AC1 : Key Outcomes – Year 10

Curriculum: Science

Excellence.
No Excuses.

Section	Knowledge Code:	Outcomes:	How students will demonstrate success:
1	S10.1.1 Structure of the atom	SWBAT • Identify the Rutherford (nuclear) model of an atom. • Identify the locations of protons, neutrons, and electrons in the nuclear model. • State that electrons can move between fixed energy levels within an atom.	• Labelling a diagram with and matching properties to particles. • Explain in an extended writing task what happens to electrons when they emit or absorb radiation.
2	S10.1.2 Mass number, atomic number and isotopes/RAM	SWBAT • Identify the mass and atomic number by using nuclear notation. • Describe how isotopes are atoms of the same element with different mass numbers.	• Determine the atomic number, mass number and number of neutrons of an atom using the periodic table • Give the definition of isotopes. • Use relative abundance figures to calculate the relative atomic mass of elements with non-integer RAMs
3	S10.1.3 Relative electrical charges of subatomic particles	SWBAT • Name and give the relative charges and mass of the subatomic particles	• Complete and extended writing task that names the subatomic particles, giving their location, mass and charge in relative units.
4	S10.1.4 Electronic structure	SWBAT • Write the standard electronic configuration notation from a diagram for the first 20 elements. • Explain why elements in the same group react in a similar way.	• Use the periodic table of elements to give the electron structure and draw the electrons shells of any of the first 20 elements. • State the link between group and electrons in outer shells. Linking that to their reactions.
5	S10.1.5 The Periodic Table	SWBAT • Use the Periodic table to find atomic number and mass number data and use it to determine the number of each sub-atomic particle in any given form. • Recognise and describe patterns in sub-atomic particles of elements listed in the Periodic Table. • Explain why we can be confident that there are no missing elements in the first 10 elements of the Periodic Table. • Describe the development of the periodic table by mendelev et al.	• Link periods an d group numbers to number of shells and electrons in outer shells respectively • Describe Mendelev's and Newlands models of the periodic table. • State how they are different to current table • Explain why Mendelev's model was better
6	S10.1.6 The development of the model of the atom	SWBAT • Identify the Rutherford (nuclear) model of an atom. • Identify the locations of protons, neutrons, and electrons in the nuclear model. • State that electrons can move between fixed energy levels within an atom. • Compare the plum pudding model, Rutherford model, and Bohr model of the atom in terms of the evidence for each model. • Explain how Rutherford and Marsden's experiment caused a rejection of the plum pudding model. • Describe how the initial evidence for the nuclear model was processed and how the model came to be accepted.	• Describe both models of the atom in terms of distribution of mass, charge and matter. • Describe the experiment carried out by Rutherford • Say how the two conclusions from the Alpha scattering experiment disproved PPM • Say how they supported NM • Combine all above into an extended writing response.

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7	**S10.1.7** **Transition Metals**	SWBAT • Describe the difference between transition metals and Group 1 in melting points, densities, strength, hardness and reactivity with oxygen, water and halogens. • Exemplify these general properties by reference to Cr, Mn, Fe, Co, Ni, Cu.	• Use knowledge and data to make a comparison between properties of different groups and transition metals. • Link properties of transition metals to their uses
8	S10.1.8 Radioactive decay and nuclear radiation	SWBAT • Name the three types of nuclear radiation. • Name the three sub-atomic particles found in an atom (proton, neutron, and electron). • Describe the relative penetrating powers of the three types of nuclear radiation. • Describe in detail the decay of an unstable nucleus. **• Explain the similarities and differences between nuclear radiation and visible light.** **• Explain why particles are ejected from the nucleus during nuclear decay.**	• Give the names and properties and source of the three types of ionising radiations in extended writing.
9	S10.1.9 Nuclear equations	SWBAT • Describe the changes in the nucleus that occur during nuclear decay. • Write full decay equations, for example, nuclear decays.	• Recall the general equations for the three types of radiations. • Use the equations to predict the products formed from the different radiations
10	S10.1.10 Half-lives and the random nature of radioactive decay	SWBAT • State that the activity of a radioactive sample will fall over time. • Define half-life in simple terms such as 'the time it takes for half of the material to decay'. • Find the half-life of a substance from a graph of count rate (or nuclei remaining) against time. **• Compare a physical model of decay with the decay of nuclei, noting the limitations of the model.**	• Draw a graph from secondary data and use this to deduce half life graphically. • Use data provided to calculate half life from activities over time or activity over time from half life without graphs.
11	**S10.1.11** **Radioactive contamination**	SWBAT **• Define contamination and irradiation** **Describe some safety precautions used when dealing with radioactive materials.** **• Describe how a Geiger counter can be used to detect radiation.** **• Identify natural and man-made sources of background radiation.**	• Extended writing – compare and contrast contamination and irradiation.
12	**S10.1.12** **Background radiation**	SWBAT • **Define background radiation and explain its sources.**	• Label a pie chart showing source of radiation • Explain in writing that man made forms of background radiation contribute a small part of the whole.

