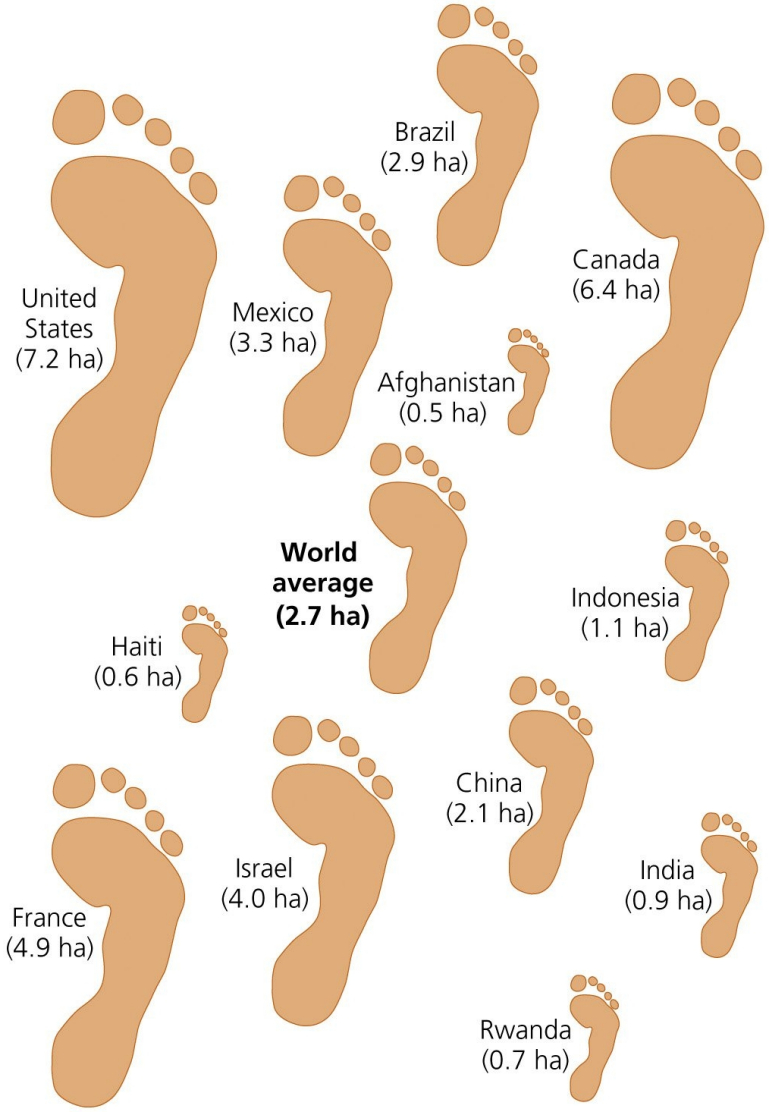
Exam

Name_____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.



Use the figure above to answer the following question(s).

1) How many citizens of Mexico does it take to equal the ecological footprint of the average citizen of the United States? 1) _____

A) They are essentially equal.
B) It takes just over eight Mexican citizens to equal the ecological footprint of the average U.S. citizen.
C) It takes nearly three Mexican citizens to equal the ecological footprint of the average U.S. citizen.
D) Two citizens of Mexico equal the ecological footprint of one average citizen of the United States.
E) It takes about 12 Mexican citizens to equal the ecological footprint of the average U.S. citizen.

