Science: Year 7 Topic 2. Autumn Term

Organisms- Cells

This unit aims to give KS3 students an overview of the organisation of living things from single cells through to organ systems. They will start to look at how the structural differences between types of cells allow them to perform specific functions within the organism.

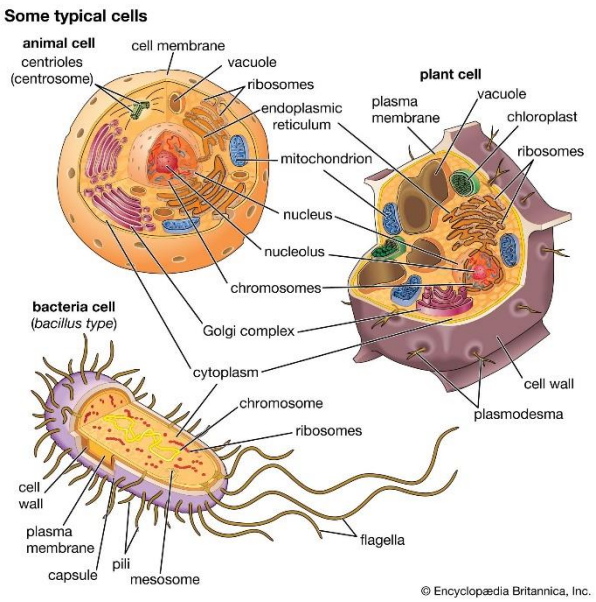
- Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope.
- State the structure and function of all organelles in plant, animal, and bacterial cells.
- Explain why multi-cellular organisms need organ systems to keep their cells alive.
- Suggest what kind of tissue or organism a cell is part of, based on its features.
- Recall and apply the role of diffusion in the movement of materials in and between cells.
- Explain how to use a microscope to identify and compare different types of cells.
- Explain how uni-cellular organisms are adapted to carry out functions that in multi-cellular organisms are done by different types of cells.
- Understand and explain the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.

Assessment:

Mixed topic exam style questions (50 min)

Specialist key terms for this unit:

Cell: The unit of a living organism, contains parts to carry out life processes.
Uni-cellular: Living things made up of one cell.
Multi-cellular: Living things made up of many types of cells.
Tissue: Group of cells of one type.
Organ: Group of different tissues working together to carry out a job.
Diffusion: One way for substances to move into and out of cells.
Structural adaptations: Special features to help a cell carry out its functions.
Cell membrane: Surrounds the cell and controls movement of substances in and out.
Nucleus: Contains genetic material (DNA) which controls the cell's activities.
Vacuole: Area in a cell that contains liquid and can be used by plants to keep the cell rigid and store substances.
Mitochondria: Part of the cell where energy is released from food molecules.
Cell wall: Strengthens the cell. In plant cells it is made of cellulose.
Chloroplast: Absorbs light energy so the plant can make food.
Cytoplasm: Jelly-like substance where most chemical processes happen.
Immune system: Protects the body against infections.
Reproductive system: Produces sperm and eggs and is where the foetus develops.
Digestive system: Breaks down and then absorbs food molecules.
Circulatory system: Transports substances around the body.
Respiratory system: Replaces oxygen and removes carbon



Suggested enrichment activities:

Visit the science museum which as a great exhibit on the human body.

Create a paper mache/ putty/play doh replica of an animal, plant or bacterial cell.

Interactive cell website:
https://sciencewiz.com/portals/cells/

Science: Year 7. Autumn Term

Topic: Fundamentals of physics

This unit begins by understanding how to identify when a force is acting and that sometimes there is no observable effect. It continues by developing knowledge of the causes of forces which arise from interactions between objects and representing all forces acting on an object by the use of free body diagrams.

Students will also learn of the possible effects of balanced and unbalanced forces acting, in terms of changes to motion and shape.

Students will also be introduced to energy stores – pathways model of analysing energy transfers between stores/objects/systems using 'end-point analysis', with a particular emphasis on how forces cause a change in energy stores.

Assessment:

This unit will form part of the Autumn term assessment

Specialist key terms for this unit:

balanced forces **contact force** **control measure** **deformation** **energy store**
energy pathway **equilibrium force** **force-meter** **free-body force diagram**
friction **hazard** **hypothesis** **interaction** **lubricant** N**ewton**
non-contact force **resultant force** **risk** **unbalanced forces** **unit**

Suggested enrichment activities:

Investigate elastic potential energy transfers by making a paper plane launcher
https://www.youtube.com/watch?v=9Fv0-501msc&t=3s

Key Concept: Forces and Motion

A force when applied to an object will make the object change shape, speed or direction. The size and magnitude of a force can be represented by arrows on a diagram. Air resistance, drag and friction are all examples of stopping forces, and there are various things that can be done to reduce their effects. Energy transfer occurs when one energy store transfers energy to another. This can occur mechanically (when a force is applied) chemically, electrically, or as radiation. Diagrams can be used to show energy transfer and that energy is always conserved.

