

**VIRGINIA
STANDARDS OF LEARNING ASSESSMENTS**

Spring 2001 Released Test

**END OF COURSE
BIOLOGY**

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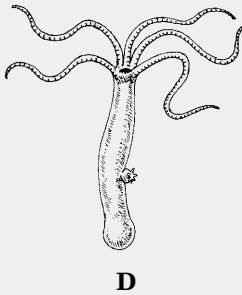
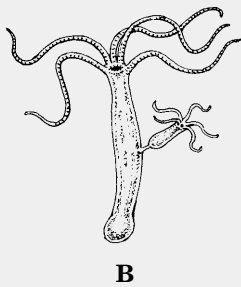
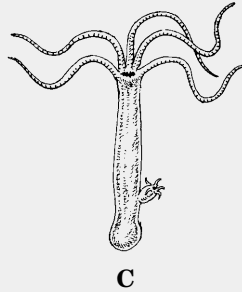
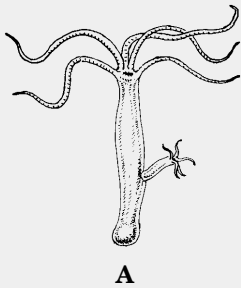
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DIRECTIONS

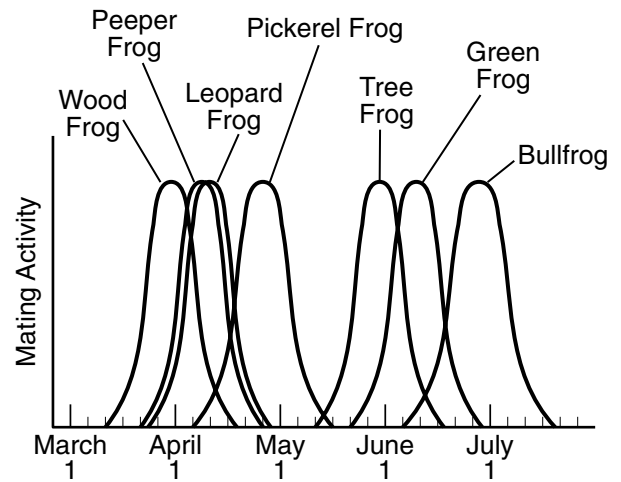
Read each question carefully and choose the best answer. Then mark the space on the answer sheet for the answer you have chosen.

SAMPLE

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



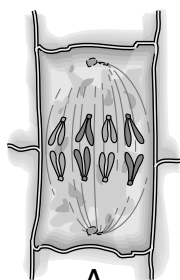
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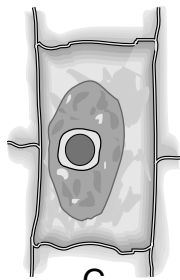
Which frog species would be most likely to interbreed?

- A Peeper and leopard
- B Wood and pickerel
- C Bullfrog and green
- D Tree and pickerel

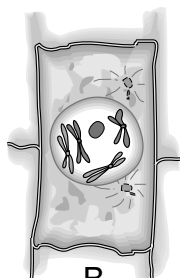
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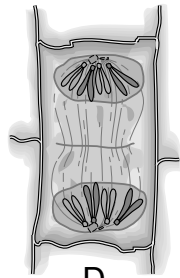
A



C



B



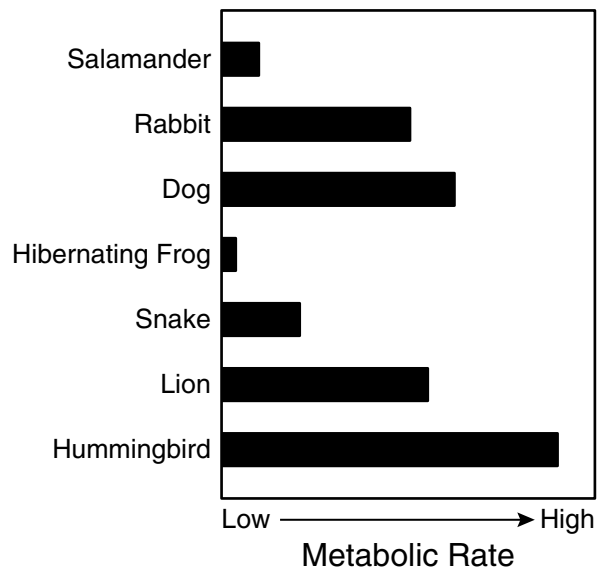
D

What is the correct sequence for plant cell mitosis?

- F A, B, D, C
- G C, B, A, D
- H B, A, D, C
- J D, C, B, A

3

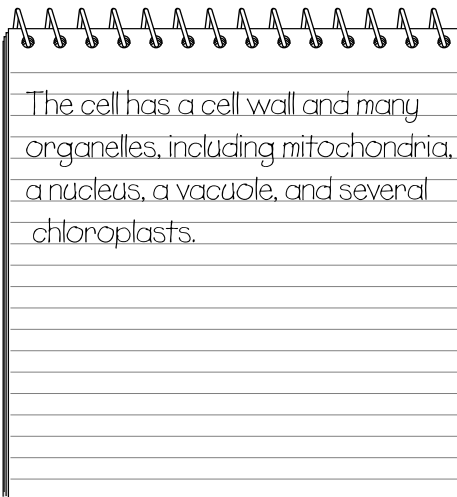
Animal Metabolic Rates



According to the graph, the highest metabolic rate is found in —

- A amphibians
- B reptiles
- C birds
- D mammals

4



A student wrote this description of a cell after looking at it under a microscope. Which type of cell was the student most likely describing?

