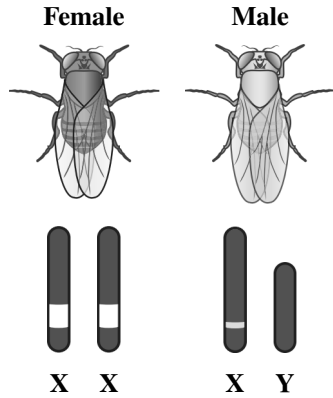


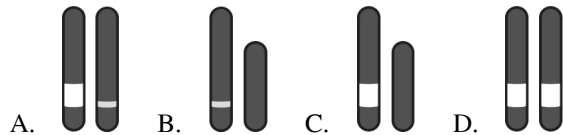
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1. The diagram below shows the X chromosomes in a female fruit fly and the X and Y chromosomes in a male fruit fly.



The two fruit flies are crossed with each other. The female offspring of the fruit flies will receive which pair of chromosomes?



2. A particular genetic disorder leads to very high levels of blood cholesterol. The gene linked to this trait has two alleles, **N** and **n**. The table below shows how the three different combinations of these alleles are expressed.

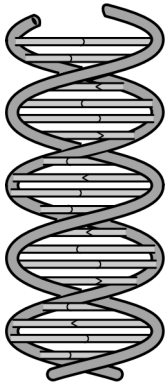
Genotype	Expressed Phenotype
<b>NN</b>	normal cholesterol levels
<b>Nn</b>	slightly elevated cholesterol levels
<b>nn</b>	greatly elevated cholesterol levels

Which of the following statements describes the interaction of the **N** and **n** alleles for the gene?

- A. The **N** allele is recessive to the **n** allele.
  - B. The **N** allele is incompletely dominant to the **n** allele.
  - C. The **N** allele assort independently from the **n** allele.
  - D. The **N** allele completely masks the phenotype of the **n** allele.
3. A dog gives birth to five puppies. What percentage of its chromosomes does each puppy share with the mother?
- A. 25%
  - B. 50%
  - C. 75%
  - D. 100%

4. Which of these would have the same degree of genetic similarity as organisms cloned from the same DNA?
- A. fraternal twins
  - B. identical twins
  - C. father and son
  - D. mother and daughter

5. Look at the illustration below.



This illustration is a model of

- A. RNA
- B. DNA
- C. a lipid
- D. a protein

6. The messenger RNA codes for six different amino acids are shown in the table below.

**MESSENGER RNA CODES  
FOR AMINO ACIDS**

Amino Acid	Messenger RNA Codes
Arginine	CGU, CGC, CGA, CGG
Cysteine	UGU, UGC
Glutamic acid	GAA, GAG
Leucine	CUU, CUC, CUA, CUG
Serine	AGU, AGC
Valine	GUU, GUC, GUA, GUG

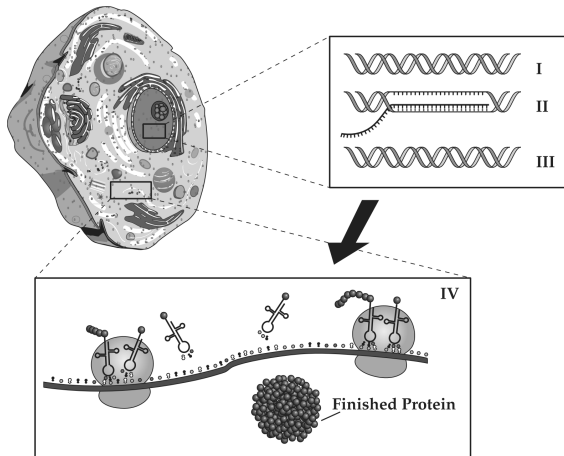
In one type of mutated gene for hemoglobin, CAC has replaced the normal CTC in the DNA code. What amino acid substitution has taken place in the mutated hemoglobin?