2) Nearly 50% of the land on our planet is currently used for agriculture. If everyone on the planet had an ecological footprint the size of the average citizen of the United States, then _____. 2) _____

A) we would be able to provide for everyone without much difficulty by using the other 50% of the land currently not being used
B) we could support 50% more people on our planet
C) we would need at least two more planet Earths to feed and support everyone
D) we would have 50% more food to go around
E) about 50% of the people would starve

3) The world's average footprint per person is about 2.7 hectares per person. At that size, we are depleting our renewable resources 30% faster than they can replenish. The U.S. average footprint is 9.4 hectares, which is _____ times larger than the average world footprint. 3) _____

A) 2.5 B) 5 C) 2 D) 3.5 E) 6.7

4) The average footprint per person has increased from 2.2 to 2.7 since 2008, and the footprints of many developing nations, such as India and China, have also increased. This means that _____. 4) _____

A) some nations no longer have a measurable footprint
B) the populations of both India and China have decreased since 2008
C) the ability of the planet to sustain human beings has increased
D) our collective lifestyle is slightly more sustainable than before
E) our collective lifestyle is even more unsustainable than before

MATCHING. Choose the item in column 2 that best matches each item in column 1.

Match the following:

5) A scientific field of study	A) environmentalism	5) _____
6) Information expressed with numbers	B) qualitative data	6) _____
7) The variable that is manipulated	C) social science	7) _____
8) Expectations of experimental outcome	D) hypothesis	8) _____
9) Widely accepted, well-tested explanation of one or more cause-and-effect relationships	E) ecology	9) _____
	F) quantitative data	
10) Type of discipline describing environmental science	G) prediction	10) _____
	H) theory	
	I) interdisciplinary science	
	J) independent variable	
	K) dependent variable	
	L) paradigm	

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

11) Global population is projected to be about _____ in 2050. 11) _____
A) 7 billion B) 8 billion C) 11 billion D) 9 billion E) 10 billion

12) To determine your specific impacts on the environment, you can _____. 12) _____
A) calculate the biodiversity of your local community
B) measure the volume and type of all the wastes you contribute to the municipal waste stream
C) measure local air pollution and its impacts on your health
D) calculate your ecological footprint
E) determine your current water pollution impact

13) Which of the following terms best describes the practice of environmental science? 13) _____
A) Integrative and interdisciplinary
B) Abstract and theoretical
C) Theoretical and controversial
D) Highly specialized and focused
E) Elitist and unnecessary

14) Solutions to environmental problems _____. 14) _____
A) can be implemented only by scientists
B) are best designed and discussed in the political arena
C) must be on a local scale
D) must be short term
E) must be designed with sustainable goals

15) Nonrenewable natural resources include _____. 15) _____
A) coal
B) crude oil
C) minerals
D) wind
E) A, B, and C

16) Which of the following best embodies the qualities of a scientific theory? 16) _____
A) All gases, liquids, and solids consist of atoms.
B) Squirrels in central Illinois prefer to build their nests in oak trees instead of hickory trees.
C) Prairies that have larges herds of bison show greater plant diversity than prairies without bison.
D) Students who study for their environmental science exams will perform better on those exams than those who do not.
E) Dangerous wildfires in California could be avoided by better fire prevention strategies.

17) By studying ancient civilizations, such as the Greek and Roman empires and the Angkor civilization of Southeast Asia, historians have concluded that these civilizations declined partly because of _____. 17) _____
A) floods
B) sustainable practices
C) overabundance of resources
D) fires
E) environmental degradation due to unsustainable use of resources

18) _____ gives inherent value to certain living things or to the biotic (living) realm of the earth in general; both human and nonhuman lives have ethical standing. 18) _____
A) Ecocentrism
B) Realism
C) Anthropocentrism
D) Relativism
E) Biocentrism

19) A paradigm _____. 19) _____
A) is a means of evaluating scientific hypotheses
B) can only come from qualitative data
C) is synonymous with the scientific method
D) is a group of several hypotheses that can be tested together
E) is a dominant world view in science

20) Advances in agriculture _____. 20) _____
A) did not increase the amount of food per person from a global perspective
B) have often resulted in alteration and destruction of natural systems
C) are always sustainable, since they are based on natural ecosystems
D) have resulted in a smaller global population
E) do not rely on ecosystem services

21) The scientific process and knowledge is based on _____. 21) _____
A) observation alone
B) guesses based our personal feelings about the subject under inquiry
C) quantitative data alone
D) a systematic process of learning about and testing our understanding of the world
E) the fact that all hypotheses can be proven true