- F Animal cell
- G Fungus cell
- H Bacterium cell
- J Plant cell

5 In 1893, a one-million acre area of the Grand Canyon National Forest Reserve was home to an estimated 3,000 Rocky Mountain mule deer. Cattle, sheep, and horses also roamed the reserve. In 1906, government hunters killed off hundreds of mountain lions, coyotes, and bobcats when the area was set aside as the Grand Canyon National Game Preserve. The number of Rocky Mountain mule deer rose to over 100,000 by 1923. What was the approximate density of the mule deer in 1923?

- A 1 for every acre
- B 1 for every 10 acres
- C 1 for every 100 acres
- D 1 for every 1,000 acres

6 A biology class wanted to develop a research project to predict the effects of a new highway on wildflower species found in the Piedmont region of Virginia. The class could *best* conduct such a study by sampling flowers found in the highway construction area —

- F one year before highway construction begins
- G both before and after highway construction is completed
- H immediately after highway construction is finished
- J during the time highway construction is taking place

7

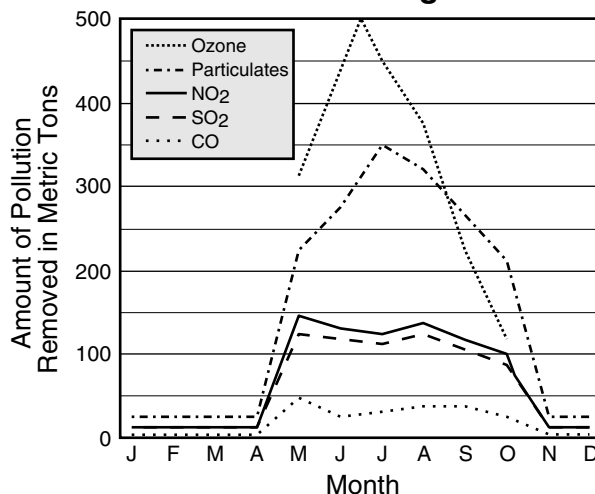
G-G-T-A-C-A-G-A-T-C-T-T-A-A-G-C-A-A

In order to form recombinant DNA, scientists have found a way to cut a DNA segment using an enzyme named *EcoRI*. This enzyme cuts DNA wherever the sequence C-T-T-A-A-G occurs between the A and the G base. Which of these would result if *EcoRI* were used on the DNA in the diagram above?

- A G-G-T-A-C-A-G A-T-C-T-T-A-A G-C-A-A
- B G-G-T-A-C-A G-A-T-C-T-T-A-A-G-C-A-A
- C G-G-T-A-C-A-G-A-T-C-T-T-A-A G-C-A-A
- D G-G-T-A-C-A-G A-T-C-T-T-A-A-G-C-A-A

8

Air Pollution Removed from One Region



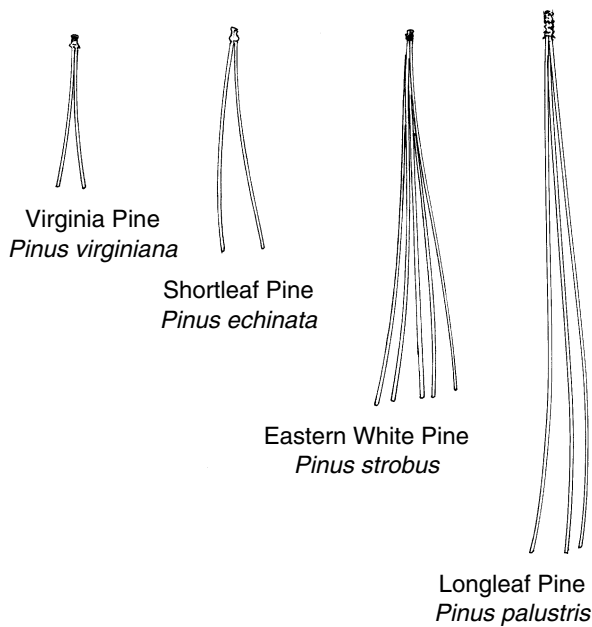
The graph shows the amount of pollutants removed by trees. During October, the trees were able to remove the greatest amount of —

- F ozone
G particulates
H NO₂
J SO₂

9 The reduction of the chromosome number during meiosis is most important for —

- A preventing the nucleus from becoming larger with each cell division
B maintaining the chromosome number during sexual reproduction
C keeping the amount of DNA in the cell at a minimum level
D allowing the growth of the cell without increasing the DNA content

10



A biology student collected pine needles from four different species of trees. She then made diagrams showing the number and actual length of needles in a bundle and the common and scientific name of each species. Use her diagram above to help you answer the following question. These four different pine trees are *not* classified in the same —

- F order
- G species
- H genus
- J phylum

11 In the human body, the circulatory system transports and delivers substances. Within the cell, which organelle performs a similar function?

- A Nucleus
- B Golgi apparatus
- C Mitochondrion
- D Endoplasmic reticulum

12 Wild cats such as cheetahs, lions, and tigers experience decreased genetic diversity as their populations decline and become fragmented due to habitat destruction. Decreased genetic diversity leads to populations with —

- F disproportionate gender ratios
- G decreased disease resistance
- H increased immigration rates
- J increased birthrates

13 The body of which of these organisms has the *least* specialized organization?

- A Jellyfish
- B Sea urchin
- C Starfish
- D Sponge

- 14 Two plant species found in a dry region of the western United States exhibit vastly different abilities to survive. Species A has very slow stem growth and few leaves but is very abundant. Species B has rapid stem growth and many leaves but is very rare. Which hypothesis is most likely supported by this information?