- A. Serine has replaced leucine.
- B. Arginine has replaced leucine.
- C. Valine has replaced glutamic acid.
- D. Cysteine has replaced glutamic acid.

7. Which of these are the repeating units that form a DNA molecule?

- A. fatty acids
- B. nucleotides
- C. amino acids
- D. chromosomes

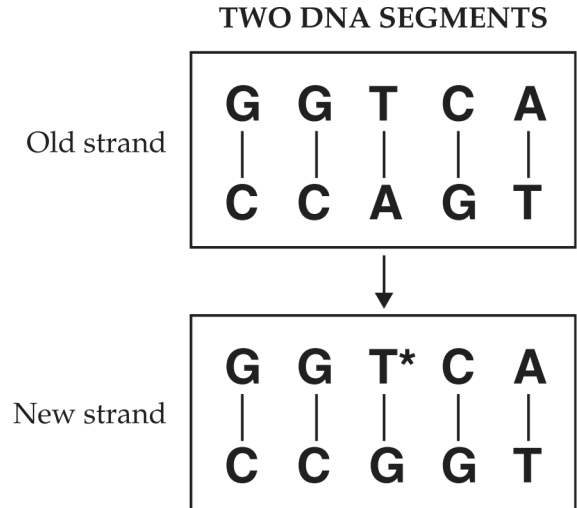
8. The diagram below shows the key steps for making proteins. Use the diagram to answer the following question(s).



According to the diagram, in which step is messenger RNA being constructed?

- A. I      B. II      C. III      D. IV

9. Two segments of DNA are shown in the diagram below.



Normal thymine (T) is found in the old strand. It is replaced by an abnormal molecule (T\*) in the new strand. The abnormal molecule (T\*) binds to guanine (G) instead of binding to adenine (A). This is an example of

- A. an adaptation      B. protein synthesis  
C. a mutation      D. binary fission

10. Which gas makes up the largest component of the Earth's atmosphere?

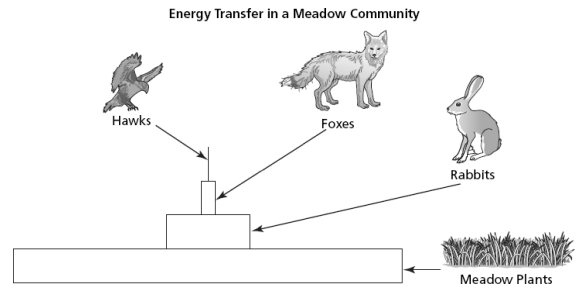
- A. argon (Ar)  
B. oxygen (O<sub>2</sub>)  
C. nitrogen (N<sub>2</sub>)  
D. carbon dioxide (CO<sub>2</sub>)

11. Which statement correctly describes how nitrogen in the soil returns to the atmosphere?
- A. Soil bacteria convert nitrates into nitrogen gas.
  - B. Decomposers directly convert ammonium into nitrogen gas.
  - C. Plants assimilate nitrites and convert them into nitrogen gas.
  - D. Nitrogen-fixing bacteria in plant roots convert nitrates into nitrogen gas.

12. In the carbon cycle, atmospheric carbon dioxide is converted into organic material by which process?
- A. cellular respiration      B. decomposition
  - C. photosynthesis            D. transpiration

13. Which of the following processes puts carbon from a forest floor back into the atmosphere?
- A. combustion                B. photosynthesis
  - C. evaporation                D. transpiration

14. The picture below shows the energy flow through a meadow community.



Which statement *best* describes the flow of energy as it passes through the organisms in the pyramid?

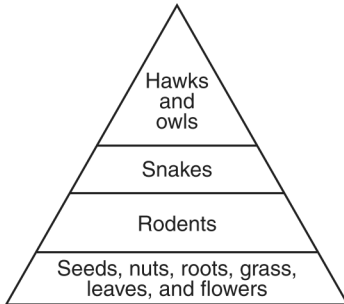
- A. Energy flows through the organisms from bottom to top and increases at each level.
- B. Energy flows through the organisms from bottom to top and decreases at each level.
- C. Energy flows through the organisms from top to bottom and increases at each level.
- D. Energy flows through the organisms from top to bottom and decreases at each level.

