Year 9 Science Cycle 1

Independent Learning Booklet

Name: Science teacher(s): Science class:

	Week Beginning	Topic(s)	Due Date	Score
1.1	07.09.20			
1.2	14.09.20			
1.3	21.09.20			
1.4	28.09.20			
1.5	05.10.20			
1.6	12.10.20			
1.7	02.11.20			
1.8	09.11.20			
1.9	16.11.20			
			Total:	

Atomic Structure and the Periodic Table

Topic	1 Point	2 Points	4 Points	6 Points	10 Points
Atoms, Elements and Isotopes	State what an atom is. Give its radius.	Give the names, symbols, mass numbers and atomic numbers for 5 different elements.	Describe what an isotope is and give an example of isotopes of an element.	Research an element and present the information you find in a creative way. You should include the name, symbol, mass number, atomic number, number of protons, neutrons and electrons, whether it has any isotopes and what it is useful for.	Write a story, comic or song that will help you to remember the first 20 elements and their symbols.
Compounds, Mixtures and Equations	State what a compound is and how it is formed.	Describe the difference between a compound and a mixture.	Write the formula for each of the following compounds. For each compound, name the atoms that it is made from and state how many of each atom make up the compound. water carbon dioxide methane table salt ammonia	Draw particle diagrams of at least two different elements, two different compounds and two different mixtures to help you explain the difference between them.	Create a model, using materials of your choice, that shows the difference between elements, compounds and mixtures (craft materials, balls, modelling clay, cakes). You need to have at least two examples of each.

Required Practical: Chromatography	In the paper chromatography experiment, what is the solvent used for?	In the chromatography practical, explain why you draw a pencil line on the paper.	Draw a diagram of the chromatography apparatus. Label all of the parts.	In the chromatography practical, explain how you would use the distance travelled to identify the chemicals that had been used. Include a diagram to explain where the values you discuss come from.	Write a complete method for the chromatography investigation, including the equipment and a labelled diagram to show how it will be set up. Explain how you would analyse your results to identify the chemicals involved.
Filtration and Crystallisation	State when you would use filtration and when you would use crystallisation.	Write definitions for the keywords: solvent solute solution soluble insoluble	Draw a diagram that shows the equipment used for filtration and crystallisation.	Write an information leaflet that uses the particle model to explain how the filtration and crystallisation methods work. Include diagrams where necessary.	Make a video or stop motion animation using materials of your choice that shows how the particles are separated in the filtration and crystallisation methods.
Distillation	State when you would use distillation and when you would use fractional distillation.	Distillation involves both evaporation and condensation. Describe the changes of state that happen at each stage.	Describe the process of distillation. Include the keywords evaporate and condense and refer to the equipment used. A labelled diagram might help with this.	Produce an information leaflet that describes the difference between distillation and fractional distillation. You should include any differences in the equipment used, when you would use them and how they work.	Ethanol has a boiling point of 78°C and water has a boiling point of 100°C. Produce a story, comic or animation to show how fractional distillation can be used to separate pure ethanol from a mixture of ethanol and water.

Development of the Atom	Draw a diagram to show the nuclear model of an atom.	Produce a timeline that shows the steps in the development of our current model of an atom.	Write a comic or story that shows the history of the development of the atom.	Plan a lesson to teach to primary school children that explains how our understanding of the structure of an atom has changed from the plum pudding model to the model we use today.	Make models of the plum pudding model, Rutherford's model and Bohr's model of the atom using whatever materials you like.
Electron Structure	Draw an electron shell diagram for oxygen.	Draw the electron diagrams and write down the electronic structures for 5 of the first 20 elements.	Draw the electron diagrams and write down the electronic structures for lithium, sodium and potassium. Give the position of these elements in the periodic table and describe any patterns in the electron structure that you find.	Make a model of an atom of oxygen using whatever materials you would like.	Make an animation or a sequence of illustrations (this could be in comic form) that shows the order in which electron shells are filled. Try and show how the energy levels are different between each shell.
History of the Periodic Table	What made it difficult to produce some of the earliest periodic tables?	How did Mendeleev overcome some of the problems with early periodic tables?	Describe the discoveries that supported Mendeleev's version of the periodic table.	Imagine you are Mendeleev. Write some diary entries covering issues with the earliest periodic tables, how he overcomes the issues and the evidence that supports his changes.	Create a board game that takes the players through the history of the periodic table. The game should include the issues with the early tables and how Mendeleev overcame them, as well as the evidence that supported his table.

