SNC1D
CHAPTER 1: NUTRIENT CYCLES & ENERGY FLOW

1.3: EXTRACTING ENERGY FROM BIOMASS

Cellular Respiration (See Textbook Pages 28 - 29, including Figure 1.19)

Cellular respiration is the process that occurs within the cells of living organisms and should not be confused with breathing. Within the cells, glucose is broken down in the presence of oxygen releasing energy, carbon dioxide, and water.

Write the **word equation** that summarizes the cellular respiration reaction:

_____

Write the **chemical equation** that summarizes the cellular respiration reaction:

_____

A Balancing Act of Two Complementary Processes:

Together, **photosynthesis** and _____ create a cycle that allows matter and energy to flow through an ecosystem.

Producers, such as plants, **"breathe in" carbon dioxide and "exhale" oxygen**, and **consumers**, such as humans, **breathe in oxygen and exhale carbon dioxide**.

Decomposers are also a part of this cycle. When decomposers break down dead organic matter, they release carbon dioxide into the air. Without this step, carbon would get locked into soil and rock, forming coal and oil deposits, and the cycle would stop.

Left on their own, **photosynthesis** and **cellular respiration** achieve a beautiful balance of matter and energy flowing through the global ecosystem. Increased human activity such as **industrialization**, **deforestation**, and **fossil fuel burning** pose a threat to this balance.

Photosynthesis

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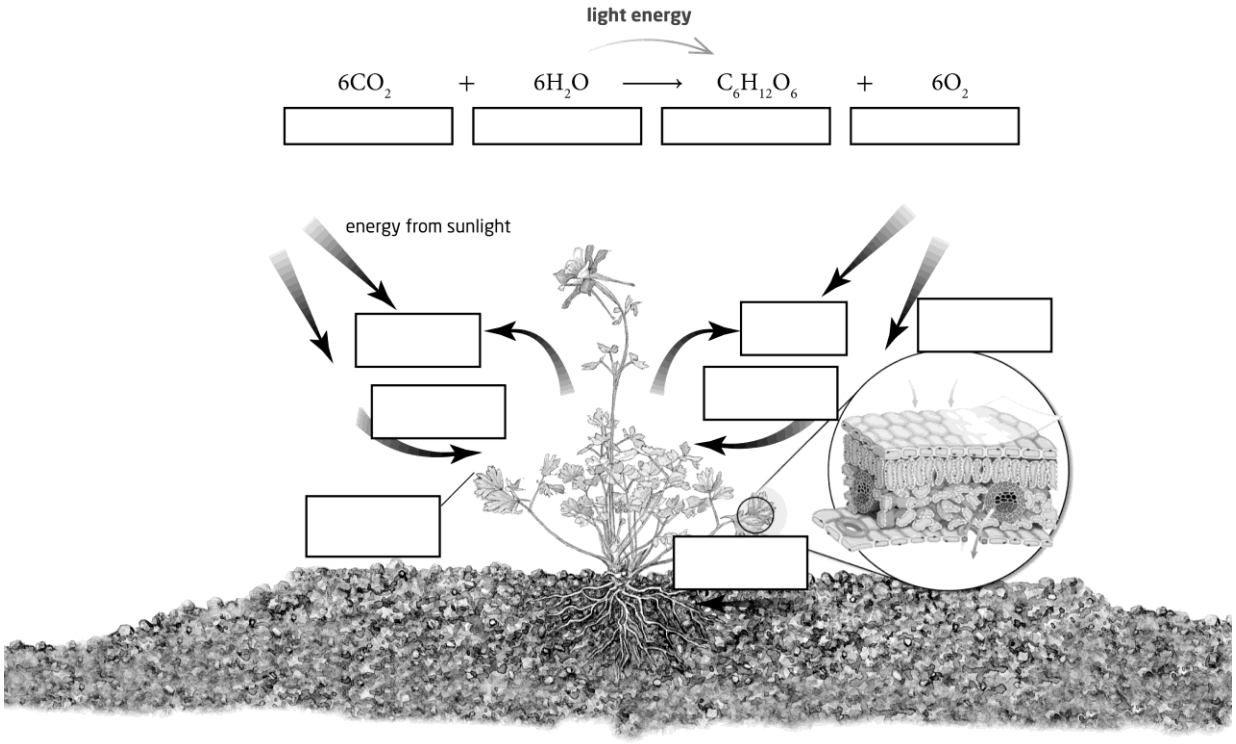
Refer back to Section 1.2, **Page 22**, **Figure 1.13**.