15. The table below contains information about animal diets.

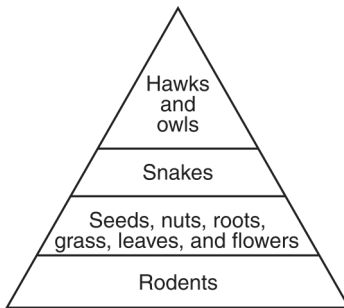
Animals	Diet
Snakes	Squirrels, chipmunks, gophers, and mice
Hawks and owls	Rodents and reptiles
Rodents	Seeds, nuts, roots, grass, leaves, and flowers

Which energy pyramid best represents the data in the table?

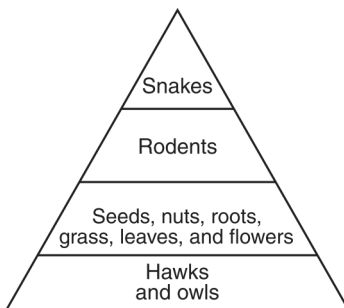
A.



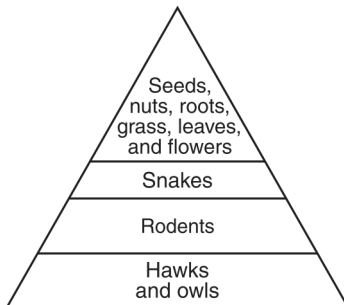
B.



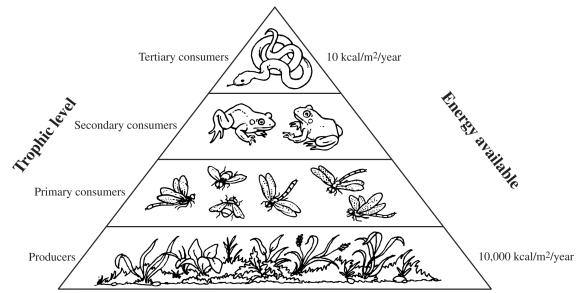
C.



D.



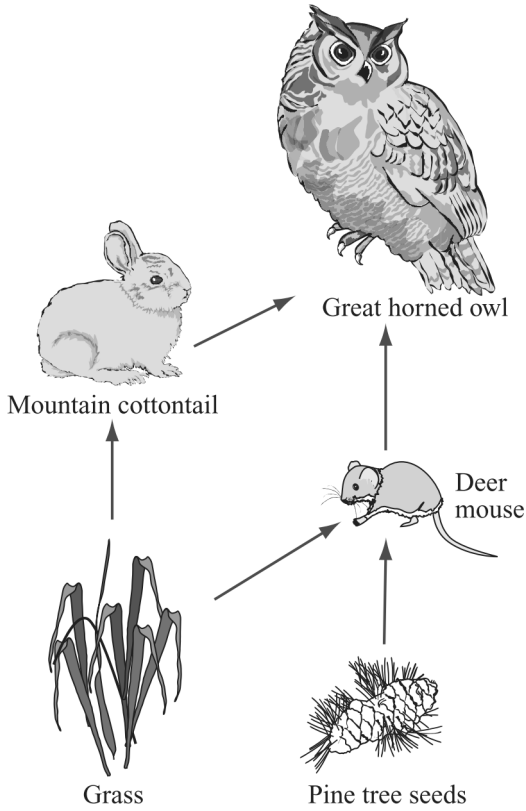
16. The diagram below shows an energy pyramid.



Approximately how much energy is available to the secondary consumers in this energy pyramid?