22) Scientific inquiry is based on _____. 22) _____
A) making huge leaps of knowledge with scientific insights
B) the production of technological advances
C) facts that can be proven true without experimental manipulation
D) designing experiments that have never been done before
E) an expanding knowledge based on observation, questioning, testing and discovery

23) A hypothesis is _____. 23) _____
A) the design of an experiment that can be used in scientific inquiry
B) a prediction about something that has not yet been observed
C) a testable proposition that explains an observed phenomenon or answers a question
D) a proven scientific fact
E) an instrument that is used to examine environmental conditions

24) Sachiko and Fred are having a discussion about the scientific method. Sachiko makes the comment that every time she sees people carrying open umbrellas, she also sees several small car accidents. This is a(n) _____. 24) _____
A) theory about car accidents
B) scientific study
C) observation
D) hypothesis
E) theory about umbrellas

25) An experiment _____. 25) _____
A) does not need to be repeated if well designed
B) often involves manipulating as many variables as possible
C) involves only collection of quantitative data
D) is an activity designed to test the validity of a hypothesis
E) is designed to generate new scientific hypothesis

26) In a manipulative experiment _____. 26) _____
A) replication of the experiment is not necessary
B) the motive is economic gain
C) the peer review process is bypassed
D) researchers manipulate as many variables as possible
E) researchers manipulate the independent variable

27) A(n) _____ is best defined as one who considers the impacts on the whole ecosystem, both the living and non-living, when considering an action. 27) _____
A) relativist
B) anthropocentrist
C) biocentrist
D) ecocentrist
E) ethnocentrist

28) John Muir, a great American environmentalist, felt that _____. 28) _____
A) national parks violated the principles of environmental justice
B) resources should be exploited wherever they were found to the greatest economic benefit
C) pristine wilderness should be preserved because "We need beauty as well as bread"
D) the only true value of wilderness was its ability to provide national economic growth
E) wilderness was essentially worthless and should not be preserved

29) In general, natural resources _____. 29) _____
A) belong only to those on whose property they exist
B) should be used efficiently and conserved
C) are evenly divided among all countries
D) should not be used
E) should be used by everyone equally

30) Environmental problems whose dimensions include differential exposure to risk from toxic wastes and air pollution or lack of access to the natural beauty of parks based on ethnicity or race are issues of _____. 30) _____
A) anthropocentrism
B) moral relativism
C) environmental justice
D) paradigm shifts
E) ecocentrism

31) Ruben has a new puppy and wants to feed it the best possible food. He decides on an experiment where he will feed it the very best canned food plus a dietary supplement of vitamins recommended by a veterinarian. Which of the following best describes Ruben's project? 31) _____

A) Ruben needs to use his mother's 6-year-old chocolate shar-pei to feed a standard diet so he can compare his puppy with a control dog.
B) This is not an experiment—there are no controls or replicates.
C) Ruben needs to take careful measurements of the puppy's weight and height at least once a week for it to be a good experiment.
D) This is an example of an excellent, controlled experiment as it is written.
E) Ruben needs to control for the amount of exercise, sunshine, water, and care that the puppy gets each week, so that they are equal from week to week.

32) The process by which several researchers review another researcher's manuscript prior to publication to ensure research quality is referred to as _____. 32) _____

A) quality control
B) peer review
C) hypothesis testing
D) investigative inquiry
E) critical analysis

33) Geothermal energy, wind and solar radiation are all examples of _____. 33) _____

A) biodiversity
B) non-renewable natural resources
C) renewable natural resources
D) biodegradable materials
E) biotic environmental factors

34) The best description of a sustainable system component is _____. 34) _____

A) one in which all species have rapidly increasing populations
B) one which is in balance with the system as a whole
C) a component that does not need to interact with other components
D) one which can appropriate increasing amounts of energy from other components
E) a component that requires increasing amounts of materials from surrounding components