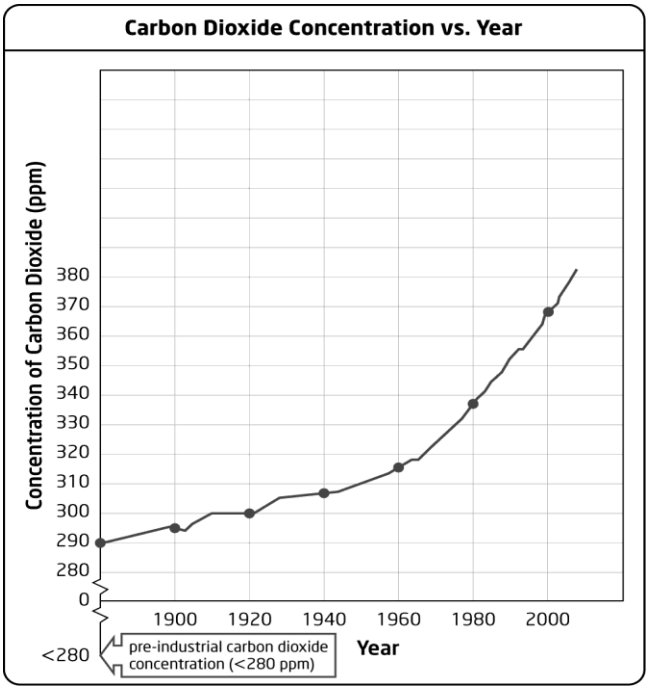
The process of cellular respiration is the opposite reaction of the one involving photosynthesis.

Complete the diagram by inserting the correct labels.



Carbon Dioxide and Temperature

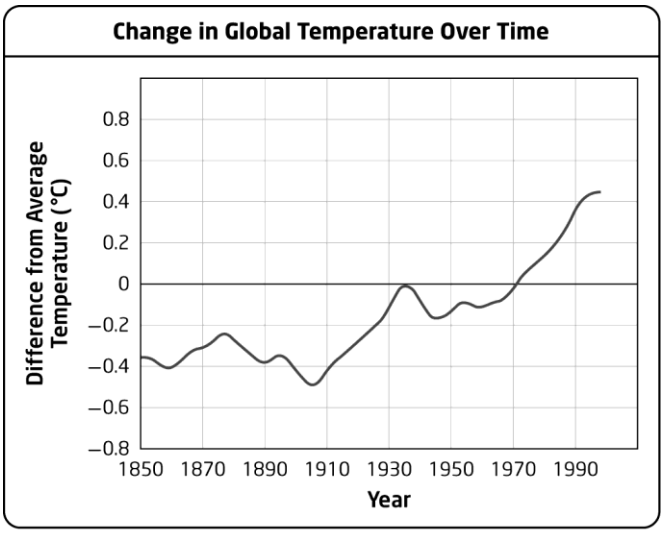
1. Examine the graph. Extend the vertical axis to 450. Extend the horizontal axis to 2020. Extend the graph line to the end of the grid. Determine the concentrations of carbon dioxide in 2010 and 2020 by extrapolation.



Year 2010: _____

Year 2020: _____

2. Examine the graph. Extend the horizontal axis to 2010. Extend the graph line to the end of the grid. Determine the temperature changes in 2000 and 2010 by extrapolation.



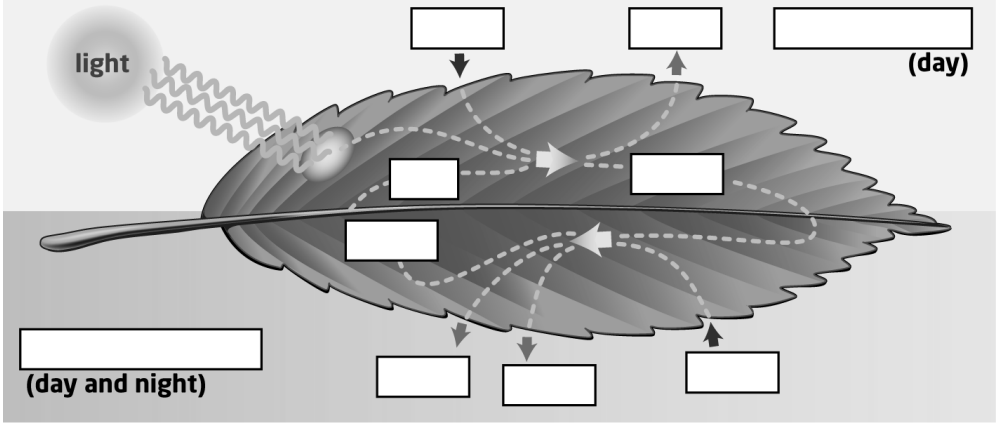
Sources: Climatic Research Unit and Hadley Centre, 2008

Year 2000: _____

Year 2010: _____

Extracting Energy from Plants

1. Complete the diagram of respiration and photosynthesis by inserting the correct labels.



2. Complete the statements. [See pages 32-33]

In a landfill site, some of the waste is plant product, which contains energy storing molecules such as glucose, which are produced through _____.
The organic material in the landfill ecosystem contains microorganisms called _____ which break down the waste to produce _____, which is harvested and used as an alternative fuel.

