

**BE1 – knowledge organiser part a**

Below is a checklist of everything you need to know for this topic:

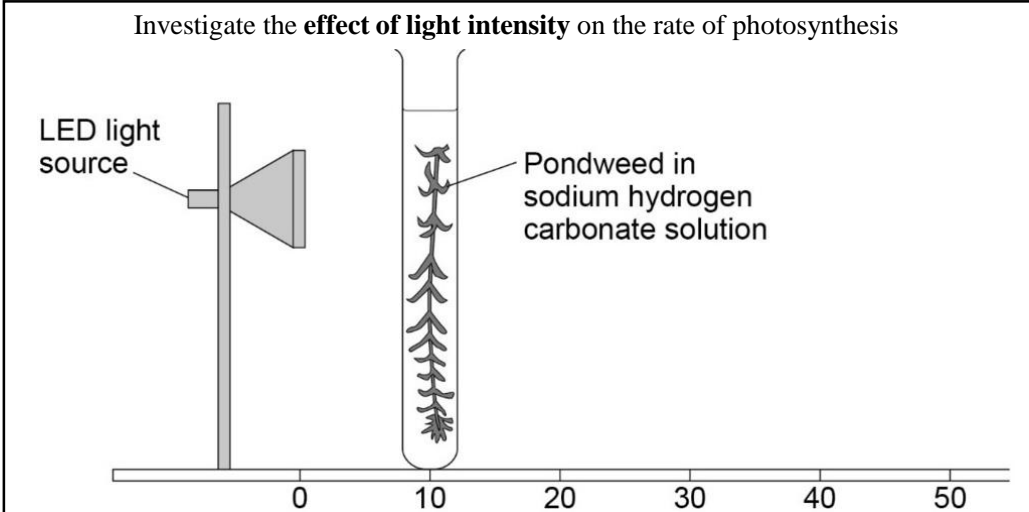
State the word and symbol equations for photosynthesis
Explain why photosynthesis is an endothermic reaction
Explain the effect of temperature, light intensity, carbon dioxide and chlorophyll levels on rate of photosynthesis
Explain the inverse square law
Investigate the effect of light intensity on the rate of photosynthesis
Explain why limiting factors are important in the economics of greenhouses
State the uses of the glucose produced in photosynthesis
State the word and symbol equations for aerobic respiration
State the word equation for anaerobic respiration
State why organisms need energy
Describe the process of fermentation in yeast and how the products are useful
Explain why heart and breathing rates increase with exercise
Explain what is meant by oxygen debt
Describe what happens to the lactic acid produced during anaerobic exercise
Define metabolism
Give examples of processes included in metabolism

**Photosynthesis**  
 Photosynthesis takes place in the **chlorophyll**  
**Word Equation:** carbon dioxide + water → glucose + oxygen + energy  
**Symbol Equation:**  $6\text{CO}_2 + 6\text{H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + \text{energy}$

**Uses of glucose** from photosynthesis:

- **Energy source** in respiration
- Converted in to **insoluble starch** for **storage**
- Produce **fats or oils** for storage
- Produce **cellulose** to **strengthen cell walls**
- Produce **amino acids** for **protein** synthesis

To produce proteins plants also use **nitrate ions** absorbed from the soil



**Independent Variable** (the thing you change) – The **distance** of the **lamp** from the pondweed  
**Dependent variable** (the thing you measure) – The number of bubbles  
**Control Variables:** Time, temperature, species of pondweed, concentration and volume of sodium hydrogen carbonate solution,

The **sodium hydrogen carbonate** acts as a **source of carbon dioxide** for the plant in order for it to be able to carry out photosynthesis

