

Understanding this is important because:

Cells are the building blocks of life. A simple understanding of structures found in cells and how cells work in animals and plants. Microscopes are scientific instruments that allow structure and function of cells to be studied. Diffusion as an example of transport.

Key Skills:

- Using and focusing a microscope
- Preparing simple specimens of animal and plant cells on slides for observation using a microscope.
- Investigating diffusion using teabags.
- Investigating diffusion at different temperatures and different concentrations (usually with coffee)

Assessment:

Summative:

- Cells structure and function CCT 1

Formative:

- White board retrieval quizzes, cell structure standardised homework, White workbook self-marked homework pages 1 to 6. Educake CCT Quiz

Curriculum Enhancement:

- Key stage 3 bitesize
- <https://www.bbc.co.uk/bitesize/topics/znycdm/articles/zkm7wnb>
- Key stage 3 Biology revision guide
- Key stage 3 Biology workbook
- Year 7 teacher google classroom

'The Big Picture':

- The similarities and differences between the structure of animal and plant cells
- The function of some of the different structures found in cells
- The parts and function of the light microscope
- How to prepare specimens for observation under a microscope
- The levels of organisation—cells, tissues, organs, organ systems, organism.
- A description of cell differentiation and the structure and function of some specialised cells
- Simple description of how cells divide and how organisms grow
- The structure of some unicellular organisms including bacteria
- Transport in and out of cells by simple diffusion and why this is important.

Key Vocabulary / Terms:

Nucleus, cell membrane, cytoplasm. Differentiation and specialised cell examples, unicellular organism examples. Diffusion

Prior Learning

- Key stage 2 cells—all living things are made of cells.
- Some organisms are just one cell whilst others are trillions of cells.

Cross Curricular Links:

- Art—drawing cells. D & T—technology of microscopes. Chemistry—diffusion.

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Understanding this is important because:

Movement is one of the seven characteristics of life. The importance of the skeleton and muscles to enable this movement. Breathing is important to obtain oxygen rich air and release carbon dioxide rich air—respiration—another life characteristic

Key Skills:

- Completing a carousel activity—investigating different bones, skulls and bones that have been left to soak in acid
- Completing an investigation to look at exercise and the effects on heart rate and breathing rate
- Using the spirometers to measure lung capacity
- Moving different parts of the body to investigate levers

Assessment:

Summative:

- CCT—Skeleton, muscles and breathing

Formative:

- White board retrieval quizzes, skeleton, muscles and breathing standardised homework, White workbook self-marked homework pages 21-24 and 25-30, Eudcake

Curriculum Enhancement:

- Key stage 3 bitesize
- <https://www.bbc.co.uk/bitesize/topics/znyy/cdm/articles/zgbddp3>
- Key stage 3 Biology revision guide
- Key stage 3 Biology workbook
- Year 7 teacher google classroom

'The Big Picture':

- Structure of the skeleton
- Function of bones, joints, tendons and ligaments
- Biomechanics— bones act as levers
- Structure of the breathing / respiratory system, to include trachea (windpipe), bronchi, bronchioles, alveoli, diaphragm
- Gas exchange between the alveoli and blood capillaries
- Importance of diffusion for gas exchange—oxygen in to the blood and carbon dioxide out of the blood
- Effect of exercise on breathing rates and heart rates
- The link between exercise, energy needs and respiration
- Effects of asthma and smoking on lung function and breathing

Key Vocabulary / Terms:

Antagonistic muscles, tendons, ligaments, joints, lever, fulcrum, pivot, emphysema, bronchitis, asthma.

Prior Learning

Key stage 3 respiration and diffusion
Key stage 2—skeleton and movement—how do muscles and bones enable movement / breathing and respiration topic

Cross Curricular Links:

- PE & Games—How we move.
Physics—Bones as levers.

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Understanding this is important because:

Cells are the building blocks of life. A deep understand of the structure of cells and the function of the parts that make up cells in eukaryotic and prokaryotic organisms

Prior Learning

KYear 7 cells topic—structure and function of animal/plant cells, specialised cells, light microscope parts and use.

Key Skills:

- How to make microscope slides
- Focusing a microscope
- Required practical 1—observing and drawing correctly animal and plants cells after viewing under a microscope
- Calculating magnification using data on real size and image size

'The Big Picture':

- The similarities and differences between the structure of eukaryotic and prokaryotic cells.
- The structure of animal, plant and bacterial cells
- The function of the different parts (organelles) found in cells
- The structure and function of specialised cells in animals focusing on sperms cells, nerve cells and muscle cells
- The structure and function of specialised cells in plants focusing on xylem cells, phloem cells and root hair cells
- The differences between electron and light microscopes in terms of resolution and magnification and the ability to see sub-cellular structures
- Calculating magnification using real size and image size data

Assessment:

Summative:

- Cells structure and function CCT,

Formative:

- White board retrieval quizzes, Cell structure standardised homework, White workbook self-marked homework pages 1 to 5, Educake

Cross Curricular Links:

- Rearranging equations in Maths, ART—drawing cells.