This process occurs when there is an absence of _____.

Fossil fuels come from ancient organisms and contain the same nutrients as living things. But burning them can release undesirable by-products such as _____ and _____.
When these by-products combine with water in the atmosphere, _____ is produced, which can have toxic effects on vegetation and aquatic ecosystems.

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Section 1.3 Review

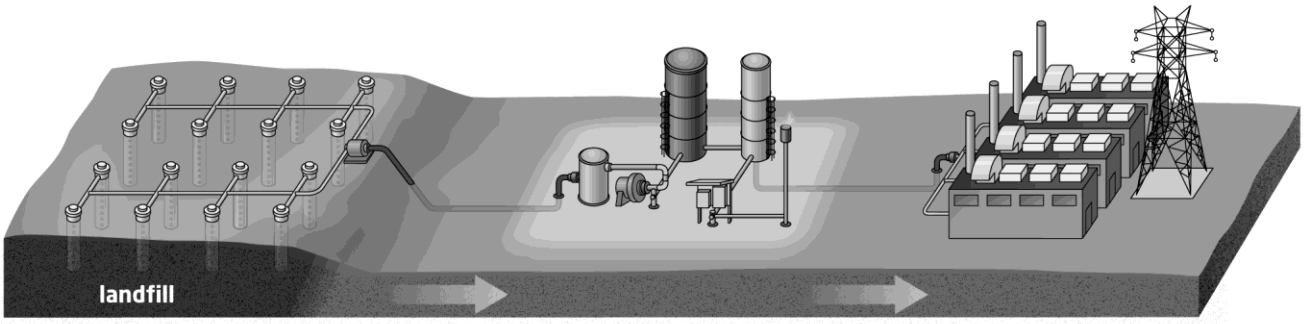
1. Choose the 2 processes that organisms use to extract energy stored in glucose.

_____ photosynthesis
_____ cellular respiration
_____ evaporation
_____ condensation
_____ biomagnification
_____ fermentation

2. Circle the correct word(s) to complete the sentence.

Hydrogen / Carbon / Oxygen / Nitrogen must be present for the aerobic breakdown of glucose to occur.

3. Complete the flowchart to show how methane gas can be collected from a landfill site to produce electricity.



4. Select the statement that describes why humans have suddenly released stored carbon dioxide.

_____ Fossil fuels have been accumulating on Earth for millions of years well before the presence of man. With the thinning of the ozone layer due to pollution, the Sun heated the fossil fuels so that carbon dioxide emission was increased.

_____ Fossil fuels have been accumulating on Earth for millions of years well before the presence of man. With the presence of man and the discovery of fossil fuels and their use for energy, lots of carbon dioxide was added to the air, especially during the Industrial Revolution.

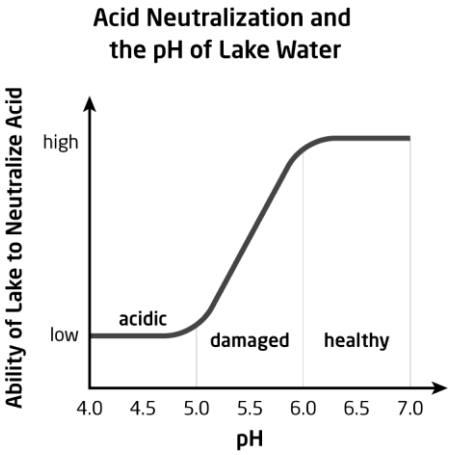
5. What substances that are responsible for acid precipitation are released into the atmosphere from burning fossil fuels?

6. Complete the statements about the graph.

a) A healthy lake has a pH between _____ and _____.
All organisms should be able to live in the lake without any health effects.

b) A damaged lake has a pH between _____ and _____.
At this level, an organism's health could be affected.

c) An acidic lake has a pH between _____ and _____.
At this level, organisms would be burned and could not survive in the lake.



7. Circle the correct word to complete the summary. Then provide an explanation.

Two countries produce the same product. The less expensive product is made by a country that is not efficient at reducing greenhouse gases. The more expensive product is made by a country that follows international laws about greenhouse gas production. I would buy the more expensive / less expensive product because _____

_____

_____

8. Complete the statement.

By driving a car to commute to and from home and work, more _____ are emitted. The increase could contribute to the death of trees.