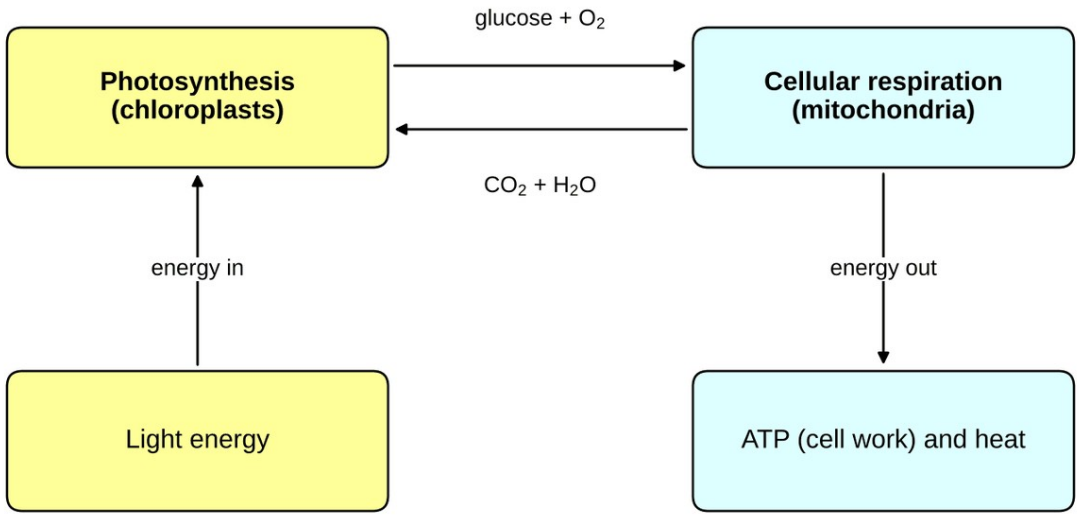
Essential Question

Why do producers and consumers depend on each other?

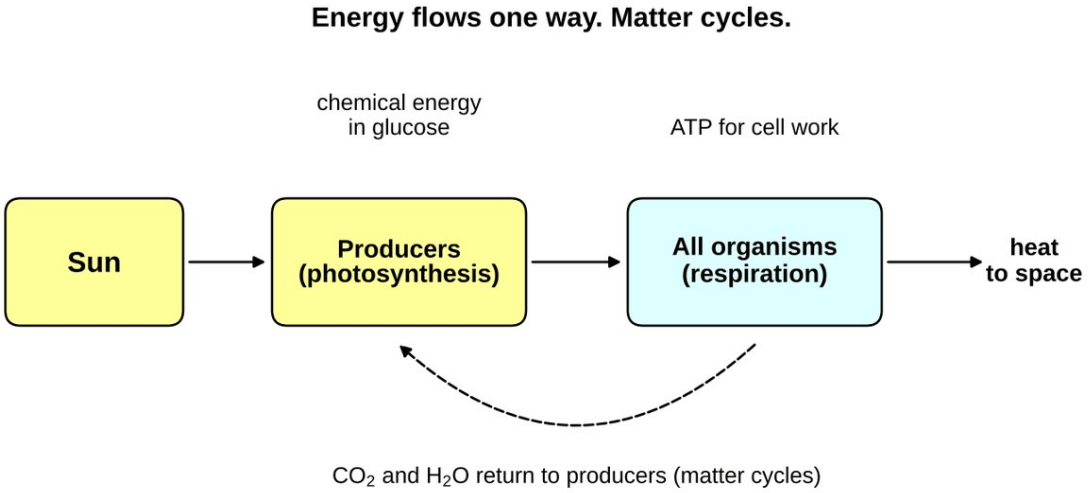
The Products of One Are the Inputs of the Other

- Photosynthesis makes glucose and O_2
- Cellular respiration uses glucose and O_2
- Respiration makes CO_2 and H_2O
- Photosynthesis uses CO_2 and H_2O



