Particle physics

Specification reference	Checklist questions	
6.4.1 a	Can you explain the alpha-particle scattering experiment?	☐
6.4.1 b	Can you describe the simple nuclear model of the atom; protons, neutrons, and electrons?	☐
6.4.1 c	Can you describe the relative sizes of the atom and the nucleus?	☐
6.4.1 d	Can you define proton number, nucleon number and isotopes, and explain the notation for the representation of nuclei?	☐
6.4.1 e	Can you explain the strong nuclear force and its short-range nature?	☐
6.4.1 f	Can you calculate the radius of nuclei, $R = r_0 A^{\frac{1}{3}}$?	☐
6.4.1 g	Can you calculate the mean densities of atoms and nuclei?	☐
6.4.2 a	Can you define particles and antiparticles, including electron–positron, proton–antiproton, neutron–antineutron, and neutrino–antineutrino?	☐
6.4.2 b	Can you describe relative masses and charges of particles and their corresponding antiparticles?	☐
6.4.2 c	Can you describe the classification, examples, and behaviour of hadrons?	☐
6.4.2 d	Can you describe the classification, examples, and behaviour of leptons?	☐
6.4.2 e	Can you explain the simple quark model of hadrons in terms of up and down, and strange quarks and their anti-quarks?	☐
6.4.2 f	Can you explain the quark model of the proton and the neutron?	☐

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Specification reference	Checklist questions	
6.4.2 g	Can you explain the charges of the up, down, strange, anti-up, anti-down, and anti-strange quarks as fractions of the elementary charge *e*?	☐
6.4.2 h	Can you describe beta-minus (β^-) and betaplus (β^+) decay, and the quark models for these decays?	☐
6.4.2 k	Can you demonstrate quark transformation equations balanced in terms of charge?	☐
6.4.2 l	Can you explain decay of particles in terms of the quark model?	☐