Rutherford Scattering

Checklist statement	✓
I can describe the Rutherford scattering experiment qualitatively.	☐
I can explain how Rutherford scattering provided evidence for the nuclear model of the atom.	☐
I can describe how understanding of nuclear structure has changed over time.	☐

Alpha, Beta and Gamma Radiation

Checklist statement	✓
I can describe the properties of α, β and γ radiation.	☐
I can identify α, β and γ radiation using simple absorption experiments.	☐
I can describe applications of α, β and γ radiation, including consideration of hazards to humans.	☐
I can describe the use of radiation in thickness measurements of aluminium foil, paper and steel.	☐
I can apply the inverse-square law for γ radiation, $I = \frac{k}{x^2}$, define all terms and know their standard units.	☐
I can describe experimental verification of the inverse-square law.	☐
I can explain safe handling procedures for radioactive sources.	☐
I can describe background radiation, including its origins.	☐
I can explain how background radiation is accounted for in experimental measurements.	☐
I can discuss the balance between risks and benefits in the medical uses of radiation.	☐
I can describe a required practical investigating the inverse-square law for gamma radiation.	☐

Radioactive Decay

Checklist statement	✓
I can explain the random nature of radioactive decay.	☐
I can explain the concept of constant decay probability.	☐
I can apply $\frac{\Delta N}{\Delta t} = -\lambda N$, define all terms and know their standard units.	☐
I can apply $N = N_0 e^{-\lambda t}$, define all terms and know their standard units.	☐
I can define activity.	☐
I can apply $A = \lambda N$, define all terms and know their standard units.	☐
I can apply $A = A_0 e^{-\lambda t}$, define all terms and know their standard units.	☐
I can apply the half-life equation $T_{1/2} = \frac{\ln 2}{\lambda}$, define all terms and know their standard units.	☐
I can determine half-life from decay curves and logarithmic graphs.	☐
I can describe applications of radioactive decay, including radioactive dating and waste storage.	☐

Nuclear Instability

Checklist statement	✓
I can interpret a graph of neutron number against proton number for stable nuclei.	☐
I can describe possible decay modes of unstable nuclei, including α, β^-, β^+ decay and electron capture.	☐
I can describe changes in proton number and neutron number during radioactive decay.	☐
I can represent radioactive decay using simple decay equations.	☐
I can interpret nuclear energy-level diagrams.	☐
I can explain nuclear excited states and gamma-ray emission.	☐
I can describe the use of technetium-99m as a gamma source in medical diagnosis.	☐

Nuclear Radius

Checklist statement	✓
I can explain how nuclear radius can be estimated using closest approach of alpha particles.	☐
I can describe determination of nuclear radius using electron diffraction.	☐
I can recall typical values for nuclear radii.	☐
I can apply Coulomb's law to estimate distance of closest approach.	☐
I can explain how nuclear radius depends on nucleon number.	☐
I can apply $R = R_0 A^{1/3}$, define all terms and know their standard units.	☐
I can explain how this relationship provides evidence for constant nuclear density.	☐
I can calculate nuclear density.	☐
I can interpret intensity–angle graphs for electron diffraction by a nucleus.	☐