Key Vocabulary / Terms:

Eukaryote, prokaryote, ribosome, cell differentiation, resolution, magnification, sub-cellular structures/organelles

Curriculum Enhancement:

- <https://www.bbc.co.uk/bitesize/guides/z84jtv4/revision/1>
- Year 9 teacher google classroom
- Year 9 stretch and challenge classroom
- Kerboodle online login

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Understanding this is important because:

It helps to understand how plants are adapted to carry out the transport of water, mineral ions, sugars and gas exchange.

Key Skills:

- How to make microscope slide template of stomata
- Focusing a microscope
- Calculating magnification
- Using a potometer

Assessment:

Summative:

- Organisation in plants CCT.

Formative:

White board retrieval quizzes, Plant transport standardised homework, White workbook self-marked homework pages 36-39, Educake.

Curriculum Enhancement:

- Year 10 teacher google classroom
- Year 10 stretch and challenge classroom
- Kerboodle online login
- <https://www.bbc.co.uk/bitesize/guides/zyk8msg/revision/1>

'The Big Picture':

Label the main organs of a plant and describe their functions. Identify the tissues in a leaf and describe their functions. Relate the structure of each tissue to its function in photosynthesis. Explain why there are more stomata on the lower surface of a leaf.

Describe the role of stomata and guard cells to control water loss and gas exchange.

Calculate stomatal density.

Describe the organs that make up the plant transport system.

Describe the role of xylem, phloem and root hair cells and explain how they are adapted for their functions.

Define the terms 'transpiration', 'transpiration stream' and 'translocation'.

Key Vocabulary / Terms:

Transpiration, transpiration stream, translocation, xylem & phloem, potometer, stomata, guard cells, spongy mesophyll, palisade mesophyll, epidermis

Prior Learning

Year 7 cells topic—structure and function plant cells, specialised cells & plant tissues.

Cross Curricular Links:

- MATHS -Calculating mass loss,
- ART—drawing guard cells.

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Key Skills:

- How to make microscope slide template of stomata
- Focusing a microscope
- Calculating magnification
- Using a potometer

Assessment:

Summative:

- Organisation in plants CCT.

Formative:

White board retrieval quizzes, Plant transport standardised homework, White workbook self-marked homework pages 36-39, Educake.

Curriculum Enhancement:

- Year 10 teacher google classroom
- Year 10 stretch and challenge classroom
- Kerboodle online login
- <https://www.bbc.co.uk/bitesize/guides/zyk8msg/revision/1>

'The Big Picture':

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Cross Curricular Links:

- MATHS -Calculating mass loss,
- ART—drawing guard cells.

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Understanding this is important because:

To further our understand of different types of reproduction and develop our knowledge in the inheritance of genes. The human genome is being research now and this exciting area of bioscience is part of the future of biotechnology in many key industries.

Key Skills:

- Using punnet squares to predict phenotype ratios from genetic crosses

Assessment:

Summative:

- Reproduction and inheritance CCT

Formative:

In lesson White board retrieval quizzes, reproduction and inheritance standardised homework, White workbook self-marked homework, CCT revision homework, Educake

Curriculum Enhancement:

- <https://www.bbc.co.uk/bitesize/guides/z8t47p3/revision/1>
- Year 10 teacher google classroom
- Year 10 stretch and challenge classroom
- Kerboodle online login

'The Big Picture':

Describe the differences between asexual and sexual reproduction.

Evaluate the advantages and disadvantages of sexual and asexual reproduction.

Describe and explain the importance of meiosis

Describe the structure of DNA

Explain how DNA codes for proteins

Outline the process of producing proteins from DNA in cells

State the role of DNA mutations in protein production

Define the genome and explain its importance to science

Define key inheritance terms

Analyse pedigree charts to predict phenotypes using punnet squares (see key skills).

Explain the inheritance of genetic disorders focusing on Polydactyly caused by dominant alleles and cystic fibrosis caused by recessive alleles.

Evaluate the ethical, social and financial implications of embryo screening.

Key Vocabulary / Terms:

DNA, Gene, Chromosome, genome, bases, heterozygous, homozygous, dominant, recessive, alleles, genotype, phenotype

Prior Learning

Year 8 topic— on variation focusing on DNA and Genes

Year 7 topic on reproduction in animals

Year 9 topic on cell division

Cross Curricular Links:

- MATHS -Calculating mass loss,
- ART—drawing guard cells.

