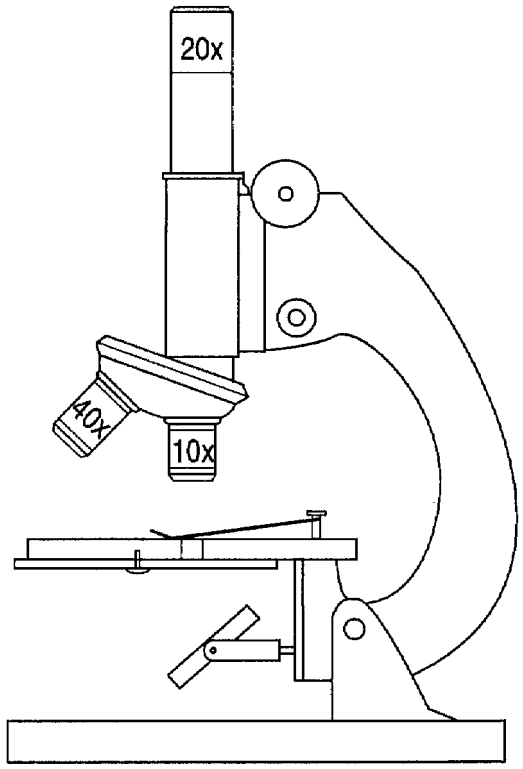
**Biology SOL Review**

**Name:** _____ **Date:** _____

1. What is the *lowest* possible magnification that can be obtained using the microscope shown?




A. 20 × B. 200 × C. 40 × D. 800 ×

2. Two organisms, *Paramecium caudatum* and *Paramecium aurelia*, were observed in a drop of pond water on a slide. These two organisms are members of

A. the same genus and species

B. the same genus but different species

C. the same species but different genera

D. different species and different genera

3. To test the effect of hormones on plant growth, six potted plant seedlings of the same species were measured and then sprayed with auxin (a growth hormone). After four weeks of growth under ideal conditions, the plants were measured again. To set up a proper control for this experiment, the investigator should

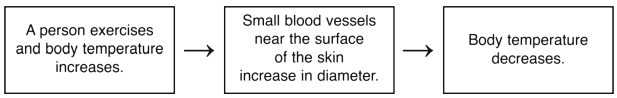
A. spray the same plants with different amounts of auxin

B. spray auxin on six plant seedlings of the same species and grow them in the dark for four weeks

C. wash the auxin off three of the plants after two weeks

D. grow another six plant seedlings of the same species under the same conditions, spraying them with distilled water only

4. The diagram below represents an activity that occurs in the human body.




This diagram best illustrates

A. active transport

B. maintenance of homeostasis

C. synthesis of nutrients

D. differentiation

5. Which element is present in living cells and in *all* organic compounds?

A. potassium B. sulfur

C. nitrogen D. carbon

6. Which pH indicates a substance that is more acidic than a substance with a pH of 4?

A. 6 B. 2 C. 7 D. 12

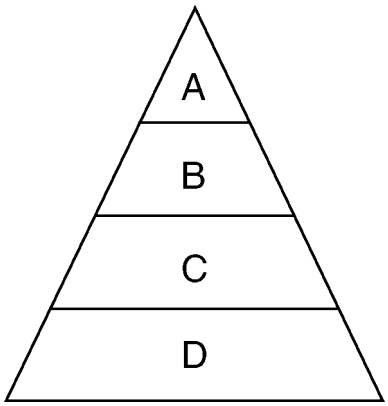
7. Base your answer(s) to the following question(s) on the data table below and on your knowledge of biology. The table contains information about glucose production in a species of plant that lives in the water of a salt marsh.

| Temperature (°C) | Glucose Production (mg/hr) |
|---|---|
| 10 | 5 |
| 20 | 10 |
| 30 | 15 |
| 40 | 5 |

At which temperature would the plants most likely use the greatest amount of carbon dioxide?

