

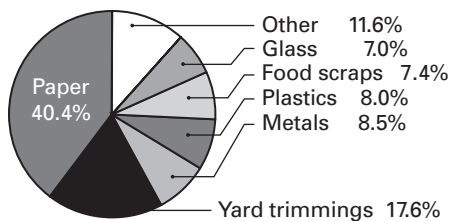
# Benchmark Test 1

Choose the letter of the best answer.

- 1 An experiment may generate many forms of information. Which of the following types of data would be *best* analyzed and presented using data tables on a spreadsheet program?**

**A** subjective descriptions  
**B** annotated photographs  
**C** many numeric data  
**D** electronic sound recordings

- 2 WHAT IS IN AMERICA'S TRASH?**



**The diagram shows a circle graph. Which of the following types of data can a circle graph *best* represent?**

**A** estimates and predictions of trends  
**B** relative proportions of categories  
**C** rate of change in a system  
**D** dimensions such as length and height

- 3 For what reason is repeated, careful measurement and documentation of experimental data essential?**

**A** Only a little data must be collected during a single experiment.  
**B** Data not obtained with perfect accuracy can be discarded.  
**C** Variables can be random and impossible to control.  
**D** Experiments can be reviewed and replicated by other scientists.

- 4 Suppose you work in a laboratory, and your research team decides to do experiments measuring toxic chemicals in streams. Which of the following is the *best* example of a type of unavoidable error for this experiment?**

**A** taking inaccurate records of where each sample was collected  
**B** forgetting to clean the bottles you use to collect samples  
**C** adding the wrong amount of solution to the sample before measuring it  
**D** having part of the sample naturally degrade as you drive to the laboratory

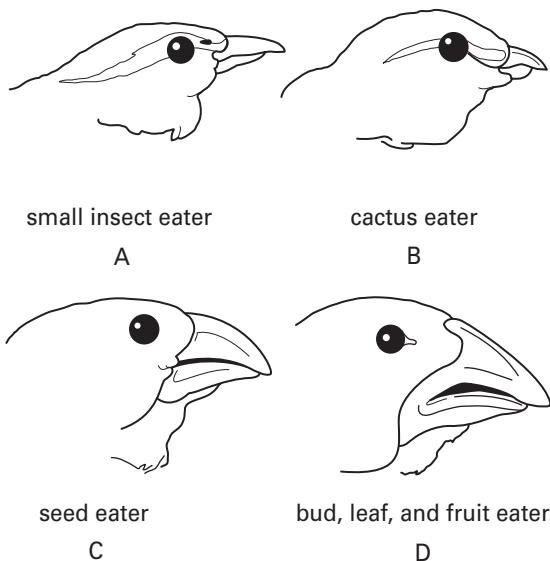
- 5 Before you use a scientific instrument, you should calibrate it. Calibration is the adjustment of a scientific instrument so that it measures correctly and consistently. Which of the following *best* describes how calibration is essential?**

**A** to ensure accurate documentation of qualitative observations  
**B** to eliminate a potential source of experimental error  
**C** to reduce the chance that instruments will have to be reset  
**D** to make sure that what is observed is measured

**6 Suppose you are studying a particular troop of wild monkeys. What would be the *best* way to study them in order to find out what they prefer to eat?**

- A** Observe them often, in different locations and over a long period of time.
- B** Capture them, move them to a lab, and offer them different types of food.
- C** Record everything they eat during one day and analyze the results.
- D** Leave a variety of foods out for them and document what they take.

**7 Beak Variations**



**Suppose a group of scientists discovers the birds shown in the diagram. By looking at these birds, each scientist comes up with a hypothesis. Which of the following hypotheses about these birds is *most* logical?**

- A** Birds with beaks the size of Bird D's beak are flightless.
- B** Only small birds catch and eat small insects.
- C** Beak size and shape are related to what birds eat.
- D** Insect- and cactus-eating birds are undernourished.

**8 Suppose you have your own theory, supported by a great deal of observation, that all frogs are green. One day, you find a brown frog. Which of these explanations for your finding is *most* likely?**

- A** It can't be a frog, because frogs are green.
- B** Someone has colored the frog brown as a hoax.
- C** All frogs are green except this one you found.
- D** Frogs can be brown, but the color is not very common.

**9 Which of the following phrases *best* defines a hypothesis?**

- A** an explanation for an event or condition that best fits the known facts
- B** a specific, testable proposed answer to a scientific question
- C** a satisfactory final interpretation of a puzzling natural phenomenon
- D** an analysis of quantitative and qualitative data that produces a solution

**10 The "Big Bang" theory of the origin of the universe is considered a theory. Which statement *best* explains what makes this a theory?**

- A** It does not explain all aspects of the universe we can observe.
- B** It can be used to demonstrate measurable effects that are not due to chance.
- C** It does not have enough supporting evidence to be considered a hypothesis.
- D** It explains a wide range of observations and is supported by much evidence.

**11 A computer model uses a series of mathematical equations that describe a system, such as the atmosphere. Computer models are used to bring together large quantities of data, making those data easier to analyze. Computer modeling would be the best method of obtaining information about which of the following systems?**

- A** mutations in human DNA after exposure to environmental toxins
- B** social behaviors in a flock of ravens when food supplies are scant
- C** the rate at which frogs reproduce in ponds in temperate climates
- D** the biting frequency of mosquitoes in a darkened observation chamber

**12 New data and conclusions may explain observations more accurately than did a previously accepted theory. What is likely to happen to the old theory?**

- A** It will be completely discredited.
- B** It may be revised or replaced.
- C** It will eventually be proved.
- D** It must turn into a hypothesis.

