

VIRGINIA
STANDARDS OF LEARNING ASSESSMENTS

Spring 2003 Released Test

END OF COURSE
BIOLOGY

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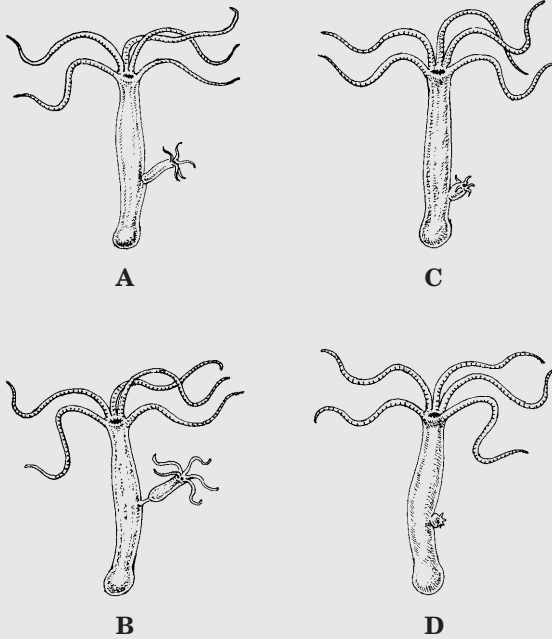
Biology

DIRECTIONS

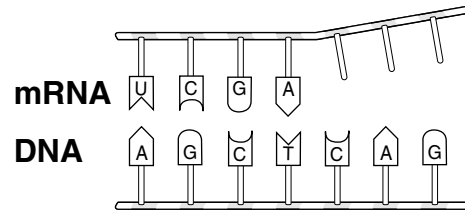
Read each question carefully and choose the best answer.

SAMPLE

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



1



Which of these will complete the mRNA strand matched to DNA?

- A CAG
- B AUG
- C GUC
- D UAC

2 Which of these would be the *best* resource to research the symptoms and treatment of hypoglycemia?

- F New England Journal of Medicine
- G Natural History Magazine
- H Daily television news
- J Journal of Zoology

3 Animals coming from foreign countries are kept in quarantine before being allowed into the United States. This precaution is taken to help prevent —

- A the escape of foreign animals into local natural habitats
- B predator destruction of the foreign animals
- C the introduction of foreign animal diseases
- D cross-breeding of native animals with the foreign ones

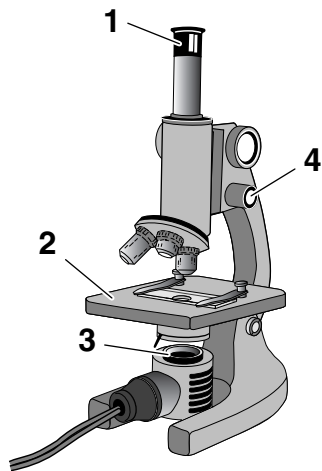
4 Unlike other animals, mammals can perspire. The main benefit of perspiring is that it —

- F removes extra water from the cells
- G cools the skin with evaporation
- H removes dirt from the surface of the skin
- J relaxes the muscles

5 The process of photosynthesis ultimately converts light energy into —

- A mechanical energy
- B electrical energy
- C chemical energy
- D nuclear energy

6



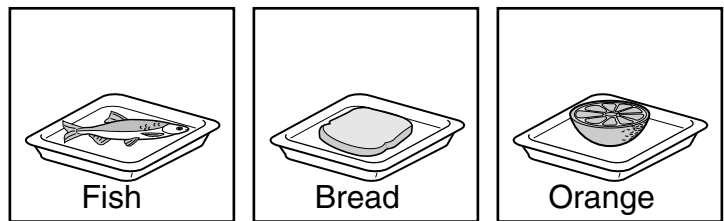
When viewing a prepared slide under the compound microscope, a student has to remove his glasses. This means he will need to readjust for fine focus with which part labeled above?

- F 1
- G 2
- H 3
- J 4

7 The jimsonweed *Datura stramonium*, normally has 12 chromosomes in the body cells. How many chromosomes will an egg cell of the weed have?

- A 6 chromosomes
- B 12 chromosomes
- C 18 chromosomes
- D 24 chromosomes

8



The picture shows some containers of different foods that were left in the open for 2 days. Which question could best be answered by this experiment?

