THE DUSTON SCHOOL
Knowledge itself is power
TDS 4-19

# Year 8 Science Knowledge Booklet

## Term 3

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| **Name:** | **Class:** |
| **Homework 1 Due: 14/01/2025** | **Homework 2 Due: 28/01/2025** |
| **Homework 3 Due: 11/02/2025** | |

# Science Homework 1

Read all of this knowledge organiser. The work covered will be in the first knowledge quiz of the term.

**Big questions: What is electricity?**

Why do circuits need to be loops?
What is electric current?
What does potential difference tell us in a circuit?
How does the resistance of components affect current?
How are current and potential difference connected?
What is Ohm's law?
What is a series circuit?
What are the patterns in circuits with two loops?
How do you calculate power in a circuit?

**Key vocabulary**

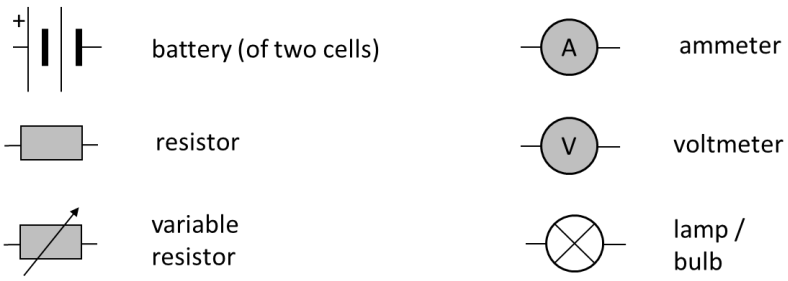
| | |
|---|---|
| **Electric current** | The flow of electric charge around a circuit. Electric current carries energy transferred from the cells. Measured in amps, A. |
| **Series circuit** | A single loop of a circuit with the components following one after another. The current is the same all around the loop. |
| **Voltmeter** | A meter to measure potential difference. Voltmeters are connected in parallel with the component they are measuring in their own loop. |
| **Light dependent resistor** | A device whose resistance goes down when the amount of light goes up. They are useful in light sensing circuits such as automatic street lights. |
| **Potential difference** | The energy per coulomb transferred between two points in a circuit. Measured in volts, V |
| **Parallel circuit** | A circuit with more than one loop. The current from the cells divides at the junction. |
| **Variable resistor** | A resistor whose value can be changed (varied). They can control the current in a circuit to make it bigger or smaller. |
| **Alternating current** | Electric current that rapidly changes direction. Mains electricity is 50Hz ac – it changes direction 50 times a second. |
| **Resistance** | How much a component in a circuit slows down the current. It is found by dividing the potential difference by the current. Measured in ohms, Ω |
| **Ammeter** | A meter to measure electric current. Ammeters are connected in **series** in the loop they are measuring. |
| **Thermistor** | A device whose resistance goes down when the temperature goes up. They are useful in temperature sensing circuits like thermostats. |
| **National grid** | The network of overhead cables and transformers that connects power stations and our homes to provide us with electricity. |

**Why do circuits need to be loops?**

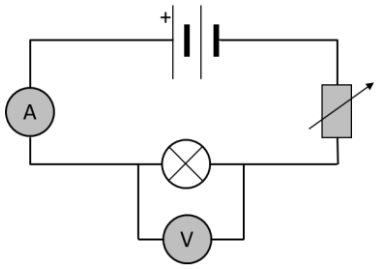
Electric circuits transfer energy.

- Energy is transferred from a power supply or battery to a device like a bulb, a heater or motor.
- Energy is transferred by the electric current.
- The current must flow from the power supply to the device and then back to the power supply. This is called an electrical circuit. The circuit must be a complete loop.
- If it not a complete circuit, current will not flow.

**Symbols are used to represent the components in an electrical circuit.**




**Circuits are drawn neatly with a ruler and pencil.**




**What is electric current?**

Electric current is rate of flow of charge. In metal wires, the charges that flow are electrons. Electrons are negatively charged.