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## Hominid Skulls



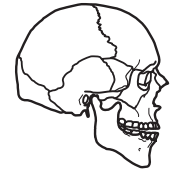
*Australopithecus afarensis*  
4-3 mya  
Brain volume 430 cm<sup>3</sup>



*Homo habilis*  
2.4-1.5 mya  
Brain volume 700 cm<sup>3</sup>



*Homo neanderthalensis*  
200,000-30,000 mya  
Brain volume 1500 cm<sup>3</sup>



*Homo sapiens*  
200,000 ya-present  
Brain volume 1300 cm<sup>3</sup>

**The diagram shows a series of Hominid skulls at different periods in evolutionary history. Which statement best describes a conclusion you can draw simply by looking at this diagram?**

- A** Hominid jaws were larger 2 million years ago.
- B** Modern hominids have the largest brains of any hominids that ever existed.
- C** *Homo neanderthalensis* and *Homo sapiens* are not hominids.
- D** Hominids have been around for only about 3 million years.

**14 A group of scientists suspects that a hypothetical plant would grow best when given large amounts of salt water. They design an experiment in which they give four groups of the same species of plant different concentrations of salt water. What is missing from their experimental design?**

- A** a hypothesis
- B** a constant
- C** a control
- D** a variable

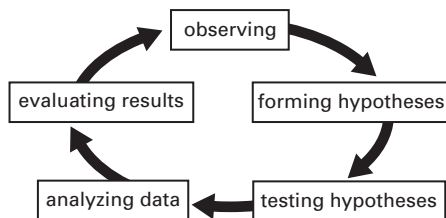
**15 What is the role of a control group in a scientific experiment?**

- A** to manipulate all conditions so that their effects can be observed
- B** to provide just one factor that does not change
- C** to observe what happens under “normal” or unchanged conditions
- D** to ensure that only one dependent variable can be changed at a time

**16 After an experiment is complete, researchers analyze data with statistics. An experimental result that is statistically significant shows that the outcomes of the study are**

- A** not likely due to chance.
- B** extremely important.
- C** mostly inconsistent.
- D** not meaningful.

**17**



**The diagram shows a typical cycle of scientific inquiry. At which point in the process will a researcher compare the experimental data with the original hypothesis?**

- A** observing
- B** forming hypotheses
- C** testing hypotheses
- D** evaluating results

**18 Many groups of scientists worked to sequence all of the bases in human DNA, also called the human genome. Eventually they completed their task by using computers and other technologies. Which of the following is likely to have contributed the *most* to the scientists’ work?**

- A** microscopes with combination lenses
- B** nearly 150 years of previous investigations
- C** tests on special strains of laboratory mice
- D** genetic mutation tests on humans

**19 Suppose a student wants to study how a disease gets passed between people. The student interviews 20 people in one town. Each of these people had the disease, and they all said they first noticed they were sick after eating the same type of food. The student concludes that this disease is passed by eating that type of food. Which of the following *best* justifies whether this a valid conclusion?**

- A** Yes. If all 20 people experienced the same effect, then it must be true.
- B** No. At least some of those people probably lied to the student.
- C** Yes. The student suspects that there were no other cases of the disease in the town.
- D** No. Twenty people are too few to conclude that the disease always spreads through food.

**20 Which of the following *best* completes this statement? The more an experiment is repeated, and the more researchers get the same patterns in their data, the more**

- A** reliable the data are.
- B** unavoidable errors are made.
- C** models are useful.
- D** controls are necessary.

**21 Suppose you are a state representative in a state that is debating a ban on all genetically modified organisms. Which source will provide the most accurate information about genetic engineering?**

- A** newspapers, magazines, and news broadcasts
- B** advocacy and citizens' groups studying the issue
- C** peer-reviewed scientific journals
- D** legislators whose districts have banned GMOs

**22 When making decisions about health, the environment, and public policy, people should balance scientific knowledge and**

- A** ethics.
- B** politics.
- C** philosophy.
- D** beliefs.

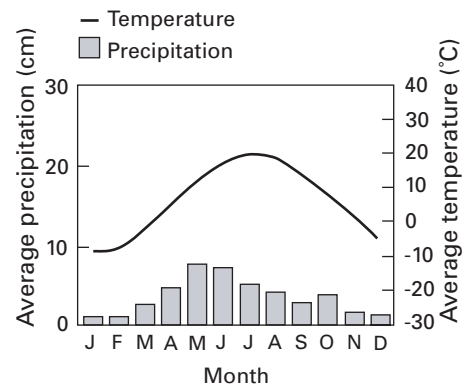
**23 Suppose you hear that a new human-like species has been seen. Footprints and a blurry cell-phone video are the only evidence. As a scientist, you think this sighting is most likely a(n)**

- A** exciting discovery.
- B** unsolved mystery.
- C** breakthrough.
- D** hoax or mistake.

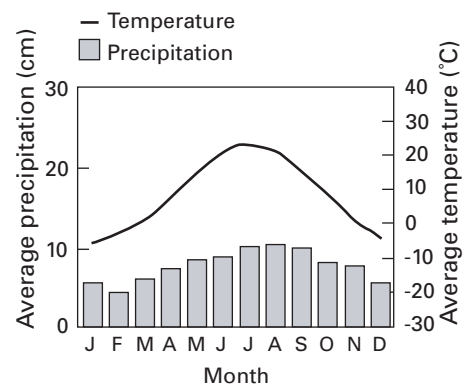
**24 Well-accepted scientific theories sometimes are**

- A** proved definitively, beyond all doubt.
- B** revised based on new discoveries.
- C** accepted uncritically by scientists.
- D** so obvious that they need not be tested.

**25 TEMPERATE GRASSLAND**



**TEMPERATE FOREST**



**The figure shows the results of observational studies in two ecosystems. How many variables do each of the graphs compare?**

- A** two
- B** three
- C** four
- D** five