

## Paper 1

### Chapter 4

#### Bioenergetics

**Symbols** Name the chemicals

CO<sub>2</sub> -

H<sub>2</sub>O -

O<sub>2</sub> -

C<sub>6</sub>H<sub>12</sub>O<sub>6</sub> -

#### Uses of Glucose

Give 5 uses for the glucose produced by plants in photosynthesis

- 
- 
- 
- 
- 

To produce proteins plants also need...

...from the soil.

#### Respiration

Respiration is an EXOTHERMIC reaction

AEROBIC respiration can take place in cells with oxygen

ANAEROBIC respiration can take place in cells without oxygen

Organisms need energy for:

- UNGLIBI LAGER CELLULOSE
- MOMENT
- PEELING MARW

In anaerobic respiration the oxidation of glucose is incomplete. Anaerobic respiration transfers much less energy than in aerobic respiration.

Anaerobic respiration by yeast cells is called fermentation and is used to make bread and alcoholic drinks.

**Equations** Complete the equations, cross out incorrect words

#### Photosynthesis

+ → +

Endothermic/Exothermic/Fermentation

#### Aerobic respiration

+ → +

Endothermic/Exothermic/Fermentation

#### Anaerobic respiration in muscles

→

Endothermic/Exothermic/Fermentation

#### Anaerobic respiration in yeast cells

→ +

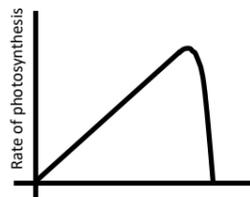
Endothermic/Exothermic/Fermentation

Photosynthesis requires energy from \_\_\_\_\_

#### Limiting Factors

Name 4 factors that can limit the rate of photosynthesis

- 1.
- 2.
- 3.
- 4.



What factor is shown on the graph?

How can you tell?

How would a graph of the other 3 factors be different?

(HT) Highlight the area of the graph where

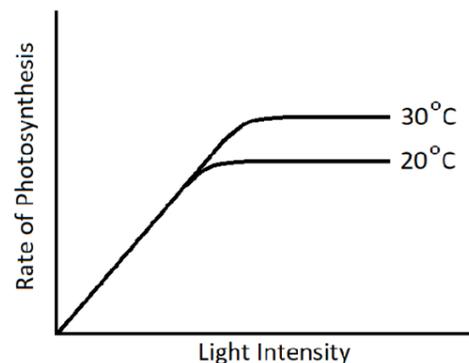
A.) light intensity is the limiting factor

B.) Temperature is the limiting factor

Why may the greenhouse owner still choose 20°C and lower light intensity?

(HT) What is the equation for light intensity?

(HT) Work out the light intensity for these distances 0.5m, 1m, 1.5m, 2m



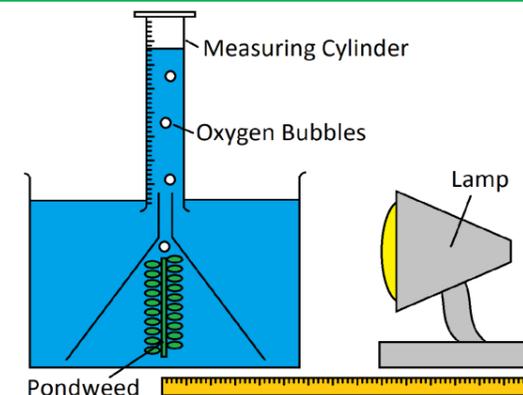
#### Pondweed

Why should you place an extra beaker of water between the lamp and the pondweed?

Why is counting bubbles of oxygen often inaccurate?

Why should you wait for 2 minutes after moving the lamp before collecting data?

Sketch the graph for light intensity vs photosynthesis rate



**Exercise** Cross out anything incorrect, fill in the gaps

When you exercise your body needs more energy from respiration.

Heart rate INCREASES/DECREASES/STAYS THE SAME

Breathing rate INCREASES/DECREASES/STAYS THE SAME

The volume of each breath INCREASES/DECREASES/STAYS THE SAME

If exercise is vigorous and the muscles don't receive enough oxygen then AEROBIC/ANAEROBIC respiration takes place. This produces GLUCOSE/OXYGEN DEBT/FATIGUE/LACTIC ACID.

(HT) Lactic acid is carried by the blood from the muscles to the \_\_\_\_\_. It reacts with oxygen and is converted to \_\_\_\_\_. The amount of oxygen required to remove the lactic acid is the \_\_\_\_\_.

#### Metabolism

Metabolism is the total of all the chemical reactions in an organism.

Metabolism includes:

- Joining glucose molecules to form starch, glycogen or cellulose (in plants)
- Joining 1 glucose and 3 fatty acid molecules to produce a lipid molecule (fat or oil)
- Joining glucose molecules with nitrate ions to form amino acids which then join to make proteins
- Breaking down proteins to make urea which is excreted by the kidneys in urine

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#### Bioenergetics

**Symbols** Name the chemicals

CO<sub>2</sub> - Carbon Dioxide

H<sub>2</sub>O - Water

O<sub>2</sub> - Oxygen

C<sub>6</sub>H<sub>12</sub>O<sub>6</sub> - Glucose

#### Uses of Glucose

Give 5 uses for the glucose produced by plants in photosynthesis

- for respiration
- converted to starch for storage
- to produce fat for storage
- to produce cellulose for cell walls
- to produce amino acids for protein

To produce proteins plants also need...

