The Particle Model

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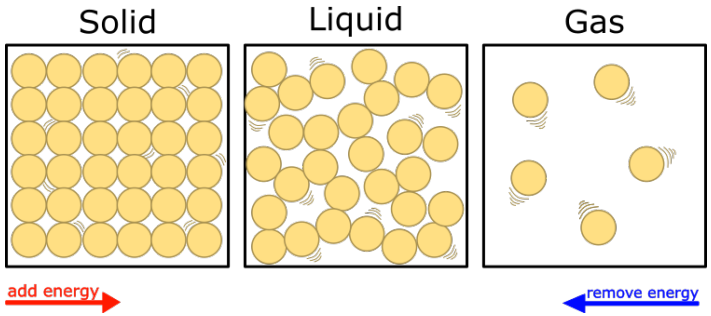


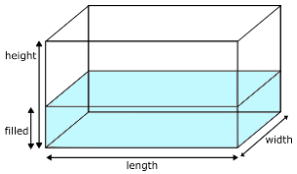
Solids, Liquids and Gases

The three different states of matter are solid, liquid and gas.

State properties of solids, liquids and gases. Can solids, liquids and gases change shape and flow? Can they change their volume or be compressed? Give examples of each state.

Solid	Liquid	Gas
Do not flow or change shape	Can change their shape and flow	Can change their shape and their volume
The volume of a solid does not change a great deal and cannot be easily compressed	Do not change their volumes and cannot be easily compressed	Can be easily compressed into a smaller volume
E.g. wood, plastic, metal	E.g. water, cooking oil	E.g. air, natural gas, hydrogen

Volume



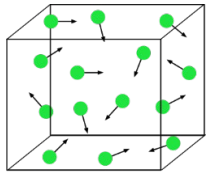
What is meant by volume?

The amount of space a substance or object takes up.

What is volume measured in?

Cubic centimetres, cm^3 ($1\ cm^3 = 1\ mL$)

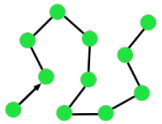
Brownian Motion & Diffusion



What is Brownian motion?

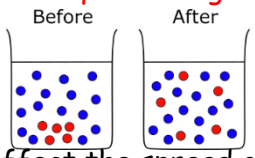
The random motion of particles due to their collisions with one another in liquids and gases.

What is diffusion?



Brownian Motion of a Particle

The movement of a substance from an area of high concentration to an area of low concentration. Diffusion occurs in liquids and gases.

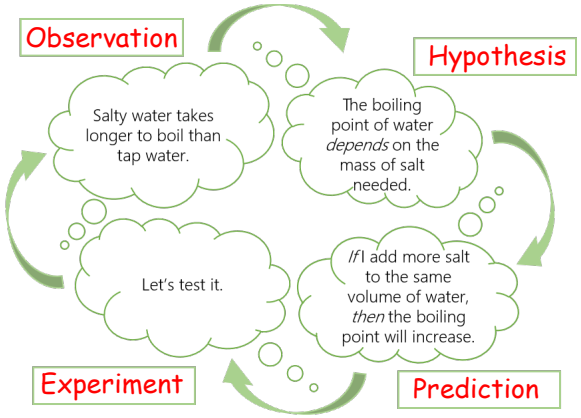


What factors affect the spread of diffusion?

- Temperature
- State of matter – diffusion is slower in liquids than in gases.

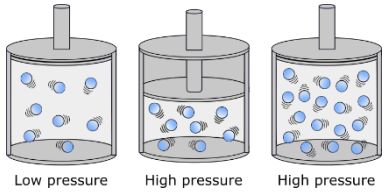
Scientific Methods

Name the different sections of a scientific method.



Air Pressure

What is pressure?



The force of particles hitting a surface.

What factors affect pressure?

- Temperature
- Pressure
- Particle concentration

Cells, Tissues and Organ Systems

Life Processes

State the 7 life processes.

1. Movement
2. Sensitivity
3. Growth
4. Reproduction
5. Excretion
6. Nutrition
7. Respiration

Create a mnemonic to help remember the seven life processes.

