



**AP[®] Biology
2004 Scoring Commentary
Form B**

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Question 1

Sample: 1R
Score: 10

In part (a), the student earned two points for knowing that prokaryotes that live in extreme environments have few competitors. The student also earned two points for understanding the adaptive significance of pili and conjugation. The student earned the maximum for this section by explaining that the adaptive significance of fast reproduction is the rapid spread of genetic traits. In part (b), the student demonstrated a clear understanding that endosymbiosis (1 point) lead to the evolution of mitochondria and chloroplasts (1 point) and provided evidence (1 point). The student earned a point for understanding that photosynthetic prokaryotes produced atmospheric oxygen, and would have earned another for understanding that this led to ozone formation if the maximum of 10 points had not already been reached.

Sample: 1S
Score: 7

In part (a), the student earned a point for knowing that some prokaryotes live in extreme environments and another for understanding that this led to decreased competition. Binary fission earned the student another point, but there was no clear explanation of the adaptive success of this type of division. The second example provided about the structure of the DNA earned no points. Two points were earned for the operon example and a sound explanation for its adaptive significance. For part (b) the student earned a point for stating that prokaryotes increased oxygen on early Earth and for correctly identifying these organism as the cyanobacteria. No further points were earned in this section.

Sample: 1T
Score: 5

For part (b) the student earned a point for stating that prokaryotes increased oxygen on early Earth and another for correctly identifying these organism as the cyanobacteria. The student earned two points for understanding that endosymbiosis gave rise to organelles; they earned an additional point for providing evidence to support this theory. The remaining paragraph appears to be addressing (a) but no further points were earned.

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Question 2

Sample: 2R

Score: 10

This student earned 1 point for the hypothesis. The student selected algae as the organism and earned 1 point. This student correctly identified the control and earned 1 point. The student earned 1 point for selecting a range of intensities for the independent variable. This student opted to use a probe to measure D.O., earning 1 point. The student earned 1 point for selecting the duration of the experiment. This student correctly set up and drew the lines of comparison on the graph and earned 2 points. The student correctly related D.O. to photosynthesis and primary productivity, earning 1 point. Finally, the student earned 1 point for replicating the experiment.

Sample: 2S

Score: 8

A correct hypothesis earned 1 point. The student earned 1 point for selecting green algae as the experimental organism. This student earned 1 point for identifying a control. This student indicated 4 different light intensities and earned 1 point for the range of the independent variable. The student indicated the frequency of measurements and earned 1 point. The student earned 2 points for the graph for set up and comparison of data. This student also earned 1 point for linking D.O. to primary production.

Sample: 2T

Score: 6

The student wrote a correct (but brief) hypothesis, earning 1 point. The student selected one plant as the sole experimental organism and earned 1 point. The student described a range of distances from the light to the water (different light intensities) as the range of independent variable measurements and earned 1 point. The student identified the independent variable and earned 1 point. On the graph, the student earned 2 points for set up and comparison.

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Question 3

Sample: 3R
Score: 10

Blood Glucose Levels – The student earned one point for identifying secretion of glucagon as a mechanism that contributes to homeostasis of blood glucose in humans and one point for explaining that it does so by converting glycogen to glucose. The third point was earned for identifying the secretion of insulin as a mechanism in humans and one point for explaining that it does so by causing cells to take up glucose. The maximum of 4 was earned on this part of the question.

Body Temperature – The student earned one point for identifying specific behavior as a human mechanism that contributes to homeostasis of body temperature. A second point was earned for identifying shivering as a mechanism. The third point was earned for identifying sweating as a mechanism, and the fourth point for stating that sweating allows evaporative cooling. The maximum score of 4 was earned on this part.

Neuron Resting-Membrane Potential – The student earned one point for identifying the Na/K pump as a human mechanism that contributes to homeostasis of resting potential and a second point for describing how it maintains the resting potential.

Sample: 3S
Score: 7

Blood Glucose Level – The student earned one point for identifying secretion of glucagon (note that this misspelling/vocabulary error was accepted because it was accompanied by the clarification: *hormone produced by pancreas*) as a human mechanism that contributes to homeostasis of this parameter and one point for explaining that it does so by causing the liver to release stored glucose. A third point was awarded for identifying the secretion of insulin as a mechanism. No point was awarded for an incorrect explanation of how insulin regulates glucose.

Body Temperature – The student earned one point for identifying shivering as a human mechanism that contributes to homeostasis of body temperature. A second point was awarded for identifying vasoconstriction as a human mechanism. The third point was earned for describing that it can prevent blood flow to the skin. The fourth point was earned for identifying sweating as a human mechanism. The student earned the maximum of 4 on this section.

Osmotic Concentration of the Blood – No points earned.

Sample: 3T
Score: 5

Body Temperature – The student earned one point for identifying sweating (*water release from skin*) as a human mechanism. The second point was earned for identifying peripheral vasodilation as a human mechanism, and the third point was earned for the description of increased blood flow to the skin.

Blood Glucose Levels – One point was earned for identifying secretion of insulin as a human mechanism, but no point was earned for the incorrect description of how it raises blood glucose.

pH of the Blood – One point was earned for identifying the hemoglobin buffer as a human mechanism.

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Question 4

Sample: 4R

Score: 9

Part (a): Points were earned for three differences: autotrophy vs. heterotrophy, chloroplasts vs. none, and cell wall vs. none. Part (b): Points were earned for three similarities: DNA (molecular), cell membrane (cellular), and protein synthesis. An elaboration point was earned for the description of protein synthesis. Part (c): Points were earned for the explanations of the similarities (common ancestor) and differences (accumulated natural selection- induced changes).

Sample: 4S

Score: 8

Part (a): Points were earned for three differences: chloroplasts, large central vacuole, and plasmodesmata. Part (b): Points were earned for three similarities: ATP (molecular), membrane-bound nuclei and organelles (cellular), and cellular respiration. Part (c): Points were earned for linking similarities with evolution from a common ancestor and linking differences with evolutionarily accumulated changes.

Sample: 4T

Score: 6

Part (a): Points were earned for contrasting autotrophy with heterotrophy, and mobility with lack of mobility. The alternation of generations contrast was weakly developed, and incorrectly implied dominance of the gametophyte generation in the entire plant kingdom. Part (b): Points were earned for similarities of nucleus and multicellularity. No elaboration points were earned because no molecular similarity was included. Part (c): A point was earned for the explanation given for similarities and another point for differences.