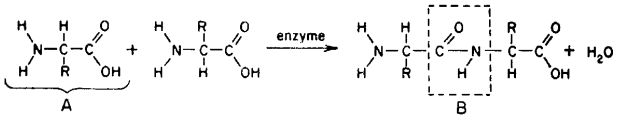
A. 10°C B. 20°C C. 30°C D. 40°C

8. Which level of the energy pyramid below would contain the plant species of this salt marsh?




A. *A* B. *B* C. *C* D. *D*

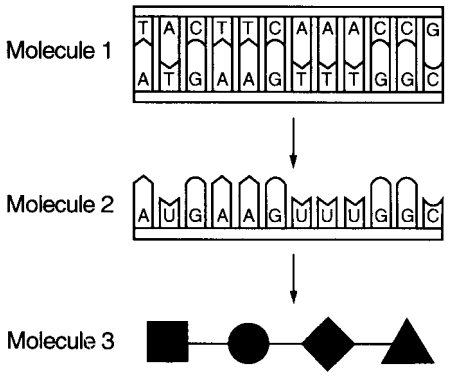
9. The chemical equation represents an example of the process known as




A. photosynthesis B. respiration

C. hydrolysis D. dehydration synthesis

10. The diagram represents molecules invovled in protein synthesis.




In plant cells, molecule 1 is found in the

A. centriole B. nucleus

C. cell wall D. lysosome

11. The building blocks of molecule 3 are known as

A. amino acids B. DNA molecules

C. fatty acids D. RNA molecules

12. Where do the chemical reactions that are coded for by molecule 2 take place?

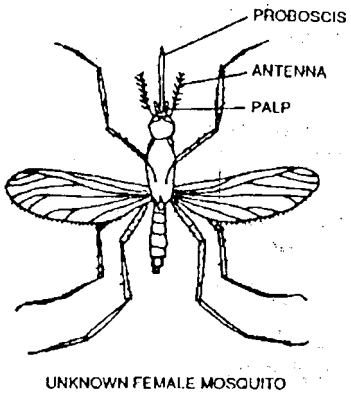
A. in the vacuole

B. on the plasma membrane

C. in the lysosome

D. at ribosomes

13. Keys are used by biologists to accurately classify unknown organisms such as the unidentified female mosquito shown in the diagram. These keys are designed to categorize organisms according to structural characteristics. The key shows various characteristics used to identify the differences between *Anopheles*, *Deinocerites*, *Culex*, *Psorophra* and *Aedes* mosquitoes.



UNKNOWN FEMALE MOSQUITO

**Key to Mosquito Genera**

1*a* Antennae very bushy– Male mosquito

1*b* Antennae not bushy— Go to 2

2*a* Palps much shorter than proboscis – Go to 3

2*b* Palps as long as proboscis— Female *Anopheles*

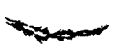
3*a* Tip of abdomen blunt without points – Go to 4

3*b* Tip of abdomen with points – Go to 5

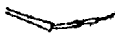
4*a* Antennae much longer than proboscis – Female *Deinocerites*

4*b* Antennae shorter than proboscis – Female *Culex*

5*a* Many long scales present on hind legs – Female *Psorophora*



5*b* Hind legs without long scales – Female *Aedes*



According to the key, the unknown female mosquito shown belongs to the genus known as

A. *Deinocerites*  B. *Culex*  C. *Psorophora*  D. *Aedes*

14. Cell membranes are said to be selectively permeable. Which statement best explains what selectively permeable means?

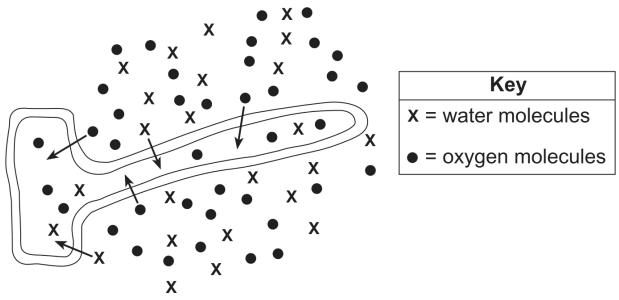
A. The cell membrane prevents any harmful substance from entering the cell.

B. The cell membrane lets certain substances enter the cell and keeps certain substances out of the cell.

C. The cell membrane allows only large molecules to diffuse into the cell.

D. The cell membrane has pores that let only water and glucose into the cell and carbon dioxide out.

15. The diagram below represents a specialized cell located in the root of a plant. The arrows in the diagram indicate the movement of molecules of oxygen and water into the cell.

