

**VIRGINIA STANDARDS OF LEARNING**

**Spring 2005 Released Test**

# **END OF COURSE BIOLOGY**

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## **CORE 1**

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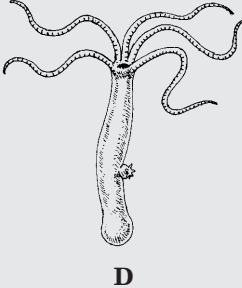
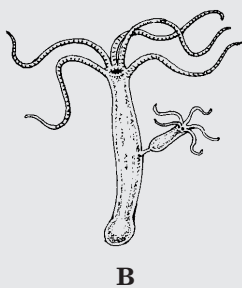
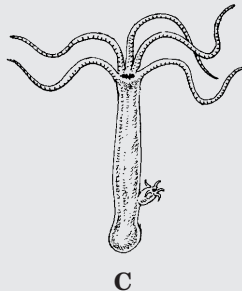
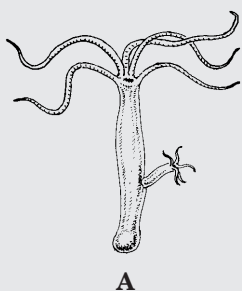
## Biology

### DIRECTIONS

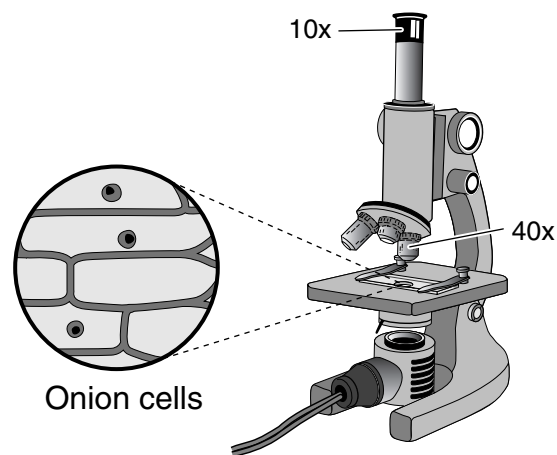
Read each question carefully and choose the best answer. Then mark the space on the answer sheet for the answer you have chosen.

#### SAMPLE

The following pictures show some stages during asexual reproduction of a hydra. Which picture shows the first step?



1



What is the total magnification used to view these onion cells through this microscope setup?

- A 10×
- B 40×
- C 50×
- D 400×

2 External sources, such as radiation or chemicals, can cause mutations in genes or entire chromosomes. For a mutation to pass on to offspring, it must occur in a —

- F brain cell
- G muscle cell
- H sex cell
- J bone cell

3 Scientists believe that a dinosaur known as a hadrosaurus was a plant eater. Which of the following pieces of evidence supports this conclusion?

- A Hadrosaurus fossils are found with fossils of other dinosaurs that were herbivores.
- B Fossilized plant remains are found with the fossils of the hadrosaurus.
- C The fossilized teeth of the hadrosaurus are flat like the teeth of modern herbivores.
- D The regions where hadrosaurus fossils are found were heavily forested.

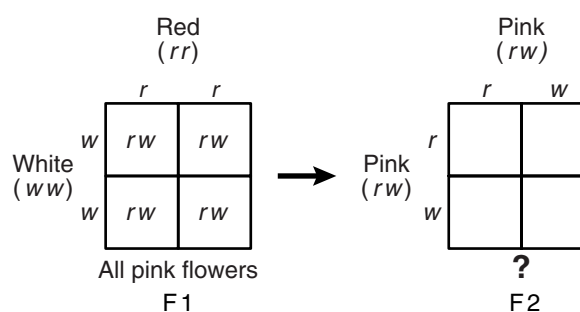
4 A biology class in Virginia conducted a survey of the plant species found on their school grounds. They found several plants that they didn't recognize. What resources would be *most* helpful to the class in identifying the plants and determining if they were introduced as exotic species?

