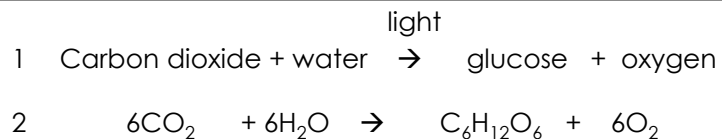


## B4: Bioenergetics

### Section 1: Photosynthesis Equation



### Section 2: Key terms

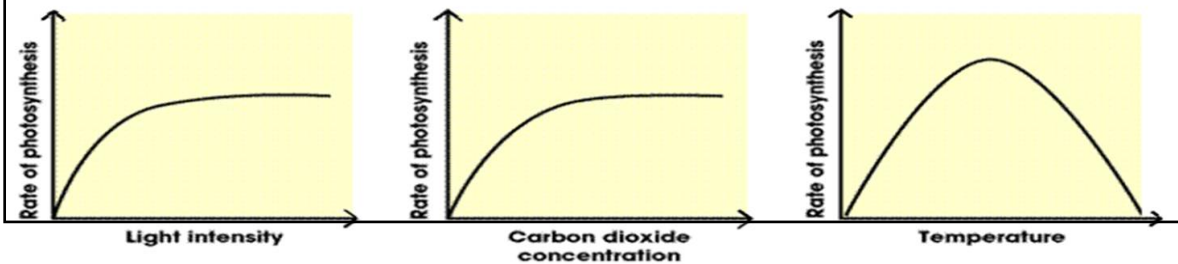
3 Chloroplast	The plant <b>organelle</b> where <b>photosynthesis</b> takes place.
4 Chlorophyll	The <b>green pigment</b> that <b>absorbs energy from light</b> .
5 Endothermic	Photosynthesis <b>takes energy</b> in (in the form of <b>light</b> ). It is an endothermic reaction.
6 Diffusion	<b>The spreading out of particles by random motion from where they are in high concentration to a low concentration. Occurs in gases and liquids.</b>

### Section 3: Uses of Glucose

- 7 Used in **respiration** to provide **energy**.
- 8 Converted into **starch** for **storage**.
- 9 Converted into **fats** and **oils** for **storage**.
- 10 Produce **cellulose** to **strengthen** the **cell wall**.
- 11 Produce **amino acids** to **make proteins** (also needs nitrate ions from the soil)

### Section 4: Limiting Factors

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|--------------------|--|
| 12 Limiting Factor | The factor that stops the rate of photosynthesis from increasing; could be light intensity, CO <sub>2</sub> concentration, temperature or amount of chlorophyll. |
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| <b>13 Light Intensity</b><br>Initially light is the limiting factor. When the graph plateaus something else (e.g. CO <sub>2</sub> concentration, temperature) is limiting the rate. | <b>14 CO<sub>2</sub> concentration</b><br>Initially CO <sub>2</sub> concentration is the limiting factor. When the graph plateaus something else (e.g. light intensity, temperature) is limiting the rate. | <b>15 Temperature</b><br>As temperature increases, the rate of photosynthesis increases. Above the optimum there is a decrease in photosynthesis. Enzymes needed for photosynthesis become denatured. |
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### Section 5: Respiration

16 Energy	Energy in organisms is needed for <b>chemical reactions to build larger molecules, movement and keeping warm</b> .
17 Aerobic Respiration	Aerobic respiration <b>provides energy</b> . It requires <b>oxygen</b> . It is an <b>exothermic</b> reaction (produces heat). In <b>mitochondria</b> . <b>Glucose + oxygen → carbon dioxide + water</b> $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O}$
18 Anaerobic Respiration (muscles)	<b>No oxygen</b> needed. Provides <b>less energy</b> than aerobic respiration as glucose <b>not fully oxidised</b> . Occurs during <b>intensive exercise</b> . In <b>cytoplasm</b> . <b>Glucose → lactic acid</b>
19 Lactic Acid	Produced in <b>anaerobic respiration in muscles</b> . <b>Build up</b> of lactic acid <b>causes fatigue</b> . Lactic acid must be <b>taken to the liver by the blood</b> so that it can be <b>oxidised back to glucose</b> .
20 Oxygen Debt	The <b>amount of extra oxygen</b> the body needs <b>after exercise</b> to <b>react with the lactic acid</b> and remove it.
21 Anaerobic Respiration (plant and yeast cells)	<b>No oxygen</b> needed. In yeast cells it is called <b>fermentation</b> – economically important for manufacture of <b>bread</b> and <b>alcoholic drinks</b> . In <b>cytoplasm</b> . <b>Glucose → ethanol + carbon dioxide</b>

### Section 5: Response to Exercise

22 Increase in breathing rate	Increases rate at which <b>oxygen</b> is taken into the lungs.
23 Increase in heart rate	Oxygenated blood is pumped around the body at a faster rate. Carbon dioxide is removed at a faster rate.
24 Increase in breath volume	A <b>greater volume</b> of oxygen is taken in with each breath.

### Section 6a: Metabolism

- |               |   |
|---------------|---|
| 25 Metabolism | The <b>sum of all the reactions</b> in a <b>cell</b> or <b>body</b> . Some of these reactions <b>require the energy released from respiration</b> . |
|---------------|---|

### Section 6b: Metabolic Reactions

- 26 Conversion of glucose to starch, cellulose or glycogen.
- 27 Formation of lipids from glycerol and fatty acids
- 28 Use of glucose and nitrates to make amino acids (plants only)
- 29 Respiration
- 30 Breakdown of proteins to urea