Element assignments: teacher answer notes

Use with the three student worksheets and the evidence rubric. Accept equivalent scientifically supported reasoning.

Grades 6-7

Carbon: C, Z=6, period 2, group 14. Oxygen: O, Z=8, period 2, group 16. Sodium: Na, Z=11, period 3, group 1.

Li, Na and K share group 1; periods 2, 3 and 4. Rows are horizontal periods; columns are vertical groups. Neutral oxygen has 8 electrons.

C-12 has N=6; C-14 has N=8. A decimal reference atomic mass is not a whole-number mass number for a particular isotope. Eleven protons identify Na; gaining an electron makes an ion without changing the element.

Ninth-grade assignment

Check the property-use response against its stated source. Require appropriate units, a relevant connection and a limitation; do not award evidence points solely for a decorative image or an unsupported use claim.

Na: period 3, group 1, shells 2,8,1. Mg: period 3, group 2, shells 2,8,2. Cl: period 3, group 17, shells 2,8,7. They share the period but differ in outer-shell electron count and chemistry.

Carbon isotopes: C-12 has Z=6,N=6,A=12; C-13 has Z=6,N=7,A=13; C-14 has Z=6,N=8,A=14. All have six protons.

Quantitative chemistry

Ionization-energy decreases: Mg to Al, and P to S. A 3p electron in Al is removed more readily than a 3s electron in Mg; pairing and electron repulsion contribute to the P/S exception. Shell rings alone do not display subshell structure.

After 1,2,3 half-lives: expected 128,64,32 nuclei; elapsed 5700,11400,17100 years. Trial counts and means vary. Half-life is a probabilistic population measure, not a scheduled individual lifetime.

Pearson r and graph answers depend on selected properties and scope. A correct response reports the pair count and a relevant limitation, without causal claims or invented precision.

The simulation shows parent survival only. It omits daughter populations and detailed radiation transport; source numeric values can have uncertainty or bounds.

Rubric use

Apply the same four criteria: accuracy, evidence, reasoning, communication. Separate scientific quality from spelling or response format when accommodations apply. Give feedback that lets a learner improve the claim or evidence.

Suggested levels are starting points, not formal curriculum alignment. Use the site or printed data; no physical element samples are needed. Source data and limitations: elementexplore.com/sources.html. These original Element Explore materials may be copied and adapted for classroom use.