
AP Biology

Sample Student Responses and Scoring Commentary

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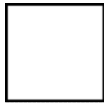
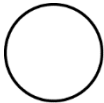
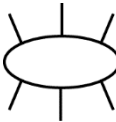
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2018 SCORING GUIDELINES

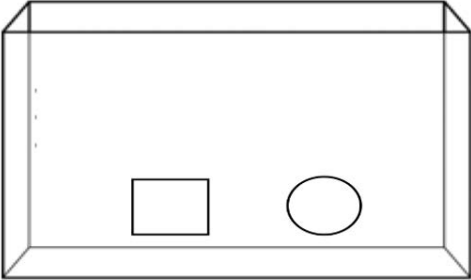
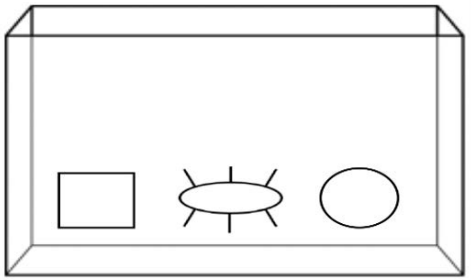
Question 3

Seagrasses are aquatic plants that reproduce sexually. Male seagrass flowers produce sticky pollen that is carried by circulating water to female flowers, resulting in fertilization. A researcher claims that mobile aquatic invertebrates can also transfer pollen from male to female flowers in the absence of circulating water. To investigate this claim, the researcher set up aquariums to model the possible interactions between the invertebrates and seagrasses.

- (a) Use the symbols below and the template aquariums to demonstrate the experimental design for testing the researcher’s claim that mobile aquatic invertebrates can pollinate seagrass in the absence of circulating water. **Draw** the appropriate symbols in the negative control aquarium AND the experimental aquarium. Do not use any symbol more than once in the same aquarium.

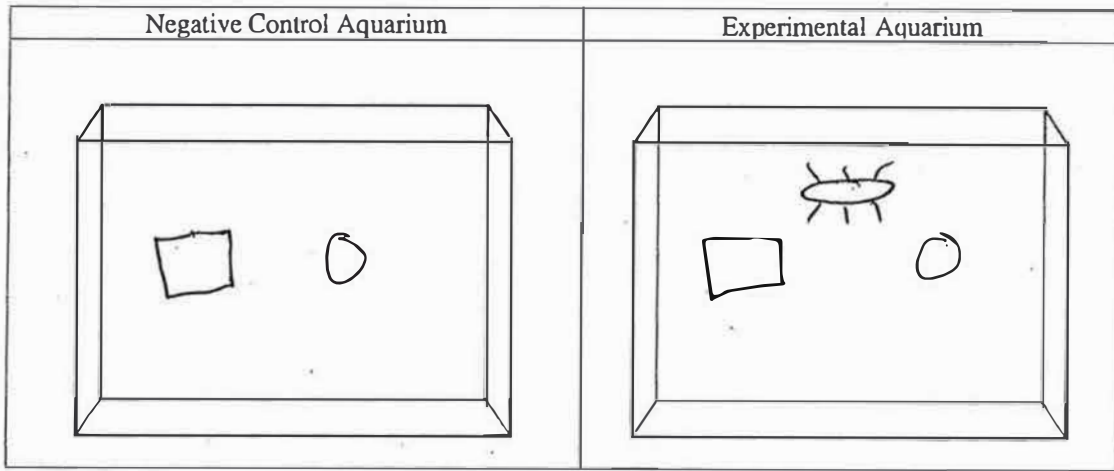
| Male Flower | Female Flower | Invertebrates |
|---|---|---|
|  |  |  |

Drawing (2 points)

| Negative Control Aquarium (1 point) | Experimental Aquarium (1 point) |
|---|--|
|  |  |

- (b) **Identify** the dependent variable in the experiment. **Predict** the experimental results that would support the researcher’s claim that mobile aquatic invertebrates can also transfer pollen from male to female flowers in the absence of circulating water.

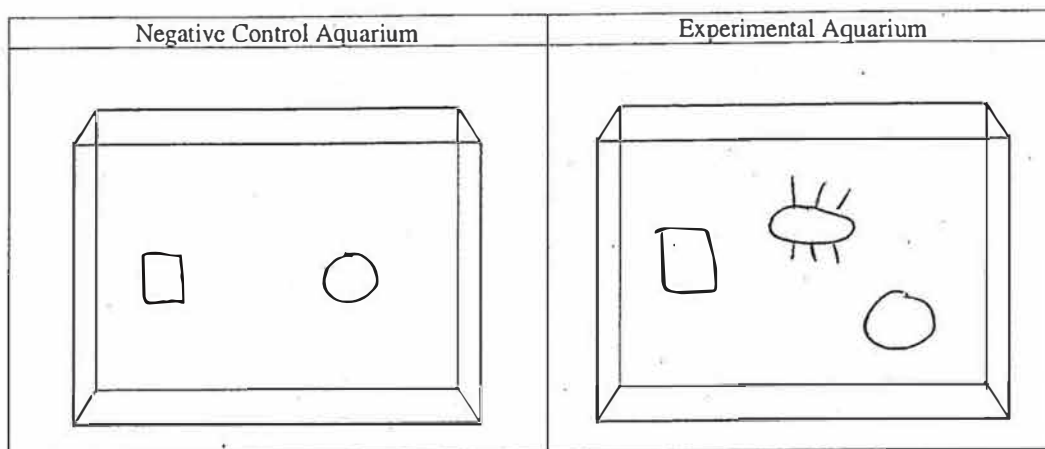
| Identification (1 point maximum) | Prediction (1 point maximum) |
|---|--|
| Number/presence of pollen grains on female flowers OR pollination | More pollen grains transferred/pollination seen in experimental aquarium |
| Number/presence of fertilized plants/flowers OR fertilization | More fertilized plants/flowers/fertilization seen in experimental aquarium |
| Number/presence of seed/fruit/offspring produced OR reproduction | More seeds/fruits/offspring produced/reproduction in experimental aquarium |



