

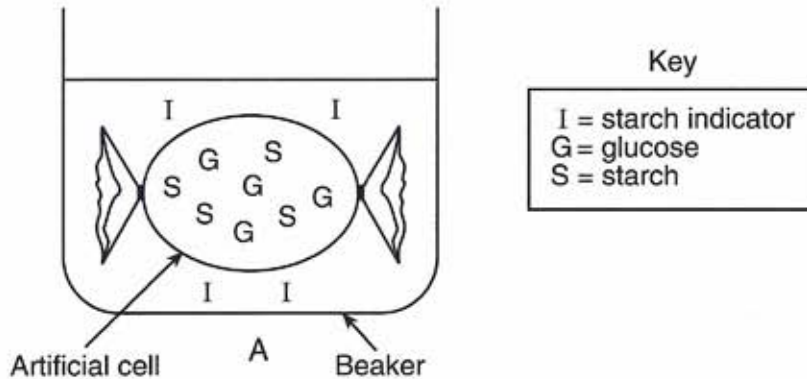
Part D

Answer all questions in this part. [13]

Directions (1-10): For those questions that are followed by four choices, circle the number of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the questions and record your answers in the spaces provided.

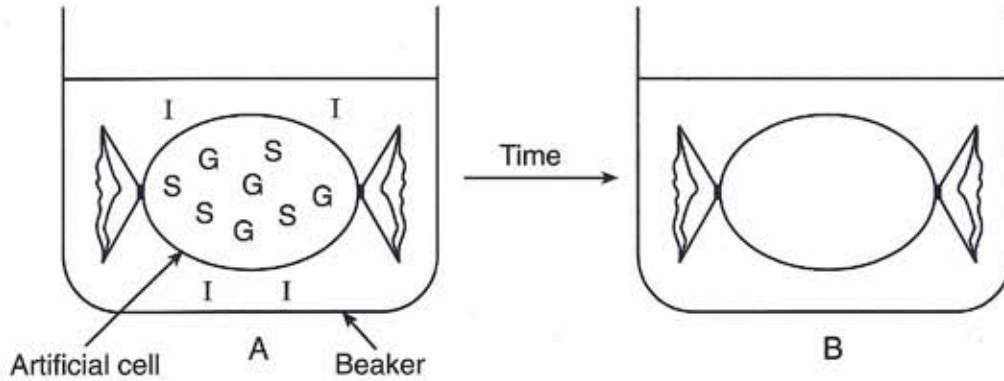
Base your answers to questions 1 and 2 on the information and diagram below and on your knowledge of biology. The diagram illustrates an investigation carried out in a laboratory activity on diffusion. The beaker and the artificial cell also contain water.

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Key
 I = starch indicator
 G = glucose
 S = starch

1. Predict what would happen over time by showing the location of molecules I, G, and S in diagram B below. [3]



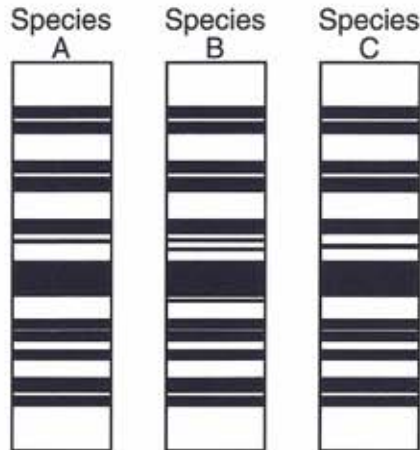
60

2. State what is observed when there is a positive test for starch using the starch indicator. [1]

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Base your answers to questions 3 through 5 on the information and diagram below and on your knowledge of biology.

The DNA of three different species of birds was analyzed to help determine if there is an evolutionary relationship between these species. The diagram shows the results of this analysis.



3. Identify the technique normally used to separate the DNA fragments to produce the patterns shown in the diagram. [1]

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4. The chart below contains amino acid sequences for part of a protein that is found in the feathers on each of these three species of birds.

