

Year 8 Science Knowledge Booklet

Term 3

Name:

Class:

Homework 1 Due: 11th January

Homework 2 Due: 25th January

Homework 3 Due: 8th February





Science Homework 1

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

Big questions:

Why do we need a healthy diet?

What is an unbalanced diet?

How can we test which nutrients are in 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 → 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 of 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	Maximises 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?

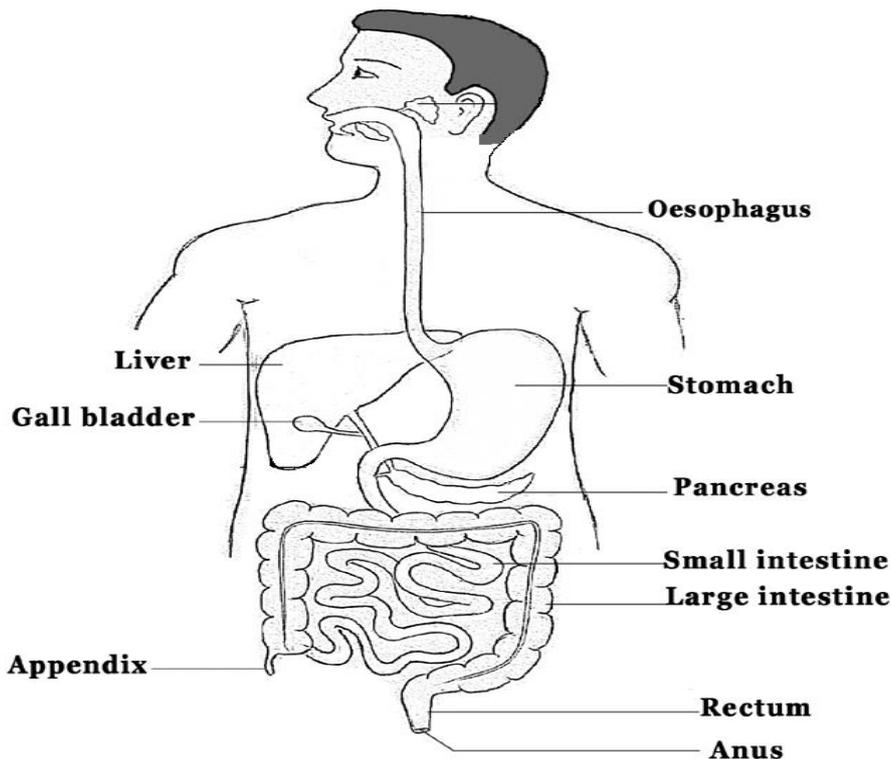
Imbalanced/poor diet → contains **too much** or **too little** of a particular nutrient

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

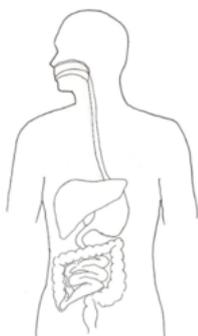
How can we test which nutrients are in your food?

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?

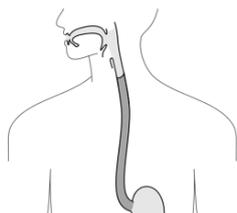


Essentially our digestive system is one long tube from mouth to anus → GUM to BUM



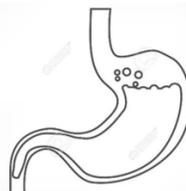
- It is made up of hollow organs
- It fuels your heart, lungs and mind
- It helps fight infection and illness
- It can even impacts your mood and energy levels
- It works every moment of every day and it needs to be protected, respected and cared for

Part	Function
Oesophagus	long tube between mouth and stomach



Adaptation
<ul style="list-style-type: none"> • 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
<ul style="list-style-type: none"> • Strong smooth muscle walls “mash” food by contracting regularly • Secretes acid and enzymes to help digestion



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.

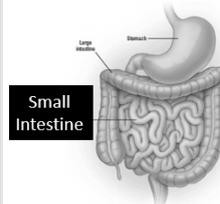
Key knowledge question	Answer
An enzyme is what sort of molecule?	
Describe the difference between Type 1 and Type 2 diabetes	
Describe the test for glucose	
Describe the test for lipid	
Describe the test for protein	
Describe the test for starch	
Describe the use of lipids by the body	
Explain why an enzyme no longer works if it is above its optimum temperature	
Identify the main nutrient found in meat	
Identify where protease is made	
State the risk factors associated with coronary heart disease	
State what protein is broken down into	
What are enzymes?	
What does the body use carbohydrate for?	
What is the name of the reagent used in the starch tests?	
What is the theory we use to explain enzyme action	
Why does the body need protein?	
<i>What is the name for the state change from gas to liquid?</i>	
<i>Which out of solids, liquids, and gases can easily be compressed?</i>	