- F Biology textbooks and the encyclopedia
- G Virginia native plant checklists and plant identification keys
- H Fossil records and historical society publications
- J Virginia newspapers and science journals

5 Which of these is responsible for the "rough" appearance of endoplasmic reticulum?

- A DNA
- B Enzymes
- C Lysosomes
- D Ribosomes

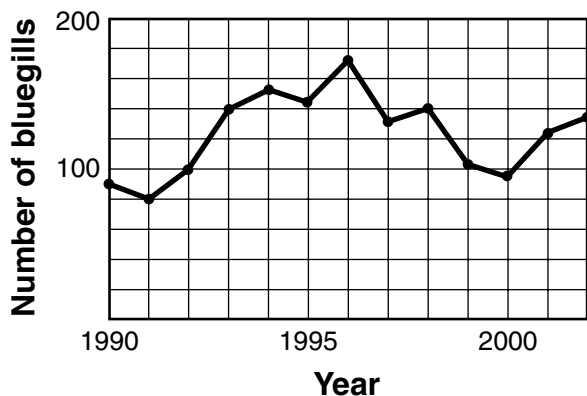
6



In snapdragons, the combined expression of both alleles for flower color produces a new phenotype that is pink. This illustrates incomplete dominance. The Punnett square above shows that both the white and red snapdragons are homozygous. Which of the following would be the correct product from a cross between two heterozygous pink snapdragons?

- F 2 red, 1 pink, 1 white
- G 1 red, 2 pink, 1 white
- H 1 red, 1 pink, 2 white
- J 2 red, 2 white

7 **Bluegill Population in Farm Pond  
1990–2002**



According to the data in the graph, during which time period did the overall bluegill population decline?

- A 1990–1993
- B 1993–1996
- C 1996–1999
- D 1999–2002

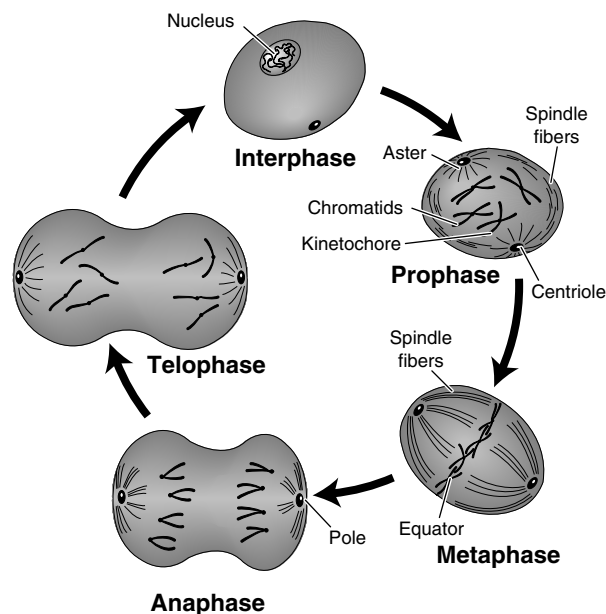
8 **A biology class of 24 students decides to measure the height of each student and then calculate the average height for the class. Which of these is a possible source of error in this activity?**

- F The accuracy of making and recording measurements
- G The total number of students in the class
- H The number of males and females in the class
- J The difference in the ages of the students in the class

9 **The energy in the food produced by autotrophs or taken into the bodies of heterotrophs must be changed into a form that cells can use. The energy-transferring molecule used by cells is —**

- A DNA
- B RNA
- C ATP
- D CO<sub>2</sub>

10



**Which of the following phases is the first step in mitosis?**

- F Anaphase
- G Metaphase
- H Prophase
- J Telophase

- 11 *Escherichia coli* is the scientific name of a bacterium. What category of classification is *Escherichia*?