- F Which food attracts flies from the greatest distance?
- G How does a fly digest different foods?
- H Which food attracts the most flies?
- J How much energy do flies get from different foods?

9 Which of the following would most likely change the current classification of two closely related flower species to a single species?

- A The discovery of a new, related species
- B An analysis of the DNA sequence of each species
- C An analysis of photosynthesis for each species
- D The collection of seeds from each species

10 An experiment was conducted to test the effectiveness of four different fertilizers on plant growth. Two grams of each fertilizer were to be diluted in 9 milliliters (mL) of water before adding to a plant. Which of the following measuring devices would introduce the *least* error into the measurement of the 9 mL of water?

- F 10 mL graduated cylinder
- G 20 mL graduated cylinder
- H 50 mL graduated cylinder
- J 100 mL graduated cylinder

11 Which of the following molecules is most abundant in the cells of the human body?

- A Amino acids
- B Nucleotides
- C Lipids
- D Water

12 Scientists studied a flock of tundra swans that spent the winter along rivers in Virginia. The swans migrate in the spring to other locations. What would be the *best* way for scientists to distinguish between the birds they study in Virginia and flocks in the summer location?

- F Capture and put coded bands on the birds in Virginia, then record the bands seen on birds in the summer location
- G Take detailed photographs of winter flocks in Virginia and summer flocks in other locations and compare photographs
- H Follow the Virginia flock by vehicle on a daily basis
- J Capture birds in the expected summer location and dissect them to find clues that show the birds were in Virginia during the winter

13

| | | |
|---|----|----|
| | G | g |
| G | GG | Gg |
| g | Gg | gg |

In corn plants, green (G) is dominant to albino (g). According to the Punnett square, what is the chance of this heterozygous cross producing albino corn plants?

- A One in four
- B Two in four
- C Three in four
- D Four in four

- 14 Giant fossil ferns have been found in Canada. Which conclusion can be drawn from this discovery?
- F Canada once had a much warmer climate.
 - G Giant dragonflies once lived among the ferns.
 - H Canada was once covered by an ancient sea.
 - J Dinosaurs once lived in Canada.

15 **Test Paper Results**

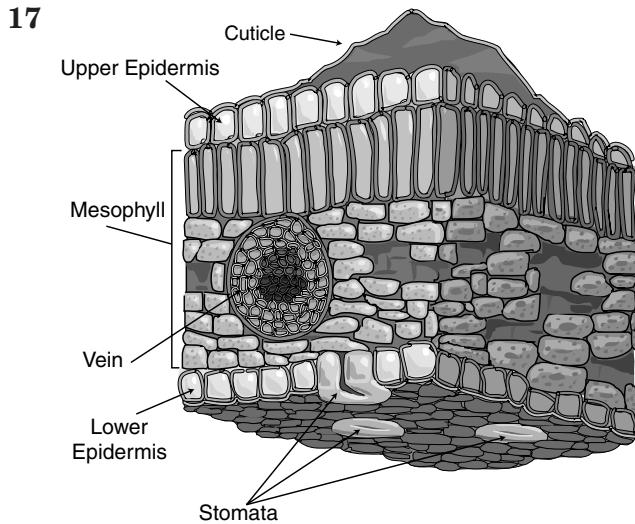
| Chart A | | | |
|-------------|------------|-------------|----------|
| pH | Red Litmus | Blue Litmus | pH Paper |
| Acid - pH2 | red | red | red |
| Acid - pH4 | red | red | orange |
| Acid - pH6 | red | red | yellow |
| Base - pH8 | blue | blue | green |
| Base - pH10 | blue | blue | blue |

| Chart B | | | |
|-----------|------------|-------------|--------------|
| Substance | Red Litmus | Blue Litmus | pH Paper |
| Water | red | blue | yellow-green |
| Apples | red | red | red-orange |
| Beans | red | red | yellow |
| Milk | red | blue | yellow |
| Shrimp | red | blue | yellow-green |

Chart A shows how changes in pH cause testing paper to change color. Chart B shows how testing papers reacted with several experimental substances. Which of these has a pH of about 3?

