

23 Mass-energy equivalence — Part 1

— Answers

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Work through these after trying the questions yourself.

23.1 $E = mc^2$.

23.2 Because c^2 is a very large number.

23.3 Balance (be equal on both sides).

23.4 The charge (proton number).

23.5 $A = 14 + 4 - 17 = 1$.

23.6 $\Delta E = c^2 \Delta m = (3.0 \times 10^8)^2 (2.0 \times 10^{-3}) = 1.8 \times 10^{14} \text{ J}$.

23.7 Energy comes from a loss of mass ($E = mc^2$). A nuclear reaction converts a measurable fraction of the nucleus's mass into energy, whereas burning coal converts a far tinier mass — so fission gives far more energy per kilogram.