Species	Amino Acid Sequence
A	Arg-Leu-Glu-Gly-His-His-Pro-Lys-Arg
B	Arg-Gly-Glu-Gly-His-His-Pro-Lys-Arg
C	Arg-Leu-Glu-Gly-His-His-Pro-Lys-Arg

State *one* way this data supports the inference that these three bird species may be closely related. [1]

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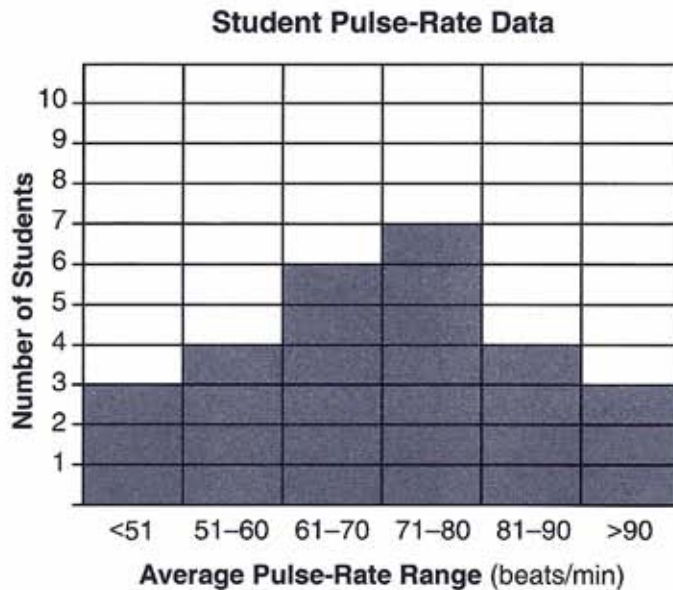
5. State *one* type of additional information that could be used to determine if these three species are closely related. [1]

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Base your answers to questions 6 through 8 on the information and graph below and on your knowledge of biology.

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Pulse-rate data were collected from some students during their lunch time for the lab activity, *Making Connections*. The data are represented in the histogram below.