An ammeter connected in series is used to measure the electric current. The unit of current is amps (A).

**What does potential difference tell us in a circuit?**

Potential difference is a measure of the amount of energy supplied into or out of the circuit between two points.

A voltmeter connected in parallel across a component is used to measure the potential difference.
The unit of potential difference is volts (V).

**How does the resistance of components affect current?**

Resistance is the opposition to the current. As resistance increases, current decreases. The unit of resistance is ohms ($\Omega$).

**How are current and potential difference connected?**

# Science Homework 2

**Try to answer all of these key knowledge questions. Then check your answers using the last page. These are some of the questions that will be in the knowledge quizzes and the end of term tests.**

**Questions in *italics* are from older work.**

| **Key knowledge question** | **Answer** |
|---|---|
| How is resistance defined? | |
| If resistance in a circuit increases what happens to the current? | |
| What is the equation that links potential difference, current and resistance? | |
| What is current? | |
| What is the unit of current? | |
| What is the unit of potential difference? | |
| What is the unit of resistance? | |
| What meter is used to measure potential difference? | |
| What meter is used to measure current? | |
| What is the equation that links power, current and potential difference? | |

As potential difference increases, current increases.

**What is Ohm's law?**

Ohm's Law: current is directly proportional to potential difference for a fixed resistor at constant temperature.

We can use the equation:

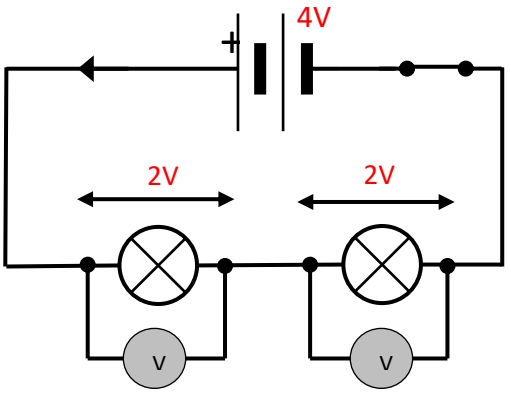
Potential difference = current x resistance

$$V = IR$$

**What is a series circuit?**

A series circuit has just one loop – one path for the current to take. Current is the same at all points in a series circuit.

The potential difference supplied by a battery is shared between the components in the circuit.




**What are the patterns in circuits with two loops?**

A parallel circuit has two or more loops – two or more paths for the current to take.
When two paths meet, the currents add together.
The potential difference across each branch is the same.

**How do you calculate power in a circuit?**

Power is a measure of how much energy is transferred each second.

Power = current x potential difference

$$P = IV$$

| **Key knowledge question** | **Answer** |
|---|---|
| How is resistance defined? | The opposition to the flow of current |
| If resistance in a circuit increases what happens to the current? | It decreases |
| What is the equation that links potential difference, current and resistance? | $V = IR$<br><br>potential difference = current x resistance |
| What is current? | The rate of flow of charge |
| What is the unit of current? | Amps (A) |
| What is the unit of potential difference? | Volts (v) |
| What is the unit of resistance? | Ohms (Ω) |
| What meter is used to measure potential difference? | A voltmeter |
| What meter is used to measure current? | An ammeter |
| What is the equation that links power, current and potential difference? | $P = IV$<br><br>Power = current x potential difference |