A Order  
B Genus  
C Phylum  
D Species

12

**Transition forest** – overlap zones between needleleaf forests and deciduous forests

**Appalachian Cove forest** – climax forests known for high humidity and lush foliage

**Northern Needleleaf forest** – spruce-fir forests found on the highest, coolest peaks

**Oak-Hickory forest** – classic deciduous forests with abundant food and shelter

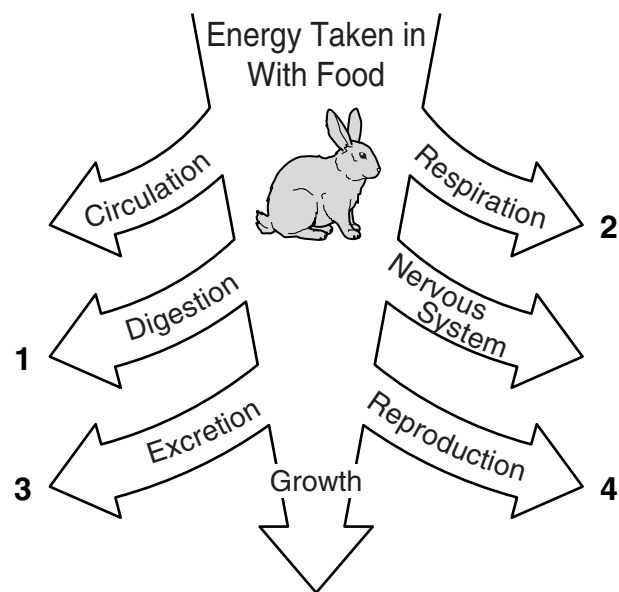
Shenandoah National Park is home to many different types of ecosystems. According to the characteristics shown above, which ecosystem would *most likely* be home to a mixture of wildlife species from northern, cooler ranges and southern, warmer ranges?

F Transition forest  
G Appalachian Cove forest  
H Northern Needleleaf forest  
J Oak-Hickory forest

- 13 Tissue samples taken from the heart and stomach of a grasshopper would be *expected* to have the same —

A cell shape  
B cell size  
C metabolic rates  
D DNA

14



Rabbits have developed behavioral and physiological strategies to sustain them through periods of environmental stress. Which of the numbered life processes above could be sacrificed without affecting an individual rabbit's survival in periods of extremely poor environmental conditions?

F 1  
G 2  
H 3  
J 4

- 15 A company that produces Brand X flea shampoo claims to have the most effective shampoo for killing fleas. Which of these sets of data supports the Brand X claim?

A Number of Dogs With Fleas

Brand X		Brand Y		Brand Z	
Before	After	Before	After	Before	After
25	4	25	1	25	10

B Number of Dogs With Fleas

Brand X		Brand Y		Brand Z	
Before	After	Before	After	Before	After
25	2	25	12	25	5

C Number of Dogs With Fleas

Brand X		Brand Y		Brand Z	
Before	After	Before	After	Before	After
25	10	25	4	25	12