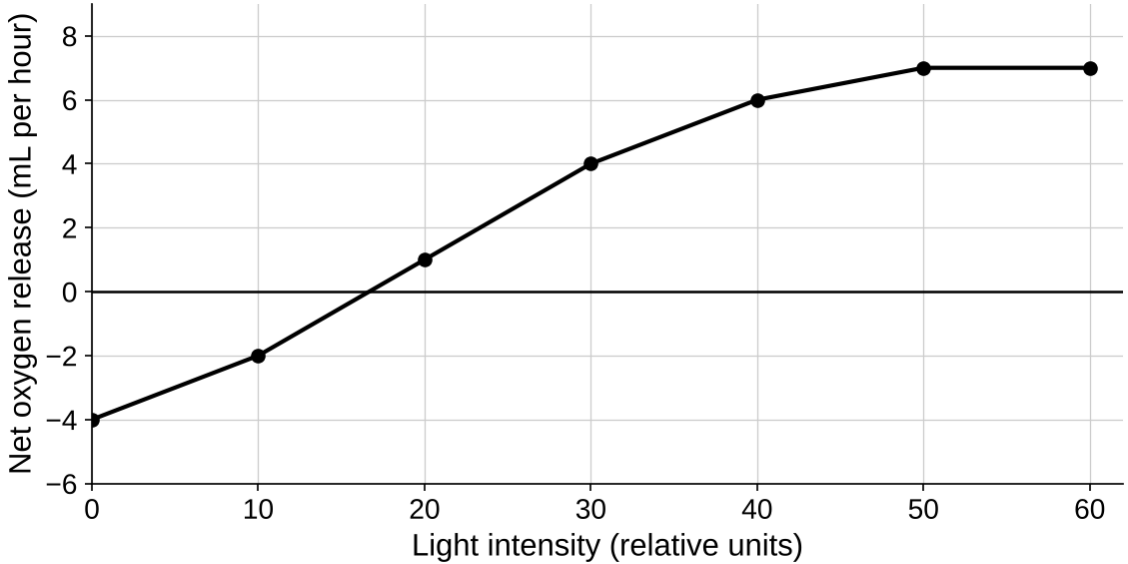
Matter Cycles, Energy Flows

- Matter (C, H, O): cycles between the processes
- Energy: enters as light, leaves as heat
- ATP carries energy for cell work, not between organisms
- The Sun must keep resupplying energy



Gross and Net Photosynthesis

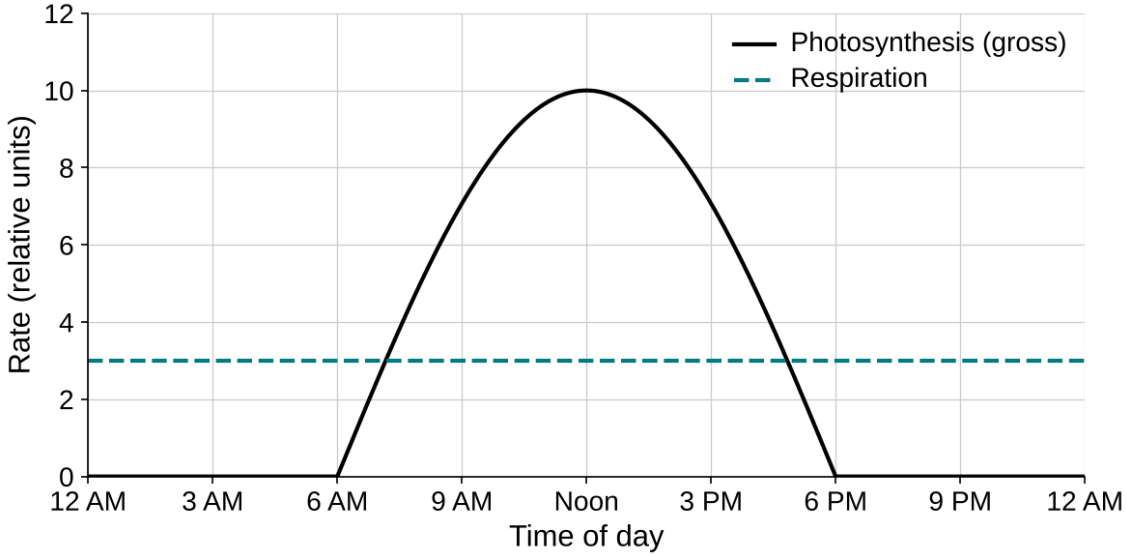
- Gross: all O_2 the plant makes by photosynthesis
- A plant also uses O_2 in respiration
- Net = gross − respiration
- Compensation point: net = 0