- A Apples
- B Beans
- C Milk
- D Shrimp

- 16 Which is *not* a major muscle in the human body?
- F Biceps
 - G Deltoid
 - H Pectoralis major
 - J Sternum

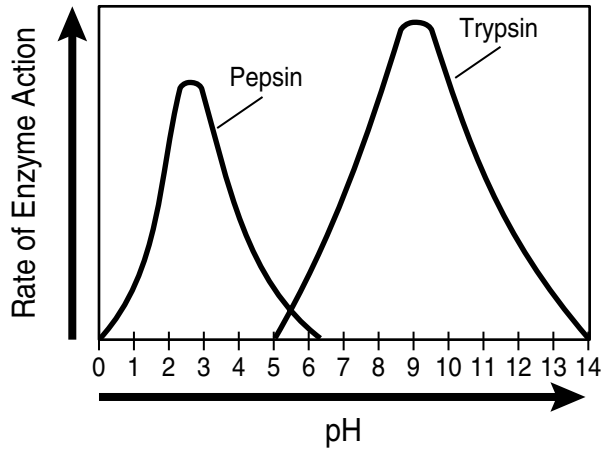


Which area of the leaf is most responsible for protecting the leaf from the drying effects of the air?

- A The epidermis
- B The mesophyll
- C The vein
- D The cuticle

- 18 Like the camel, many animals that live in soft sandy areas have large wide feet compared to their body size. The large feet are an advantage in these environments because they —
- F are rapidly toughened by sharp sand grains
 - G allow rapid digging in the sand
 - H distribute body weight over a large area
 - J reduce the vibrations caused by walking

19



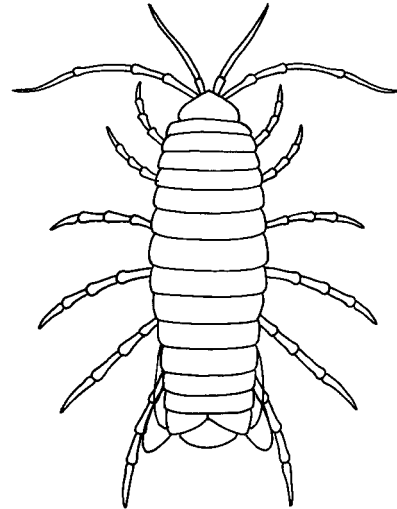
This graph shows that —

- A more enzymes are present at a higher pH
- B pepsin is less sensitive to pH than trypsin
- C pepsin is less effective at low pH than trypsin
- D pH affects the activity rate of enzymes

20 What structure is common to all five kingdoms of living organisms?

- F DNA
- G Nucleus
- H Cell wall
- J Mitochondria

21



The picture shows an organism that lives in the lakes of two caves in Augusta County, Virginia. Its primary food source appears to be fine bits of organic matter that drift into the cave lakes. This cave-dwelling species belongs to the kingdom —

- A Monera
- B Protista
- C Fungi
- D Animalia

22 Compared to a skin cell, a muscle cell is likely to have more —

- F Golgi bodies
- G mitochondria
- H cell membranes
- J chloroplasts

23

| Stimuli | Number of Movements Toward | Number of Movements Away From | No Response |
|-----------|----------------------------|-------------------------------|-------------|
| light | 0 | 10 | 0 |
| sound | 5 | 4 | 1 |
| magnetism | 4 | 4 | 2 |
| gravity | 7 | 2 | 1 |

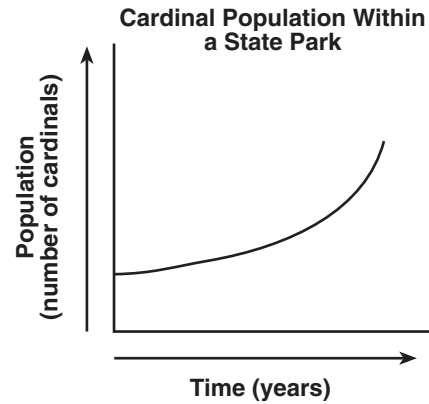
As a result of the above experiment, responses of a planarian to different environmental stimuli were recorded. Planaria seem to have the strongest response to —

- A light
- B sound
- C magnetism
- D gravity

24 There are probably fewer than 3,000 manatees (*Trichechus manatus*) left in the world. Which would probably cause the extinction of the species?

