



AP[®] Biology 2003 Scoring Commentary Form B

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Question 1

Sample 1A (3 points)

This essay received two points for part (a) by identifying the location of DNA in the nucleus in eukaryotes and in the cytoplasm for prokaryotes. The only point given in part (b) was earned by identifying cell division in eukaryotes as mitosis or meiosis.

Sample 1B (6 points)

This essay received two points for part (a) identifying location of DNA in prokaryotes and eukaryotes. In part (b), two points were given for understanding of the lactose operon gene regulation in prokaryotes and the role of enhancers in eukaryotic gene regulation. In addition one point was given for identifying that eukaryotic cell division involved mitosis and meiosis and one point for prokaryotic cell division involving binary fission and not mitosis.

Sample 1C (9 points)

This essay earned two points in part (a) by identifying the location of DNA outside the nucleus in prokaryotes and inside the nucleus for eukaryotes and two additional points for the existence of plasmids in prokaryotes with no plasmid in eukaryotes. The histone proteins in eukaryotes was an additional point which was not given due to the fact section a had already earned the internal maximum of four points. In part (b), two points were earned for establishing the location of transcription and translation in the cytoplasm for prokaryotes, while differentiating the location in eukaryotes as transcription in the nucleus and translation in the cytoplasm. The point for post-transcriptional m-RNA modification in eukaryotes was not given due to the two point maximum already given for transcription. One point was given for understanding of the operon gene regulation in prokaryotes. Two points were given for differences in cell division in eukaryotes as mitosis and meiosis, versus binary fission in eukaryotes.

Question 2

Sample 2A (3 points)

In part (a) this essay earned two points, one for identifying phototropism as a hormone-caused response to change in light and one for explaining how a hormone causes the response. Part (b) earned one point for identifying concentration of urine as a hormone-caused adjustment to lack of water in animals. No points were earned for part (c).

Sample 2B (6 points)

This essay received all four points for part (a) one for identifying stem elongation as a hormone-caused response that accounts for increased height in plants, one for explaining how a hormone causes the response, one for identifying flowering as a hormone-caused response to change in light, and one for explaining how a hormone causes the response. The essay also addressed water adjustment but no points were earned for two reasons: the maximum points were already earned and this was a “choose two” question so the first two chosen were scored. In part (b) only two points were earned, one for explaining that biorhythm is a hormone-caused response to change in light in animals, without explaining how this happens, and one for explaining that a hormone causes the reabsorption of water in animals, without explaining what response this produces. In part (c) no points were earned.

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Question 2 (cont'd.)

Sample 2C (10 points)

This essay received all four points in part (a), one for identifying stem elongation as a hormone-caused response that accounts for increased height in plants, one for explaining how a hormone causes the response; one for identifying flowering as a hormone-caused response to change in light and one for explaining how a hormone causes the response. In part (b) all four points were earned, one for identifying concentration of urine as a hormone-caused adjustment to lack of water in animals, one for explaining how a hormone causes the response; one for identifying bone growth as a hormone-caused response that accounts for increased height in animals, one for explaining how a hormone causes the response. In part (c) all four points were earned, two for explaining that hormones which enter cells bind to receptors in the cell and influence transcription; two for explaining that hormones bound to cell membranes activate proteins via signal transduction.

Question 3

Sample 3A (4 points)

In part A, the student was awarded 2 points for describing the property of cohesion and correctly linking it to the movement of water through the xylem vessels, as part of the transpiration process. This student also received 2 points for correctly describing the structure of the plasma membrane and clearly indicating how water influences this structure. No points were awarded in parts B or C. In part B, the student incorrectly described the role of water as a product in the carbon cycle. In part C, the student attempted to describe the role that industrial pollution plays in the formation of acid rain and its effect on the water cycle. The student failed to establish a clear link to the water cycle so no point was awarded. Such attempts were typical in many student responses.

Sample 3B, (8 points)

In part A, 2 points were awarded for correctly describing the property of cohesion between adjacent water molecules and how that property “pulls” water molecules through xylem vessels. In part B, the student was awarded 2 points for correctly linking an accurate description of membrane structure to the influence that surrounding water molecules have on the membrane itself. In part B, 2 points were awarded for correctly identifying water as being a reactant in photosynthesis and a product in cell respiration. 2 additional elaboration points were awarded for correctly describing details of how water was involved in each of those processes.

Sample 3C, (10 points)

In part A, 2 points were awarded for correctly linking the cohesion of water molecules to the process of transpiration. This paper was also awarded 2 points for correctly linking water’s high “heat of vaporization” to the process of evaporative cooling in endotherms. In part B, the student was awarded 2 points for correctly identifying water as both a reactant in photosynthesis and a product in cellular respiration. This student also received 2 elaboration points for correctly describing the specific role of water in each of those processes. In Part C, 4 points are present but only 2 were awarded as the student had reached the maximum of 10 points. The student received 2 points for correctly identifying the cause of global warming and predicting that this warming would lead to increased evaporation, thus influencing the water cycle. Additional points could also have been awarded for predicting that global warming would lead to the increased melt of polar ice caps and linking that to an increase in sea level.

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Question 4

Sample 4A. (3 points)

The student got the definition point and the example point for mutation, the definition point for adaptive radiation, and the explanation point for growth of the human population.

Sample 4B (6 points)

The student got (in order) the explanation point, the definition point, and the example point for mutation; the definition point and the explanation point for population bottlenecks; and the explanation point for the growth of human populations.

Sample 4C. (8 points)

This essay received the four points maximum for adaptive radiation selection with the example point, the explanation point, the definition point, and the impact point. For the growth of human population selection it got the definition point and the impact point. For the mutation selection it got the definition point and the impact point.