- A. 10 kcal/m<sup>2</sup>/year      B. 100 kcal/m<sup>2</sup>/year  
 C. 1,000 kcal/m<sup>2</sup>/year      D. 5,000 kcal/m<sup>2</sup>/year

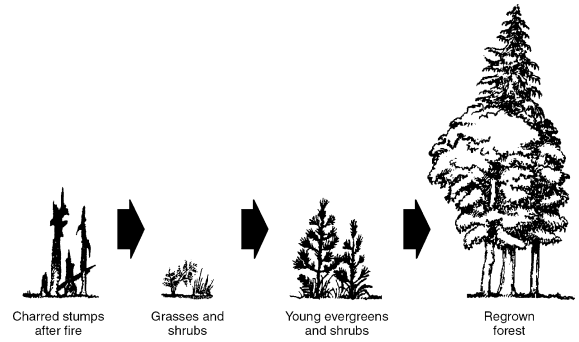
17. A simple food web is shown below.



Which of the following is most likely to lead to the *greatest* decrease in the deer mouse population?

- A. an increase in the owl population
- B. an increase in the grass population
- C. an increase in the pine tree population
- D. an increase in the cottontail population

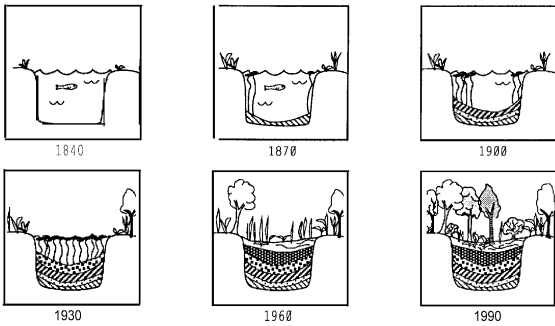
18. The accompanying diagram shows changes that might occur over time after a fire in a forest area.



Which statement is most closely related to the events shown in the diagram?

- A. The lack of animals in an altered ecosystem speeds natural succession.
- B. Abrupt changes in an ecosystem only result from human activities.
- C. Stable ecosystems never become established after a natural disaster.
- D. An abrupt environmental change can cause a long-term gradual change in an ecosystem.

19. Answer the following question(s) based on the sequence of diagrams shown and on your knowledge of biology.

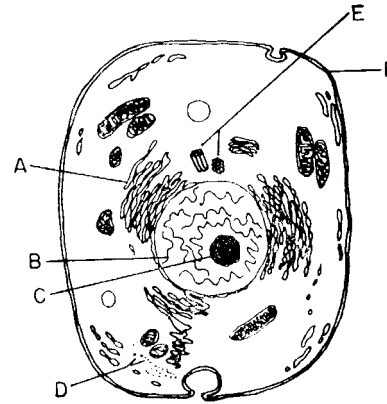


This sequence of diagrams best illustrates

- A. ecological succession  
 B. organic evolution  
 C. the effects of acid rain  
 D. a food chain
20. Which organelle is primarily concerned with the conversion of potential energy of organic compounds into suitable form for immediate use by the cell?

- A. mitochondria                      B. centrosomes  
 C. ribosomes                            D. vacuoules

21. Which structures function mainly in transport?



- A. A and F                              B. B and D  
 C. C and F                              D. C and D

22. Which structure, composed mainly of proteins and lipids, aids in maintaining homeostasis in a cell?

- A. chromosome                        B. centrosome  
 C. cell membrane                      D. nucleolus

23. The ribosome is an organelle that functions in the process of

- A. phagocytosis                        B. pinocytosis  
 C. protein synthesis                    D. cellular respiration

24. In which organelles are enzymes for intracellular digestion stored?

- A. centrioles
- B. lysosomes
- C. nucleoli
- D. chloroplasts

25. Active transport is different from passive transport in that active transport involves

- A. the movement of molecules from high concentration to low concentration
- B. an expenditure of energy
- C. the use of ribosomes
- D. a process which occurs only in the cells of simple plants and animals