D Number of Dogs With Fleas

Brand X		Brand Y		Brand Z	
Before	After	Before	After	Before	After
25	5	25	1	25	4

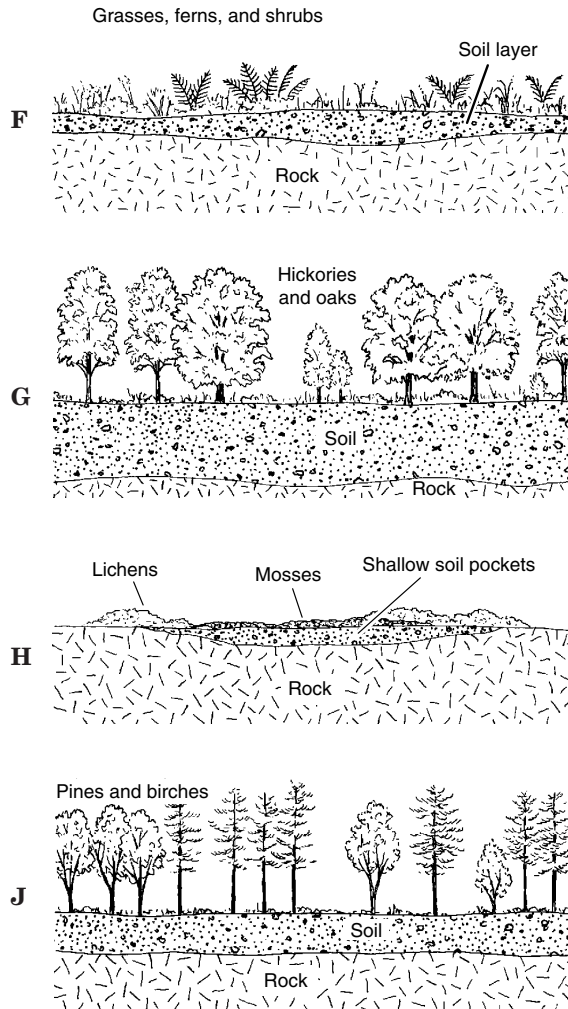
- 16 A student hypothesizes that thick leg muscles are an inherited trait in dogs. The student collects data on several dogs, and the data show that dogs that live outdoors have thicker leg muscles than dogs that live indoors. What should the student conclude?

- F Dogs that inherit thick leg muscles may not survive indoors.  
 G Dogs with thick leg muscles may require more exercise than dogs with thin leg muscles.  
 H Inheritance alone may not account for thick leg muscles in dogs.  
 J Inheritance of thick leg muscles may be associated with coat thickness in dogs.

- 17 Over many generations, unrelated or distantly related species may come to resemble each other due to —

- A similar environmental factors  
 B similar genetic mutations  
 C homologous structural adaptations  
 D competition with each other

- 18 Each drawing represents different stages in community succession within the state of Virginia. Which of the following drawings represents the climax community in this succession pattern?



- 19 Both lipids and carbohydrates are important in animal cells because both —

- A store energy
- B contain nitrogen
- C form cell walls
- D provide insulation

- 20 Ice floats on a lake. This characteristic of water is responsible for —

- F suffocation of aquatic organisms
- G mixing a lake's thermal layers
- H altering migration patterns of fish
- J preventing a lake from freezing solid

- 21 Algae and multicellular plants are autotrophs because they —

- A decompose dead organisms
- B absorb nutrients from soil
- C break down starches to glucose
- D capture sunlight to produce sugars

- 22 Some unicellular organisms are motile (have the ability to move) and some are nonmotile. Which cellular structures are associated with movement?

- F Ribosomes
- G Flagella
- H Chloroplasts
- J Vacuoles

- 23 Francesco Redi performed an experiment in 1668. In the experiment, he placed rotting meat in two jars. The first jar was left open. After a few days, fly larvae were found on the decaying meat inside. The mouth of the second jar was covered with gauze. After a few days, the decaying meat inside was free of fly larvae, but larvae were found on the gauze. This experiment supports the hypothesis that —

- A adult flies are not attracted to decaying meat
- B fly larvae prefer fresh meat
- C fly larvae only come from adult flies
- D decaying meat produces fly larvae

24

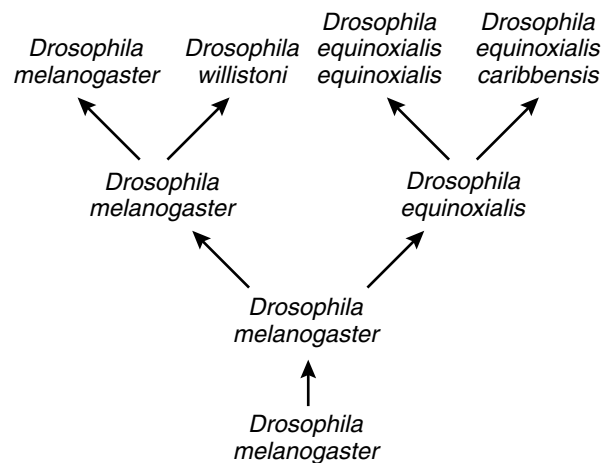
Structures Present in Vertebrate Embryos							
Stage of Development	Structure	Frog	Fish	Pig	Bird	Turtle	Human
early	tail	✓	✓	✓	✓	✓	✓
early	gill slits	✓	✓	✓	✓	✓	✓
early	notochord	✓	✓	✓	✓	✓	✓
late	external ears			✓			✓
late	limbs	✓		✓	✓	✓	✓

