AP® Environmental Science
2001 Scoring Commentary

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Question 1

Sample 1A (Score 10)

This is a good example of a well-written paper for question 1. Each step of the part (a) calculations are clearly identified and labeled with proper units. However, only 3 of 4 possible points were awarded because the 80% efficiency was not calculated correctly. Part (b) is an excellent example of an answer that reflects a depth of knowledge and understanding in each description of the three actions. Part (c) clearly discusses both positive and negative impacts and consequences.

Sample 1B (Score 8)

This student gave a thorough presentation of the calculations required, including the 80% efficiency for the maximum 4 points. Three actions were clearly described for 3 points in part (b). A positive impact was cited for 1 point in part (c), but no points were awarded for the general nature of the positive consequence and negative impact. No negative consequence was discussed.

Sample 1C (Score 6)

This student provided a concise explanation of the calculations with units, thereby earning 3 of the 4 possible points for part (a). The fourth point was not awarded because the 80% efficiency calculation was omitted. The maximum 3 points were awarded for part (b) because all three actions were clearly described. The student did not receive credit for part (c) because there was no discussion of impacts or consequences.

Question 2

Sample 2A (Score 10)

This is a very nice example of a student who scored 10 points on Question 2. The food web in part (a) is drawn clearly and concisely, and received the maximum of 3 points. It is clear that the student was thinking carefully about the document as the food web was being constructed — note the scratched out connection between "acorns" and "gypsy moths," indicating that the student realized that gypsy moths don't eat acorns. All appropriate connections were made between organisms, and the arrows point in the direction of energy flow. In part (b) the student was able to clearly and accurately describe and elaborate on a valid scientific experiment, with an appropriate hypothesis, and thus received 4 points. In part (c) the student received 2 points for two valid methods of tick control, and one point for elaboration on the method of host population control.

Sample 2B (Score 7)

The student received 3 points in part (a) for including all five organisms and their proper connections, as well as showing the direction of the flow of energy by the arrows. There were no points awarded in part (b). Although the hypothesis was stated in an acceptable form, it was not tested by the experimental design. If the student believes that acorn production controls gypsy moth population, he/she must count mice (the critical link between acorns and moths) in the experiment. In the experimental design, the student not only failed to count mice, but also did not count acorns or specify an amount of time over which the experiment must be conducted. Finally, there was no control in this experiment (i.e., no setting in which acorns are eliminated completely). The student did an excellent job on part (c), and easily received the maximum of 4 points. In addition to describing three techniques of tick control, the student also elaborated on each of these techniques.

Sample 2C (Score 6)

Three points were awarded for part (a) on this paper: the student clearly identified the five major organisms, clearly showed the connections between all the organisms, and had the arrows pointed in the direction of energy flow through the system. The student received 2 points in part (b): 1 point for a valid hypothesis that was then linked to the experimental design, and 1 point for a good experimental control (leaving one of their areas free of moths). The student did not receive a measurement point because it was unclear how long he/she intended to run this experiment — the only specific mention of time was the proposal that the trees be monitored each week. The proposal that "when acorns develop, count the number. . ." does not take into account that the trees may be in a natural stage of no acorn production, and may have nothing to do with the number of gypsy moths. In part (c) the student earned 1 point by discussing the control of the host populations (deer and mice) as a way of controlling the tick population.

Question 3

Sample 3A (Score 10)

Part (a): 9 points were awarded in this part of the question. The student earned all 5 points available for their discussion of cigarette smoke: identification of a specific indoor air pollutant, with a discussion of the building type, source of the pollutant, human health effect, and a prevention/cleanup method. For asbestos, the student earned 4 points for the following: identifying asbestos, with a discussion of building type, a discussion of a source, and a discussion of a human health effect.

Part (b): 1 point was awarded for describing two (or more) symptoms that are commonly associated with sick buildings.

Sample 3B (Score 8)

Part (a): 7 points were awarded for part (a). The student earned all 5 points available for a discussion of cigarette/second-hand smoke; the student appropriately addressed each of the following: building, source, human health effects, and a prevention/cleanup method.

For asbestos, the student earned 2 points: 1 point for specifying asbestos with the second point coming from an appropriate human health effect.

In part (b), 1 point was earned for an accurate explanation of the term "sick building".

Sample 3C (Score 7)

Part (a): 6 points were awarded in part (a). The student specified carbon monoxide as one pollutant, then accurately discussed a type of building, a source, and a human health effect. The student also earned 2 points for specifying radon as a pollutant, coupled with a discussion of a prevention/cleanup method.

Part (b): 1 point was earned for an appropriate explanation of the term "sick building".

Question 4

Sample 4A (Score 10)

The student gave a well thought out answer, representative of those receiving a high score on this question. The likelihood that animal waste was contaminating the stream was clearly validated by scientific evidence. The increased level of nitrates was attributed to their presence in the animal waste, and the recovery of the stream was noted. Two additional water quality tests, monitoring macroinvertebrates and BOD, were given and the expected patterns explained. A particularly thorough description of pollution sensitive indicator species was also provided. Ecological changes that would result from discharge of animal waste into a body of water were well described in sequential order. The regulatory and monitoring aspects of the Clean Water Act were referred to as provisions that might apply to the quality of water in the stream.

Sample 4B (Score 8)

The student suggested water contamination and used the nitrate data as the scientific evidence. One additional water quality test (BOD) was given and an expected pattern described. A second test for hydrogen ions (i.e., pH) was incorrect as this test was already shown in the table of results. A good explanation of the sequence of ecological changes that might occur in a body of water was postulated. Suggested Clean Water Act provisions included decreasing runoff and the proposal of a management plan.

Sample 4C (Score 6)

This sample is a good representation of a student answer that scores in the mid-range for this question. The student assessed likely water contamination due to the increased levels of nitrates and phosphates. Two additional water quality tests (Fecal Coliform and BOD) were stated and the expected patterns for each explained. The sequence of ecological changes was well described. The student left part (d) unanswered.