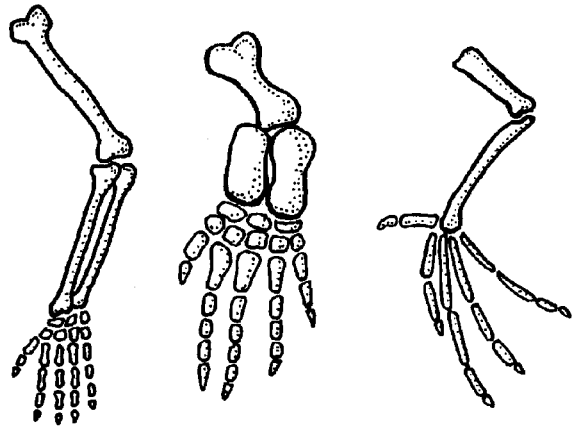
26. The organelle that is the site of cellular respiration is the

- A. chloroplast
- B. nucleus
- C. mitochondrion
- D. ribosome

27. An organelle found in most plant cells, but absent from animal cells, is the

- A. contractile vacuole
- B. centriole
- C. chloroplast
- D. Golgi complex

28. The accompanying diagrams show the bones in the forelimbs of three different organisms.



Human

Whale

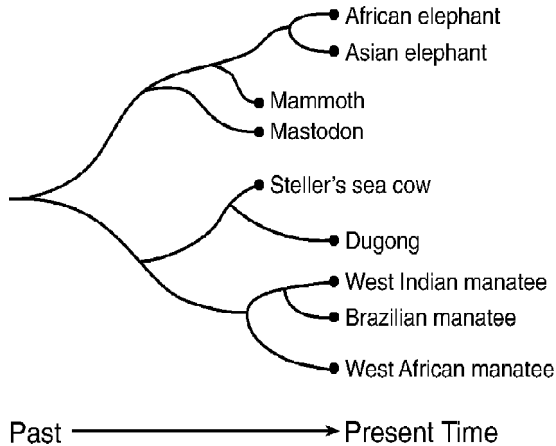
Bat

Differences in the bone arrangements support the hypothesis that these organisms

- A. are members of the same species
- B. may have descended from the same ancestor
- C. have adaptations to survive in different environments
- D. all contain the same genetic information



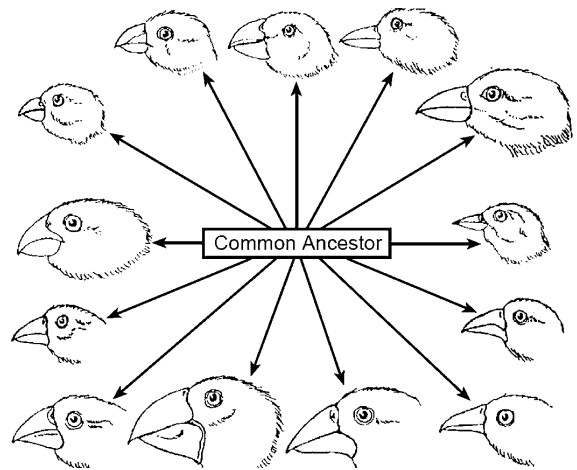
29. The relationship of some mammals is indicated in the diagram.



Which statement about the African elephant is correct?