- F Leaf shape may give species B an advantage over species A.
- G Flower size and color may give species B an advantage over species A.
- H Reduced root growth may give species A an advantage over species B.
- J Reduced stem growth may give species A an advantage over species B.

15

		White-Eyed Male	
		X^r	Y
Red-Eyed Female	X^R	$X^R X^r$	$X^R Y$
	X^R	$X^R X^r$	$X^R Y$

All offspring have red eyes.

In 1910, Thomas Morgan discovered traits linked to sex chromosomes in the fruit fly. The Punnett square above shows the cross between red-eyed females and white-eyed males. Fruit flies usually have red eyes. If a female and male offspring from the cross shown above are allowed to mate, what would the offspring probably look like?

- A 2 red-eyed females; 2 white-eyed males
- B 2 red-eyed females; 1 red-eyed male, 1 white-eyed male
- C 1 red-eyed female and 1 white-eyed female; 2 red-eyed males
- D 2 white-eyed females; 1 white-eyed male and 1 red-eyed male

- 16 A symbiotic relationship in which one organism benefits while one organism is harmed is known as —

F antagonism
 G commensalism
 H mutualism
 J parasitism

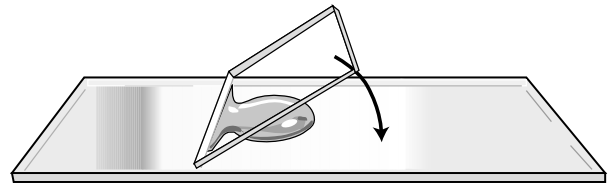
17 **Cell Organelles and Functions**

Kingdom	Metabolism	Control	Covering	Food Production
Fungi	mitochondria	nucleus	cell wall	none
Animalia	mitochondria	nucleus	cell membrane	none
Plantae	mitochondria	nucleus	cell wall	chloroplasts
Protista	mitochondria	nucleus	cell membrane	some with chloroplasts
Monera	ribosomes	DNA strand	cell wall	none

Which of these statements is supported by the data shown in the table?

- A Most kingdoms are made up of prokaryotic cells.
 B All cells have nuclei for control of cell functions.
 C Eukaryotic cells vary in covering and in food production.
 D Each of the kingdoms has different organelles for metabolism.

18



The picture shows a coverslip correctly being lowered onto a slide. This method is used because it —

- F reduces the possibility of air bubbles on the slide
 G prevents the escape of microorganisms found in the water
 H allows microorganisms to move freely in the water
 J prevents the coverslip from moving

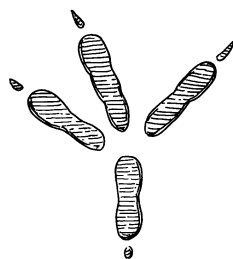
- 19 Tall land plants have requirements different from those of aquatic plants. Which of these must the tall land plants have that aquatic plants do not need?

- A Photosynthetic abilities
 B Organelles for respiration
 C A means of reproduction
 D Thick-celled walls

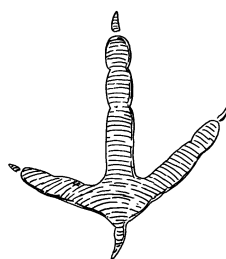
20 Which of the following is an example of a genetically engineered organism?

- F A plant that received external DNA to produce natural insecticides
- G A new plant variety created by cross-pollination
- H Seedless fruits resulting from grafting of one plant onto another
- J A plant that naturally possesses medicinal properties

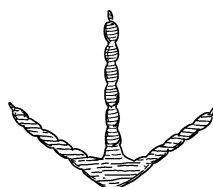
21 These feet belong to different birds. Three of the birds spend most of their time on the ground, while one bird rarely walks on the ground. Which foot belongs to the bird that is best adapted for grasping branches?



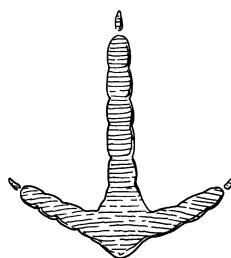
A



C



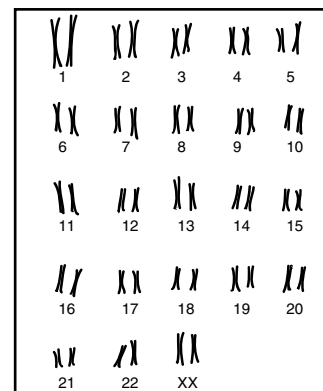
B



D

22

Human Karyotype



A chart of human chromosome pairs is called a karyotype. What information is revealed in the karyotype above?