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Understanding this is important because:

This topic is important because:- all life on Earth shares a common Chemistry. Despite the great variety that exists between species, all living organisms contain only a few groups of carbon based molecules that interact in very similar ways

Key Skills:

Required Practical—Use colorimeters to investigate the effect of a named variable on the rate of enzyme controlled reactions

Draw molecular diagrams of alpha glucose, beta glucose, amino acids, DNA/RNA nucleotides, ATP

Describe the biochemical tests for starch, reducing sugars, non-reducing sugars, lipids and proteins

Assessment:

Summative:

- SFT 1 —Biological Molecules, SFT 2 - Enzymes, DNA, ATP, cells and mitosis

Formative:

White workbook pages 3 to 15

Self-assess homework— Biological Molecules, DNA/ATP & Water

Assessed homework on biological molecules and DNA/ATP

Curriculum Enhancement:

- Google classroom - A-level Stretch and Challenge and A-level Biology revision
- Maths and physics tutor—<https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/biological-molecules/>
- Miss Estruch Biology videos—<https://www.youtube.com/channel/UCN4caNO-ij8-4jGB1W0do9w>

'The Big Picture':

Describe what a monomer and polymer is

Describe, explain and relate the structure to the function of key carbohydrates

Describe, explain and relate the structure to the function of triglycerides and phospholipids

Describe and explain the general structure of amino acids and the effects of protein structure

Describe and explain the key properties and functions of enzymes

Describe, explain and relate the structure to the function of nucleotides found in RNA and DNA

Describe and explain the key stages in DNA replication

Describe and explain the structure of ATP and its role in living organisms

Describe and explain the properties of water

Describe and explain the common uses of in-organic ions in living organisms

Key Vocabulary / Terms:

Mono/di/poly-saccharide, glycosidic/peptide/ester/phosphodiester bond, triglyceride, phospholipid, di-peptide, polypeptide, primary/secondary/tertiary/quaternary protein structure, Induced fit, competitive/non-competitive inhibition, DNA, RNA, ATP.

Prior Learning

Glucose, cellulose, glycogen and starch from various GCSE topics, Cells and enzymes, Digestive enzymes, Inheritance and reproduction from Year 9, 10 and 11

Cross Curricular Links:

- Maths—graph drawing and calculations, Chemistry—bonding, structure of molecules

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Understanding this is important because:

TLife depends on continuous transfers of energy. The process of photosynthesis is common in all photoautotrophic organisms and the process of respiration is common in all organisms, providing indirect evidence for evolution.

Key Skills:

Required practical 7: Use of chromatography to investigate the pigments isolated from leaves of different plants, eg, leaves from shade-tolerant and shade-intolerant plants or leaves of different colours, Required practical 8: Investigation into the effect of a named factor on the rate of dehydrogenase activity in extracts of chloroplasts, Required practical 9: Investigation into the effect of a named variable on the rate of respiration of cultures of single-celled organisms

Assessment:

Summative:

- Yr 13 SFT 2 - Energy in ecosystems, Year 13 mock exam and Summer mock exam.

Formative:

White workbook pages— 75 to 89

Self-assess homework— Photosynthesis, respiration & nutrient cycles

Teacher assessed homework — Photosynthesis, respiration & nutrient cycles

Curriculum Enhancement:

- Google classroom - A-level Stretch and Challenge and A-level Biology revision
- <https://www.physicsandmathstutor.com/biology-revision/a-level-aqa/energy-transfers-in-between-organisms/>
- Miss Estruch Biology videos—<https://www.youtube.com/channel/UCN4caNO-ij8-4jGB1W0do9w>

'The Big Picture':

The light dependent stage of photosynthesis.

The light independent stage of photosynthesis.

Environmental factors that limit photosynthesis.

The process of glycolysis.

The link reaction and krebs cycle in aerobic respiration.

The role of oxidative phosphorylation in aerobic respiration.

Anaerobic respiration produces either lactate or ethanol & carbon dioxide.

The role of biomass in food chains and how biomass is measured

The relationship between GPP, NPP and net production of consumers

Design of farming practises to maximise efficiency in energy transfers

The recycling of materials in the nitrogen and phosphorus cycles

The role of micro-organisms in the nitrogen cycle and the phosphorus cycle

The use of fertilisers to replaces nitrogen and phosphorus lost in the soil

Evaluating the environmental impact of fertiliser use

Key Vocabulary / Terms:

Photo-ionisation, photolysis, thylakoid, grana, stroma, RuBP, rubisco, GP, triose phosphate, glycolysis, link reaction, krebs cycle, oxidative phosphorylation, NADP, NAD, FAD, chemiosmosis, NPP, GPP, productivity, saprobionts, mycorrhizae, nitrogen fixation, nitrification, ammonification, denitrification.

Prior Learning

KS3/4 —Bioenergetics, eukaryotic cell structure, interdependence and adaptations

A-level— ATP, transport, protein structure, enzyme structure, carbohydrates.

Cross Curricular Links:

- Maths— Energy efficiency in food chain calculations, calculating rates of reaction. Chemistry— Redox reactions, rates of reaction, PE— Aerobic and anaerobic respiration in humans, Physics—concepts of energy, Geography—environmental sciences

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