Metals and Non-Metals	Show where metals and non-metals are found on the periodic table.	Describe an experiment to show how metals conduct both heat and electricity.	Compare the properties of metals and non-metals.	Write a 4 mark exam question about metals and non-metals.	Make a video explaining how ions are formed - how metals form positive ions and non-metals form negative ions.
The Alkali Metals	Describe the location of the alkali metals in the periodic table and say what this tells you about the number of outer-shell electrons they have.	Draw the electron structures of the first three alkali metals.	Describe (or draw illustrations) to show the reactions of the first three alkali metals with water, oxygen and chlorine. Include a word equation for each reaction.	Research the reactions of rubidium and caesium in water. Describe them and write down word equations for the reactions. Predict the reaction you would see if you could react francium with water.	Write the script for a documentary that describes the trends in the alkali metals and explains how the properties depend on the number of electrons in the outer shell.
The Halogens	Draw the electron structure of two of the halogens.	Describe the trends shown in the halogens as you move down the group.	Chlorine has two isotopes, ^{35}Cl (abundance 75%) and $^{3\,6}Cl$ (25% abundance). Write the numbers of protons, neutrons and electrons in each isotope and calculate the relative atomic mass.	Write a poem about halogens that includes the trends down the group and how the electron structure affects these trends.	Produce a comic that uses an analogy to explain how displacement reactions work.

The Noble Gases	Give three facts about the noble gases.	Research the uses of neon, argon and krypton.	Make a model of the electronic structure of one of the noble gases.	Prepare a speech to convince people that noble gases are the best group on the periodic table.	Produce an information leaflet that compares the electron structure and properties of the alkali metals, halogens and noble gases.
Properties of the Transition Metals	List the properties of the transition metals.	Draw a diagram that shows the colours of the compounds that different transition metal ions make.	Produce a table that compares the properties of alkali metals with the transition metals.	Produce an extended writing exam question (and its mark scheme) about properties of the transition metals and how these compare to the alkali metals.	Research the uses of copper, iron, nickel, cobalt, chromium and manganese and explain why the properties of these metals make them good for those uses.

Cell Biology

Topic	1 Point	2 Points	4 Points	6 Points	10 Points
How to Use a Microscope	Draw or print out a picture of a microscope and label the main parts.	Write step-by-step instructions that someone could follow to use a microscope to view a prepared slide.	Pick three things that you would like to look at underneath a microscope. What do you think you would observe if you did? Can you sketch a diagram of what you'd expect to see?	Research the history of the microscope and produce a timeline to show the events in history.	Make up an answer to a six-mark exam question on microscopes, include mistakes in it, get a friend to find the mistakes.
Animal and Plant Cells	Write an old style tweet that describes what the nucleus does. (140 characters)	Summarise the organelles that you find in plant and animal cells as a Venn diagram.	Produce revision notes to describe the function of each organelle. You could make flash cards, a poster for your wall, or something else that will support your revision.	Write a letter to a scientific journal that explains the differences between plant and animal cells.	Make a model of a plant or animal cell (or both!) using whatever resources you have. Find a way to label each part and describe what it does.
Bacterial Cells	Draw and label a diagram of a bacterial cell.	Write definitions for the keywords unicellular and multicellular. Give examples of each.	Write a poem that compares bacterial cells to plant and animal cells. Remember that when we compare, we give both similarities and differences.	Produce an information leaflet that explains how unicellular organisms are adapted to carry out functions that are done by different types of cell in a multicellular organism.	Research the origin of mitochondria and chloroplasts - can you find out where scientists think they came from? Summarise your research in no more than 100 words.
Specialised Cells	Draw and label one specialised plant cell and one specialised animal cell.	Produce flash cards for each of the specialised cells we have covered, labelling their adaptations.	Produce an information poster that includes a diagram of at least five specialised cells, including labels. Describe how each cell is adapted to its function.	Make a comic strip of specialised cells that explains how they are adapted to their function. Be creative when coming up with your story line - how do you think the cells would describe their roles?	Compose a song or write a poem that explains what an organism would be like if each of the specialised cells couldn't perform their function. It can be funny or serious.