# 1.3 Digestion

**Big questions:**

**Why do we need a healthy diet?**

**What is an unbalanced diet?**

**How can we test which nutrients are I your food?**

**What is the structure and purpose of the digestive system?**

**What are enzymes?**

**How fast do enzymes work?**

**Key vocabulary**

| | |
|---|---|
| **Deficiency** | too little of a particular nutrient |
| **Balanced diet** | contains the correct amounts of all the necessary nutrients needed for healthy growth and activity |
| **Imbalanced/poor diet** | contains too much or too little of a particular nutrient |
| **Carbohydrate** | source of energy, glucose is the main respiratory substrate |
| **Protein** | assist with **growth** and **repair** of the body |
| **Lipids (fats)** | needed for energy, make up part of cell membranes and are essential for normal growth |
| **Minerals** | needed in small amounts to help the body function properly and stay strong |
| **Vitamins** | needed in very small amounts for growth and health |
| **Fibre** | provides roughage to help to keep the food moving through the gut |
| **Water** | needed for cells and body fluids |
| **Eating disorder** | mental health disorders that lead to an unhealthy relationship with food and weight, severely impacting day-day-life |
| **Obese** | describes a person who's very overweight, with a lot of body fat |
| **Diabetes** | → **type 1** diabetes is a genetic condition that often shows up early in life<br>→ **type 2** is mainly lifestyle-related and develops over time |
| **CHD** | Coronary Heart Disease, can lead to a heart attack |
| **Food testing** | analysis of food contents |
| **Digestive system** | Group od organs responsible for breaking down the food we eat |
| **Anus** | opening at the end of the digestive system from which faeces (poo) leaves the body |
| **Oesophagus** | long tube between mouth and stomach |
| **Gall bladder** | a small sac below the liver, stores and releases bile into the small intestine |
| **Large intestine** | maximise water absorption. Shorter, wider tube than the small intestine |
| **Liver** | large organ which makes bile that neutralises stomach acid |

| | |
|---|---|
| **Mouth** | first part of the digestive system, where food enters the body |
| **Pancreas** | gland below the stomach which makes lots of chemicals called enzymes that help break down food |
| **Rectum** | lower part of the large intestine, where faeces (poo) is stored before it leaves the body |
| **Small intestine** | long, thin winding tube that food goes through after it leaves the stomach |
| **Stomach** | sack-like, muscular organ that is attached to the oesophagus. When food enters the stomach, it is churned with lots of acid |
| **Smooth muscle** | found throughout the digestive system |
| **Villi** | small hair like projections in the small intestine, that increase the surface area for more efficient diffusion |
| **Enzyme** | biological catalyst, large proteins that speed up reactions, but remain unchanged |
| **Lipase** | enzyme that breaks down lipids into fatty acids and glycerol |
| **Protease** | enzyme that breaks down protein into amino acids |
| **Amylase** | enzyme that breaks down starch into glucose |

**Why do we need a healthy diet?**

**Balanced** diet → contains the **correct amounts** of all the necessary **nutrients** needed for healthy growth and activity