35) Ecosystem services _____. 35) _____

A) are economically valuable services provided by natural systems
B) are not necessary to sustainable systems
C) are required to rebalance natural systems that we have disturbed
D) are valuable to natural systems but not to human-created systems
E) contribute to keeping ecosystems productive

36) Today, in 2015, the human population totals about _____. 36) _____

A) 7 billion
B) 9 billion
C) 10 billion
D) 2% less that it did in 2010
E) the same as for the past six years, 5.35 billion

37) You have read about the mistakes made on Easter Island. On Tikopia, another small island, the people acted in other ways. When they realized that the pigs they had imported were damaging the environment, they killed them all. They had to have permission from a chief to fish, which prevented overfishing. They practiced contraception. These all indicate that _____. 37) _____

A) they were concerned with only one year at a time
B) they felt that everything was a renewable resource
C) they truly practiced sustainability
D) they believed in full resource utilization
E) they felt that everything was a nonrenewable resource

38) Ethicists who believe that the guidelines for making environmental decisions are context-specific, depending on the cultures, social issues and other factors framing the decision are _____. 38) _____

A) preservationists
B) conservationists
C) following Leopold's land ethic
D) universalists
E) relativists

39) The Endangered Species Act, passed by Congress nearly four decades ago, has spawned a continuous series of debates between those who feel the ethical necessity to protect species at the brink of extinction and others who feel that if we have to protect every habitat of every species at risk, then there will be a loss of jobs and a blow to an already shaky economy. This boils down to a conflict between _____. 39) _____

A) economists and environmental scientists
B) social scientists and conservationists
C) universalists and ecofeminists
D) relativists and environmental justice advocates
E) anthropocentrists and ecocentrists

40) Sustainable development _____. 40) _____

A) means consuming resources without compromising future availability
B) is possible given our increased use of fertilizers and technology for agriculture
C) ensures an economy that will decline over time
D) is beyond our current technology and attitudes
E) is impossible to accomplish

41) Who is credited for articulating the conservation ethic and for founding the U.S. Forest Service? 41) _____

A) Aldo Leopold
B) Ralph Waldo Emerson
C) Gifford Pinchot
D) Theodore Roosevelt
E) John Muir

42) In a controlled experiment, _____. 42) _____

A) the researcher has several hypotheses, one of which will be proven correct
B) the experimental organisms have all been used before and given good results
C) the researcher knows the outcome before beginning the experiment
D) you need only a single experimental organism which is tested again and again
E) the researcher controls for the effects of all variables except one

43) Qualitative data _____. 43) _____
A) cannot be used to support or disprove hypotheses
B) can be acquired in the detailed examination of personal interviews or observations
C) have variables that may not have been properly manipulated
D) are data that are expressed as numbers and tested using statistics
E) cannot be replicated

44) A pharmaceutical company wishes to study a possible new headache medicine. They are doing human trials with 1000 volunteers and need to _____. 44) _____
A) put all women in the control group and all men in the experimental group
B) control for the type of headache—stress, migraine, or other causes
C) give both control and experimental groups the same amount of the new medication
D) have 10 volunteers in the control group
E) divide the groups by level of health

45) A study's results are deemed worthy of acceptance into the body of scientific knowledge if they are published in journals which _____. 45) _____
A) use the peer review process
B) conform to current political and religious views
C) charge a high fee for acceptance
D) meet guidelines advocated by environmentalists or consumer groups
E) are funded by corporations funding the research

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

46) Why is it important to understand our interactions with the environment? What will studying environmental science enable you to do?

47) Compare and contrast the philosophies of John Muir and Gifford Pinchot.

48) Differentiate between environmental science and environmentalism. Define each term and explain how they are similar and how they differ.

49) Name two transformative events of the past 10,000 years that caused human population size to increase. Describe each, briefly explaining the contributions that each made to human population growth. Include pros and cons of each.