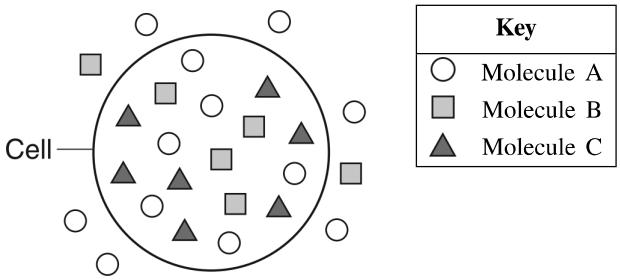



Which row in the chart below correctly identifies the process responsible for the movement of each type of molecule represented in the diagram?

| Row | Water | Oxygen |
|---|---|---|
| (1) | diffusion | active transport |
| (2) | diffusion | diffusion |
| (3) | active transport | diffusion |
| (4) | active transport | active transport |

A. (1) B. (2) C. (3) D. (4)

16. The diagram below represents a cell and several molecules. The number of molecules shown represents the relative concentration of the molecules inside and outside of the cell.

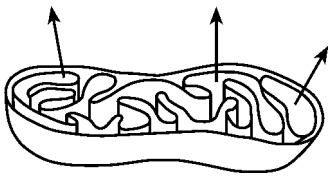



Molecule B could enter the cell as a direct result of

A. digestion B. diffusion

C. active transport D. enzyme production

17. The diagram below represents a cell organelle involved in the transfer of energy from organic compounds.



The arrows in the diagram could represent the release of

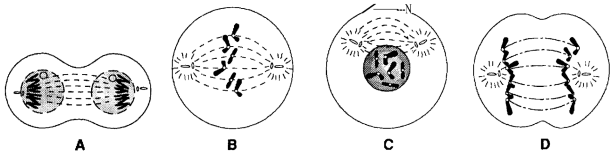
A. ATP from a chloroplast carrying out photosynthesis

B. oxygen from a mitochondrion carrying out photosynthesis

C. glucose from a chloroplast carrying out respiration

D. carbon dioxide from a mitochondrion carrying out respiration

18. The diagrams shown represent stages of a cellular process. Which is the correct sequence of these stages?




A. A → B → C → D
B. B → D → C → A
C. C → B → D → A
D. D → B → A → C

19. In a species of corn, the diploid number of chromosomes is 20. What is the number of chromosomes found in each of the normal egg cells produced by this species?

A. 5
B. 10
C. 20
D. 40

20. In pea plants, the gene for tallness (*T*) is dominant over the gene for shortness (*t*). If 100% of the $F_1$ generation offspring are heterozygous tall, what were the most probable genotypes of the parent plants?

A. $Tt \times Tt$
B. $Tt \times tt$
C. $TT \times Tt$
D. $TT \times tt$

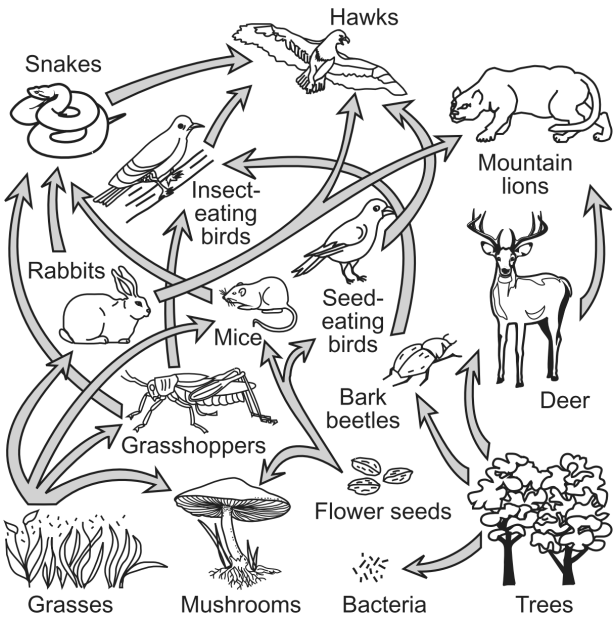
21. A woman with blood genotype $I^Ai$ marries a man with blood genotype $I^Bi$. What is the probability that they will have a child with type O blood?

A. 1/1
B. 1/2
C. 1/3
D. 1/4

22. In a certain ecosystem, rattlesnakes are predators of prairie dogs. If the prairie dog population started to increase, how would the ecosystem most likely regain stability?

A. The rattlesnake population would start to decrease.
B. The rattlesnake population would start to increase.
C. The prairie dog population would increase rapidly.
D. The prairie dog population would begin to prey on the rattlesnakes.