- F The sex
- G The age
- H Trisomy
- J Gene dominance

23 A microorganism which releases water into its environment to regulate its salinity during osmosis is undergoing a process that is similar to a human being who releases moisture on a hot day. This process that helps keep both the microorganism and the human body fluids in balance is known as —

- A homeostasis
- B cell division
- C heredity
- D mutation

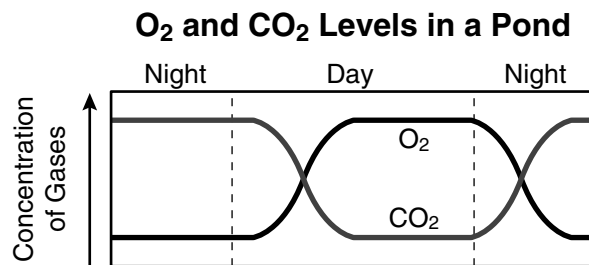
24 Henry's project is on porcupine populations in Virginia. He would like to use the phone book to help him make contacts. His most reliable contacts would probably be found by looking in the phone book under —

- F travel agencies
- G newspapers
- H state agencies
- J civil engineers

25 Scientists found the fossilized remains of a canine's jaw and leg. What information must first be obtained before the scientists can place the fossils in the ancestral time line of the dog?

- A The rest of the skeleton
- B The continent where the fossils were found
- C The age of the fossils
- D The population trends for the species

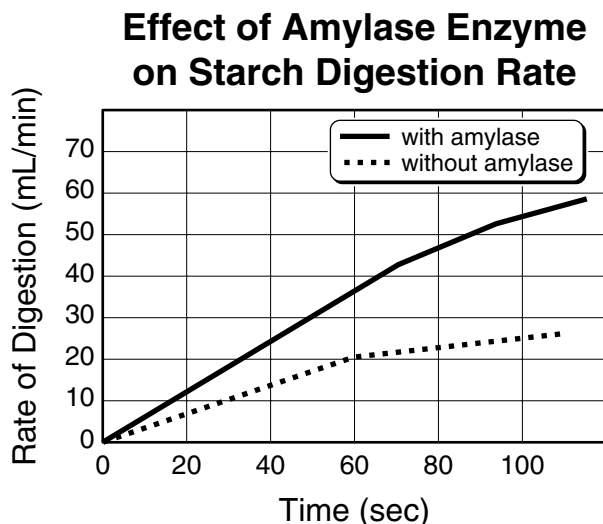
26



The above graph shows how dissolved O₂ and CO₂ levels changed in a pond over a 24-hour period. What caused the decrease in O₂ concentration during the night?

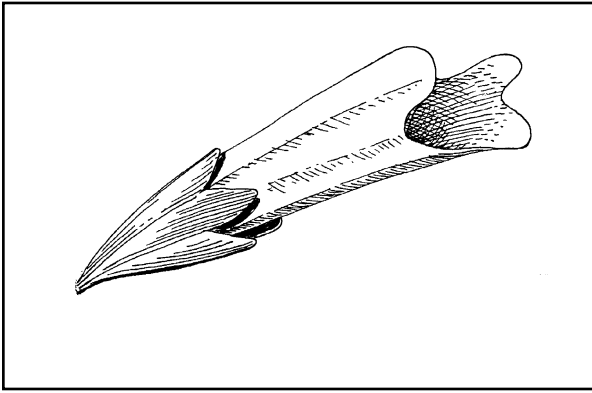
- F Increased evaporation
- G Decreased photosynthesis
- H Increased respiration
- J Decreased temperatures

27



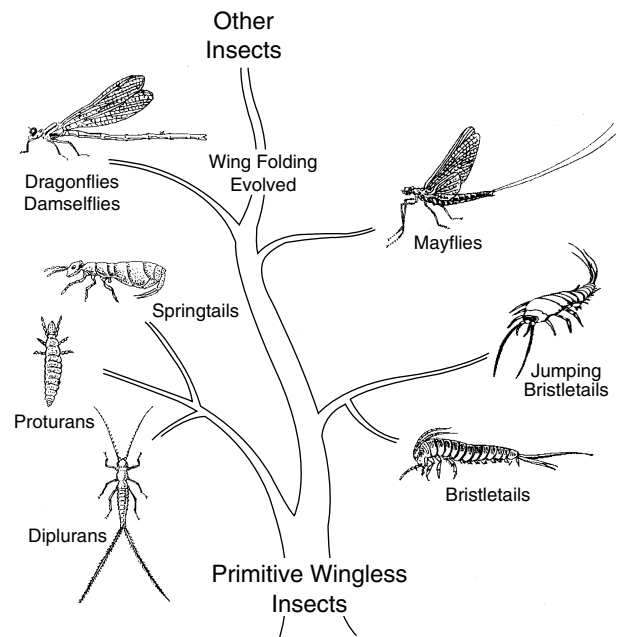
According to the graph, addition of the enzyme amylase causes the reaction to —

- A slow down
- B speed up
- C give off heat
- D take in heat



A flower with this shape would use what type of pollinator?

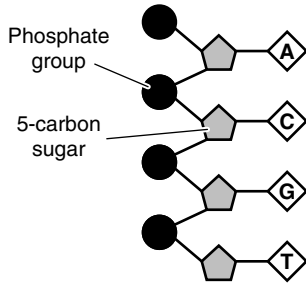
- F** Wind
- G** Mammal
- H** Rain
- J** Hummingbird



According to this chart, the insects that are most closely related are the —

- A** springtails and bristletails
- B** dragonflies and proturans
- C** springtails and proturans
- D** bristletails and mayflies

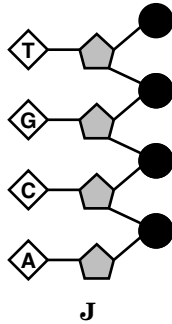
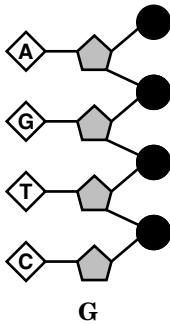
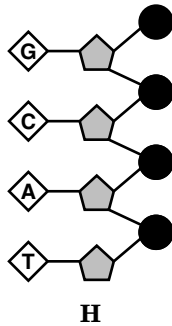
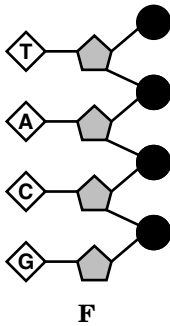
DNA Molecule Segment



Pairing of Nitrogen Bases

Adenine pairs with thymine.
Cytosine pairs with guanine.