6. The histogram includes data from a total of how many students?

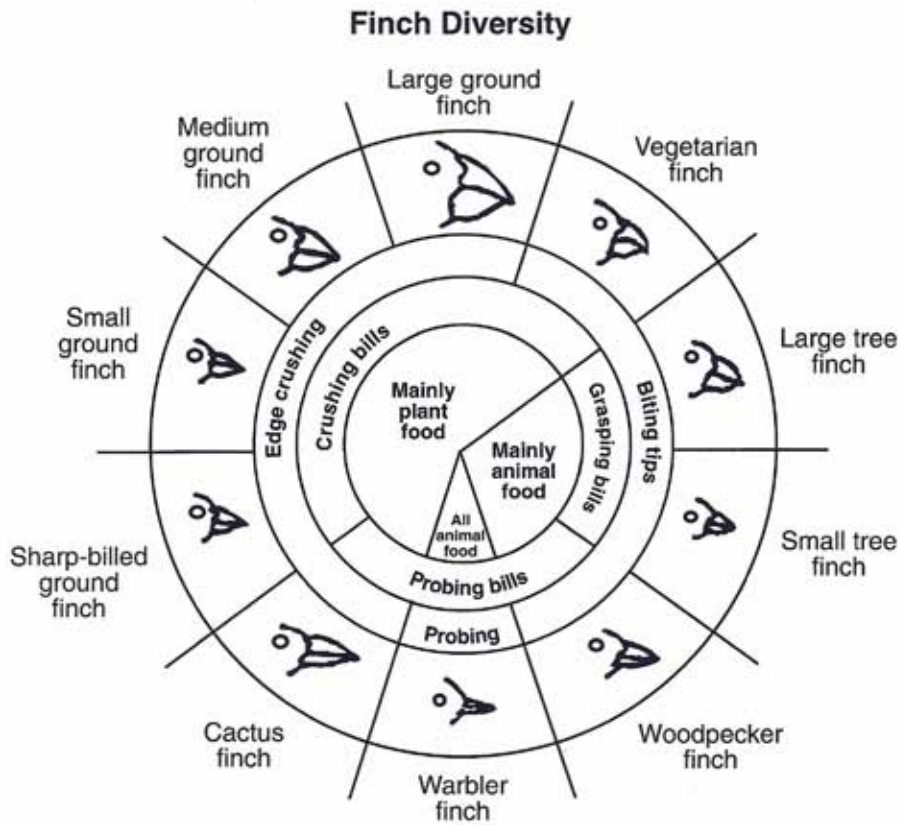
- (1) 6
- (2) 7
- (3) 10
- (4) 27

7. Describe *one* way in which a pulse rate below 45 would disrupt homeostasis in an individual whose average resting pulse rate falls in the range of 71–80. [1]

8. State *one* way the data would most likely be different if the pulse rates were collected immediately after exercising instead of during lunch. [1]

Base your answers to questions 9 and 10 on the finch diversity chart below, which contains information concerning the finches found on the Galapagos Islands.

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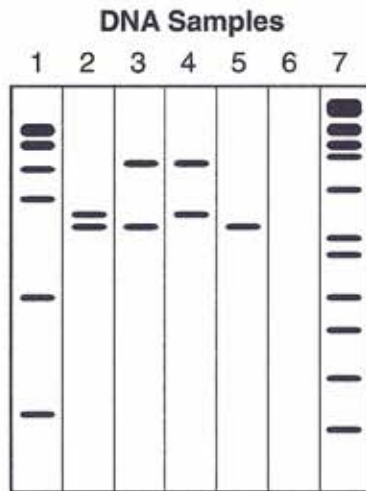


9. Identify *one* bird that would most likely compete for food with the large tree finch. Support your answer. [1]

10. Identify *one* trait, other than beak characteristics, that would contribute to the survival of a finch species and state *one* way this trait contributes to the success of this species. [2]

Base your answers to questions *11* through *13* on the diagram below and on your knowledge of biology. The diagram shows the results of a technique used to analyze DNA.

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11. This technique used to analyze DNA directly results in

- (1) synthesizing large fragments of DNA
- (2) separating DNA fragments on the basis of size
- (3) producing genetically engineered DNA molecules
- (4) removing the larger DNA fragments from the samples

12. This laboratory technique is known as

- (1) gel electrophoresis
- (2) DNA replication
- (3) protein synthesis
- (4) genetic recombination

13. State *one* specific way the results of this laboratory technique could be used. [1]

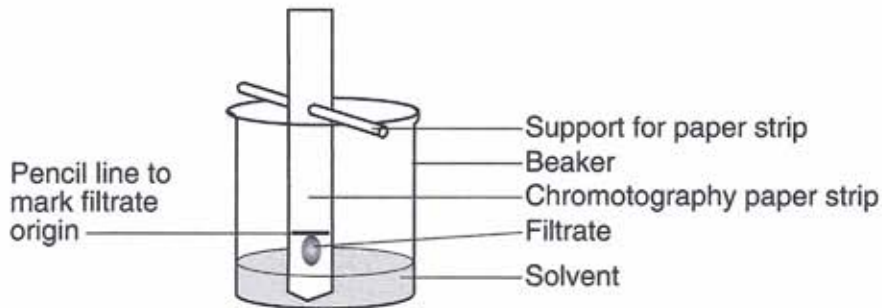
Base your answers to questions 14 through 16 on the information below and on your knowledge of biology.

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Paper chromatography can be used to investigate evolutionary relationships.

Leaves from a plant were ground and mixed with a solvent. The mixture of ground leaves and solvent was then filtered. Using a toothpick, twenty drops of the filtrate (material that passed through the filter) were placed at one spot on a strip of chromatography paper.

This procedure was repeated using leaves from three other species of plants. A separate strip of chromatography paper was prepared for each plant species. Each of the four strips of chromatography paper was placed in a different beaker containing the same solvent for the same amount of time. One of the laboratory setups is shown below.



