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Year 9 Autumn Term 1

Motion and Pressure (ESA/CRD)

Science, Year 9, unit 1 of 12

What previous learning am I building on?	
• Year 7 Forces – gravity, weight, friction, air resistance and water resistance, and representing forces with force diagrams • Year 7 Movement – using force diagrams and simple biomechanics to describe how the skeleton and muscles interact • Numeracy and graph skills built across Year 7 and Year 8 units – plotting and interpreting graphs, and using equations with units	By the end of this unit, I will: Understand Know • Be able to •
Learning Journey – lesson title and main activities	

1 Speed Numeracy: Using the speed formula to calculate speeds, distances and times, taking care with units.			
2 Displacement Time Graph Skills: Distinguishing between the key terms distance and displacement. Learning how to read displacement-time graphs and describe an object's speed at different points. (This will take two lessons)			
3 Pressure in Gases Literacy: Describing the factors that affect gas pressure and how atmospheric pressure changes with height.			
4 Pressure in Liquids Command Words: <u>Describing</u> why some things sink and float using force diagrams, <u>predicting</u> and <u>explaining</u> how water pressure changes with depth			
5 Pressure on Solids Numeracy: Use an equation to calculate pressure from mass and volume, taking care with units.			
6 Levers Numeracy: Linking forces and rotation (moments). Calculating moments using force and distance and using this to predict which way an object turns.			
7 Summary			
How will I be assessed at the end of this unit?			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?

Variation (MSC)

Science, Year 9, unit 2 of 12

What previous learning am I building on?	What am I learning that is new?
• Year 7 Interdependence – ecosystems, food chains and webs, adaptation to the environment, and predator–prey population changes • Year 7 Cells – classifying living things and describing similarities and differences between organisms • Graph-drawing and data-handling skills developed across Year 7 (e.g. Interdependence, The Universe)	By the end of this unit, I will: Understand Know • Be able to •

Learning Journey – lesson title and main activities			
1 Variation Students learn the definition of variation, are able to describe how variation occurs and explain the differences between environmental and inherited variation			
2 Continuous and Discontinuous Variation Students able to give examples of continuous and Discontinuous Variation and can identify variation type based on graphical presentation •Skill Graph Drawing – line graph for continuous data			
3 Variation Investigation Investigation into a continuous variable – arm length •Skill – Make accurate measurements, collate class data and present data on a graph			
4 Adapting to change Student able to describe and explain predator- prey relationships – building on knowledge from Year 7 Ecosystems unit Explore evidence for the snow hare and artic fox and be able to describe the pattern from population changes graph Skill – Graph interpretation			
5 Enrichment Lesson – Investigation into Apple Varieties Plan an investigation in the variation of two different apple varieties Carryout the investigation and present data using graphs			
6 Review and Summary			
How will I be assessed at the end of this unit?			
End of topic test			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?

Climate (AFA)

Science, Year 9, unit 3 of 12

What previous learning am I building on?	What am I learning that is new?
•Year 8 Types of Reaction – combustion, oxidation and chemical equations, and how burning fuels changes the atoms present • Year 8 Metals and Non-Metals – the reactivity series and comparing the properties of metals • Year 7 Earth's Structure – the composition of the Earth and how	By the end of this unit, I will: Understand Know • Be able to •

materials are recycled through natural cycles such as the rock cycle			
Learning Journey – lesson title and main activities			
1 Global warming			
What is global warming? What is the atmosphere? The greenhouse effect explained. Students watch a video about the facts of climate change and answer questions			
2 The carbon cycle			
Diagram: Interpreting the carbon cycle Complete the following diagram by using words from the list to fill in the missing labels to identify the carbon stores involved in the carbon cycle.			
3 Climate change			
Discussion: Students will have a classroom discussion on ways ordinary people can reduce carbon dioxide emissions. They will then list possible positive and negative consequences of each of these proposals. Finally, they will write a paragraph to evaluate each proposal.			
4 Extracting metals			
How are metals extracted? Students are going to answer questions about how metals are extracted, complete a reactivity series, and then predict how certain metals could be extracted. Read 7.4.1 Extracting metals in your student book to help answer the questions.			
5 Recycling			
Students compare two towns recycling data to decide which town is better at recycling. Plot a suitable graph for the data shown below.			
Students will need to think about how they can represent the data for the two different towns clearly, in a way that will be useful for them to make a direct comparison between the two towns.			
Skill:			
- present data on an appropriate graph - interpret data to identify patterns and draw conclusions - use mathematical skills to calculate results.			
How will I be assessed at the end of this unit?			
End of topic retrieval			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
	Set on satchel one		

