

a. the quality of the evidence supporting a conclusion
b. the certainty that a conclusion is true, based on the evidence*

c. whether a conclusion can be drawn, based on the evidence
d. the closeness of the association between evidence and conclusion

20. In valid *deductive* reasoning, if the evidence is true, the conclusion

a. may be true or false.
b. may be strong or weak.
c. must be true.*
d. depends on the variety of supporting evidence.

21. Someone studying homelessness finds that the first four homeless people he examines are mentally ill. He therefore concludes that all homeless people are mentally ill. What type(s) of reasoning is this?

a. deductive reasoning
b. inductive reasoning*
c. neither deductive nor inductive reasoning
d. both deductive and inductive reasoning

22. Which of the following sequences best describes the *inductive* logic of inquiry?

a. theory → data → hypothesis
b. data → theory → hypothesis
c. data → empirical pattern → theory*
d. theory → hypothesis → data
e. empirical pattern → hypothesis → theory

23. Which of the following sequences best describes the *deductive* logic of inquiry?

a. theory → data → hypothesis
b. data → theory → hypothesis
c. data → empirical pattern → theory
d. theory → hypothesis → data*
e. empirical pattern → hypothesis → theory

24. Scientists engage in *deductive* reasoning when they

a. show how a hypothesis follows from a theory.*
b. infer empirical patterns from data.
c. formulate a theory to account for empirical patterns.
d. infer the validity of a theory from a set of data.

25. Based on the "mental alienation" theory of suicide, Durkheim argued that groups with higher rates of insanity will have higher rates of suicide. Women have higher rates of insanity than men. Therefore, women have higher rates of suicide than men. What type(s) of reasoning is this?

a. deductive reasoning*
b. inductive reasoning
c. neither deductive nor inductive reasoning

d. both deductive and inductive reasoning

26. According to Durkheim's theory of suicide, the more socially integrated a group, the lower its suicide rate. Catholics are more socially integrated than Protestants. Therefore, the suicide rate is lower among Catholics than among Protestants. What type(s) of reasoning is this?

a. deductive reasoning*
b. inductive reasoning
c. neither deductive nor inductive reasoning
d. both deductive and inductive reasoning

27. Durkheim found that predominantly Catholic nations had lower suicide rates than predominantly Protestant nations, and that married people had lower suicide rates than single people. Noting that both Catholics and married people are more socially integrated than their counterparts, he theorized that the more socially integrated a group, the lower its suicide rate. What type(s) of reasoning is this?

a. deductive reasoning
b. inductive reasoning*
c. neither deductive nor inductive reasoning
d. both deductive and inductive reasoning

28. In a *deductive* argument the conclusion may be _____, whereas in an <u>inductive</u> argument the conclusion is _____.

a. true or false; more or less probable*
b. valid; invalid
c. true or false; always true
d. valid or invalid; true or false

29. In contrast to deductive reasoning, inductive reasoning

a. is *not* based on empirical evidence.
b. involves conclusions that are more or less probable.*
c. is less descriptive of human thought processes.
d. moves from general principles to particular conclusions.
e. should be avoided in science whenever possible.

30. When Durkheim formulated his theory of egoistic suicide from several established facts he used _____ ; when he showed how his theory explained the facts he used _____.

a. deductive reasoning; inductive reasoning.
b. deductive reasoning; valid reasoning.
c. valid reasoning; deductive reasoning
d. inductive reasoning; deductive reasoning*
e. valid reasoning; inductive reasoning

31. An observer of street corner groups finds that more acts of vandalism are committed by same-sex groups than by mixed-sex groups. She speculates that the propensity to commit

publicly deviant acts is a product of competition for recognition among peers of equal status. This is an example of

a. prediction without explanation.
b. deductive reasoning.
c. inductive reasoning.*
d. hypothesis testing.

32. According to the deprivation theory of religiosity, people who are denied gratification within the secular society will be more likely to turn to the church as an alternative source of gratification. The United States is a male-dominated society in which women are denied the level of gratification enjoyed by men. Therefore, women will be more religious than men. This is an example of

a. logical inconsistency.
b. feminist reasoning.
c. deductive reasoning.*
d. inductive reasoning.

33. The three key principles underlying scientific research are

a. observation, theory, experiment.
b. prediction, experiment, serendipity.
c. empiricism, objectivity, control.*
d. deduction, induction, generalization.

34. The principles of empiricism, objectivity, and control

a. are found in the social sciences but not in the natural sciences.
b. guide the collection and evaluation of scientific evidence.*
c. are recent innovations in the scientific method.
d. complement intuition and revelation as ways of knowing in the social sciences.

35. According to the notion of empiricism, questions about the social world should be settled by resorting to

a. rational reflection.
b. logical reasoning.
c. careful, public discussion.
d. direct or indirect observation.*

36. Which phrase best captures the meaning of "objectivity" as it applies to scientific inquiry?

a. Observational evidence that is completely free of bias.
b. Evidence that is not subject to interpretation.
c. Agreement among independent observers of the same event.*
d. Agreement between scientists' observations and the external world.

