



## KS3 Science Department Cycle 2

This Knowledge Organiser contains information to help you succeed in Cycle 2! Learning consultants will set some of the tasks to complete as independent learning. You should also attempt some as part of your revision. The more tasks you complete, the more progress you will make this Cycle.



### Reduce it

- Reduce the key information for this topic into 20 words or less!
- Sum up each page in 5 bullet points.
- Answer each learning question in 10 words.



### Transform it

- Transform the key word definitions into a set of pictures.
- Transform each learning question into a picture.
- Transform each learning question into a poem.



### Prioritise it

- Prioritise 5 points from the topic. Arrange them from most to least important. Can you explain your choice?
- Which learning question is most important? Why?



### Practice it

- Write your own exam questions (with answers) on the topic.
- Make flashcards for the keywords. Test yourself on the definitions!

### Tricky Test Terminology

Identify, state or name—this is a simple instruction to just write the correct term or name.

Define—what does the word mean?

Describe—give some extra detail. Let the number of marks guide you on how much to write.

Outline—describe the theory or process.



### Connect it

- Choose 4 keywords from the topic. How do they link? Connect them with lines to explain the links.
- How does the topic link to other areas of science?



### Extend it

- Write down 3 key words for this learning question. Why are they important?
- Answer the learning question as fully as you can.



### Create it

- Create a mind-map about the topic or learning question.
- Create a short test for this topic. Produce an answer booklet to match.

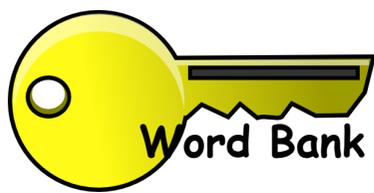
Useful websites;

Kerboodle.com (username: school username, password: school username, institution code: gra9)

<https://www.bbc.com/bitesize/guides/zpkq7ty/revision/1>  
(BBC Bitesize Biology)

<https://www.bbc.com/bitesize/guides/z2wmxnb/revision/1>  
(BBC Bitesize Chemistry)

<https://www.bbc.com/bitesize/topics/z4brd2p>  
(BBC Bitesize Physics)



## How is a multicellular organism organised?

cell → tissue → organ → organ system → organism

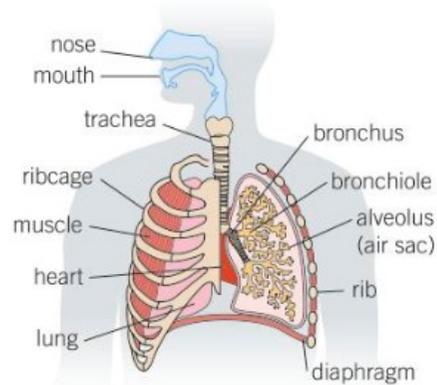
<b>Cell</b>	The smallest part of a living organism.
<b>Tissue</b>	A group of cells working together.
<b>Organ</b>	Group of tissues working together to carry out a function.
<b>Organ System</b>	Group of organ systems working together to carry out a function.
<b>Organism</b>	Living thing.
<b>Breathing</b>	Inhaling and exhaling gases from the air.
<b>Respiration</b>	A chemical reaction to produce energy.
<b>Contract</b>	Get smaller.
<b>Antagonistic Pair</b>	A pair of muscles working together.

## How do our bodies change when we breathe?

**Inhale:** ribs up and out, diaphragm contracts, chest volume increases, pressure decreases and air enters.

**Exhale:** ribs down and in, diaphragm relaxes, chest volume decreases, pressure increases and air leaves.

## How does the gas exchange system work?



Air enters your body through your mouth and nose.

Air moves down the **trachea** (windpipe) – a large tube.

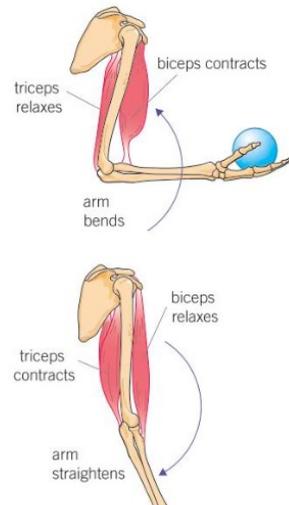
Air moves down a **bronchus** – a smaller tube.

Air moves through a **bronchiole** – a tiny tube.

Air moves into an **alveolus** – an air sac.

Oxygen then diffuses into the blood.