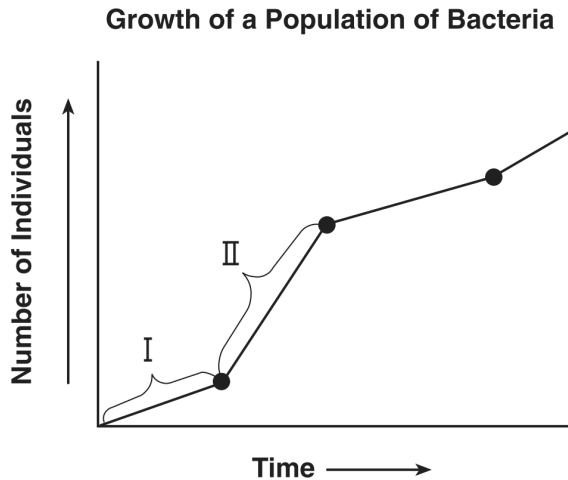
- A. It is more closely related to the mammoth than it is to the West African manatee.
  - B. It is more closely related to the West Indian manatee than it is to the mastodon.
  - C. It is not related to the Brazilian manatee or the mammoth.
  - D. It is the ancestor of Steller's sea cow.
30. According to the theory of natural selection, why are some individuals more likely than others to survive and reproduce?
- A. Some individuals pass on to their offspring new characteristics they have acquired during their lifetimes.
  - B. Some individuals are better adapted to exist in their environment than others are.
  - C. Some individuals do not pass on to their offspring new characteristics they have acquired during their lifetimes.
  - D. Some individuals tend to produce fewer offspring than others in the same environment.

31. The diversity within the wild bird species in the accompanying diagram can best be explained by which process?



- A. natural selection
- B. asexual reproduction
- C. ecological succession
- D. mitotic cell division

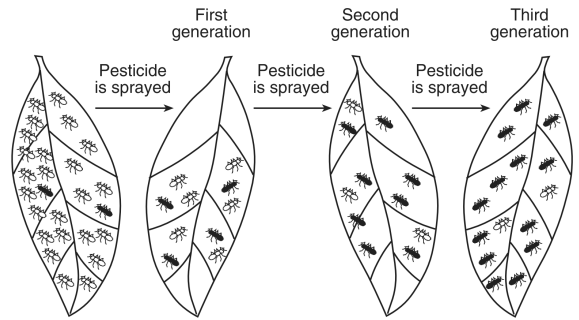
32. The graph below shows the growth of a population of bacteria over a period of 80 hours.



Which statement best describes section II of the graph?

- A. The population has reached the carrying capacity of the environment.
- B. The rate of reproduction is slower than in section I.
- C. The population is greater than the carrying capacity of the environment.
- D. The rate of reproduction exceeds the death rate.

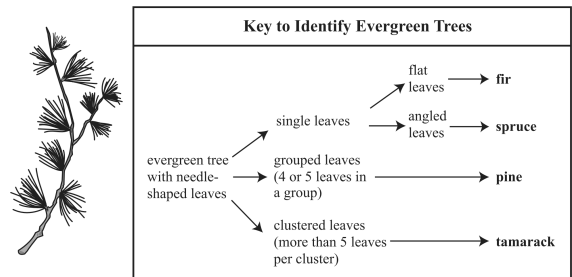
33. The diagram below shows the effect of spraying a pesticide on a population of insects over three generations.



Which concept is represented in the diagram?

- A. survival of the fittest
- B. dynamic equilibrium
- C. succession
- D. extinction

34. While on a walk, Samuel saw a tree he had not seen before. He used a key to help him identify the type of tree. A branch from the tree and the key he used are shown below.



Based on the key, which type of tree did Samuel *most likely* see?

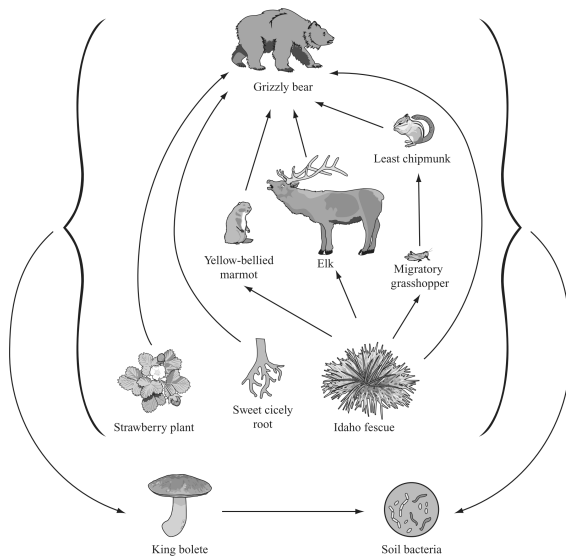
- A. fir
- B. spruce
- C. pine
- D. tamarack

35. Which of the following is an example of a prokaryotic organism?
- A. bacterium                      B. celery  
 C. horse                              D. mushroom

37. Scientists have discovered a new type of organism. To assign the organism to a domain and kingdom, which of the following is *most* important for scientists to know?