What previous learning am I building on?		What am I learning that is new?	
•Differences between organisms • Continuous and discontinuous variation • Adaptations to change in the environment • Importance of biodiversity		By the end of this unit, I will: Understand: heredity as the process by which genetic information is transmitted from one generation to the next Know : • a simple model of chromosomes, genes and DNA in heredity, including the part played by Watson, Crick, Wilkins and Franklin in the development of the DNA model Be able to • Use a Punnett square to show how genes are inherited	
Learning Journey – lesson title and main activities			
1. Inheritance • Describe how characteristics are inherited • The relationship between genes, DNA and chromosomes • How DNA mutations can affect an organism and its future offspring			
2. DNA Literacy • Describe the structure of DNA • Understand how scientists worked together to discover the structure			
3. Genetics • That genes have different versions called alleles • The difference between dominant and recessive alleles • Use a Punnett square to show how genes are inherited • Why are offspring not identical to their parents?			
4. Genetic Modification • What is meant by genetic modification? • Why do we use genetic modification? • Describe how genetically modified bacteria can be used to make useful products • What are the pros and cons of genetic modification?			
How will I be assessed at the end of this unit?			
End of topic retrieval test			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
Reading about how scientists discovered the structure of DNA and summarizing what you have found.	Carousel quiz	Research examples of genetic modification and make notes	Bitesize/Seneca Revision Guide Teacher

What previous learning am I building on?	What am I learning that is new?		
- Year 2 Living things and their habitats: living things suited to habitats, interdependence, food chains - Year 3 Rocks: how fossils are formed - Year 4 Living things and their habitats: grouping living things, classification keys, environments can change and pose dangers to living things - Year 4 Animals including humans: food chains with producers, predators and prey - Year 5 Living things and their habitats: life cycles and reproduction (sexual and asexual) - Year 6 Living things and their habitats: classification into broad groups, reasons for classifying - Year 6 Evolution and inheritance: change over time and fossils, offspring vary from parents, adaptation to environment	By the end of this unit, I will: Understand How scientists use evidence about changing organisms How Darwin used evidence to develop his theory Know - What biodiversity is and why it is important - What does ‘endangered species’ mean? Be able to - Interpret graph data about populations - To link natural selection to evolution - Define peer review - Explain why peer review is important - Define extinction - Describe and explain factors that lead to extinction - Describe the process of natural selection - Describe how organisms change over time - Describe captive breeding and its pros and cons - Name some techniques for preventing extinction and how they work		
Learning Journey – lesson title and main activities			
Natural selection			
Charles Darwin (literacy task)			
Extinction (literacy task - Extinction of the dinosaurs)			
Preserving Biodiversity : project Tiger. Students will analyse: present data using appropriate methods, including tables and graphs; analyse: interpret observations and data, including identifying patterns to draw conclusions			
How will I be assessed at the end of this unit?			
Retrieval test at the end of the topic			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
Through reading, making notes, summarising texts and comparing theories.	Literacy-based homework Darwin’s finches	You can deepen your understanding by going over materials in on platforms like BBC Bitesize, Seneca, and	Use websites such as BBC Bitesize/Seneca/Cognito Find relevant books in the library

		Cognito. There are plenty of documentaries on the topic of evolution. You should explore literature focused on forces.	Use the textbook on Kerboodle Speak to the teacher Revise on Carousel Learning.
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Year 9 Spring Term 1

B1 (AGU)

Science, Year 9, unit 6 of 12

What previous learning am I building on?	What am I learning that is new?
• Year 7 Cells – cell structure (cell wall, membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts), using a light microscope, and diffusion in and between cells • Year 7 Particles – the particle model of matter • Year 8 Breathing – the gas exchange system and how the alveoli are adapted for efficient exchange of gases	By the end of this unit, I will: Understand Know • Be able to • Calculate magnification • Use a microscope safely • Convert measurement units • use orders of magnitude to compare sizes of organisms • perform calculations to work out orders of magnitude.
Learning Journey – lesson title and main activities	
1 Microscopes: Labelled diagrams with parts of microscope. Development and Comparison of different microscopes	
2 Animal and Plant Cells: labelled diagrams of organelles found on each cell	
• Required Practical 1: Looking at cells Animal and plant cells (cheek and onion cells)	
• Eucaryotic and Prokaryotic cells. Scale and size worksheet (order of magnitude)	
• Specialised cells: Investigate how different cells are specialised to their function. Analyse relationship between form and function.	

