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| **Topic:** B1 Cells and Organisation (12 lessons)In this unit you will be finding out why you have a skeleton and how it works together with your muscles to enable you to move. You will then look inside organisms to discover what plants and animals are made of. You will learn how to view the building blocks of life using microscopes and investigate different cells that are specially adapted for their important roles in organisms. Finally, you will meet some tiny organisms that can only be seen under a microscope.  |
| **Core Questions for the Unit** | Core questions:1. What are the function and structure of the human skeleton to include support, protection, movement and making blood cells?
2. State the functions of the skeleton
3. Describe how the functions of the skeleton work together in a human
4. Describe the structure of the skeleton (not necessary to learn every bone!), can talk through some common examples
5. How does the skeleton and muscle interact, including the measurement of force exerted by different muscles?
6. State the role of ligaments and tendons
7. Describe how muscle and skeleton works together
8. Explain how to measure the force exerted by different muscles
9. What is the function of muscles and can you name examples of antagonistic muscles?
10. Describe the function of a muscle
11. State the names of antagonistic pairs
12. Describe what an antagonistic pair of muscles is
13. Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope
14. Required practical
15. What are cells and do they differ?
16. identify animal, plant and prokaryotic cells.
17. Specialised cells to include: sperm, egg, root hair cell, red blood cell and nerve cell.

 1. What are cells made of? *Organelles: Vacuole, membrane, cell wall, nucleus, mitochondrian, chloroplast, cytoplasm, ribosome.*
2. Identify organelles within a cell
3. Identify their function
4. What are the similarities and differences between plant, animal and prokaryotes? *(Double bubble map/organelles)*
5. Structure function of animal, plant and prokaryote (bacteria)
6. Include examples of each.
7. How can we observe them?
8. Microscope practical (Required practical)
9. Calculate magnification
10. Scientific drawing
11. The role of diffusion in the movement of materials in and between cells
12. Define diffusion
13. Describe what substances are necessary to i) be taken in by cells and ii) excreted by cells
14. The structural adaptations of some unicellular organisms
15. Know or state adaptations of unicellular organisms i.e. Euglena, Yeast.
16. Describe how these adaptations benefit organism.

11. The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms1. Give examples of both plant and animal to depict this.
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| **Links to other subjects** | PE- Muscles, joints and skeletonMaths- Microscopy calculations, unit conversions DT- 3D printing of joints  |
| **Scientific skill development****You will compete practical activities using microscopes to view cells**  | * You will prepare a sample of plant cells t view under a light microscope
* You will present drawings of magnified images
* You will label drawing correctly to include; magnification, organelles seen.
* You will evaluate what can be seen with a light microscope
* You will investigate factors that affect diffusion
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| **Development of new knowledge****(this is from the national curriculum)**  | 1. The structure and functions of the human skeleton, to include support, protection, movement and making blood cells
2. Biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles
3. The function of muscles and examples of antagonistic muscles
4. Cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope
5. The functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts
6. The similarities and differences between plant and animal cells
7. The role of diffusion in the movement of materials in and between cells
8. The structural adaptations of some unicellular organisms
9. The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms
 | **Strengthening of prior****knowledge** | **SCIENCE****Working Scientifically Skills:**Converting units in KS1/2**Scientific content:**Year 6 Transport of nutrients in bloodSingle celled organisms in living things  |
| **Vocabulary:** | **Tier 2 Words:**Analyse Compare Contrast Describe ExplainExtend Focus Function Observe similarity  | **Tier 3 Words:**AmoebaBacteriaCellCell wallChloroplastCytoplasmDiffusionDiffusionEuglenaMagnifyMembraneMicroscopeMitochondriaMulticellularNucleusObjective lensOrganellepermeableProkaryoteRibosomesUnicellular | **Reading Opportunities****Numeracy Opportunities** | * History text books: History of the microscope (Robert Hooke)- no specific text book found just yet.
* Science text book will have at least 1 page of cells (different depending on your school)
* Robert Hooke- More than just springs article (**in the one drive folder for reading opportunities**) – please be aware this is based on a KS4 reading age and may need adapting for your students.