- A. the organism's cell structure  
 B. the organism's population size  
 C. the organism's social behavior  
 D. the organism's reproductive rate

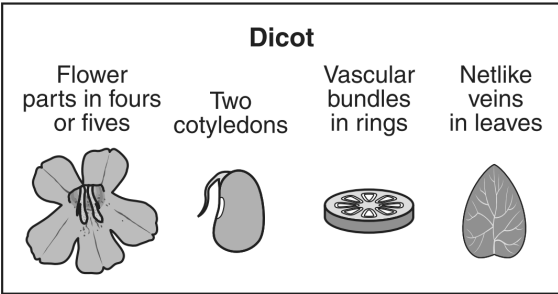
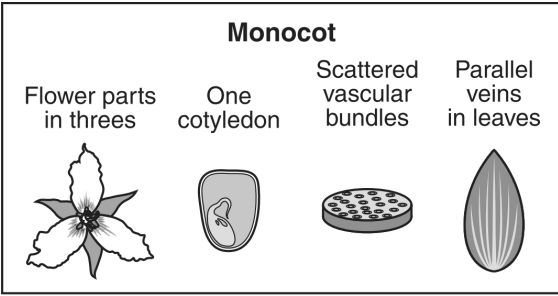
36. A partial food web for organisms in Yellowstone National Park is shown below.





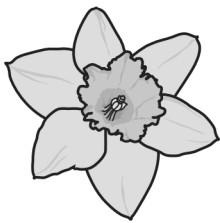

Which organism in the food web is classified into kingdom Fungi?

- A. Idaho fescue  
 B. king bolete  
 C. migratory grasshopper  
 D. yellow-bellied marmot

38. The diagrams below show characteristics of monocot and dicot flowering plants.



Which picture represents a part of a member of the dicot group?

- A. 
- B. 
- C. 
- D. 

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- |         |   |         |   |
|---------|---|---------|---|
| 1.      |   | 21.     |   |
| Answer: | A | Answer: | A |
| 2.      |   | 22.     |   |
| Answer: | B | Answer: | C |
| 3.      |   | 23.     |   |
| Answer: | B | Answer: | C |
| 4.      |   | 24.     |   |
| Answer: |   | Answer: | B |
| 5.      |   | 25.     |   |
| Answer: |   | Answer: | B |
| 6.      |   | 26.     |   |
| Answer: | C | Answer: | C |
| 7.      |   | 27.     |   |
| Answer: | B | Answer: | C |
| 8.      |   | 28.     |   |
| Answer: | B | Answer: | C |
| 9.      |   | 29.     |   |
| Answer: | C | Answer: | A |
| 10.     |   | 30.     |   |
| Answer: | C | Answer: | B |
| 11.     |   | 31.     |   |
| Answer: | A | Answer: | A |
| 12.     |   | 32.     |   |
| Answer: | C | Answer: | D |
| 13.     |   | 33.     |   |
| Answer: | A | Answer: | A |
| 14.     |   | 34.     |   |
| Answer: | B | Answer: | D |
| 15.     |   | 35.     |   |
| Answer: | A | Answer: | A |
| 16.     |   | 36.     |   |
| Answer: | B | Answer: | B |
| 17.     |   | 37.     |   |
| Answer: | A | Answer: | A |
| 18.     |   | 38.     |   |
| Answer: | D | Answer: | A |
| 19.     |   |         |   |
| Answer: | A |         |   |
| 20.     |   |         |   |
| Answer: | A |         |   |