B) The dependent variable would be amount of fertilization that occurs between the male and female seagrass. I predict that more fertilization will occur in the experimental aquarium because the invertebrates will transfer pollen from the males to females.

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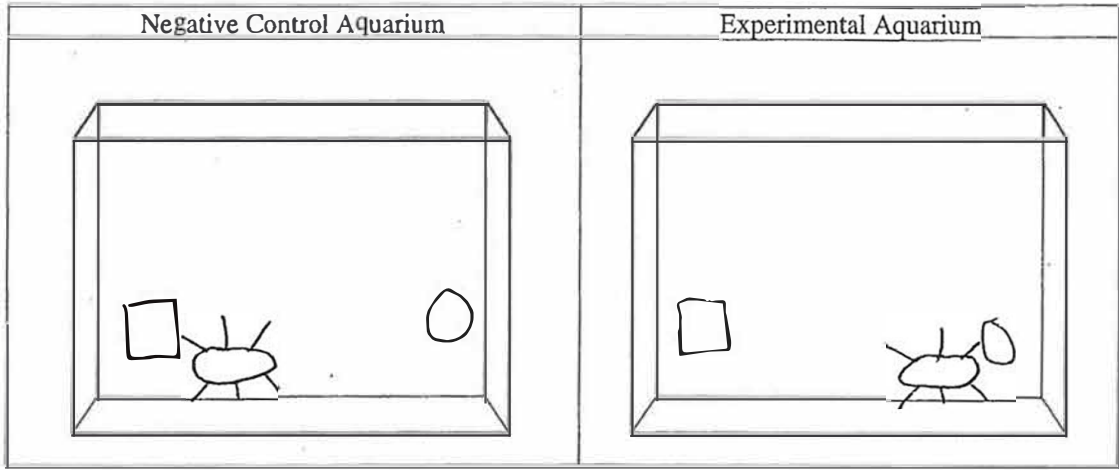
PAGE FOR ANSWERING QUESTION 3



a) see aquariums above

b) The dependent variable is pollen transfer. The experimental aquarium would have reproducing seagrass.

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The dependent variable is the resulting fertilization of the flowers. If there is no water flow, the flower's fertilization depends on mobile invertebrates. The invertebrate must go from male flower to female flower to transfer the pollen to female. The flowers will fertilize.

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2018 SCORING COMMENTARY

Question 3

Overview

The first part of the question focused on experimental design. The prompt described natural seagrass fertilization, which depends on circulating water, and presented a claim by a researcher that mobile aquatic invertebrates could provide an alternative method of transferring pollen in the absence of circulating water. The question asked the students to design an experiment appropriate to test the scientist's claim. Students were provided with symbols for both male and female flowers and invertebrates and told to place the symbols in two template aquarium drawings to represent the experiment. The second part of the question asked the students to identify the dependent variable in the experiment and to predict the results that would support the researcher's claim.

The key understandings and skills students were expected to demonstrate included the following:

- The scientific method was used to design an experiment, identify the dependent variable, and predict results.
- Knowledge of how organisms interact and how biotic and abiotic factors affect life processes such as sexual reproduction was used to predict the results of an experiment.

Sample: 3A

Score: 4

The response earned 1 point in part (a) for drawing the appropriate symbols in the negative control aquarium. The response earned 1 point in part (a) for drawing the appropriate symbols in the experimental aquarium. The response earned 1 point in part (b) for identifying the “amount of fertilization” as the dependent variable in the experiment. The response earned 1 point in part (b) for predicting that “more fertilization will occur in the experimental aquarium.”

Sample: 3B

Score: 3

The response earned 1 point in part (a) for drawing the appropriate symbols in the negative control aquarium. The response earned 1 point in part (a) for drawing the appropriate symbols in the experimental aquarium. The response earned 1 point in part (b) for identifying “pollen transfer” as the dependent variable in the experiment.

Sample: 3C

Score: 2

The response earned 1 point in part (a) for drawing the appropriate symbols in the experimental aquarium. The response earned 1 point in part (b) for identifying “fertilization of the flowers” as the dependent variable in the experiment.