AQA GCSE Physics Student Checklist

P7 Radioactivity

Name ..... Class ..... Date .....

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P7.1 Atoms and radiation	I can name the three types of nuclear radiation.	☐	I can describe some safety precautions used when dealing with radioactive materials.	☐	I can describe in detail the decay of an unstable nucleus.	☐
	I can name the three sub-atomic particles found in an atom (proton, neutron, and electron).	☐	I can describe how a Geiger counter can be used to detect radiation.	☐	I can explain the similarities and differences between nuclear radiation and visible light.	☐
	I can identify some sources of background radiation.	☐	I can identify natural and man-made sources of background radiation.	☐	I can describe the relative penetrating powers of the three types of nuclear radiation.	☐
P7.2 The discovery of the nucleus	I can identify the Rutherford (nuclear) model of an atom.	☐	I can describe he plum pudding model of the atom.	☐	I can compare the plum pudding model, Rutherford model, and Bohr model of the atom in terms of the evidence for	☐
	I can identify the locations of protons, neutrons, and electrons in the nuclear model.	☐	I can describe the evidence provided by the Rutherford scattering experiment.	☐	I can explain how Rutherford and Marsden's experiment caused a rejection of the plum pudding model.	☐
	I can state that electrons can move between fixed energy levels within an atom.	☐	I can describe the properties of protons, neutrons, and electrons.	☐	I can describe how the initial evidence for the nuclear model was processed and how the model came to be	☐
P7.3 Nuclear reactions	I can identify the mass and atomic number by using nuclear notation.	☐	I can calculate the number of neutrons in an isotope by using nuclear notation.	☐	I can explain why particles are ejected from the nucleus during nuclear decay.	☐
	I can identify the type of decay taking place from a nuclear equation.	☐	I can describe the differences between isotopes.	☐	I can describe the changes in the nucleus that occur during nuclear decay.	☐
	I can state that isotopes are atoms of the same element with different atomic masses.	☐	I can complete decay equations for alpha and beta decay.	☐	I can write full decay equations for example nuclear decays.	☐

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P7.4 More about alpha, beta, and gamma radiation	I can rank the three types of nuclear radiation in order of their penetrating power.	☐	I can describe how the penetrating powers of radiation can be measured.	☐	I can describe in detail how the thickness of a material being manufactured can be monitored by	☐
	I can rank the three types of nuclear radiation in order of their range through air.	☐	I can describe the path of radiation types through a magnetic field.	☐	I can compare the ionisation caused by different types of nuclear radiation.	☐
	I can state that all three types of nuclear radiation are ionising.	☐	I can describe the process of ionisation.	☐	I can evaluate in some detail the risks caused by alpha radiation inside and outside the human body.	☐
P7.5 Activity and half-life	I can state that the activity of a radioactive sample will fall over time.	☐	I can find the ratio of a sample remaining after a given number of half-lives.	☐	I can compare a physical model of decay with the decay of nuclei, noting the limitations of the model.	☐
	I can define half-life in simple terms such as 'the time it takes for half of the material to decay'.	☐	I can state that all atoms of a particular isotope have an identical chance to decay in a fixed time.	☐	I can outline how the age of organic material can be determined by using radioactive dating.	☐
	I can find the half-life of a substance from a graph of count rate (or nuclei remaining) against time with support.	☐	I can plot a graph showing the decay of a sample and use it to determine half-life.	☐	I can calculate the changes in count rate or nuclei remaining by using an exponential decay function.	☐
P7.6 Nuclear radiation in medicine	I can name some medical applications for radioactive substances.	☐	I can explain why alpha, beta, or gamma radiation is chosen for a particular medical application.	☐	I can describe the use of radioactive implants and the hazards associated with the technique.	☐
	I can state that the larger the dose of radiation, the more likely harm will be caused.	☐	I can describe how gamma rays can be used to destroy cancerous cells and the damage they may cause to healthy	☐	I can discuss the factors that need to be taken into account when selecting a medical tracer for a diagnostic test.	☐
	I can describe some precautions used during diagnoses or treatments involving radioactive substances.	☐	I can explain how precautions to reduce exposure to patients and medical staff work.	☐	I can explain how a medical tracer is used including the function of a gamma camera.	☐

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P7.7 Nuclear fission	I can state that nuclear fission is the breaking of a large nucleus to form two smaller nuclei.	☐	I can describe induced nuclear fission in terms of neutron impacts and release.	☐	I can explain how a steady-state induced fission reaction can be maintained.	☐
	I can distinguish between induced fission and spontaneous fission.	☐	I can explain how an escalating induced fission reaction occurs.	☐	I can explain the differences between naturally occurring isotopes and enriched nuclear fuels.	☐
	I can label the key components of a nuclear reactor.	☐	I can outline the function of the moderator, control rods, and coolant.	☐	I can explain the operation of a nuclear fission reactor, including the choices of appropriate materials.	☐
P7.8 Nuclear fusion	I can state that nuclear fusion is the energy releasing process in the Sun.	☐	I can outline the process of nuclear fusion.	☐	I can explain why it is difficult to carry out controlled nuclear fusion on Earth.	☐
	I can state that the Sun fuses (joins together) hydrogen nuclei into helium nuclei.	☐	I can complete a nuclear equation showing simple fusion processes.	☐	I can construct a variety of nuclear equations showing nuclear fusion.	☐
	I can state that very high temperatures and pressures are required for fusion to take place.	☐	I can describe the key design features of a nuclear fusion reactor.	☐	I can compare the operation of a nuclear fission reactor and a nuclear fusion reactor.	☐
P7.9 Nuclear issues	I can identify sources of radiation, including medical and background radiation.	☐	I can compare the risks and damage associated with alpha, beta, and gamma radiation.	☐	I can discuss the risks and benefits of nuclear power compared to other methods of electricity generation.	☐
	I can describe the type of damage caused by large-scale nuclear accidents.	☐	I can describe how damage caused by radioactive material can be reduced.	☐	I can describe and explain the safety precautions that need to take place after a large nuclear accident.	☐
	I can state that nuclear waste is very dangerous and must be stored safely for very long periods of time.	☐	I can discuss the difficulties associated with the handling and storage of nuclear waste.	☐	I can evaluate in detail a variety of storage or disposal solutions for nuclear waste.	☐