•Diffusion. Factors that affect diffusion. Students will learn how the small intestine, lungs and leaves are adapted for diffusion			
• Osmosis. This is a theory heavy lesson. The main idea is the importance of osmosis in animal and plant cells. Key terms: Isotonic, Hypotonic and Hypertonic solutions			
• Required Practical 3: Investigating water potential.			
• Osmosis applications: The main idea is the importance of osmosis in animal and plant cells. Key terms: Turgor and Plasmolysis			
• Active transport: The main objective of this lesson is to compare diffusion and active transport, and to highlight the importance of active transport in plants and animals.			
• Material exchange: Students learn about different exchange surfaces (alveoli, gills and leaves), and practise how to calculate Surface area to volume ratio.			
• Summative lesson			
How will I be assessed at the end of this unit?			
End of topic Recall test (Examprom past paper questions)			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
	Printed worksheets		

P7 (ESA)

Science, Year 9, unit 7 of 12

What previous learning am I building on?	What am I learning that is new?
•Year 7 Elements – what atoms are, and representing atoms and elements using particle diagrams and chemical symbols • Year 7 Particles – the particle model of matter • Year 8 Periodic Table / Types of Reaction – the simple (Dalton) atomic model and the differences between atoms, elements and compounds	By the end of this unit, I will: Understand Know • Be able to •
Learning Journey – lesson title and main activities	
• Lesson 1: Atoms and Radiation Students understand what radioactive substances are and the types of radiation given out of radioactive substances.	

Students understand the different types of radiation emitted by radioactive source			
Lesson 2: The discovery of the nucleus Students learn about the plum pudding model and the nuclear models of the atom. They learn to understand why the plum pudding model of the atom was rejected and the nuclear model accepted and the conclusions made about the atom from experimental evidence.			
Lesson 3: Changes in the nucleus Literacy: Students learn to understand keywords, isotopes, atomic mass and atomic number. They learn about the physical properties of the sub-atomic particles and changes a nucleus undergoes when it emits alpha and beta particles They learn how to represent emission of alpha and beta particles from a nucleus They learn to understand nuclear equations.			
Lesson 4: More about alpha, beta, and gamma radiation Students learn how far each type of radiation can travel in air, and how different materials absorb alpha, beta and gamma radiation. They learn radioactive dangers as well as uses of radiation Lesson 5: Activity and half-life Literacy: Students learn to understand meaning of keywords, Activity, Half-life and count rate. They learn how to calculate count rates after a given number of half-lives from graphs and by using formulas. Lesson 6: Nuclear Radiation in medicine Students learn about radioactive isotopes that are used in medicine. They learn about how to choose a radioactive isotope for a particular job, and types of nuclear radiation that can be used for medical imaging. They learn how radioactivity is used to destroy cancer cells. Lesson 7: Nuclear fission Students learn to understand nuclear fission, and the difference between a spontaneous fission and an induced one. They learn to understand how a nuclear fission can cause a chain reaction, and how chain reactions in a nuclear reactor are controlled.			
How will I be assessed at the end of this unit?			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?

Year 9 Spring Term 2 / Summer term 1

P12 (SFU)

Science, Year 9, unit 8 of 12

What previous learning am I building on?		What am I learning that is new?	
•		By the end of this unit, I will: Understand Know • Be able to •	
Learning Journey – lesson title and main activities			
•			
•			
•			
•			
•			
How will I be assessed at the end of this unit?			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?

B2 (CSM)

Science, Year 9, unit 9 of 12

What previous learning am I building on?	What am I learning that is new?
•B1 topic on types of cell and cell structure	By the end of this unit, I will: Understand The process of cell division and the cell cycle. Know • Cell differentiation and stem cells Be able to

	• Describe the advantages and disadvantages of using stem cells and ethical objections		
Learning Journey – lesson title and main activities			
1 Cell Division			
Explain why chromosomes in body cells are normally found in pairs.			
Describe situations where mitosis is occurring.			
Use the key words to describe the process of mitosis.			
2. Growth and Differentiation			
Define the terms growth and differentiation.			
Describe the importance of cell differentiation in multicellular organisms.			
Explain how using tissue culture creates a clone of a plant.			
EXT: Explain why it is easier to clone a plant than an animal.			
1. Stem Cells			
Practical			
Describe differences between embryonic and adult stem cells.			
Explain why plant clones are produced in agriculture.			
Describe how stem cells can be used to treat medical conditions.			
EXT: Explain why embryonic stem cells are particularly useful for treating medical conditions.			
5. Stem Cell Dilemmas			
Literacy			
List some arguments for and against the use of stem cells.			
Describe what therapeutic cloning can be used for.			
Explain the reasons for ethical and religious objections to use of stem cells in medicine.			
EXT: Clearly communicate strong, well-researched arguments in a persuasive manner.			
6. Review and Recap			
To practice longer-answer questions and six-mark questions			
How will I be assessed at the end of this unit?			
End of topic test			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?
Researching uses of stem cells in medicine and evaluation pros and cons	Carousel and Seneca	Watch clips about uses of stem cells Carousel study pack	Seneca, Bitesize, Revision guide and ask teacher