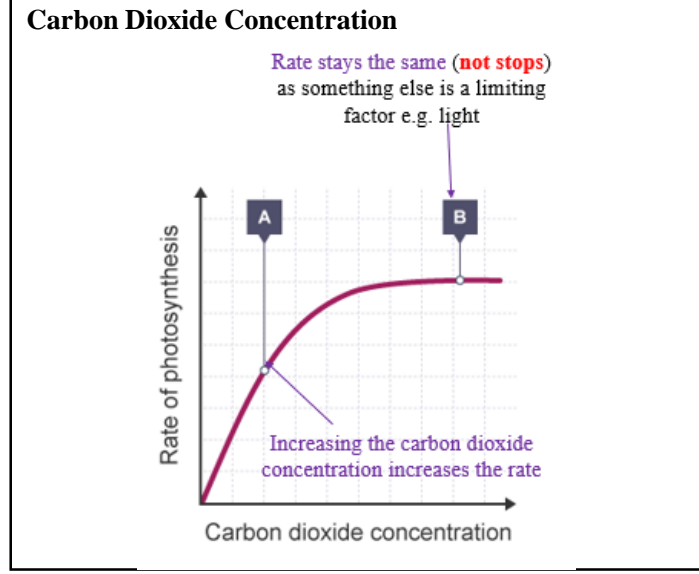
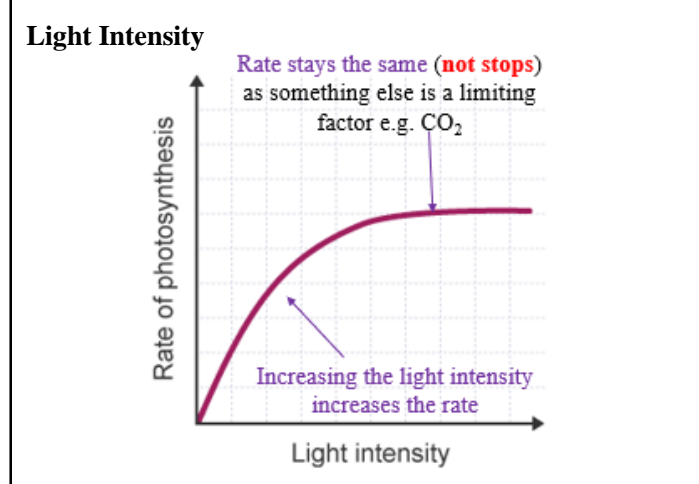
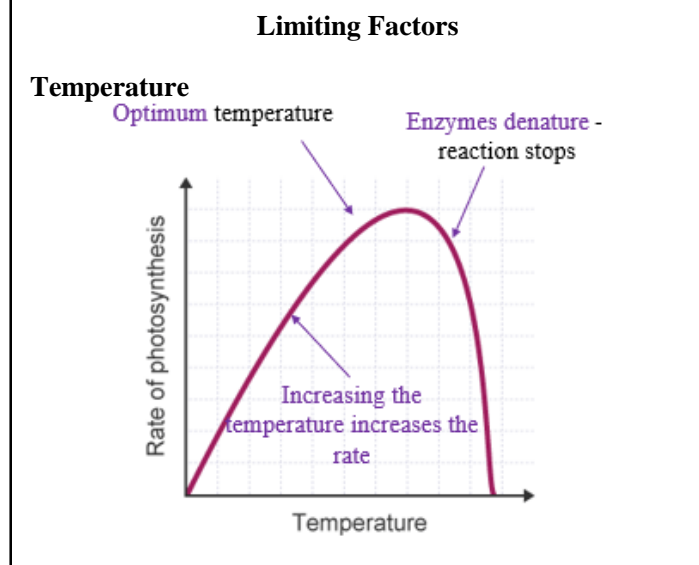
We control temperature as photosynthesis is an **enzyme controlled** reaction – at **high temperatures, enzymes denature**

As light intensity falls, so does the rate of photosynthesis

Counting the **number of bubbles** tell us the **rate of photosynthesis**.

We **change light intensity** by **moving the lamp**

Photosynthesis is an **endothermic** reaction – **energy is transferred to the chloroplasts** from the environment by light



**Inverse Square Law**

$$\text{Light intensity} \propto \frac{1}{\text{Distance}^2}$$

As the **distance doubles, light intensity falls by four**

Distance	Distance <sup>2</sup> (d <sup>2</sup> )	1÷d <sup>2</sup>
5	25	0.025
10	100	0.001
20	400	0.000025

x2      ←      →      +4

**Improve the experiment** by measuring the **volume of gas** instead of counting bubbles. This is because the **bubbles appear very fast** and are all **different sizes**.

The **bubbles** contain **oxygen gas** which is formed during photosynthesis

Greenhouses use limiting factors to **enhance the rate of photosynthesis** but this can be **expensive**.

Below is a checklist of everything you need to know for this topic:

Explain how diseases caused by viruses, bacteria, protists and fungi spread in animals and plants
Explain how the spread of diseases can be reduced or prevented
Give a definition for pathogen and state how pathogens spread
Describe how bacteria and viruses make us feel ill
Describe symptoms of bacterial, viral, fungal and protist caused diseases in plants and animals, their treatment and spread
Describe how the skin, nose, trachea and bronchi, and stomach defend against pathogens
Explain how white blood cells fight off pathogens
Define what a vaccine is
Explain how vaccinations prevent illness
Describe why herd immunity is beneficial
Describe the difference between antibiotics and painkillers
Give advantages and disadvantages of antibiotic use
Explain why it is difficult to kill viruses
Give examples of drugs extracted from natural sources
Describe the stages of drug testing
Describe how monoclonal antibodies are produced
Give uses of monoclonal antibodies
Suggest why monoclonal antibodies are not widely used
Describe ways plant disease can be identified
Describe the effect of ion deficiency on plants
Give examples of physical and chemical plant defence responses
Give examples of mechanical adaptations plants have

A pathogen is a **micro-organism** that spreads disease.