E.g. MRS GREN

Define breathing:

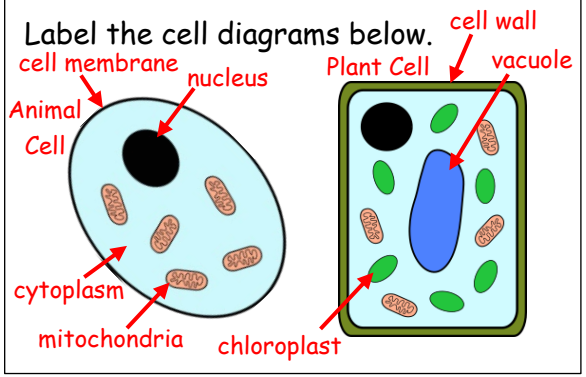
Taking in oxygen and giving out carbon dioxide.

Define respiration:

A certain chemical reaction that releases energy

Cells

Label the cell diagrams below.

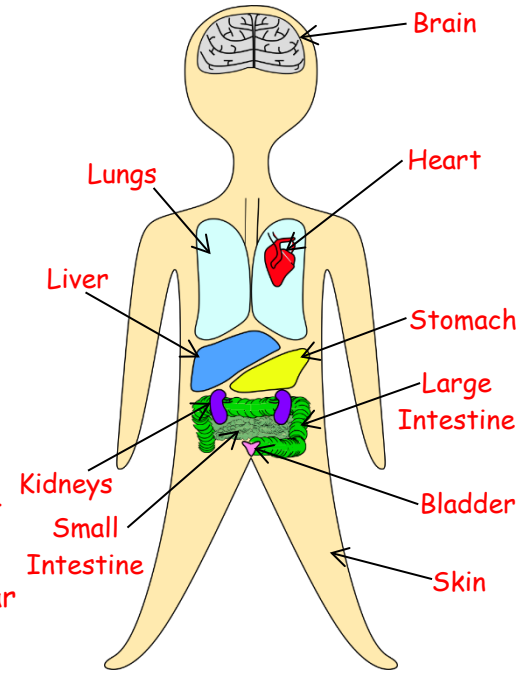


Organs

What is an organ?

A group of tissues with the same function, e.g. the heart organ.

Label the organs on the diagram.



What is an organ system?

An organ system is made from a group of different organs, which all work together to do a particular job.

Plant organs – match the part of the plant with its function.

Part	Function
Leaf	Traps the sunlight to make food for the plant
Stem	Take water from the soil
Roots	Supports the leaves and flowers

What is the equation for photosynthesis?

water + carbon dioxide → glucose + oxygen

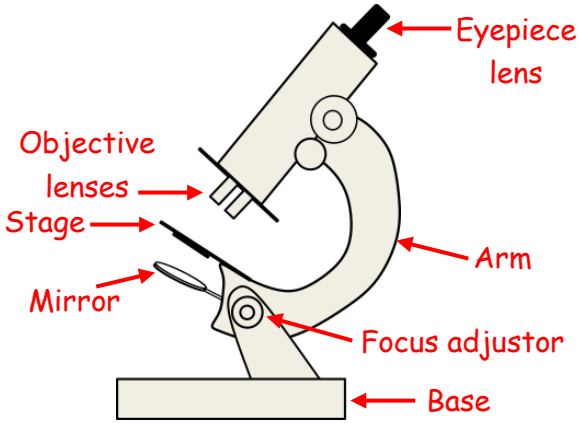
Where does photosynthesis occur? In plant leaves (more specifically, in the chloroplasts in leaf cells)

Tissues

What is a tissue?

A group of the same cell type, e.g. muscle tissue.

Microscopes are used to view tissues in detail. Label the light microscope below.