37. The revelation that Cyril Burt's data on the intelligence of identical twins reared apart were fraudulent demonstrates

a. that fraudulence is more likely to occur in the social than in the natural sciences.
b. how the public scrutiny of scientific research contributes to scientific "objectivity."*
c. that social research findings should have no bearing on public policy.
d. some areas of social research tend to attract unethical scientists.

38. One "reality" of social scientific inquiry is that, in comparison with the natural sciences,

a. theoretical knowledge is less developed in the social sciences.*
b. personal values and biases have a greater impact because social scientists are more passionate about their work.
c. the social sciences are more likely to involve collaborative research.
d. the social sciences seldom use methods to control for error and bias.

39. Which of the following statements is *false*?

a. Theoretical knowledge is less developed in the social than in the natural sciences.
b. There is inevitably some degree of error in scientific prediction.
c. It is usually possible to eliminate the influence of personal values and biases in scientific work.*
d. Some sociologists challenge the scientific conception of sociology and other social sciences.

40. Which type of theoretical explanation is favored by qualitative researchers?

a. idiographic explanation*
b. nomothetic explanation
c. universal explanation
d. abstract causal explanation

41. Which of the following is *not* among qualitative researchers' criticisms of using the natural sciences as a model for social scientific inquiry?

a. Knowledge is a social construction that differs from objective reality.
b. Explanations of the social world are limited by culture and time.
c. Human activities cannot be quantified.*
d. Studying humans, as opposed to nonhuman objects, requires an understanding of the subjects' interpretations of the world.

True and False

T* F 1. The principal goal of science is to produce knowledge.

T F* 2. The principal goal of science is the solution of technical and social problems.

T F* 3. In science, as in everyday language, it is acceptable for a concept to have multiple meanings.

T* F 4. A concept is an idea or abstract notion usually communicated by words.

T F* 5. Explanation and prediction in science involve different forms of logical reasoning.

T* F 6. Theories provide a more general understanding than scientific laws.

T* F 7. It is possible to have prediction without scientific understanding.

T F* 8. The confirmation of a particular prediction is sufficient to prove a theory.

T* F 9. In science, evidence is always open to change through reinterpretation or possible contradiction by new evidence.

T* F 10. Scientific knowledge is tentative and uncertain.

T F* 11. Science is best defined as a step-by-step method of data collection.

T F* 12. The scientific process always begins with theory and ends with data.

T F* 13. Scientific inquiry always starts with data, from which theories are developed.

T* F 14. Science involves both deductive and inductive reasoning.

T* F 15. In inductive reasoning, conclusions may go beyond the evidence at hand.

T F* 16. Inductive reasoning generally represents a top-down process, moving from theory to hypothesis to data.

T* F 17. In formulating a hypothesis from a theory, a researcher uses deductive reasoning.

T* F 18. Several theories may account for the same empirical patterns.

T* F 19. Empirical evidence is observable to the researcher and others.

T F* 20. Like many other intellectual endeavors, scientific inquiry relies on tradition, revelation, and intuition as sources of evidence.

T* F 21. Objectivity in science basically boils down to agreement among independent observers of the same event.

T* F 22. The public nature of science safeguards scientific objectivity.

T F* 23. Theories must generate highly accurate predictions to be scientifically useful.

T* F 24. Scientists may adhere to major theories for long periods in the face of much contradictory evidence.

T* F 25. Qualitative researchers tend to reject the natural sciences as a model of social scientific inquiry.

T F* 26. Qualitative researchers tend to assume that there is an objective reality that exists independent of the investigator.

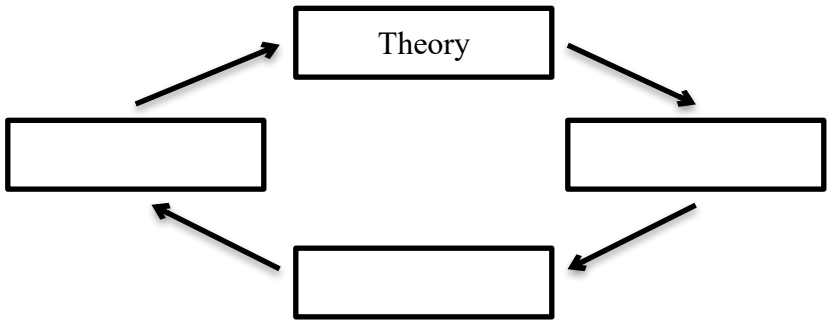
T* F 27. According to the text, both nomothetic and idiographic explanations have a place in social scientific inquiry.

Essay

1. The textbook describes science as a "product" and a "process." What is the essential defining product of science? What is the best overall description of the scientific process?

2. Describe how Durkheim used both deductive and inductive reasoning in his study of suicide. Be sure to give specific details of the study as these relate to each form of reasoning.

3. Below is an outline of a flowchart illustrating the scientific process. Fill in the boxes and then indicate whether each arrow in the diagram represents the application of deductive or inductive reasoning.



4. Because of the human element in science, some scholars believe that it is impossible to detect and eliminate sources of bias in scientific inquiry. Present a rebuttal to this criticism. Be sure to point out how biases and errors often are identifiable and correctable because the nature of scientific inquiry enables its own critique.

5. What are the three epistemic assumptions of qualitative research that challenge the natural sciences model of social science? How do the textbook authors counter these challenges?