 **Maths:** Equation for magnification of images. Use formula M= I/A Simple unit changes (mm 🡪 cm)  |
| **Suggested approaches to deliver content through scientific skills*** Key Experiments
* Seek and Find (enquiry)
* Possible enrichment opportunities
 |  1. What are the function and structure of the human skeleton to include support, protection, movement and making blood cells?
* Do it now: image of skeleton on the board and as who/what/where/when/why about it to get prior knowledge
* Function of the skeleton using image clues to work out the functions instead of just telling students
* Print cards with different skeleton images on (e.g. different animals), so you can differentiate the more challenging ones and get students to write a paragraph of why the skeleton is so important to that animals

Differentiation ideas: Lower students = humans, middle = cheetah, higher= bird or something unusual 1. How does the skeleton and muscle interact, including the measurement of force exerted by different muscles?
* Retrieval practice: Given an image of ligament and tendon and answer questions on them (e.g. what do they connect, what is their role, how are they similar, how are they different)
* Higher students could have a scenario where the tendons/ ligament is damaged.
* Use an example like Mo Farah winning a race and students (can be used a key word bank) write down how his skeleton and muscles have worked together (could allocate points to each key words to encourage use of extensive vocab)
* Alternative practical: Resistant bands to measure force of people in the class or using different body parts, Newton meter (probably not covered in Physics yet) to introduce, or weighing scales but to push down on using different parts of the body and measure the ‘force’
1. What is the function of muscles and can you name examples of antagonistic muscles?
* Youtube clip for the function of a muscle: <https://www.youtube.com/watch?v=VVL-8zr2hk4> only to 1min 10 secs
* Teacher explanation of antagonistic pairs, then students get images of muscles and have to circle the pairs, challenge then to describe why they are antagonistic and then maybe suggest a movement they are useful for?
1. What are cells and do they differ?
* Retrieval practice/ do it now: Tier 3 words definition match up (bone, muscle, ligament, tendon, contract)
* Identify differences of animal, plant and prokaryotic cells from diagrams
* Thinking map- Venn diagram/ double bubble of differences
* Info hunt around the room or research task for specialised cells which *must* include: sperm, egg, root hair cell, red blood cell and nerve cell.
* Extended writing: Describe how sperm cells and root hair cells are adapted for their functions.

 1. What are cells made of? *Organelles: Vacuole, membrane, cell wall, nucleus, mitochondria, chloroplast, cytoplasm, ribosome.*
* Retrieval practice/ do it now: Labelling a cell diagram from memory or collective memory
* Match up the key word to the image
* Match up the key word to the function
1. What are the similarities and differences between plant, animal and prokaryotes?
* Retrieval practice/ Thinking map- Double bubble map of types of cells
* Making models
* Presentation on each cell
* Thinking map to show similarities and differences
* Retrieval grid of questions relating to cells (with points awarded in relation to how difficult they are)
1. How can we observe them?
* Microscope practical (Required practical)
* WAGOLL for drawing cells from the microscope and using a microscope safely
* Calculate magnification (use modelling then students can do it with their own practical- I DO, WE DO, YOU DO would work here)
* Scientific drawing (modelled or given a bad diagram to correct and create a set of rules for good diagrams)
* Reading opportunity on the discovery of microscopes (see one drive folder)
1. The role of diffusion in the movement of materials in and between cells
* Cryptogram or word puzzle to work out definitions
* Demo- air freshener in the classroom, all stand up and sit down when they can smell it
	+ **BE AWARE DIFFUSION IS ALSO IN CHEMISTRY SO TRY TO RELATE MORE TO CELLS RATHER THAN ANYTHING ELSE**
* Describe what substances are necessary to i) be taken in by cells and ii) excreted by cells using video clips which students can complete a cloze activity about
* Students could create a model cell/ draw one out on a3 and label when needs to go in and out etc.
1. The structural adaptations of some unicellular organisms
* Retrieval practice of specialised cells e.g. card sort, quiz, true/ false
* Diagram of a Euglena/ yeast and label what is different about it/ compare to diagram of an animal or plant cell
* Thinking map using laptops e.g. flow chart of- what is the adaptation 🡪 then what is it used for 🡪 then why is it used
1. The hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms
* Retrieval practice of cell parts and their function (tier 3 words)
* Card sort with examples of cells, tissues and organ systems to group
* Card sort to order the structures (or then add a category name to their card sort of examples)
* Match up the key phrase to the example (e.g. muscle to tissue)
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| **How you will be assessed** | You will be assessed by: * A retrieval quiz during the Do It Now of every lesson.
* Mini quizzes and challenges during lesson.
* A progress assessment in the middle of the unit – Here we will reflect and improve on key areas and complete DIRT work.
* An end of unit assessment that assesses your knowledge and skills that you have built in this unit and previous units that we link back to.
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