## How do muscles work?



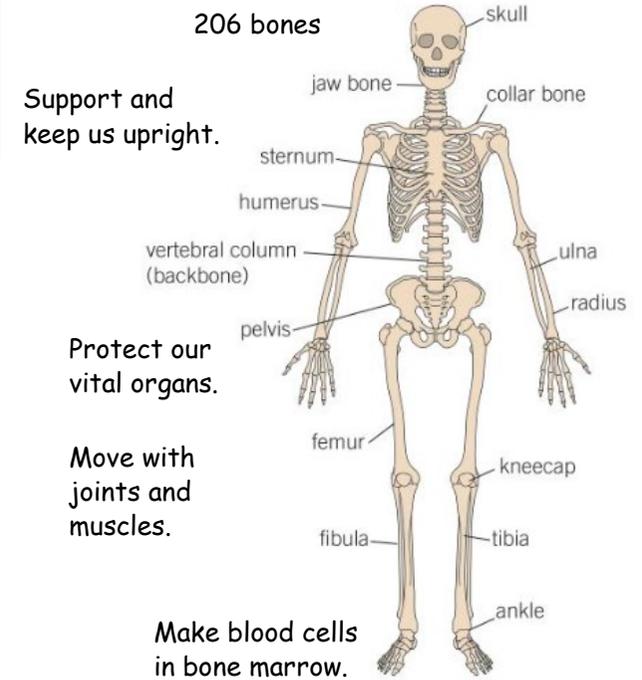
To make you move, muscles contract. Muscles are attached to bones by tendons, when a muscle contracts the bone moves.

Muscles can only pull, not push. Muscles work in pairs on joints. When one muscle contracts, the other relaxes.

This is an antagonistic pair.

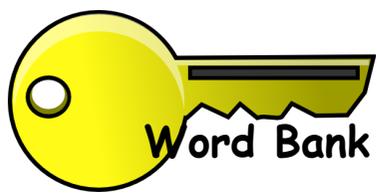
# Cycle 2 Biology

## What is the function of the skeleton?



## How do joints help the skeleton move?

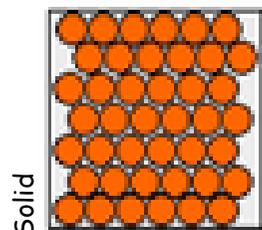
- ⇒ Hinge joints such as the knee and elbow let our bones move backwards and forwards.
- ⇒ Ball and socket joints such as the hip and shoulder allow movement in all directions.
- ⇒ Fixed joints like the skull don't allow any movement!
- ⇒ Joints are covered in cartilage to stop bones rubbing.
- ⇒ Bones are connected with ligament.



How can we explain the properties of a solid, liquid and gas using the particle model?

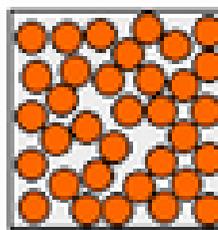
# Cycle 2 Chemistry

<b>Substance</b>	Made of one material only.
<b>Mixture</b>	Contains more than one substance.
<b>Element</b>	A substance made from one type of atom.
<b>Compound</b>	2 or more elements that are chemically combined.
<b>Particles</b>	Make up everything.
<b>State</b>	Solid, liquid or gas.
<b>Gas pressure</b>	Force per unit area from a gas.



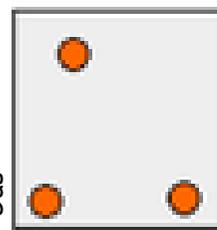
Solid

- ◇ Cannot compress because particles touch.
- ◇ Arranged in a pattern.
- ◇ Vibrate but don't



Liquid

- ◇ Cannot compress because particles touch.
- ◇ Not as closely packed together so they are less dense.
- ◇ Move randomly—flow.



Gas

- ◇ Can compress because particles do not touch.
- ◇ Spaced out so density is low.
- ◇ Move randomly and with lots of energy—flow.

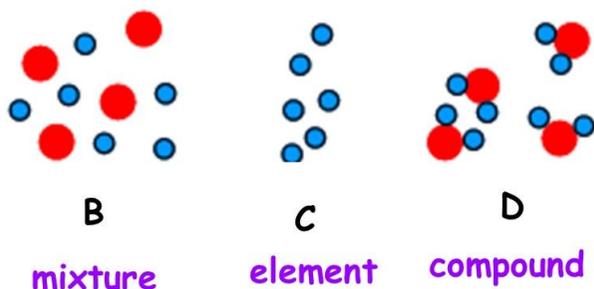
**What factors affect gas pressure?**

- Number of particles in the space (more particles = higher pressure)
- Temperature. Heating particles makes them move more and take up more space.

**What factors affect diffusion?**

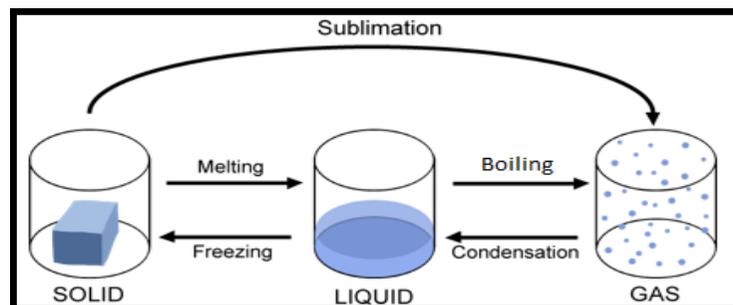
- Temperature.
- Particle size.
- State of matter.

What are the differences in the particle model of an element and a compound?