- F A sudden freeze in the northern range of the manatees
- G Increases in the range of the manatees
- H Spread of a disease that reduced fertility rates in manatees
- J Increases in noncompeting species in the manatees' habitat

25



Which hypothesis is best supported by this graph?

- A A disease of cardinals spread throughout the park.
- B Dominant cardinal chicks were the first to be fed.
- C The population of cardinal predators increased.
- D The cardinals' food supply increased.

26 Scientists have noted a decline in fungi species dating back to the early 1900s. Annual crops of edible mushrooms in France and Germany have declined since 1950. One hypothesis to explain this decline is that edible fungi are being overharvested. Global warming and air pollution have also been considered as contributing to the decline. Which of the following would exclude overharvesting as the cause of the decline?

- F Fungal-population increases in tropical regions
- G Similar declines among edible North American species
- H High fungal numbers in nitrogen-poor soils
- J A parallel decline in non-edible species

27 A certain virus causes a disease of the digestive system. What is the *most* likely source of this virus?

- A Air
- B Soil
- C Water
- D Insects

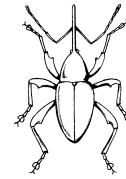
28 **Effects of Phosphates on the Growth of Grama Grass**

| Group (25 individuals) | Incubation Temperature (°C) | Phosphate Solution (ppm) | Volume of Daily Irrigation (mL) | Average Height of Grass After 30 Days (cm) |
|------------------------|-----------------------------|--------------------------|---------------------------------|--|
| A | 20 | 0 | 200 | 10 |
| B | 20 | 15 | 200 | 10 |
| C | 20 | 30 | 200 | 12 |
| D | 20 | 60 | 200 | 18 |

Which factor would need to be known before a valid conclusion could be based upon these data?

- F The original average height of grass
- G The length of the study period
- H The density of the phosphate solutions
- J The mineral content of the potting soil

29



Oak Weevil
Curculio rectus

Which of these is most closely related to the oak weevil?



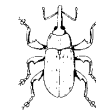
Mullein Weevil
Gymnetron tetrum



Hazelnut Weevil
Curculio neocorylus



Pine Reproduction Weevil
Cylindrocopturus eatoni



Boll Weevil
Anthonomus grandis

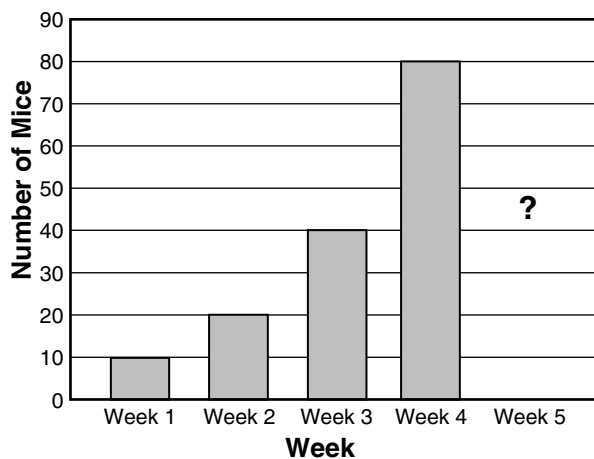
30 A cell with numerous ribosomes is probably specialized for —

- F enzyme storage
- G energy production
- H cell division
- J protein synthesis

31 Lamarck was an early scientist who studied the development of characteristics in organisms over time. Which of the following choices *best* describes his views on how organisms change over time?

- A Theory of acquired characteristics
- B Law of independent assortment
- C Theory of artificial selection
- D Theory of relative fossil-dating

32 Number of Mice Born by Week



According to the graph, how many mice will be born in week 5 if the trend continues?

- F 160
- G 140
- H 100
- J 90

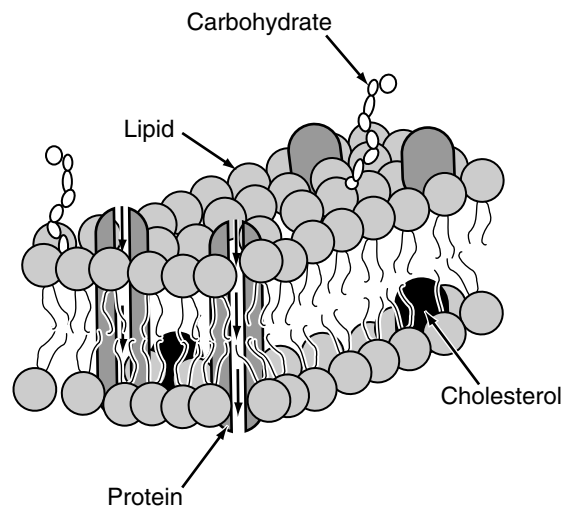
33 Which of the following organelles is present in both prokaryotes and eukaryotes?