Part	Function
Large Intestine	Maximise water absorption. Shorter, wider tube than the small intestine



Adaptation
<ul style="list-style-type: none"> • Long and folded, increases surface area, maximising water absorption • Made of smooth muscle to keep faeces moving • Mucus secreted lubricates the faeces

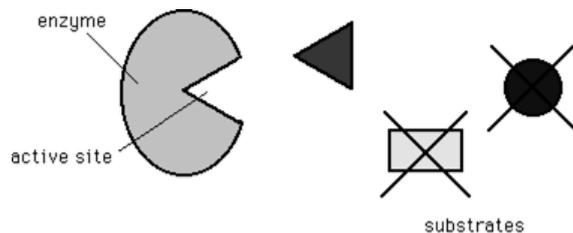
Part	Function
Small Intestine	Long, thin winding tube that food goes through after it leaves the stomach



Adaptation
Very long, increases surface area for diffusion about 7 metres!! Villi also increase surface area for diffusion

What are enzymes?

Enzymes, like keys, only work with specific molecules



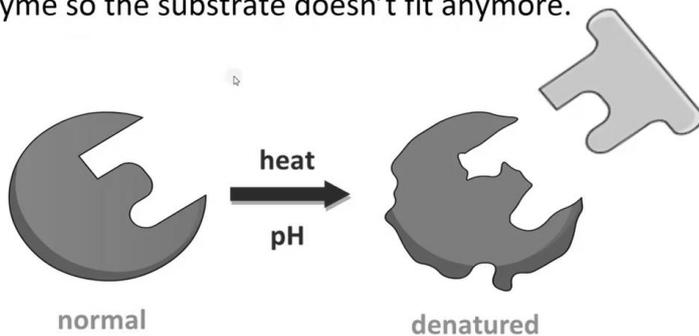
Enzymes are biological catalysts

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 from 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
<i>What is the name for the state change from gas to liquid?</i>	<i>Condensation</i>
<i>Which out of solids, liquids, and gases can easily be compressed?</i>	<i>Gases</i>

Big questions: Forces and motion

What do we mean by speed and velocity?

How is speed measured?

How can we represent real journeys on a graph?

What is acceleration?

What do velocity-time graphs show?

What are the “Laws of Motion”?

How does resistance change motion?

Why do objects reach terminal velocity?

How can terminal velocity be investigated?

Key vocabulary

Speed	Speed measures how much distance is covered in a fixed time .
Average speed	The average speed between two points
Instantaneous speed	The actual speed at any given instant in time
Velocity	Speed in a given direction .
Acceleration	The change in velocity in a given time .
Distance –time graph	A graph to show how the distance moved by an object changes with time .
Velocity-time graph	A graph to show how the velocity of an object changes with time .
Friction	A contact force that opposes the motion of an object.
Air Resistance	The friction force caused by contact with the air . Air resistance gets bigger as speed increases.
Terminal velocity	The maximum velocity that an object reaches when moving through the air or another fluid.

What do we mean by speed and velocity?

Speed measures how much **distance** is covered in a **fixed time**.

Speed can be:

- **Instantaneous speed** – the actual speed at any instant of time.
- **Average speed** – the average speed between two points.
- **Velocity** – the speed given with the direction of motion.

The equation for average speed is:

$$\text{average speed} = \frac{\text{distance}}{\text{time}}$$

How is speed measured?

Speed is calculated from measurements of **distance** and **time**.

- Distance can be measured with a **meter rule** in meters.
- Time is measured with a **stop-clock** in seconds.

Measurements are always uncertain because of **random errors**.

Random errors mean that the measurement is sometimes **too big** and sometimes **too small**.

We can take an **average** to minimise the effect of random errors.

How can we represent real journeys on a graph?

We can use a **distance-time graph** to show a journey:

Time goes on the (horizontal) **x-axis** and **distance** goes on the (vertical) **y-axis**.

The **gradient** of the line tells you the **speed**.

- A straight line shows a uniform / steady speed.
- If the line is horizontal to the x-axis, the object is stationary and the speed is 0 m/s.
- A steeper gradient shows a faster speed, while a less steep gradient shows a slower speed.
-



What is acceleration?

Acceleration is the **change in velocity** in a given **time**.