14. State *one* reason for using a new toothpick for the filtrate from each plant. [1]

15. State *one* way the four strips would most likely be different from each other after being removed from the beakers. [1]

16. State how a comparison of these resulting strips could indicate evolutionary relationships. [1]

7. Galapagos finches evolved partly due to

- (1) cloning and recombination
- (2) migration and selective breeding
- (3) mutation and asexual reproduction
- (4) variation and competition

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Base your answer to question 73 on the portion of the mRNA codon chart and information below.

AUU } AUC } AUA } AUG } ILE (Isoleucine) MET (Methionine)	ACU } ACC } ACA } ACG } THR (Threonine)	AAU } AAC } AAA } AAG } ASN (Asparagine) LYS (Lysine)	AGU } AGC } AGA } AGG } SER (Serine) ARG (Arginine)
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Series I represents three mRNA codons. Series II includes a mutation of series I.

Series I AGAUCGAGU

Series II ACAUCGAGU

8. How would the amino acid sequence produced by the mutant strand (series II) compare to the amino acid sequence produced by series I?

- (1) The amino acid sequence would be shorter.
- (2) One amino acid in the sequence would change.
- (3) The amino acid sequence would remain unchanged.
- (4) More than one amino acid in the sequence would change.



Base your answers to questions 19 and 20 on the information below and on your knowledge of biology.

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Our national parks are areas of spectacular beauty. Current laws usually prohibit activities such as hunting, fishing, logging, mining, and drilling for oil and natural gas in these areas. Congress is being asked to change these laws to permit such activities.

19. Choose *one* of the activities listed above. State *one* way that activity could harm the ecosystem. [1]

Activity: _____

Harm: _____

20. State *one* way allowing the activity you chose could benefit society. [1]

21. One variety of wheat is resistant to disease. Another variety contains more nutrients of benefit to humans. Explain how a new variety of wheat with disease resistance and high nutrient value could be developed. In your answer, be sure to:

- identify *one* technique that could be used to combine disease resistance and high nutrient value in a new variety of wheat [1]
- describe how this technique would be carried out to produce a wheat plant with the desired characteristics [1]
- describe *one* specific difficulty (other than stating that it does not always work) in developing a new variety using this technique [1]

22. Organelles carry out specific processes involving chemical reactions. In the chart below, identify *two* organelles and, for each, identify a process involving chemical reactions that occurs there. Describe *one* specific way each process identified is important to the functioning of the organism. [4]

Organelle	Process Involving Chemical Reactions that Occur in the Organelle	How the Process is Important to the Functioning of the Organism
(1) _____ _____	_____ _____ _____	_____ _____ _____
(2) _____ _____	_____ _____ _____	_____ _____ _____



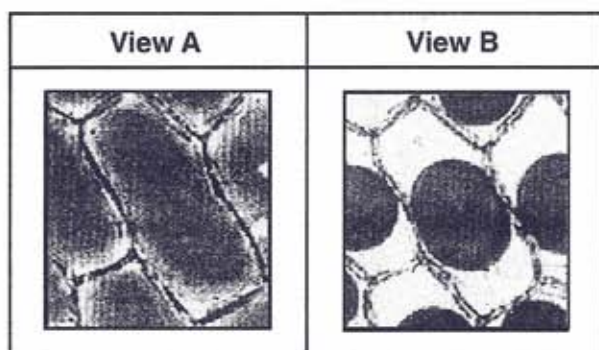
Part D

Answer all questions in this part. [13]

Directions (23-25): For those questions that are followed by four choices, circle the *number* of the choice that best completes the statement or answers the question. For all other questions in this part, follow the directions given in the question.

Base your answers to questions 62 through 64 on the information and diagram below.

A student prepared a wet-mount slide of red onion skin and observed it under high power of a compound light microscope (view A). After adding a substance to the slide and waiting one minute, the student observed that there were changes in the cells (view B).



23. Identify *one* substance that could have been added to the cells on the slide in view A that would make them resemble the cells observed in view B. [1]

24. Identify the specific substance that diffused to cause the change in appearance from view A to view B. [1]

25. In the box below, sketch how view B would appear when viewed under lower power of the same compound light microscope. [1]



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