A **communicable disease** is a disease that can **spread from one person to another** because it is caused by a pathogen

**Bacteria and Viruses**

Bacteria and viruses are the two most common types of pathogens.

**Bacteria** make us feel ill by **producing toxins** that damage tissue.

**Viruses** live and reproduce inside cells causing **cell damage**.

**Bacterial Diseases**

Illness	Symptoms	Treatment
Salmonella (food poisoning)	Fever, cramps, vomiting, diarrhoea	Fluids Vaccinate poultry
Gonorrhoea	Thick green or yellow discharge, pain when urinating	Antibiotics (most strains now resistant), use a condom

**Protist Disease**

**Malaria** is caused by protists that is spread by mosquitoes

It causes **repeating episodes of fever** which can be fatal. The spread can be controlled by:

- Stopping the vectors (mosquitoes) breeding
- Using mosquito nets
- Vaccination
- Insect repellents

**Viral Diseases**

<p><b><u>Measles</u></b></p> <p><b>Symptoms:</b> Fever, red skin rash</p> <p><b>Fatal</b> if complications arrive</p> <p>Most children are <b>vaccinated</b> at a young age</p> <p><b>Spread by</b> inhalation of <b>droplets</b> from coughs and sneezes.</p>	<p><b><u>HIV</u></b></p> <p>Attacks the body's immune system. <b>Develops in to AIDS</b> where the <b>immune system is so badly damaged</b> it cannot deal with other infections.</p> <p><b>Spread by exchange of bodily fluids.</b></p> <p>Controlled using <b>antiretroviral drugs</b></p>	<p><b><u>Tobacco Mosaic Virus</u></b></p> <p>Affects <b>tomato plants</b>.</p> <p>Gives a <b>mosaic pattern of discolouration</b> on the leaves.</p> <p>The plant growth is affected because of a <b>lack of photosynthesis</b>.</p> <p>Control the spread by <b>destroying affected plants</b>.</p>
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**Fungal Disease**

**Rose Black Spot** is a fungal disease that affects plants.

**Purple or black spots** develop on the leaves which then **turn yellow** and fall off early as there is **reduced photosynthesis**.

It is **spread by water and the wind**.

It can be **treated using fungicides** and by **removing/destroying** the affected leaves.

**Human Defence Systems**

Skin	Acts as a barrier to stop pathogens entering
Nose	Contains little hairs to trap pathogens
Trachea and bronchi	Contain ciliated cells to trap pathogens. Cells also produced mucus.
Stomach	Contains acid to destroy pathogens that enter

**White Blood Cells**

White blood cells fight pathogens by:

- Producing antibodies
- Producing antitoxins
- Phagocytosis

**Vaccinations**

A **vaccine** is a **dead or inactive** pathogen.

A **small amount of pathogen** is injected in to the body.

White blood cells recognise the pathogen as foreign and produce a **small amount of antibodies** to fight the pathogen.

If a **live pathogen re-enters** the body, white blood cells produce **more antibodies in a shorter period of time**.

Most new drugs are synthesised by chemist in the pharmaceutical industry.

The **starting point** for a new drug can often be a **chemical extracted from a plant**.

**Spread of pathogens**

Pathogens can be spread through:

1. The air
2. Contact with animals
3. Through water
4. Uncooked food
5. Other people

**Reducing the spread of disease**

The spread of pathogens can be prevented by::

- Cooking food properly
- Coughing/sneezing in to a tissue
- Good hygiene and sanitation
- Using clean water systems

**Antibiotic Use**

Antibiotics kill infective bacteria inside the body.

The antibiotic is **specific** to the bacteria.

The use of antibiotics has **reduced deaths from infectious diseases** but there are more strains become **resistant** to bacteria.

Antibiotics **do not kill viruses**

**Painkillers**

Painkillers **treat the symptoms** of a disease but not the cause.

It is **difficult to kill viruses** without also damaging the tissues of the body.

**Sources of medicine**

- The heart drug **digitalis** was extracted from the **foxglove plant**
- The **painkiller aspirin** is extracted from the **willow bark tree**
- The **antibiotic Penicillin** was discovered by Alexander Fleming from the **Penicillium mould**