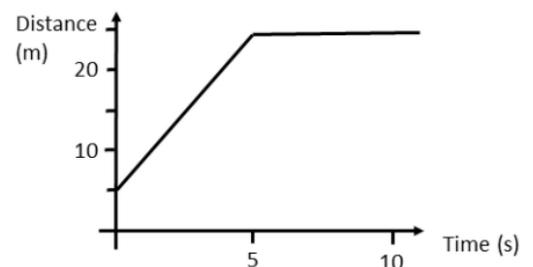
$$acceleration = \frac{\text{change of speed}}{\text{time}}$$

The unit of acceleration is metre/second/second or metre/second squared (m/s^2).

What do velocity-time graphs show?

The change in speed of a journey can be shown on a **velocity-time graph**.

- The gradient of a velocity-time graph shows acceleration.
- The area under the velocity-time graph shows the distance travelled.





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
Describe the forces when terminal velocity occurs	
What does a horizontal line on a velocity-time graph mean?	
What do we mean by acceleration?	
What do we mean by speed?	
What do we mean by velocity?	
What does a horizontal line on a distance-time graph mean?	
What is the unit of force?	
What will happen to the acceleration if the force doubles?	
What will happen to the acceleration if the mass doubles?	
When forces on an object are balanced we use which word to describe them?	
Write the equation that links force, mass and acceleration.	
<i>How many atoms are there in a molecule of H₂O?</i>	
<i>Is freezing a physical or chemical change?</i>	
<i>Name 3 things we might see if a chemical reaction is happening.</i>	

What are the “Laws of Motion”?

Isaac Newton wrote three **laws of motion**.

Newton’s First Law

If the **forces are balanced** an object will remain stationary or travelling at a constant speed.

Newton’s Second Law

A **resultant force** will cause an acceleration.

Force = mass x acceleration ($F = ma$)

Newton’s Third Law

Forces always come in pairs.

The force of object A on object B is equal and opposite to the force of object B on object A.

How does resistance change motion?

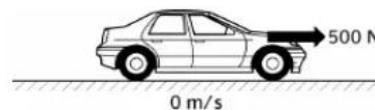
Objects of **different shapes** will travel at different speeds. The object that travels the fastest is the most **streamlined**, and is less affected by **resistance**.



Why do objects reach terminal velocity?

Terminal velocity is the fastest speed at which an object can travel.

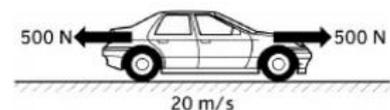
Newton’s first law states that when forces are balanced an object will remain stationary or at a constant velocity.



Moving objects reach terminal velocity when the **forces** on them are **balanced**.



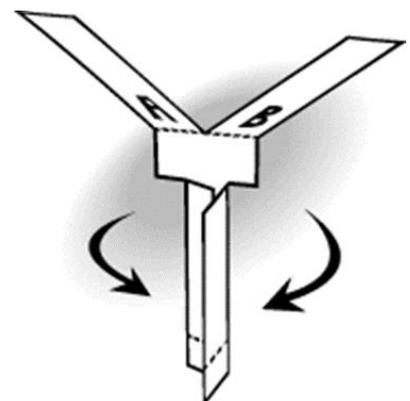
Once an object has reached terminal velocity it will not be able to travel any faster. Terminal velocity is its **maximum speed**.



How can terminal velocity be investigated?

What are the **factors** that affect the time for a paper helicopter to fall?

- **Independent Variable** (what I am going to change)
- **Dependent Variable** (what I am going to measure)
- **Control Variables** (what I am going to keep the same)



Key knowledge question	Answer
Describe the forces when terminal velocity occurs	They are balanced (Weight = (-) drag)
What does a horizontal line on a velocity-time graph mean?	The object is moving at a constant speed
What do we mean by acceleration?	The rate of change of velocity per unit of time
What do we mean by speed?	How fast an object is moving
What do we mean by velocity?	The speed of an object in a given direction.
What does a horizontal line on a distance-time graph mean?	The object is stationary
What is the unit of force?	Newton (N)
What will happen to the acceleration if the force doubles?	The acceleration will double
What will happen to the acceleration if the mass doubles?	The acceleration will halve
When forces on an object are balanced we use which word to describe them?	Equilibrium
Write the equation that links force, mass and acceleration.	Force = mass x acceleration
<i>How many atoms are there in a molecule of H₂O?</i>	3
<i>Is freezing a physical or chemical change?</i>	<i>Physical</i>
<i>Name 3 things we might see if a chemical reaction is happening.</i>	<i>A colour change, a temperature change, a gas produced (fizzing)</i>