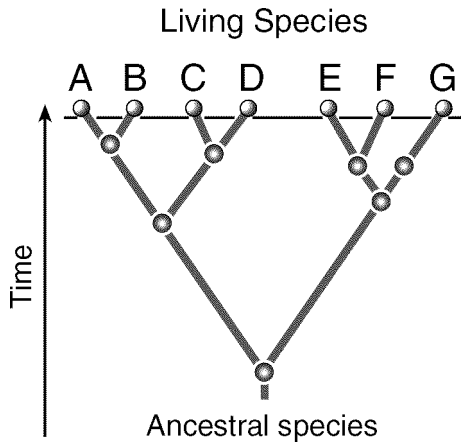
23. Base your answer(s) to the following question(s) on the diagram below and on your knowledge of biology. The diagram represents a food web.




Which statement correctly describes interactions between organisms in this ecosystem?

A. Hawks are predators of insect-eating birds, but not of seed-eating birds.
B. Hawks and snakes prey on both rabbits and grasshoppers.
C. Rabbits and mice compete for both grasses and flower seeds.
D. Grasshoppers and mice compete for grasses, but not flower seeds.

24. The evolutionary pathways of seven living species are shown in the diagram below.




Which two species are likely to have the most similar DNA base sequences?

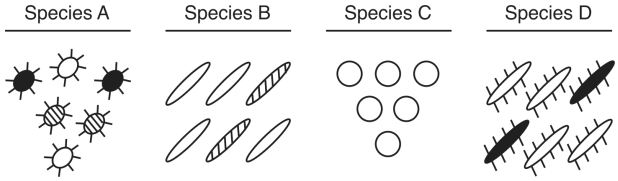
A. *B* and *G*

B. *E* and *G*

C. *B* and *C*

D. *C* and *D*

25. The diagram below represents four different species of bacteria.




Which statement is correct concerning the chances of survival for these species if there is a change in the environment?

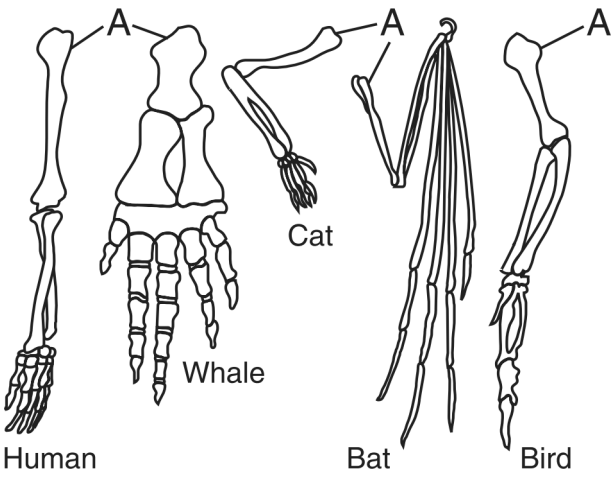
A. Species *A* has the best chance of survival because it has the most genetic diversity.

B. Species *C* has the best chance of survival because it has no gene mutations.

C. Neither species *B* nor species *D* will survive because they compete for the same resources.

D. None of the species will survive because bacteria reproduce asexually.

26. Base your answer to the following question on the diagram below and on your knowledge of biology.




The similarities of the bones labeled *A* provide evidence that

A. the organisms may have evolved from a common ancestor

B. all species have one kind of bone structure

C. the cells of the bones contain the same type of mutations

D. all structural characteristics are the same in animals

27. Woolly mammoths became extinct thousands of years ago, while other species of mammals that existed at that time still exist today. These other species of mammals most likely exist today because, unlike the mammoths, they

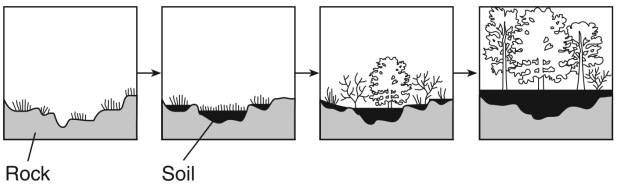
A. produced offspring that all had identical inheritable characteristics

B. did not face a struggle for survival

C. learned to migrate to new environments

D. had certain inheritable traits that enabled them to survive

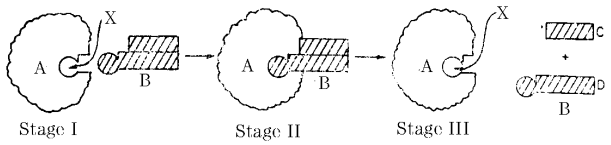
28. The diagram represents the changes in an area over time.