**What is an unbalanced diet?**

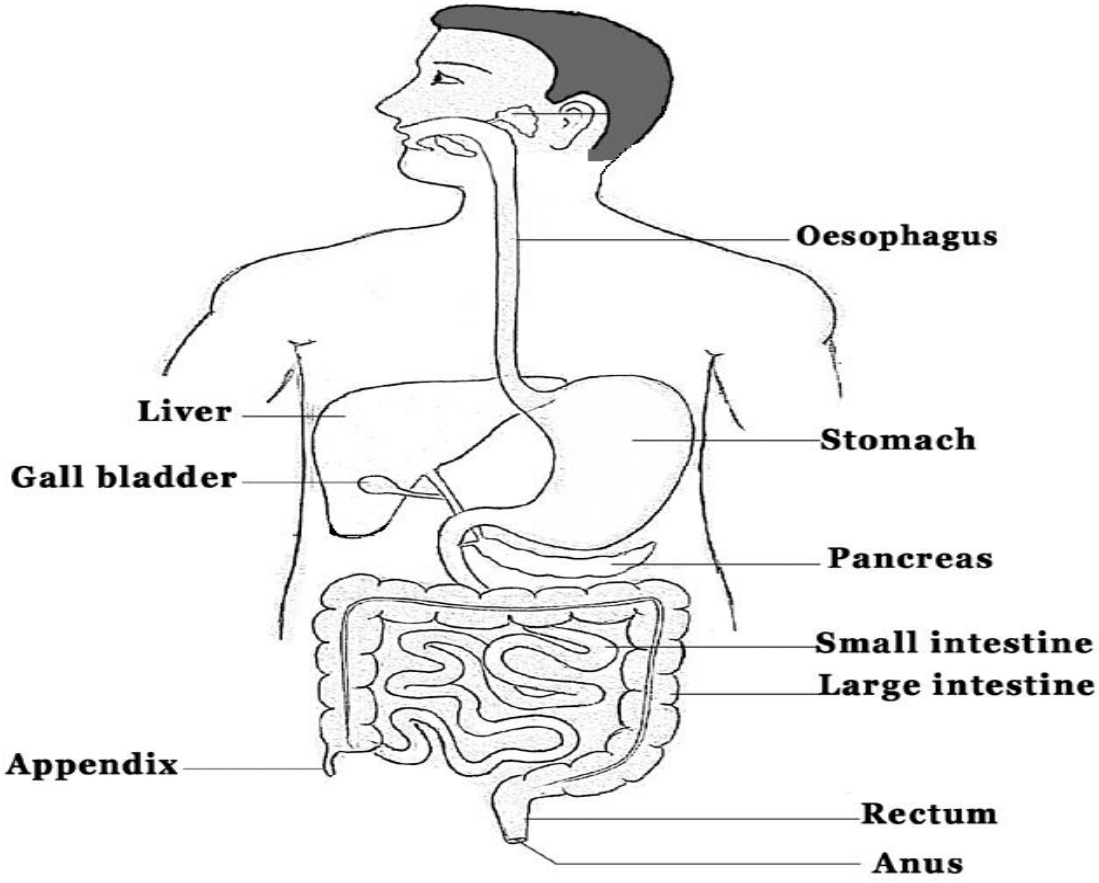
**Imbalanced/poor** diet → contains **too much** or **too little** of a particular nutrient

**Deficiency → too little** of a particular nutrient

**How can we test which nutrients are I your food?**

| **Test for…..** | **Colour change** |
|---|---|
| **Protein** | **Blue → Purple** |
| **Glucose** | **Blue → green → yellow → orange → brick red** |
| **Lipid** | **Red oil-stained layer floating on top** |
| **Starch** | **Orange → Blue black** |

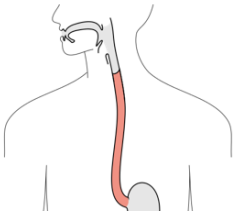
**What is the structure and purpose of the digestive system?**




**Essentially our digestive system is one long tube from mouth to anus → GUM to BUM**

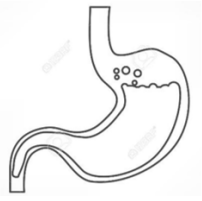
- It is made up of hollow organs
- It fuels your heart, lungs and mind
- It helps fight infection and illness
- It can even impacts your mood and energy levels
- It works every moment of every day and it needs to be protected, respected and cared for

| Part | Function |
|---|---|
| Oesophagus | long tube between mouth and stomach |



| Adaptation |
|---|
| • Made of smooth muscle that push food and liquid through the digestive system in waves called PERISTALSIS |

| Part | Function |
|---|---|
| Stomach | muscular sack, when food enters, it is churned with lots of acid |



| Adaptation |
|---|
| • Strong smooth muscle walls “mash” food by contracting regularly<br>• Secretes acid and enzymes to help digestion |

# Science Homework 3

**Try to answer all of these key knowledge questions. Then check your answers using the last page. These are some of the questions that will be in the knowledge quizzes and the end of term tests.**

**Questions in *italics* are from older work.**

| Key knowledge question | Your answer |
|---|---|
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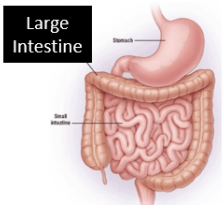
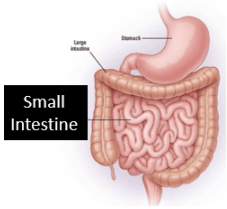
| Part | Function |
|---|---|
| Large Intestine | Maximise water absorption. Shorter, wider tube than the small intestine |




| Adaptation |
|---|
| • Long and folded, increases surface area, maximising water absorption<br>• Made of smooth muscle to keep faeces moving<br>• Mucus secreted lubricates the faeces |