50) Compare and contrast the types of knowledge gained and the research methods of natural and social sciences when considering environmental problems. Why do both types of disciplines need to be a part of environmental science?

51) What qualities would be present in a sustainable enterprise?

52) Discuss the differences between a manipulative and a natural experiment.

53) Several states in the United States and Mexico remove water from the Colorado River for a variety of purposes. Every year, California has typically removed more than its fair share of water as mandated by the Colorado River Compact of 1922. How is this action a "tragedy of the commons"?

54) Use the assessment tool at www.ecologicalfootprint.com to calculate your ecological footprint. Once you determine the factors that evaluate your use of water, energy, waste disposal, transportation and food consumption, use the results of your specific ecological footprint to determine 3 specific actions which you can take to reduce the size of your ecological footprint. Make sure that your specific actions each fit into a different category (water, energy, waste, transportation, and food). Summarize your assessment.

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Read the following scenario and answer the question(s) below.

Pablo and Johanna have to do a yearlong study for their biology course. After some discussion, they decide to try comparing their dogs and the diet that they feed them. Each has a dog from the pound, and both dogs are less than one year old. Pablo feeds his shepherd-mix dog a special diet of wet and dry foods from the local vet, while Johanna uses generic dry kibble from the supermarket for her bulldog. They want to see which diet results in bigger, healthier, faster-growing dogs.

55) The independent variable in this study will be _____. 55) _____
A) how much the dogs grow
B) the breed of the dogs
C) the age of the dogs
D) the type of food the dogs receive
E) the sex of the dogs

56) According to the information given, one dependent variable in this study will be _____. 56) _____
A) how much the dogs grow
B) the breed of the dogs
C) the age of the dogs
D) the sex of the dogs
E) the type of food the dogs receive

57) When they write up their initial proposal, the instructor will probably _____. 57) _____
A) give them an A for thoroughness and allow them to proceed with the experiment
B) give them an F and tell them to start over — it would take many years to do such a study
C) tell them they have some serious problems with the proposal, but it is possible to fix
D) tell them that the proposal is impossible and that such a study cannot be done at all
E) tell them that they need at least 100 dogs to do the study

58) The reason the instructor gives them will include the fact that they have too many _____. 58) _____
A) replicates and not enough variables
B) variables that they didn't control and not enough replicates
C) dependent variables and not enough independent variables
D) independent variables and not enough dependent variables
E) controlled variables and not enough uncontrolled variables

Read the following scenario and answer the question(s) below.

After meeting with their instructor, Pablo and Johanna know that they need to change their experimental design. They contact a local puppy farm and arrange to do their study with 3-month-old litters of pups from four Irish setters, a total of 24 puppies, consisting of 12 females and 12 males.

59) In order to have two sets of puppies, one set to be the control group and one set to be the experimental group, Pablo and Johanna should _____. 59) _____
A) randomly choose one dog for the control group and use the other 23 in the experimental group
B) put the 12 females in one group and the 12 males in the other group
C) put all the puppies from two of the litters in one group and all of the puppies from the other two litters in the other group
D) flip a coin for each dog to see which group it will be in
E) put six males and six females in each group, with some from each litter in each group

60) Pablo and Johanna should probably run the experiment _____. 60) _____
A) for several months, weighing and measuring the pups twice every day
B) for one month, weighing and measuring the pups before and after
C) for several months, weighing and measuring the pups every week
D) for at least 3 years, weighing and measuring the pups every week
E) for several months, weighing and measuring the pups before and after

61) If the puppies in the experimental group gain, on average, 3 pounds more than those in the control group over a 4-month period and seem healthier and more energetic, then _____. 61) _____
A) there is a probability that the veterinary diet is better than kibble for puppies
B) they have proven that the kibble diet is best for female dogs
C) they have proven the veterinary diet is best for all dogs
D) there is a probability that the kibble is better for puppies
E) there is a probability that the veterinary diet is better than kibble for all dogs

