Tracking Sugar and Starch in a Leaf Model

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A classroom plant model tracks carbon atoms in soluble sugars and stored starch. Sugar can be made into starch, and starch can be converted back into sugar. The table gives the amounts in both pools, in model units of carbon. These are the only two carbon pools in the model leaf. In light the model can form sugar from carbon dioxide. No sugar enters from other tissues.

Record	**Carbon in sugar (units)**	**Carbon in starch (units)**
Start	6	4
End of light interval	6	10
End of dark interval	8	6

1 Which record shows an increase in stored starch during the light interval?

(1) Sugar stays at 6 units.

(2) Starch rises from 4 to 10 units.

(3) Sugar rises from 6 to 8 units.

(4) Starch falls from 10 to 6 units.

2 A student says the unchanged sugar count means no new sugar was made in the light. Explain how the starch record supports another interpretation. [1]

Answer and work

The dark model converts some starch to sugar. In the same interval respiration uses sugar and releases its carbon as carbon dioxide. No carbon enters the model leaf in the dark.

3 Calculate the amount of carbon released during the dark interval. Use the two pools before and after that interval. [1]

Answer and work

4 Explain why the increase in sugar in the dark does not show a net gain of carbon by the leaf. [1]

Answer and work