Linking Photosynthesis and Respiration

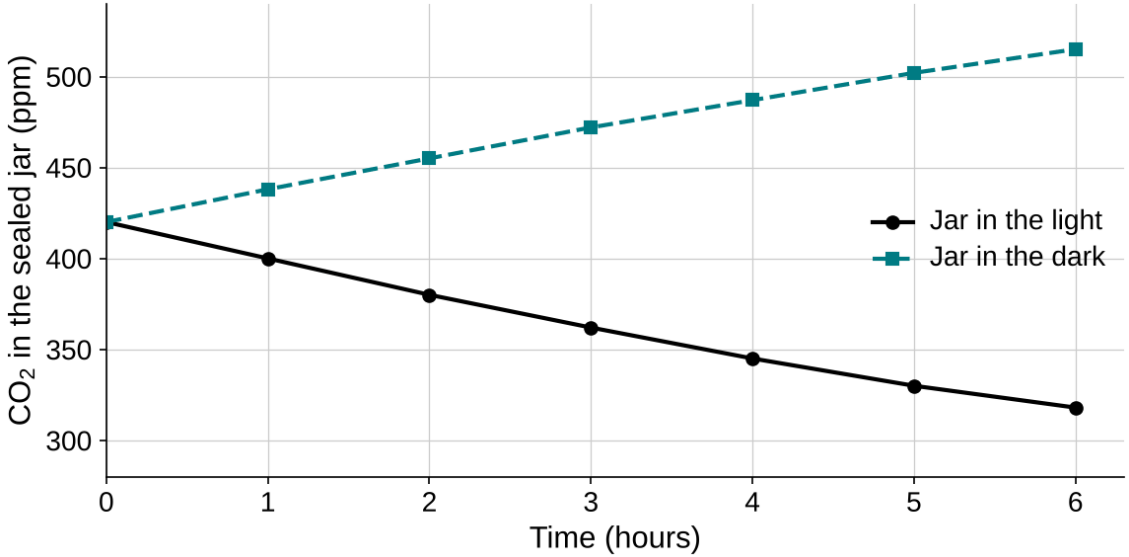
Over a Day

- Respiration continues all day and night
- Photosynthesis follows the light
- Photosynthesis is larger around midday
- At night, only respiration is happening



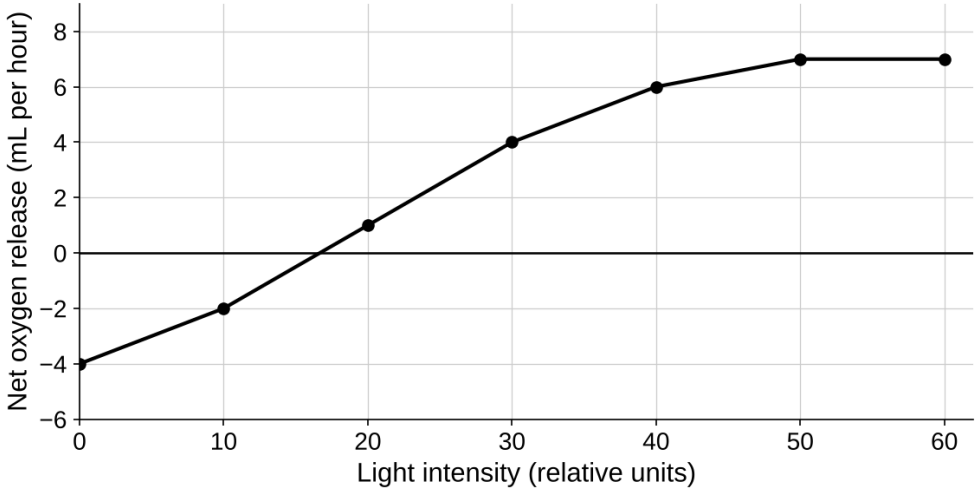
Evidence: Sealed Jars

- Sealed jars with plants, in light and in dark
- Light: CO_2 falls (photosynthesis is faster)
- Dark: CO_2 rises (only respiration)
- CO_2 in the jar shows which process is faster