1) C
2) C
3) D
4) E
5) E
6) F
7) J
8) G
9) H
10) I
11) D
12) D
13) A
14) E
15) E
16) A
17) E
18) E
19) E
20) B
21) D
22) E
23) C
24) C
25) D
26) E
27) D
28) C
29) B
30) C
31) B
32) B
33) C
34) B
35) A
36) A
37) C
38) E
39) E
40) A
41) C
42) E
43) B
44) B
45) A
46) We depend on the environment for air, water, food, shelter, and everything else. We are capable of modifying the environment whether we intend to or not. Understanding our interactions with the environment is the essential first step toward devising positive, sustainable solutions. Studying environmental science will give us the tools we need to evaluate information on environmental change and to think critically and creatively about possible actions to take in response.

47) Both men were active in the early 1900s and both aimed to protect the North American wilderness by opposing rapid deforestation and unregulated land development. Muir was a preservationist and a true ecocentrist and preservationist who believed that nature should be protected for its own inherent value and who maintained that the experience of natural beauty was as important to us as the physical necessities of food and materials. He believed from his personal experience that nature provided spiritual renewal and met recreational needs. Pinchot was a conservationist who favored sustainable use of resources for the benefit of present and future generations. He was a utilitarian, meaning that he believed humans should use resources in a way that provides the greatest good for the greatest number of people for the longest time. He leaned closer to anthropocentrism than Muir.
48) Environmental science is the pursuit of knowledge about the workings of the environment and our interactions with it. Environmentalism is a social concern focused on protecting the natural environment and, by extension, humans, from undesirable changes brought about by certain human choices. Environmental scientists and environmentalists study the same issues, but environmental scientists use an objective scientific approach to understanding environmental problems. Environmentalists, on the other hand, may use dramatic and often emotional approaches to alter the political and social understanding or to educate the public about environmental problems.
49) The agricultural revolution included transition from the hunter-gatherer lifestyle to an agricultural lifestyle. Then, during the industrial revolution, there were shifts from rural life, animal-powered agriculture, and manufacture by craftspeople to an urban society powered by fossil fuels such as coal and oil. Students should describe the benefits and problems associated with each transformative event.
50) The natural sciences are made up of disciplines that study the physical and biological facets of the natural world and their interactions with each other. These disciplines rely on all types of studies that generate mainly quantitative data, allowing scientists to acquire and interpret information about the natural world. The social sciences are made up of disciplines that study human attitudes, behaviors, and interactions. The scientists in these disciplines mainly collect qualitative data using a variety of research techniques that are similar to natural scientists. Studies that examine how cultures perceive an environmental concept may be used to implement environmental policy. Because environmental problems involve accurate assessment of the scope of the problem by which policy that affects humans is devised, both types of sciences are needed to be a part of environmental science.
51) A sustainable enterprise is one which allows future generations to carry it on at the same level of productivity that we do at present. Whatever natural capital is required will remain equally available in the future as it is now. The environmental effects of the enterprise will not damage, degrade or deplete the systems with which it interfaces. Materials and energy will be used efficiently, wastes will be minimal and non-toxic, and the ecological footprint of the enterprise will remain unchanged, or may diminish as better technology becomes available.
52) In a manipulative experiment, the researcher chooses and manipulates the independent variable, but in a natural experiment the researchers records differences in variables as they are expressed in the natural environment, such as the mean weight of tomatoes grown in dry versus wet climates.
53) The Colorado River holds water in common for seven states in the western United States and the two northwestern states of Mexico. If California removes more than its share from the river, it leaves less water for the other users, tempting them to do likewise and scramble to compete for a limited resource. This poses a threat to the entire riverine system and is thus a "tragedy of the commons."
54) The answers will vary based on results of individual student lifestyle. Students can reflect on their results and could then consider making lifestyle adjustments that support a greater environmental sustainability.
55) D
56) A
57) C
58) B
59) E
60) C
61) A