

Investigation 2.B: Carbon Dioxide Production in Plants and Animals Answer Key

Answers to Analysis Questions

- a) $\left(2.856 \times 10^{-6} \frac{\text{mL}}{\text{min}}\right)(15 \text{ min}) = 4.284 \times 10^{-5} \text{ mL}$ ($4.3 \times 10^{-5} \text{ mL}$ to correct significant digits)

b) More. An increased amount of carbon dioxide will be produced by the larger cricket, which has more cells, all of which are actively carrying out cellular respiration and generating carbon dioxide.

c) An active cricket would respire at a higher rate. The cells of an active cricket will carry out cellular respiration at an increased rate, requiring more oxygen and producing more carbon dioxide.
- a) Your answer will reflect your experimental findings.

b) Carbon dioxide produced by cricket per minute:

$$\frac{2.856 \times 10^{-6} \text{ mL}}{36.2 \text{ mg}} \times 1000 \frac{\text{mg}}{\text{g}}$$

$$= 7.89 \times 10^{-5} \frac{\text{mL}}{\text{g}}$$

Carbon dioxide produced by plants will reflect your findings. Answers should be in mL/g and should include a statement comparing the two values.
- a) Answers will reflect your experimental design. Controlled variables could have included temperature, light, plant type, and seed type.

b) By using controlled variables, students avoid having confounded results that can be contributed to more than one variable.

Answers to Conclusion Questions

- Your answer should clearly explain how the experimental results supported or failed to support your hypothesis.
- Your answer should reflect the fact that photosynthesis uses carbon dioxide as a reactant and generates oxygen as a product of the reaction, while the reverse occurs in cellular respiration.
- a) Increasing the temperature will increase the rate of cellular respiration, since the rate of most reactions increase with temperature. As a result, oxygen uptake and carbon dioxide products would both increase.

b) Increasing the temperature will increase the rate at which rapid cycling is carried out. As temperatures increase, cellular respiration increases, as does the rate of carbon dioxide production by organisms. Decay will also occur faster, releasing more carbon into the biosphere. Increased temperatures will increase the rate of photosynthesis as well, and plants and other photosynthetic organisms will take up carbon dioxide faster, as long as sufficient water is available.

CHAPTER 2	Investigation 2.B: Carbon Dioxide Production in Plants and Animals Answer Key (cont'd)	BLM 2.2.3A
ANSWER KEY		

Answer to Extension Question

7. Any well-reasoned hypothesis is acceptable. In general, germinating and actively growing tissues and greater availability of nutrients increase the rate carbon dioxide production, as these factors increase the rate of cellular respiration. Some species of plants may respire at different rates than others. Increased light levels may also increase carbon dioxide production as more metabolic reactions occur as the rate of photosynthesis increases.