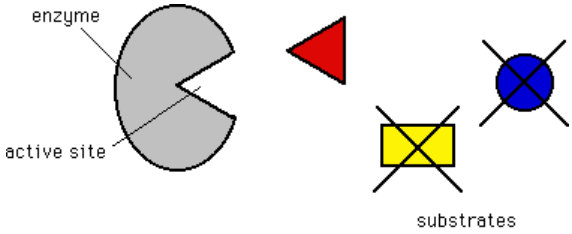
| Part | Function |
|---|---|
| Small Intestine | Long, thin winding tube that food goes through after it leaves the stomach |




| Adaptation |
|---|
| Very long, increases surface area for diffusion **about 7 metres!!**<br><br>Villi also increase surface area for diffusion |

**What are enzymes?**

Enzymes, like keys, only work with specific molecules



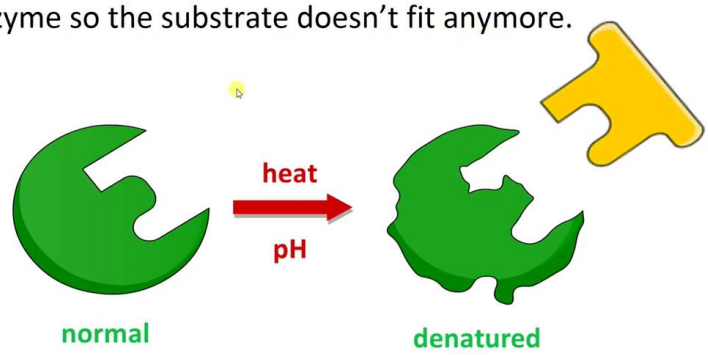

Enzymes are biological catalysts

Enzymes are large proteins

Enzymes have active sites

Enzymes speed up reaction in the body

Raising the temperature too high can **DENATURE** the enzyme so the substrate doesn't fit anymore.




**Denaturing enzymes** → if enzymes are exposed to **extremes of pH** or **high temperatures** the shape of their active site may change.

If this happens **the substrate no longer "fits"** into the enzyme's **active site**.

This means the key will no longer fit the lock. We say that the enzyme has been **denatured**.

**How fast do enzymes work?** Rate of enzyme activity increases with temperature up to a point. If it was too high the enzymes were denatured.
Similarly at an optimum pH an enzymes activity will be highest, but will reduce if not the optimum pH.

| Key knowledge question | Answer |
|---|---|
| An enzyme is what sort of molecule? | A (large) protein |
| Describe the difference between Type 1 and Type 2 diabetes | Type 1- insulin not made by pancreas, Type 2- insulin no longer recognised by the body (liver/ muscles) |
| Describe the test for glucose | Benedict's, heat, turns from blue to: yellow, green, brick-red |
| Describe the test for lipid | Sudan III, mix, red layer forms on top. |
| Describe the test for protein | Biuret, turns form blue to purple. |
| Describe the test for starch | Iodine turns from yellow/brown to blue-black |
| Describe the use of lipids by the body | Cell membranes, storage of energy |
| Explain why an enzyme no longer works if it is above its optimum temperature | Denatured- bonds broken, changes shape of active site, substrate no longer fits. |
| Identify the main nutrient found in meat | Protein |
| Identify where protease is made | Stomach, pancreas, small intestine |
| State the risk factors associated with coronary heart disease | Obesity, lack of exercise, smoking, genetic/ inheritance, high blood pressure. |
| State what protein is broken down into | Amino acids |
| What are enzymes? | Biological catalysts |
| What does the body use carbohydrate for? | Energy |
| What is the name of the reagent used in the starch tests? | Iodine (solution) |
| What is the theory we use to explain enzyme action | Lock and key (induced fit) |
| Why does the body need protein? | Growth and repair |