This series of changes in the area over hundreds of years is known as

A. evolution
B. feedback
C. ecological succession
D. direct harvesting

29. Which letter indicates a substrate molecule in this reaction?

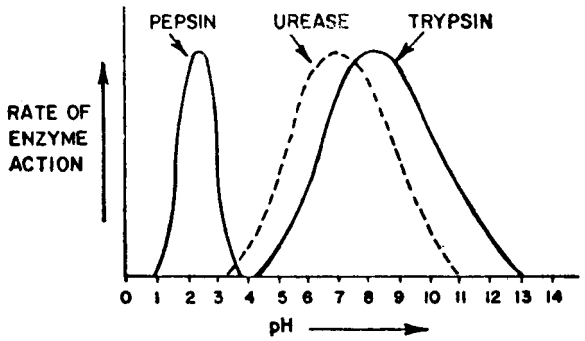



A. *A* B. *B* C. *C* D. *D*

30. The area labeled *X* is known as

A. an atomic nucleus
B. an active site
C. a pH indicator
D. a temperature regulator

31. The graph shows the relationship between the rate of enzyme action and pH for three enzymes: pepsin, urease, and trypsin.




The optimum environment for pepsin is

A. a basic medium
B. an acidic medium
C. either an acidic or a basic medium
D. a neutral medium

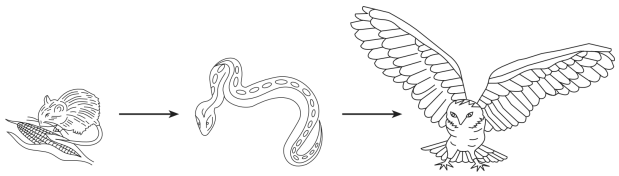
32. An individual running a marathon may experience periods of oxygen deprivation that can lead to

A. anaerobic respiration in muscle cells, forming lactic acid
B. aerobic respiration in muscle cells, generating glycogen
C. anaerobic respiration in liver cells, producing glucose
D. aerobic respiration in liver cells, synthesizing alcohol

33. An abiotic factor that could be studied by an ecologist visiting Africa is the

A. amount of rainfall in northern Africa
B. birth rate in central Africa
C. type of plants that grow in southern Africa
D. species of mosquitoes in western Africa

34. The diagram below represents a food chain made up of organisms found in a field.



Which row in the chart correctly identifies characteristics that can be associated with the members of this food chain?

| Row | Producer | Consumer | Autotroph | Heterotroph |
|---|---|---|---|---|
| (1) | corn | snake | mouse | owl |
| (2) | mouse | owl | snake | mouse |
| (3) | corn | owl | corn | snake |
| (4) | owl | corn | snake | corn |

A. (1) B. (2) C. (3) D. (4)

35. Some hydras have green algae living symbiotically inside their bodies. The algae produce food for the hydra and receive carbon dioxide and shelter from the animal. What type of relationship exists between the two organisms?

A. parasitism B. commensalism

C. mutualism D. saprophytism

36. Some small fish attach themselves to the body of a shark without harming it and feed upon its left over food. This relationship between the shark and the fish is an example of

A. commensalism B. mutualism

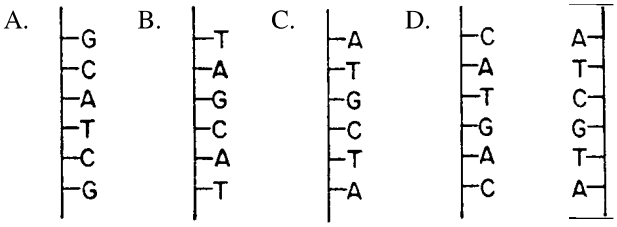
C. competition D. parasitism

37. A flea in the fur of a mouse benefits at the mouse's expense. This type of relationship is known as

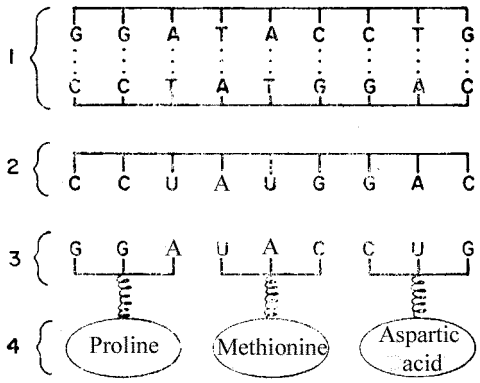
A. commensalism B. parasitism

C. saprophytism D. mutualism

38. Which DNA strand represents the complementary base sequence to the portion of a DNA strand represented in the diagram shown?