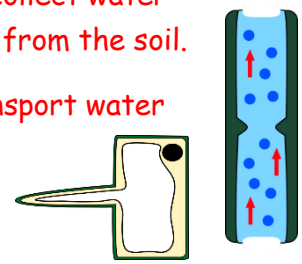
What is the overall magnification of a microscope with an eyepiece lens of x5 and objective lens of x4? 5 x 4 = 20

Overall magnification = x20

State the function of the following tissues:

Root hair tissue – to collect water and mineral nutrients from the soil.

Xylem tissue – to transport water from roots to shoots and leaves.



Forces

Different Forces

Define what a force is.

A force is a push or a pull.

What is the unit of force?

Newton (N)

How do we represent forces?

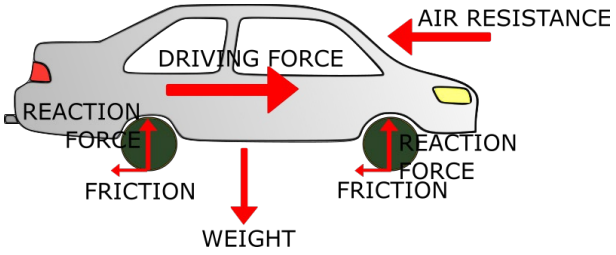
With arrows.

Explain the difference between contact and non-contact forces, giving examples for each.

Contact force – a force where there needs to be contact between objects, e.g. friction.

Non-contact force – a force that can affect something from a distance, e.g. gravity.

Sketch a force diagram showing the forces acting on a moving car.



Summarise the difference between mass and weight.

The mass of an object is the **amount of matter** it contains.

Weight is a force caused by gravity. The weight of an object is the **gravitational force** between the object and the Earth.

Friction

How can friction be increased?

Create a "rougher" surface on the objects.

How can friction be reduced?

By applying lubricant/oil.

Give an example of where friction is useful.

Brakes on a car to help slow the car down.

Give an example of where friction is not useful.

Friction in engines and machinery.

Pressure

Define pressure.

Pressure is the amount of force pushing on a certain area.

Give the equation used to calculate pressure. State the units in your equation.

Pressure = force ÷ area

(N/m^2) (N) (m^2)

N/m^2 is also called Pascal (Pa)

Use the equation to fill in the table below.

Pressure (Pa)	Force (N)	Area (m^2)
10	200	20
4,000	800	0.2
6	180	30

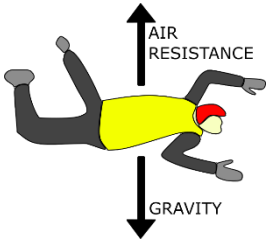
Springs

State the equation used to calculate the energy transferred in stretching.

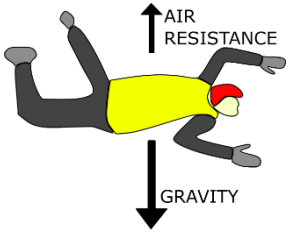
Energy transferred in stretching (J) = $\frac{1}{2}$ x spring constant (N/m) x (extension)^2 $(m)^2$

Balanced and Unbalanced forces

Sketch a force diagram of **balanced** forces acting on a skydiver. Label theses forces.



Sketch a force diagram of **unbalanced** forces acting on a skydiver. Label theses forces.



If the forces on an object are balanced, what will happen to the object?

- If the object is stopped: it will remain stopped.
- If the object is moving: it will continue to move at the same speed and in a straight line.

State the two things that can happen if the forces on an object are unbalanced.

- The speed will change.
- The direction of motion will change.

Sexual Reproduction in Animals

Animal Sexual Reproduction

Sexual reproduction requires two individuals to produce new organisms of the same type.

State the gametes that males make.

Sperm cells

State the gametes that females make.

Egg cells

What happens during fertilisation?

A sperm cell enters an egg cell and the two nuclei of the cells fuse to become one.

Explain the difference between external and internal fertilisation.

External fertilisation – happens outside the bodies of the animals, e.g. fish.

Internal fertilisation – the male parent places sperm cells inside the female.

Becoming Pregnant

During sexual intercourse, what is the name for the mixture of sperm cells and fluids from glands that get released from the male sex organ?