Which of these segments could be used to correctly complete the DNA molecule in the diagram above?



31 The nonpoisonous eastern scarlet snake has colored bands that closely resemble the poisonous coral snake. This selective adaptation provides the eastern scarlet snake with —

- A increased breeding opportunities
- B a method of avoiding predation
- C the ability to attract prey
- D increased feeding opportunities

32

♀ \ ♂	T	t
T	TT	Tt
t	Tt	tt

In pea plants, tall plants are dominant to short plants. If two heterozygous tall plants are crossed, what percent of the offspring will probably be short?

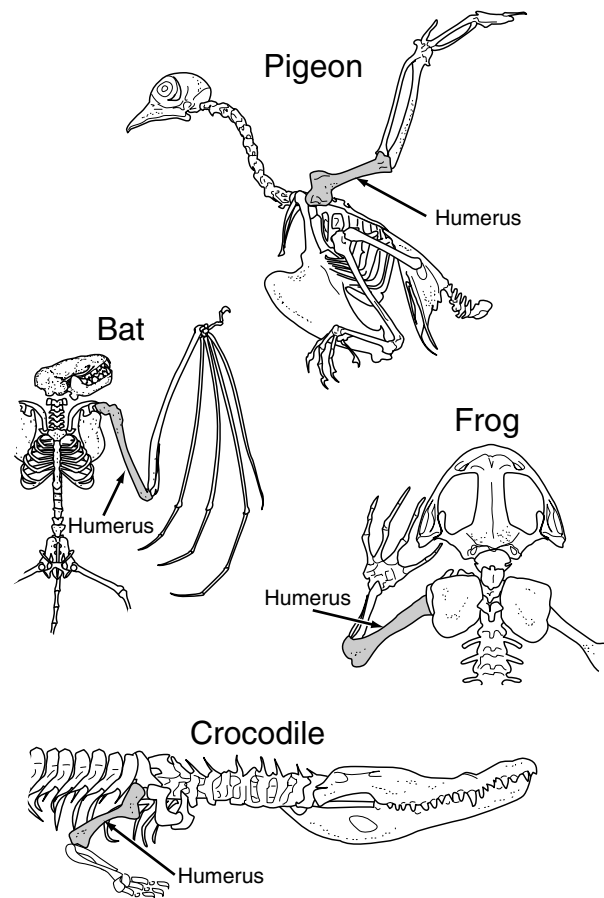
- F 75%
- G 50%
- H 25%
- J 0%

Comparison of Photosynthesis and Respiration

	Photosynthesis	Respiration
Raw Materials	water and CO ₂	glucose and oxygen
Products	glucose and oxygen	water and CO ₂
Purpose	store energy	release energy

The processes of photosynthesis and respiration can be thought of as a cycle because —

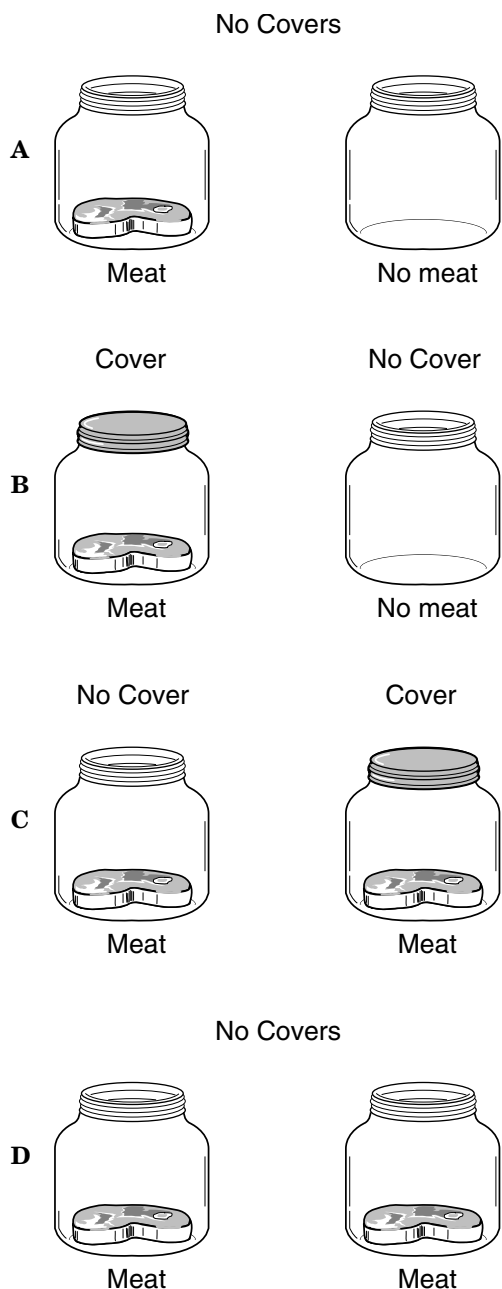
- A one is used only by plants and the other is used only by animals
- B both give off oxygen to be used by animals
- C the products of one are used as the raw materials of the other
- D they both have the same purpose