39. A portion of a DNA molecule is represented by




A. 1 B. 2 C. 3 D. 4

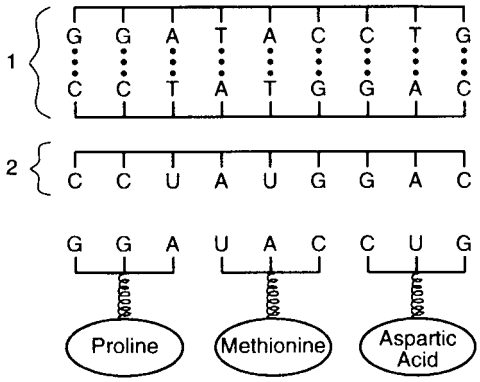
40. A portion of a messenger RNA molecule is represented by

A. 1 B. 2 C. 3 D. 4

41. The messenger RNA codon for methionin is

A. TAC B. UAC C. ATG D. AUG

42. The diagram shown represents molecular structures involved in protein synthesis. Structure 2 is synthesized in the

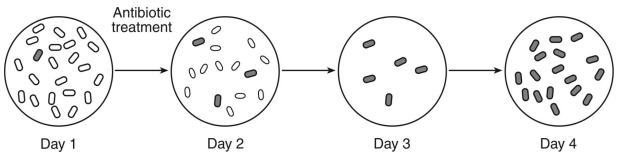



A. nucleus
B. vacuole
C. ribosome
D. lysosome

43. Tomato plants in a garden are not growing well. The gardener hypothesizes that the soil is too acidic. To test this hypothesis accurately, the gardener could

A. plant seeds of a different kind of plant
B. move the tomato plants to an area with less sunlight
C. change the pH of the soil
D. reduce the amount of water available to the plant

44. The diagram below represents some changes that took place in a bacterial population recently exposed to an antibiotic.



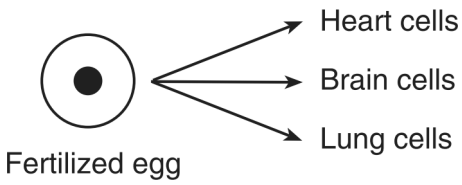

Which statement would best explain the presence of bacteria on day 4?

A. A bacterial population cannot survive exposure to antibiotics.
B. This bacterial population cannot survive exposure to this antibiotic.
C. Bacteria can change whenever it is necessary to survive antibiotic treatment.
D. Some of the bacterial population was resistant to this antibiotic.

45. If 15% of a DNA sample is made up of thymine, T, what percentage of the sample is made up of cytosine, C?

A. 15% B. 35% C. 70% D. 85%

46. The diagram below represents a process that occurs during normal human development.




Which statement is correct regarding the cells and DNA?

A. All the cells have identical DNA.
B. The DNA of the fertilized egg differs from the DNA of all the other cells.
C. The DNA of the fertilized egg differs from some, but not all, of the other cells.
D. Only the fertilized egg contains DNA.

47. Base your answer to the following question on the chart below and on your knowledge of biology.

**Universal Genetic Code Chart**
**Messenger RNA and the Amino Acids for Which They Code**

| | U | C | A | G | |
|---|---|---|---|---|---|
| U | UUU PHE<br>UUC<br>UUA LEU<br>UUG | UCU<br>UCC<br>UCA<br>UCG SER | UAU TYR<br>UAC<br>UAA STOP<br>UAG | UGU CYS<br>UGC<br>UGA STOP<br>UGG TRP | U<br>C<br>A<br>G |
| C | CUU<br>CUC<br>CUA<br>CUG LEU | CCU<br>CCC<br>CCA<br>CCG PRO | CAU HIS<br>CAC<br>CAA GLN<br>CAG | CGU<br>CGC<br>CGA<br>CGG ARG | U<br>C<br>A<br>G |
| A | AUU<br>AUC<br>AUA ILE<br>AUG MET or START | ACU<br>ACC<br>ACA<br>ACG THR | AAU ASN<br>AAC<br>AAA LYS<br>AAG | AGU SER<br>AGC<br>AGA ARG<br>AGG | U<br>C<br>A<br>G |
| G | GUU<br>GUC<br>GUA<br>GUG VAL | GCU<br>GCC<br>GCA<br>GCG ALA | GAU ASP<br>GAC<br>GAA GLU<br>GAG | GGU<br>GGC<br>GGA<br>GGG GLY | U<br>C<br>A<br>G |