- A Nucleus
- B Ribosome
- C Golgi body
- D Endoplasmic reticulum

34 Which is required by all living things?

- F Energy
- G Mobility
- H Oxygen
- J Carbon dioxide

35



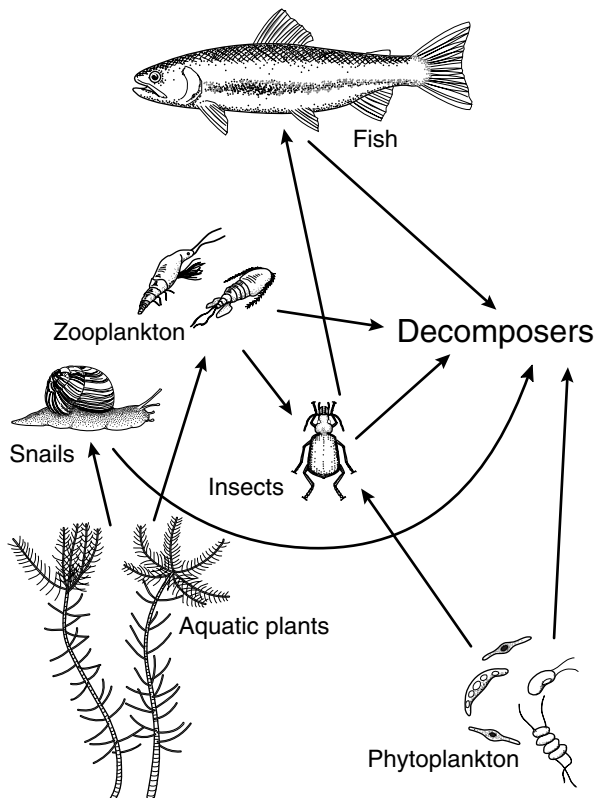
In the cell membrane model shown above, the molecules which move large molecules into and out of the cell are known as —

- A cholesterol
- B proteins
- C lipids
- D carbohydrates

36 Which of these types of reproduction provides the *most* protection to developing offspring of land-dwelling animals?

- F An egg in a mass of jelly
- G An egg with a leathery shell
- H An egg in an eggshell
- J An egg carried internally

37



Energy is transferred from insects to fish in this system by —

- A water
- B radiation
- C food consumption
- D decaying processes

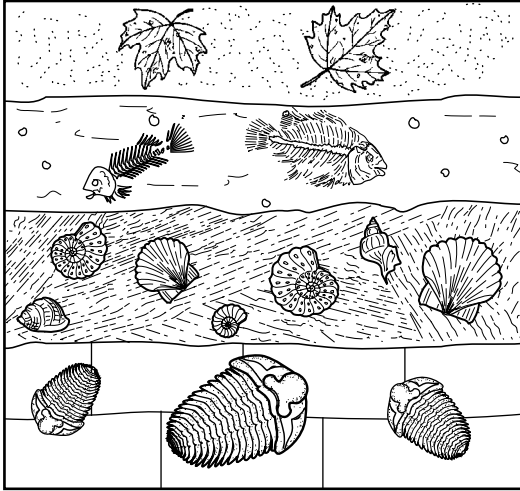
38 The parts of DNA that provide the code for proteins are the —

- F sugars
- G phosphates
- H hydrogen bonds
- J nitrogenous bases

39 Blood is considered a tissue because blood —

- A flows inside arteries and veins
- B is necessary to carry oxygen and nutrients to the cells
- C is pumped from the heart and is carried to the cells through arteries
- D is composed of red and white blood cells working together and having specific functions

40



The diagram shows undisturbed sedimentary rock strata containing fossils. Which statement *best* summarizes the history of this area?