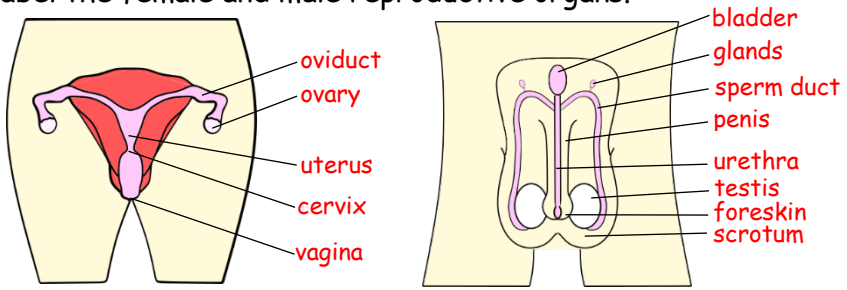
Semen

What fuses together during fertilisation?

A sperm cell and egg cell.

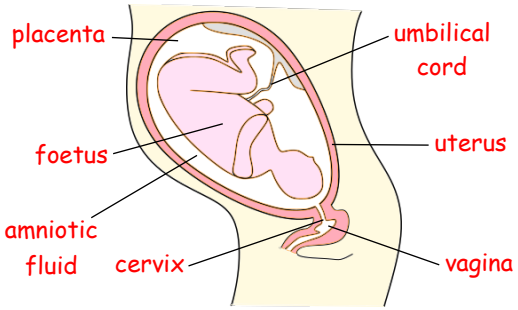
Reproductive Organs

Label the female and male reproductive organs.



Gestation

Label the diagram of a human pregnancy.

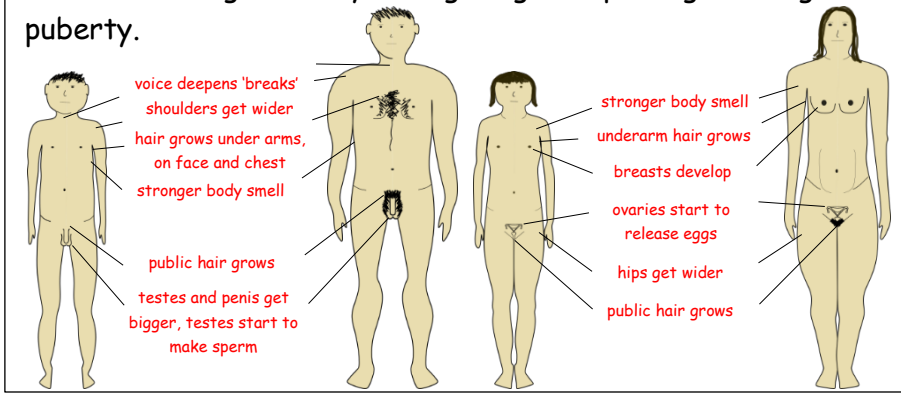


The foetus is surrounded by a fluid-filled sac. What is this sac called and what is its use?

Amnion filled with amnionic fluid to protect the baby.

Growing Up

Label the changes as boys and girls grow up and go through puberty.



Key Definitions

Gametes – sex cells.

Fertilisation – when a sperm cell enters an egg cell and the two nuclei of the cells fuse together to form one.

Offspring – an animal's young, e.g. a human's child.

Specialised cells – cells that have a structure which makes them adapted to their function.

Zygote – a cell with a complete set of chromosomes created through the fertilisation of two gametes.

Embryo – a ball of cells formed from the zygote cell dividing multiple times.

Implantation – when the embryo attaches itself to the uterus.

Gestation – the time from fertilisation until birth.

Puberty – A time during which big physical changes happen in the body.

Adolescence – A time when physical and emotional changes occur in teenagers.

The Menstrual Cycle – A recurring process which takes around 28 days. During the process, the lining of the uterus is prepared for pregnancy. Menstruation then occurs if the implantation of the fertilised egg into the uterus lining does not happen.

Hormones – Chemical messengers.