According to the table, as vertebrate embryos develop —

- F amphibians and humans develop the same structures
- G only mammals develop both limbs and external ears
- H reptiles and amphibians grow external ears
- J limbs and external ears grow on mammals and birds

25

### Evolutionary Pathway



Which type of *Drosophila* probably changed the *least* over time?

- A *Drosophila melanogaster*
- B *Drosophila willistoni*
- C *Drosophila equinoxialis equinoxialis*
- D *Drosophila equinoxialis caribbensis*

- 26 What repackages proteins into forms the cell can use, expel, or keep stored?

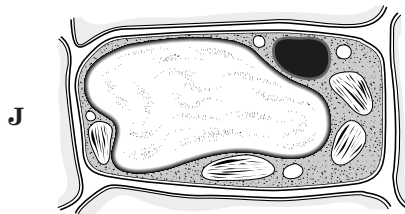
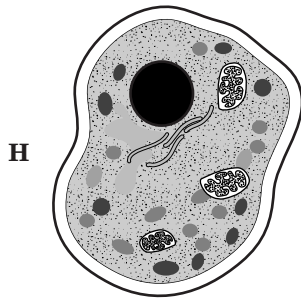
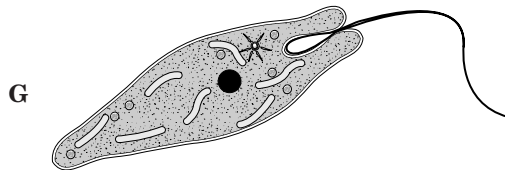
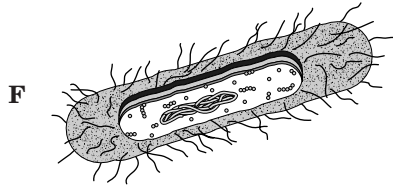
- F Lysosomes
- G Mitochondria
- H Golgi bodies
- J Centrioles

- 27 Bones do all of the following EXCEPT —

- A make nerve cells
- B make blood cells
- C protect organs
- D store calcium



- 28 Which of these is the best model of a prokaryotic cell?



- 29 The organisms in a typical backyard are likely to include bacteria, grass, shrubs, trees, insects, spiders, birds, and small mammals. Together, all these organisms make up —

- A a kingdom
- B a community
- C a population
- D an experimental group

- 30 Change in species is described as a process that usually occurs over long periods of time. Yet, even though antibiotics have only been widely used for fifty years, scientists recognize that overuse of antibiotics has led to antibiotic-resistant strains of bacteria. The reason this can occur in a relatively short span of time is that —

- F bacteria are very small
- G bacteria reproduce rapidly
- H there are many different types of bacteria
- J travelers carry bacteria around the world

31 **Flower Characteristics**

Characteristics	Insect-Pollinated Plants	Wind- or Water-Pollinated Plants
Appearance	often colorful	plain
Reproductive parts	sometimes hidden	exposed

The differences in the above characteristics of flower species *most likely* resulted from —

- A parasitism, which did not harm the host species
- B mutualism between different plant species
- C adaptations in response to different selection pressures
- D defensive mutations allowing concealment of species

32 A biologist has just discovered a new life form. The newly described organism is multicellular, does not carry on photosynthesis, and absorbs nutrients from the environment. It is composed of eukaryotic cells with cell walls. In which kingdom would the organism be classified?

- F Plant
- G Animal
- H Bacteria
- J Fungi

33 Wetlands are very specialized ecosystems. Of the following causes of wetland loss, which do people have the *least* control over?