- F The area was once a forest and was replaced by a freshwater lake.
- G The area was once a freshwater lake and was replaced by a saltwater sea.
- H The area was once a saltwater sea and later was replaced by a coniferous forest.
- J The area was once a saltwater sea and later was replaced by a forest.

41 A student wanted to look at plant growth in five different soil samples. He planted the same type of seeds in identical containers and left them together in full sunlight. He gave each plant the same amount of water and charted the growth of each plant stem. What is the independent variable in this experiment?

- A Soil
- B Light
- C Container
- D Seeds

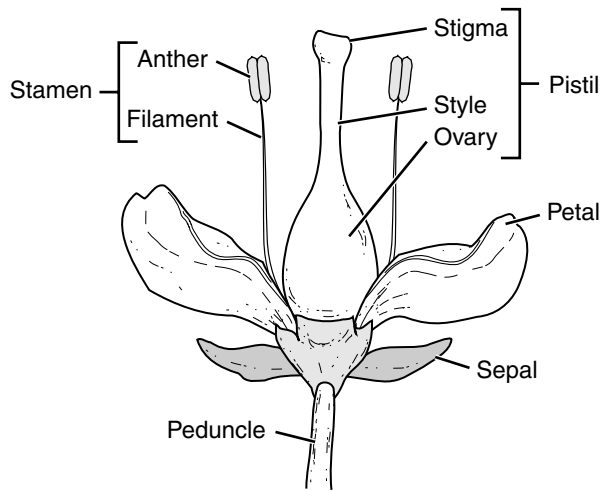
42 The Human Genome Project was begun in 1988 by scientists from 13 nations as a worldwide effort to understand the sequencing of all of the DNA in the human body. What is one potential scientific benefit of this research?

- F It will help to explain human cultural differences.
- G It will create communication between research centers.
- H It will help find the genes responsible for many diseases.
- J It helps to classify man most accurately in the animal kingdom.

43 Which of these is the greatest limiting factor for plants that grow on the floor of a rain forest?

- A Water
- B Sunlight
- C Space
- D Herbivores

44



In which part of the flower does fertilization take place?

- F Stamen
- G Pistil
- H Petal
- J Sepal

45 An important difference between viruses and living cells is that viruses —

- A cannot reproduce outside of cells
- B contain more nuclei than cells
- C cannot mutate but cells can
- D need an energy source but cells do not

46 The discovery that chromosomes are involved in inheritance was made possible by the invention of the —

- F microgram scale
- G microscope
- H computer
- J mercury thermometer

47

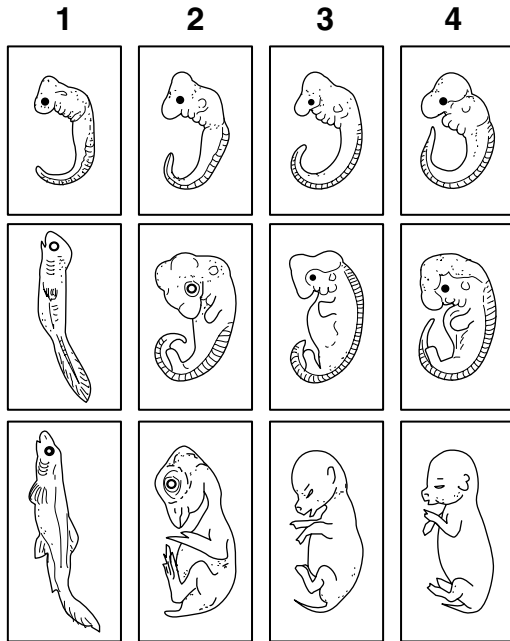
Experimental Observations

1. Nucleus is present.
2. Cell wall is present.
3. Chloroplasts and mitochondria are both present.

The eukaryotic organism described above should be classified as —

- A an animal
- B a bacterium
- C a fungus
- D a plant

48



The above chart shows vertebrate embryo development. Which of these would be *least* related to the others?

- F 1
- G 2
- H 3
- J 4

49 In which biome do the evaporation rates exceed the precipitation rates?

- A Desert
- B Tropical jungle
- C Grassland
- D Hardwood forest

50 Which of these is a mammal native to Virginia?

- F Armadillo
- G Camel
- H Kangaroo
- J Squirrel



Answer Key

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