Science: Year 7. Autumn Term

Topic: Particles, Substances and Mixtures

The themes that are covered in this unit include 'particles', 'substances' and 'matter'. This unit begins by introducing the particle model of matter (without mentioning the atom or subatomic particles at this stage), with students describing the arrangement, movement and forces of attraction between the particles of matter in the solid, liquid and gas states, alongside drawing accurate particle model diagrams to represent each state. Students then explore the properties of the states of matter and use the particle model to explain these properties.

Progressing further, students deepen their understanding of changes of state, drawing and explaining changes of state in terms of particles and identifying why a change of state is a physical change. This leads on to the exploration of melting and boiling points, how particle attraction affects these and how to predict the states of matter based on the given melting and boiling points. The difference between boiling and evaporating is addressed, as well as students being able to observe what happens to temperature during a state change, via teacher demonstration. Students then apply the particle model of matter to diffusion and gas pressure.

The unit continues by exploring pure substances and mixtures, and students learn how to differentiate between the two, as well as how to apply the particle model to understand solutions and the process of dissolving. The concept of conservation of mass in solutions is developed through investigation, and students also explore saturation and solubility in solutions, including how temperature and different solvents affect solubility.

Assessment:

This unit will form part of the Autumn term assessment

Specialist key terms for this unit:

aqueous solution **boiling point** **chromatogram** **conservation of mass** **diffusion** **dissolving** **distillation** **evaporate** **filtering** **forces of attraction** **gas pressure** **molten** **observation** **pure substance** **selectively permeable** **solubility** **soluble** **temperature** **properties** **saturated**

Suggested enrichment activities:

Everyday Separations: Filter coffee grounds, boil salt water, or separate a mixture of oil and water to physically separate components without altering the substances themselves.
https://www.youtube.com/watch?v=YuAgl0uV5uA&t=24s

Key Concept: Evaporate

To evaporate means to convert a liquid into a gas (vapor). This happens when molecules near the surface absorb enough energy to overcome the liquid's vapor pressure, escaping into the surrounding air. It occurs at temperatures below the boiling point and is utilized in processes ranging from the Water Cycle to drying clothes.

Subject: Year 7

Enquiry process

In this topic, students will discover the properties of the Equiry process and will be able to:

- Identify variables that you could not control properly.
- Identify aspects of the method that did not go according to plan.
- Calculate a mean from a set of data.
- Read values from a line graph.
- Identify the variables from information about an investigation.
- Suggest other possible conclusions that could be drawn from your data.
- Decide the type of chart or graph to draw based on its purpose or type of data.
- Design a table for the data being gathered. Label the x axis with the name of the independent variable and the y axis with the dependent variable.
- Write unit labels on the axes.
- Decide which numbers to start and finish with on each axis.
- Mark out an equal scale showing what each square of graph paper represents.
- Draw a straight line or a curve of best fit through the points.
- Describe how the strategies help communicate ideas better.
- Suggest how the ideas would be communicated for a different audience.

Assessment:

Formative assessment: 50 Minutes

Specialist key terms for this unit:

Linear relationship	Outlier	Mean
Experimental error	Control variable	Independent variable
Continuous variable	Discontinuous variable	Dependant variable
Observation	Evidence	Repeatable

Key Scientific method:
The scientific method is an empirical method for acquiring knowledge that has characterized the development of science since at least the 17th century. The scientific method involves careful observation coupled with rigorous scepticism, because cognitive assumptions can distort the interpretation of the observation.

Subject reading/further support:

YouTube:

Variables:
https://www.youtube.com/watch?v=R16p4q7Voi4

Scientific Method:
https://www.youtube.com/watch?v=c6Gp2R0wzhU

Drawing graphs:

https://www.youtube.com/watch?v=8FVM2JGfoMQ

https://www.youtube.com/watch?v=PzmxIkPWamI

Suggested enrichment/wider reading activities:

Visit: MME Revision - https://mmerevise.co.uk/ks3-revision/key-stage-3-science/

Seneca - https://senecalearning.com/en-GB/