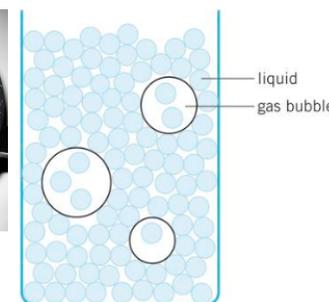


B mixture      C element      D compound

**What is the difference between evaporation, condensation and sublimation?**



What energy changes occur when a substance boils?

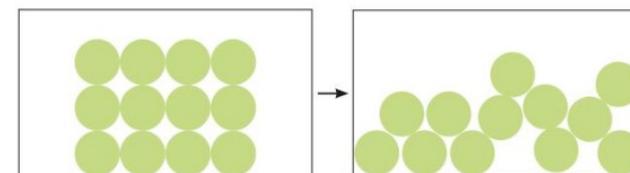


▲ Boiling water.

Liquid takes in energy. Some of the liquid turns into gas.

In water, steam bubbles form throughout the liquid. The steam bubbles rise and escape as gas in the air. Different substances need different amounts of energy to boil. This means they have different boiling points.

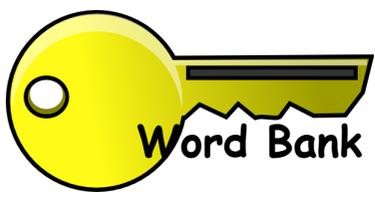
**What is the difference between melting and freezing?**



▲ The diagram shows particles before and after melting.

During melting a solid turns into a gas. The solid gains energy and so the particles vibrate faster. Particles move out of their pattern. As more particles leave the pattern, the solid melts.

When a substance freezes, it loses energy. The particles vibrate slower. Particles begin to form a pattern. As more particles lose energy and join the pattern, the liquid freezes.



<b>Force</b>	A push or pull. Measured in Newtons.
<b>Equilibrium</b>	When two forces are balanced and resultant force is 0.
<b>Resistive force</b>	A force that slows down a moving object.
<b>Interaction pair</b>	When two objects interact there are equal forces in opposite directions.
<b>Relative motion</b>	An objects speed is relative to the observers speed.
<b>Gravity</b>	A non-contact force that acts between 2 masses.

### What are balanced and unbalanced forces?

When more than one force is acting the total force is called the resultant force. Balanced forces are the same size but opposite directions. When a force is balanced, the resultant force is 0. We can say that the forces are in equilibrium.

When forces are unbalanced they do not cancel out. The resultant force is not 0. In this case, the driving force will be bigger than the resistive force. When a force is unbalanced, the speed or direction of an object will change.

### What factors affect speed?

$$\text{speed (m/s)} = \frac{\text{distance travelled (m)}}{\text{time taken (s)}}$$

Speed is a measure of how far something travels in a given time.

Average speed is the overall distance divided by the overall time of a journey.

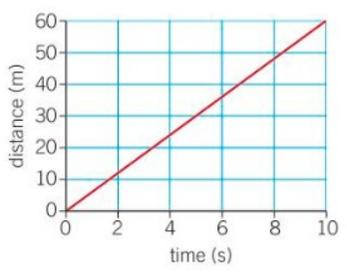
The speed of the object can be affected by the speed of the observer. This is relative motion. If 2 cars move in the same direction and speed, their relative speed is 0.

### What is the difference between mass and weight?

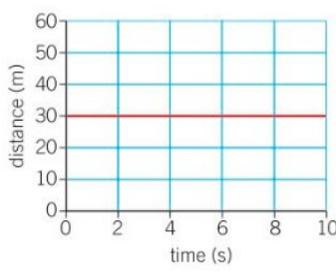
Weight is a force so it is measured in N. Mass is the amount of 'stuff' something has so is measured in kg. Weight can change but mass is always the same.

$$\text{weight (N)} = \text{mass (kg)} \times \text{gravitational field strength, } g \text{ (N/kg)}$$

What can you infer from a distance-time graph?



▲ A distance-time graph for a constant speed.

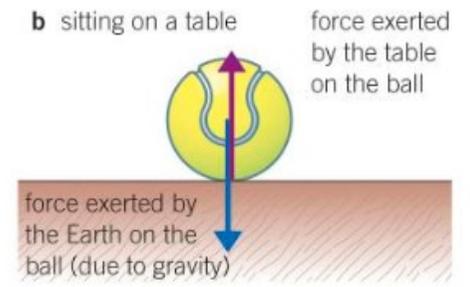


▲ A distance-time graph for a stationary object.

# Cycle 2 Physics

### What is a force?

- ⇒ A force can be a push or a pull.
- ⇒ Forces explain why objects move, or why they don't move at all! Forces can change the direction or shape of an object too.
- ⇒ You can't see forces but you can see their effects.
- ⇒ You can draw diagrams to show the forces acting on an object. The arrows have Both size and direction.
- ⇒ Forces are measured in Newtons (N) using a Newtonmeter.
- ⇒ Friction, air resistance and upthrust are contact forces.
- ⇒ Gravity and the force from magnets are non-contact forces. You don't need to touch them to feel the force!
- ⇒ Forces act in pairs called interaction pairs.



**What is gravity?** Gravity is a non-contact force that pulls us back down. Gravity keeps the moon in orbit. The gravitational force from the Earth pulls the moon.