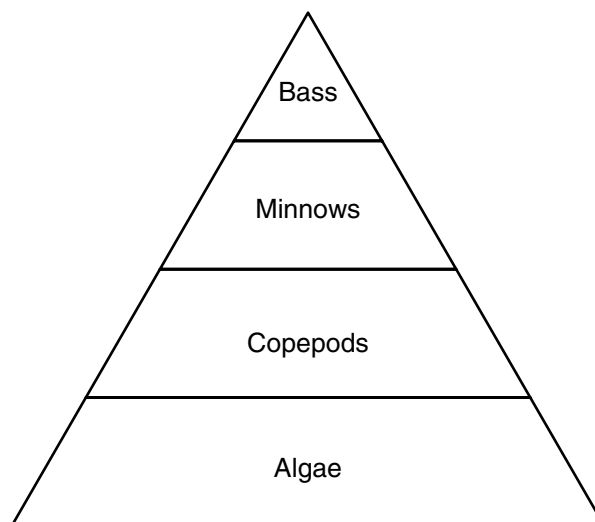
All the organisms shown above belong to the Phylum Chordata. The structural similarity in the organisms suggests that —

- F the humerus is attached to the skeleton by immovable joints
- G only animals that walk on 4 legs need the humerus
- H the humerus is the same size in all chordates
- J chordates have common ancestors

- 35 People long ago believed that maggots came from meat. In the late 1600s, Francesco Redi made the hypothesis that maggots came from flies rather than from meat. Which of these experimental designs could be used to test Redi's hypothesis?



36



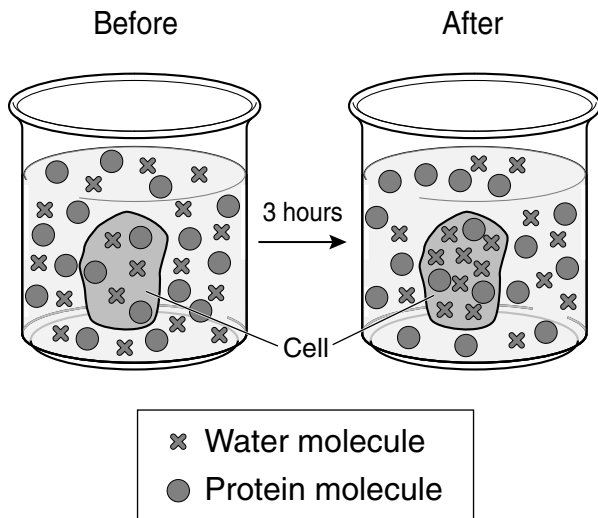
Which level of this food pyramid represents the largest biomass?

- F Bass
- G Minnows
- H Copepods
- J Algae

- 37 What is the major function of the valves found in human veins?

- A Preventing movement of blood clots
- B Reducing the back flow of blood
- C Adding oxygen to blood plasma
- D Slowing the red blood cells

38



The above diagram shows the process of osmosis. Only the water molecules could enter the cell because water molecules —

- F have more energy than the protein molecules
- G are smaller than the protein molecules
- H are more numerous than the protein molecules
- J contain more hydrogen atoms than the protein molecules

39 Cleaner fish feed off the algae, fungi, and other microorganisms that are found on larger fish. Other species of fish, which look like the cleaners, are able to approach the larger fish and remove large bites of flesh. If the look-alike populations outnumber the cleaner fish, the —

- A microorganisms on large fish would decrease
- B cleaner populations would increase
- C behavior of large fish would change
- D cleaners and mimics would interbreed

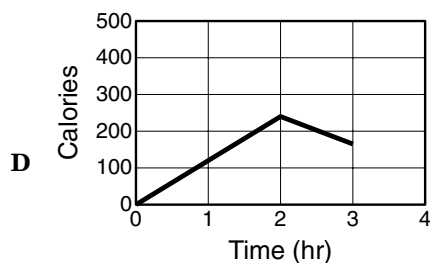
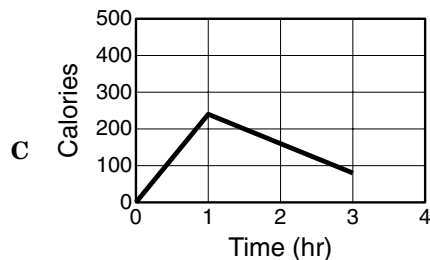
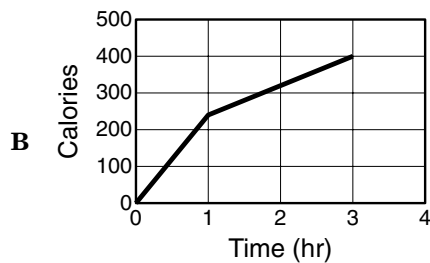
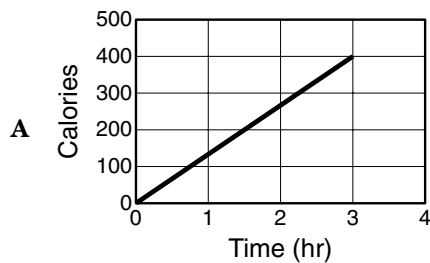
40 The 14 different species of finches in the Galapagos Islands originated from a single ancestral species. What is it about these islands that is responsible for the diversity of finch species?