Fill in the missing mRNA bases and the amino acid sequence that corresponds to the DNA base sequence below.

| DNA | CAC | GTG | GAC | TGA |
|---|---|---|---|---|
| mRNA | _____ | _____ | _____ | _____ |
| Amino acids | _____ | _____ | _____ | _____ |

48. To remain healthy, organisms must be able to obtain materials, change the materials, move the materials around, and get rid of waste. These activities directly require

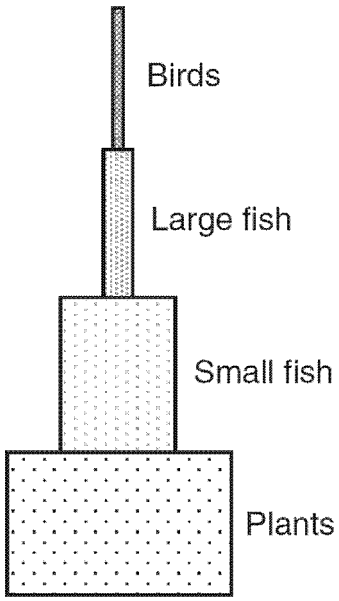
A. energy from ATP

B. the replication of DNA

C. nutrients from inorganic sources

D. manipulation of altered genes

49. The accompanying diagram represents a model of a food pyramid.




Which statement best describes what happens in this food pyramid?

A. More organisms die at higher levels than at lower levels, resulting in less mass at higher levels.

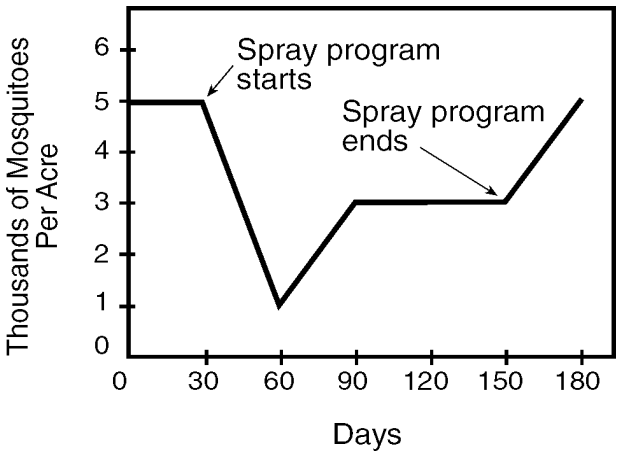
B. Energy is lost to the environment at each level, so less mass can be supported at each higher level.

C. When organisms die at higher levels, their remains sink to lower levels, increasing the mass of lower levels.

D. Organisms decay at each level, and thus less mass can be supported at succeedingly higher levels.

50. Base your answer(s) to the following question(s) on the information below and on your knowledge of biology.

A small village was heavily infested with mosquitoes. The village was sprayed weekly with an insecticide for a period of several months. The results of daily counts of the mosquito population are shown in the graph below.




Which statement best explains the decreased effectiveness of the insecticide?

A. The insecticide caused mutations that resulted in immunity in the mosquito.

B. Mosquitoes resistant to the insecticide lived and produced offspring.

C. The insecticide reacted chemically with the DNA of the mosquitoes and was destroyed.

D. All of the mosquitoes produced antibodies that activated the insecticide.

51. Which statement best describes a characteristic of an ecosystem?

A. It must have producers and consumers but not decomposers.

B. It is stable because it has consumers to recycle energy.

C. It always has two or more different autotrophs filling the same niche.

D. It must have organisms that carry out autotrophic nutrition.

52. If algal growth in a lake increases, which organisms will be most immediately affected?

A. primary consumers

B. secondary consumers

C. saprophytes

D. carnivores