#### NITRATE IONS

...from the soil.

#### Respiration

Respiration is an EXOTHERMIC reaction

AEROBIC respiration can take place in cells with oxygen

ANAEROBIC respiration can take place in cells without oxygen

Organisms need energy for:

- BUILDING LARGER MOLECULES
- MOVEMENT
- KEEPING WARM

In anaerobic respiration the oxidation of glucose is incomplete. Anaerobic respiration transfers much less energy than in aerobic respiration.

Anaerobic respiration by yeast cells is called fermentation and is used to make bread and alcoholic drinks.

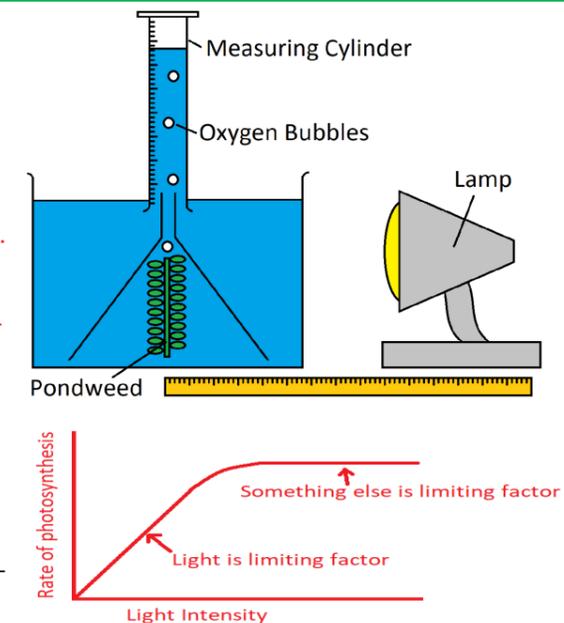
#### Pondweed

Why should you place an extra beaker of water between the lamp and the pondweed? To absorb the heat emitted from the lamp. So the pond weed doesn't change temperature giving 2 independent variables.

Why is counting bubbles of oxygen often inaccurate? Bubbles may be bigger or smaller

Why should you wait for 2 minutes after moving the lamp before collecting data? Allow the pondweed to acclimatise to new conditions

Sketch the graph for light intensity vs photosynthesis rate



**Equations** Complete the equations, cross out incorrect words

#### Photosynthesis

carbon dioxide + water → glucose + oxygen

~~Endothermic/Exothermic/Fermentation~~

#### Aerobic respiration

glucose + oxygen → carbon dioxide + water

~~Endothermic/Exothermic/Fermentation~~

#### Anaerobic respiration in muscles

glucose → lactic acid

~~Endothermic/Exothermic/Fermentation~~

#### Anaerobic respiration in yeast cells

glucose → ethanol + carbon dioxide

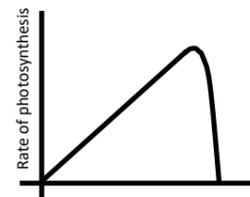
~~Endothermic/Exothermic/Fermentation~~

Photosynthesis requires energy from light

#### Limiting Factors

Name 4 factors that can limit the rate of photosynthesis

1. Temperature
2. Light intensity
3. Carbon dioxide concentration
4. The amount of chlorophyll



What factor is shown on the graph? Temperature

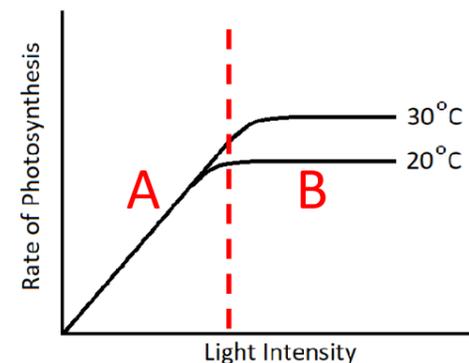
How can you tell? Photosynthesis rate falls when temperature too high

How would a graph of the other 3 factors be different? Level off not fall

(HT) Highlight the area of the graph where

A.) light intensity is the limiting factor

B.) Temperature is the limiting factor



Why may the greenhouse owner still choose 20°C and lower light intensity? Higher PROFIT

(HT) What is the equation for light intensity? Light Intensity ∝ 1/Distance<sup>2</sup>

(HT) Work out the light intensity for these distances 0.5m, 1m, 1.5m, 2m

4, 1, 0.44, 0.25

**Exercise** Cross out anything incorrect, fill in the gaps

When you exercise your body needs more energy from respiration.

Heart rate ~~INCREASES/DECREASES/STAYS THE SAME~~

Breathing rate ~~INCREASES/DECREASES/STAYS THE SAME~~

The volume of each breath ~~INCREASES/DECREASES/STAYS THE SAME~~

If exercise is vigorous and the muscles don't receive enough oxygen then ~~AEROBIC/ANAEROBIC~~ respiration takes place. This produces ~~GLUCOSE/OXYGEN DEBT/FATIGUE/LACTIC ACID~~.

HT Lactic acid is carried by the blood from the muscles to the liver. It reacts with oxygen and is converted to glucose. The amount of oxygen required to remove the lactic acid is the oxygen debt.

#### Metabolism

Metabolism is the total of all the chemical reactions in an organism.

Metabolism includes:

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