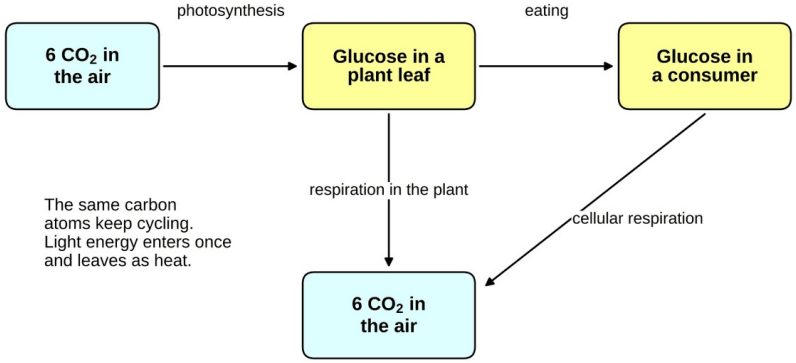
Example: Gross and Net Oxygen

Use the net oxygen graph. In the dark, the net release is −4 mL per hour. (a) How much O_2 does the plant use in respiration per hour? (b) Find the gross photosynthesis at light intensities of 20 and 40. (c) Estimate the compensation point.



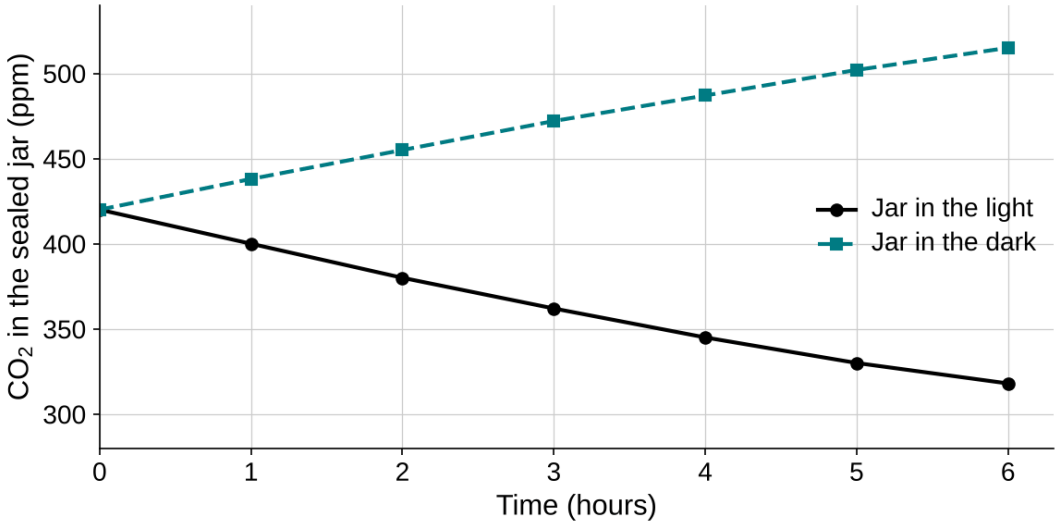
Example: Trace Carbon and Energy

Use the model to trace a carbon atom and the energy that starts in light. A carbon atom starts as CO_2 in the air, ends up in a leaf, is eaten by a rabbit, and returns to the air. (a) Name the process at each step. (b) Tell what form the energy has at each stage. (c) Which one cycles, and which one leaves the system?



Example: Light and Dark Jars

Use the sealed jar data. (a) Find the change in CO_2 in each jar after 6 hours. (b) Find the average rate for each, in ppm per hour. (c) Explain both results.



Linking Photosynthesis and Respiration

Big Ideas

- The products of each process are the inputs of the other
- Matter cycles; energy flows one way
- Net = gross − respiration
- Respiration goes on day and night; photosynthesis needs light
- CO_2 rising shows respiration; falling shows photosynthesis