- A Droughts
- B Draining and filling
- C Discharge of pollutants
- D Overgrazing

34 Biochemical substances in the human body are maintained at about a neutral pH *except* for the —

- F blood
- G stomach fluids
- H internal material of living cells
- J lymph

35 **DNA Base Sequence Comparison**

Human	AGG CAT AAA CCA ACC GAT TAA
Chimpanzee	AGG CCC CTT CCA ACC GAT TAA
Gorilla	AGG CCC CTT CCA ACC AGG CCA

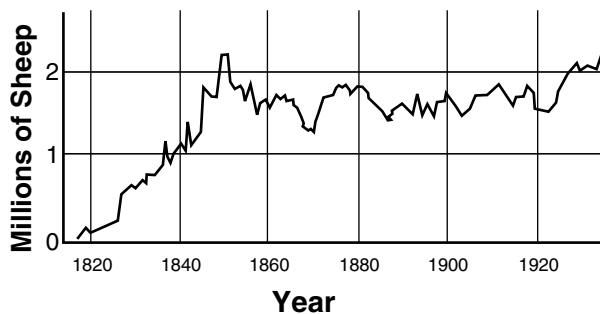
This chart compares the base sequences of homologous segments of DNA from three primates. Based on this information, how many differences in the resulting amino acid sequences would you expect to find between humans and chimpanzees?

- A 2
- B 3
- C 4
- D 6

- 36 When there is a lower concentration of water outside of a plant cell rather than inside a plant cell, the plant will tend to —

F grow toward the sun  
G lose water and wilt  
H gain water and become rigid  
J increase its rate of photosynthesis

- 37 **Tasmanian Sheep Population**



This graph suggests that from 1840 to 1920, the carrying capacity for sheep in Tasmania was approximately —

A 0.75 million  
B 1.00 million  
C 1.75 million  
D 2.25 million

- 38 Amino acids link together by peptide bonds to form proteins. In which cellular organelle would this process occur?

F Mitochondrion  
G Ribosome  
H Lysosome  
J Golgi body

- 39 Harvester ants often strip a bush of all of its leaves. Some people believe this helps the plant grow thicker, healthier stems. In an experiment, a student stripped off all the leaves from a set of plants. In a second set of identical plants, the student allowed ants to strip off the plants' leaves. In order to improve this experimental design, it is *most* important to add a set of plants —

A exposed to a different ant species  
B of a different species  
C with its leaves left intact  
D that are dormant

- 40 Most cellular activities are processes regulated by the action of —

F carbohydrates  
G enzymes  
H lipids  
J polysaccharides

41

Organism	Direction of Movement		
	Toward Light	Away from Light	Neither
Euglena	X		
Paramecium			X
Fungus			X
Coleus plant	X		
Earthworm		X	

These data were collected by observing responses of different organisms to light. Which conclusion is supported by these data?

- A Organisms that use photosynthesis are attracted to light.
- B Protists are not attracted to light.
- C Animals are attracted to light.
- D Decomposers are attracted to light.

- 42 In 1869, DNA was discovered within the nuclei of cells. By the 1940s, scientists knew that chromosomes were made of both DNA and protein but did not know which was the genetic material of cells. In the 1950s, scientists demonstrated that DNA is the material responsible for heredity. In 1953, using information collected by other scientists, an American biologist and an English physicist built a three-dimensional model of DNA. These discoveries *best* illustrate the importance of —

- F independent research
- G replication of results
- H collaborative efforts among scientists
- J recent improvements in the scientific method

- 43 Which of these is most responsible for carrying coded information from the nucleus?