- F The islands are made of volcanic peaks.
- G Each island has different food sources.
- H Each island has a different climate.
- J The islands are clustered near each other.

Calorie Use Table
(by 120 lb adult female)

Activity	Calories Used (per hr)
Walking	80
Gymnastics	170
Jogging	240
Tennis	280
Bicycling	320
Swimming	440

According to the table, which graph below illustrates the calories used for 1 hour of jogging followed by 2 hours of walking?



Second Base

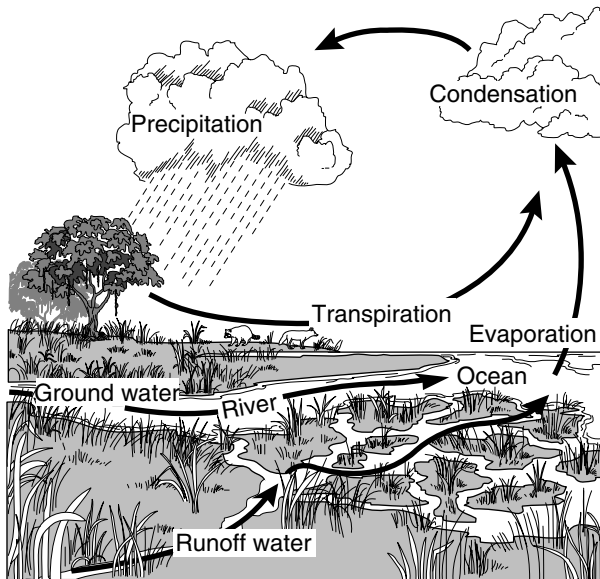
	Second Base				Third Base
	U	C	A	G	
	Phe	Ser	Tyr	Cys	U
	Phe	Ser	Tyr	Cys	C
U	Leu	Ser	stop	stop	A
	Leu	Ser	stop	Trp	G
	Leu	Pro	His	Arg	U
	Leu	Pro	His	Arg	C
C	Leu	Pro	Gin	Arg	A
	Leu	Pro	Gin	Arg	G
	Ile	Thr	Asn	Ser	U
	Ile	Thr	Asn	Ser	C
A	Ile	Thr	Lys	Arg	A
	Met	Thr	Lys	Arg	G
	Val	Ala	Asp	Gly	U
	Val	Ala	Asp	Gly	C
G	Val	Ala	Glu	Gly	A
	Val	Ala	Glu	Gly	G

Genetic Code for Amino Acids

According to this table, a codon AGC is the code for which amino acid?

- F** Cysteine (Cys)
G Leucine (Leu)
H Serine (Ser)
J Tyrosine (Tyr)

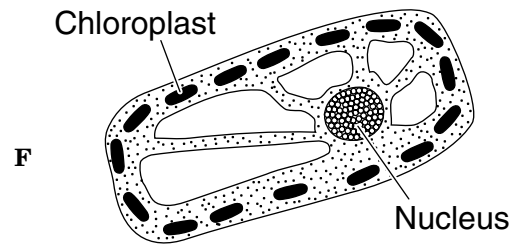
The Water Cycle



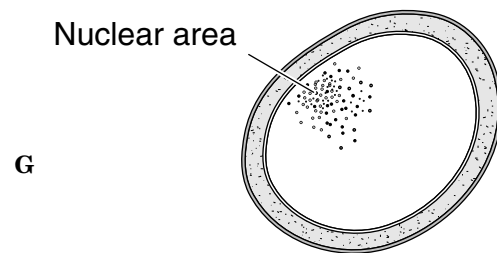
According to this simplified water cycle, the process of transpiration is the process that —

- A causes photosynthesis in plants
- B releases water vapor from plants
- C speeds the evaporation of water
- D increases the rate of the water cycle

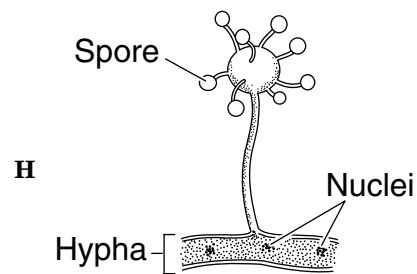
- 44 Which of these is capable of moving quickly in response to its environment?



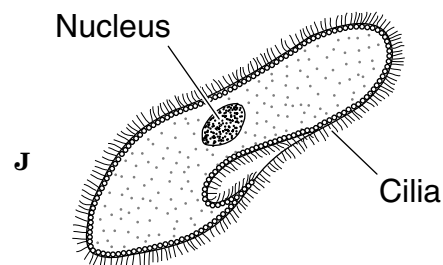
Elodea



Coccus bacterium



Mildew



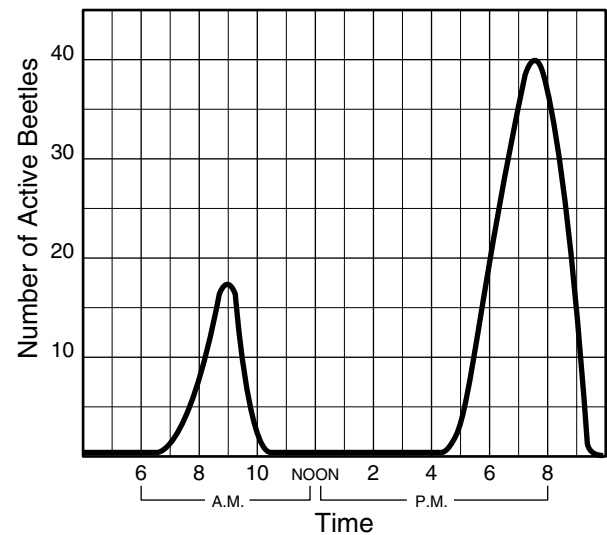
Paramecium

- 45 Which sentence best states the importance of using control groups?
- A Control groups allow comparison between subjects receiving a treatment and those receiving no treatment.
 - B Control groups eliminate the need for large sample sizes, reducing the number of measurements needed.
 - C Control groups eliminate the need for statistical tests and simplify calculations.
 - D Control groups provide a method by which statistical variability can be reduced.