Science, Year 9, unit 12 of 12

What previous learning am I building on?		What am I learning that is new?	
•Year 8 Digestion – the content of a healthy diet, food tests, and the tissues and organs of the digestive system, including enzymes as biological catalysts • Year 7 Movement – the hierarchical organisation of multicellular organisms (cells, tissues, organs and organ systems) • Year 8 Breathing – how organs are adapted to their function within a body system		By the end of this unit, I will: Understand Know • Be able to •	
Learning Journey – lesson title and main activities			
1. Organs, Tissues and Systems •			
2. Chemistry of Food •			
3. Required Practical – Food Tests •			
4. Enzymes •			
5. How the digestive system works			
6. Required Practical – Enzyme Investigation			
7. Making Digestion Efficient			
8. Summative/Revision lesson			
How will I be assessed at the end of this unit?			
How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?

What previous learning am I building on?	What am I learning that is new?
•Year 7 Separating Mixtures – mixtures and pure substances, and separation techniques including filtration, evaporation, distillation and chromatography • Year 7 Elements – atoms, elements and compounds, chemical symbols and formulae, and representing chemical reactions • Year 8 Periodic Table – the simple (Dalton) atomic model, and how the periodic table is arranged into periods and groups	By the end of this unit, I will: Understand Know • Be able to •
Learning Journey – lesson title and main activities	
1 Atoms Literacy: Defining the key terms element, compound, mixture, molecule, periodic table and atom, and linking them to simple models.	
2 Chemical Equations Numeracy: Discussing the conservation of mass principle and applying this to balancing chemical equations.	
3 Separating Mixtures Diagrams: Drawing and labelling diagrams for filtration, crystallisation and simple distillation. Describing how the apparatus is used to separate mixtures.	
4 Fractional Distillation and Paper Chromatography Literacy and Numeracy: Describe how fractional distillation is used to separate mixtures of liquids. Use chromatograms to calculate the retention factor (R_f) of compounds.	
5 History of the Atom Literacy: Collating and summarising information about the history of the atom. Writing a letter to a scientific journal under the lens of JJ Thompson, having disproved Dalton's ideas.	
6 Structure of the Atom Models: Recapping the structure of the atom from P7. Linking the structure of the atom to the element symbol on the periodic table.	
7 Ions, Atoms and Isotopes Literacy: Defining ions, polyatomic ions, atoms and isotopes and linking them with respective models.	
8 Electronic Structures Diagrams: Use the periodic table to identify the group and period number of an element, and convert the information into electronic structure diagrams.	
9 Revision and Six-Mark Question	

Literacy: Completing past paper questions and becoming mark-scheme literate. The six-mark question is: Describe the structure of an atom, including properties of its subatomic particles.

How will I be assessed at the end of this unit?

How will my literacy skills be developed?

What homework will I be set?

How can I learn more/stretch myself?

Where can I go for more help?

P13 Electromagnetic spectrum (SFU)

Science, Year 9, unit 5 of 12

What previous learning am I building on?

- Year 8 Light – light waves, the ray model, reflection and refraction, and how light transfers energy
- Year 8 Sound – wave vocabulary including frequency, wavelength and amplitude, and how waves transfer energy

What am I learning that is new?

By the end of this unit, I will:

Understand
Know

-

Be able to

-

Learning Journey – lesson title and main activities

[Lesson 1 – introduction to the electromagnetic spectrum](#)

Pupils recap learning on transverse waves then are introduced to the 7 parts of the EM spectrum – what the different components are and what EM radiation is. And how wavelength, frequency and energy change moving from one end of the spectrum to the other end.

[Lesson 2/3 – Light, IR, Microwaves and radio waves](#)

Pupils complete a core practical on emission/absorption of infrared radiation. They also look at the uses of radio waves and how aerials work.

[Lesson 4 – Communication](#)

Pupils learn about how various parts of the spectrum are used in communication. They should understand why each part of the spectrum is used in each context e.g. why phones use microwaves.

[Lesson 5 – UV, Xray and gamma radiation](#)

This lesson focuses on the dangers of radiation and the high energy end of the spectrum – what is ionisation and how can it be damaging to humans?

[Lesson 6 – Xrays in medicine](#)

This lesson looks at how xrays are made and then used in diagnosing and treating medical conditions.

How will I be assessed at the end of this unit?

How will my literacy skills be developed?	What homework will I be set?	How can I learn more/stretch myself?	Where can I go for more help?