- A The cell membrane
- B The ribosomes
- C mRNA
- D ATP

44

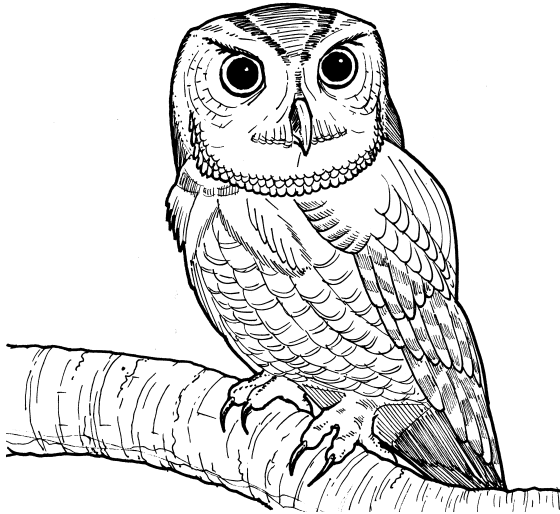
### Field Data

Pond	pH of Pond Water	Number of Duckweed Plants
A	6	150
B	12	300
C	8	500
D	4	80

The above information was collected in the field while studying the effect of pH on the growth of the duckweed plant. The data shows that duckweed has optimum growth at a pH of —

- F 4
- G 6
- H 8
- J 12

45

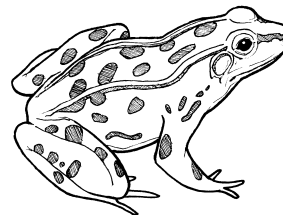
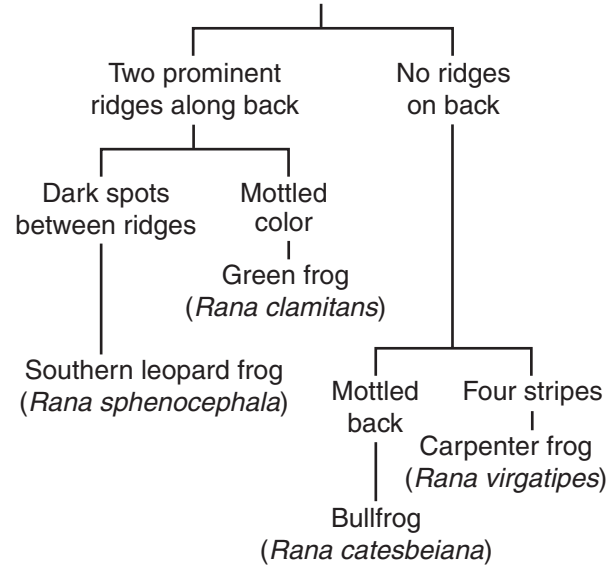


Which of the following is the *best* evidence that this bird is nocturnal?

- A The shape of its beak
- B The size of its eyes
- C The thickness of its feathers
- D The length of its talons

46

### Key to Frogs



This key can be used to distinguish four species of frogs found in ponds in eastern Virginia. To which species does the frog shown belong?

- F *Rana sphenoccephala*
- G *Rana clamitans*
- H *Rana catesbeiana*
- J *Rana virgatipes*

47 Which question cannot be answered scientifically because the quantity cannot actually be measured?

- A How fast can a tiger swallowtail butterfly fly?
- B How heavy is a mature female elephant?
- C How happy is a chimpanzee when it finds its favorite food?
- D How much food does a water buffalo consume in one day?

48 The chances of developing cancer, diabetes, or sickle-cell anemia are higher if a family member also has the disorder because they are —

- F highly infectious
- G passed through blood contact
- H genetically based
- J related to diet

49 Unlike plants, fungi cannot make their own food because they do not have —

- A roots
- B hyphae
- C spores
- D chlorophyll

## 50 Comparison of Disinfectants

Disinfectant	Bacterial Colony Size (mm)	
	Trial 1	Trial 2
None	6.0	5.5
1	3.0	2.0
2	2.5	1.5
3	4.0	4.0
4	1.5	1.5

Four disinfectants were tested in two trials, each for their effectiveness in controlling bacterial growth. The table shows the bacterial growth in each trial after four days. Which of the following conclusions is *best* supported by the results of this study?

- F Disinfectants kill most bacteria on contact.
- G Strong concentrations of disinfectants can be harmful.
- H Some disinfectants are more effective than others.
- J Disinfectants cannot be used to control bacterial infections.