- 46 The respiration system of frogs differs from mammals because frogs —
- F have lungs at hatching and develop gills for life in the water
 - G hatch with gills and develop lungs as they mature
 - H have gills throughout their life cycle
 - J breathe only through their skin

47

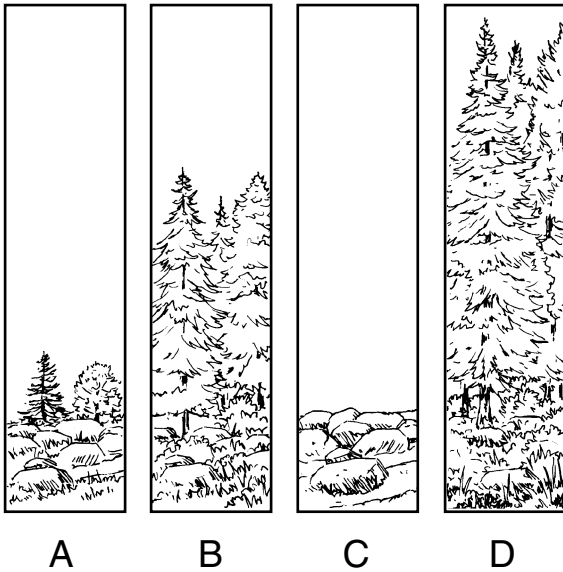
**Active Periods of
Some Black Beetles**



The hypothesis best supported by this graph is that these beetles are most active when the area is —

- A free from predators
- B coolest with some sunlight
- C wettest from dew
- D richest in oxygen supplies

48



Which order of diagrams would show primary succession in an area that had never before been occupied by living organisms?

- F A, C, B, D
- G C, A, B, D
- H D, B, C, A
- J B, A, C, D

49 Which of these statements best summarizes the cell theory?

- A Cells contain a nucleus and other parts.
- B Cells come in different shapes and sizes.
- C Cells can be seen through a microscope.
- D Cells are the building blocks of living things.

50 Which of these functions most like the “brain” of a cell?

- F The nucleus
- G The Golgi apparatus
- H The mitochondrion
- J The smooth endoplasmic reticulum

Answer Key

Test Sequence	Correct Answer	Reporting Category	Reporting Category Description
1	A	004	Interaction of Life Forms
2	G	002	Life at the Molecular and Cellular Level
3	C	003	Life at the Systems and Organisms Level
4	J	003	Life at the Systems and Organisms Level
5	B	001	Scientific Investigation
6	G	001	Scientific Investigation
7	C	002	Life at the Molecular and Cellular Level
8	G	001	Scientific Investigation
9	B	002	Life at the Molecular and Cellular Level
10	G	003	Life at the Systems and Organisms Level
11	D	002	Life at the Molecular and Cellular Level
12	G	004	Interaction of Life Forms
13	D	003	Life at the Systems and Organisms Level
14	J	001	Scientific Investigation
15	B	003	Life at the Systems and Organisms Level
16	J	004	Interaction of Life Forms
17	C	002	Life at the Molecular and Cellular Level
18	F	001	Scientific Investigation
19	D	004	Interaction of Life Forms
20	F	002	Life at the Molecular and Cellular Level
21	A	004	Interaction of Life Forms
22	F	003	Life at the Systems and Organisms Level
23	A	003	Life at the Systems and Organisms Level
24	H	001	Scientific Investigation
25	C	004	Interaction of Life Forms
26	G	002	Life at the Molecular and Cellular Level
27	B	002	Life at the Molecular and Cellular Level
28	J	003	Life at the Systems and Organisms Level
29	C	001	Scientific Investigation
30	J	002	Life at the Molecular and Cellular Level
31	B	004	Interaction of Life Forms
32	H	003	Life at the Systems and Organisms Level
33	C	002	Life at the Molecular and Cellular Level
34	J	003	Life at the Systems and Organisms Level
35	C	001	Scientific Investigation
36	J	004	Interaction of Life Forms
37	B	003	Life at the Systems and Organisms Level
38	G	002	Life at the Molecular and Cellular Level
39	C	003	Life at the Systems and Organisms Level
40	G	004	Interaction of Life Forms
41	B	001	Scientific Investigation
42	H	002	Life at the Molecular and Cellular Level
43	B	004	Interaction of Life Forms
44	J	003	Life at the Systems and Organisms Level
45	A	001	Scientific Investigation
46	G	003	Life at the Systems and Organisms Level
47	B	001	Scientific Investigation
48	G	004	Interaction of Life Forms
49	D	002	Life at the Molecular and Cellular Level
50	F	002	Life at the Molecular and Cellular Level