

The photosynthesis equation: word equation, symbol equation, balanced, with a labelled diagram

Word equation

carbon dioxide + water → glucose + oxygen (needs light energy and chlorophyll)

Symbol equation, balanced

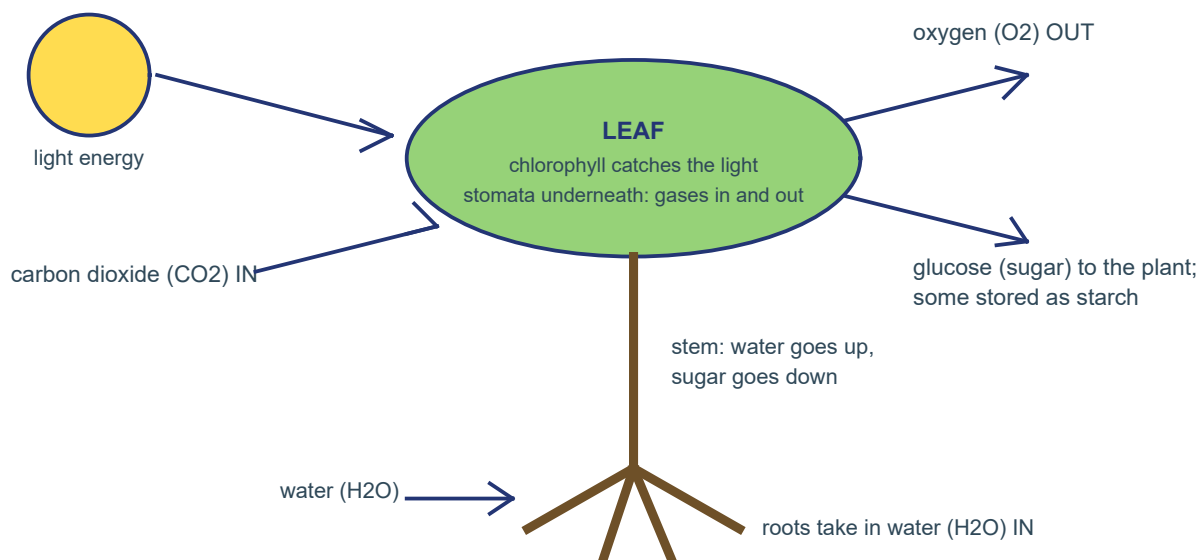


(the 2, 6 and 12 after a symbol are written as small subscripts in the exam: CO₂ is one carbon and two oxygens). Six molecules of carbon dioxide and six of water make one molecule of glucose and six of oxygen. Light energy is written above the arrow; chlorophyll below it.

Why it balances

Atom	Left side	Right side
Carbon (C)	6 (in 6CO ₂)	6 (in C ₆ H ₁₂ O ₆)
Hydrogen (H)	12 (in 6H ₂ O)	12 (in C ₆ H ₁₂ O ₆)
Oxygen (O)	12 (6CO ₂) + 6 (6H ₂ O) = 18	6 (C ₆ H ₁₂ O ₆) + 12 (6O ₂) = 18

The diagram, labelled



Light energy, caught by chlorophyll in the leaf, joins carbon dioxide from the air and water from the roots into glucose; the oxygen left over goes out through the stomata.

What each part does

Part	Job in photosynthesis
Roots	Take in water and minerals from the soil
Stem	Carries water up to the leaves; carries sugar from the leaves to wherever it is needed
Leaf	The kitchen: flat and wide to catch light, packed with chlorophyll
Stomata	Tiny holes, mostly under the leaf: carbon dioxide in, oxygen out; close in heat to save water
Chlorophyll	Catches the light energy; green because it reflects green and uses red and blue

The four things children get wrong

- 1 'Plants breathe in CO₂ and out O₂.' Plants respire like us all day and night (O₂ in, CO₂ out). Photosynthesis is a separate process that runs only in light, and in daylight it is bigger.
- 2 'Plants eat soil.' Van Helmont's willow gained 74 kg in five years; the soil lost 57 g. The plant is built from CO₂ and water.
- 3 'The roots make the food.' The leaves do; the roots collect water.
- 4 'Leaves are green because they use green light.' They reflect green and use red and blue; that is why grow lights are purple.

Respiration, for comparison (the equation written backwards)



Photosynthesis stores energy from light in glucose; respiration releases it. Both happen in a plant; only photosynthesis needs light.

Write it from memory

Word equation: _____

Symbol equation: _____

What light does: _____

What chlorophyll does: _____

From sciencewithshobha.com/blog/photosynthesis-explained-for-kids-the-recipe-the-leaf-two-experiments-and-a-worksheet/ (the 15-question worksheet is a separate PDF on the same page)