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13	**S10.1.13** **Uses of nuclear radiation**	SWBAT **• Outline how the age of organic material can be determined by using** **• radioactive dating.** **• Calculate the changes in count rate or nuclei remaining by using an exponential decay function.** **• Describe the use of radioactive implants and the hazards associated with the technique.** **• Discuss the factors that need to be taken into account when selecting a medical tracer for a diagnostic test.** **• Explain how a medical tracer is used including the function of a gamma camera.**	• Describe the different uses of radiation in written form. • Justify the choice of emitter for the different uses referring to the ALARA principle.
14	**S10.1.14** **Nuclear Fission**	SWBAT **• Explain how a steady-state induced fission reaction can be maintained.** **• Explain the differences between naturally occurring isotopes and enriched nuclear fuels.** **• Explain the operation of a nuclear fission reactor, including the choices of appropriate materials.** **• Discuss the risks and benefits of nuclear power compared to other methods of electricity generation.** **• Describe and explain the safety precautions that need to take place after a large nuclear accident.** **• Evaluate in detail a variety of storage or disposal solutions for nuclear waste.**	• Draw/label a fission diagram. • Define and describe the process. • Explain the role of the neutron in this process • Extended writing: Compare the use of nuclear fission with another method of generating electricity and evaluate.
15	**S10.1.15** **Nuclear fusion**	SWBAT **• Explain why it is difficult to carry out controlled nuclear fusion on Earth.** **• Construct a variety of nuclear equations showing nuclear fusion.** **• Compare the operation of a nuclear fission reactor and a nuclear fusion reactor.**	• Define it • Draw a diagram • Explain why it's hard, why is it easier in the sun/stars. • Link to life cycle of stars

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23	S10.1.23 Chromosomes, mitosis and the cell cycle	SWBAT • Describe how DNA is found • Describe the stages of the cell cycle, including mitosis • Recognise and describe situations where mitosis is occurring	• Give the size order of DNA/Chromosomes/cells etc. • Explain the stages of the cell cycles in writing,
24	S10.1.24 Stem cells	SWBAT • Define a stem cell • Describe the function of stem cells in embryos, adult animals and meristems (plants) • Explain how stem cells can be used as treatment for some conditions such as diabetes and paralysis • Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments.	• As outcomes
25	S10.1.25 Diffusion	SWBAT • Define diffusion • Recognise, draw and interpret diagrams that model diffusion. • Explain how different factors affect the rate of diffusion • explain the need for exchange surfaces and a transport system in multicellular organisms	• Give the definition of diffusion and state factors that affect its rate. • Link these factors to the properties of specialised cells in places like like lungs or intestines.
26	S10.1.26 Osmosis	SWBAT • Define osmosis • Recognise, draw and interpret diagrams that model osmosis. • Apply knowledge of osmosis to unfamiliar situations and make predictions.	• Give the definition of osmosis. • Identify which way osmosis is occurring in a range of diagrams/situations. • Explain what is happening in writing in a range of contexts i.e. visking tubing with different solutions in different solns.
27	S10.1.27 Active transport	SWBAT • Define active transport • Describe how substances are transported into and out of cells by diffusion, osmosis and active transport • Explain the differences between the three processes	• Define • Explain why energy is required. • Link the energy requirement to the number of mitochondria in cells in areas that carry out a lot of AT.