Equations and relative formula mass

Teacher / technician

YEAR 10 / LESSON 41 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

Staff preparation and answer guidance. Keep separate from student sheets. Desk calculations and atom-count models; no reaction is performed.

Coverage and delivery

1.25–1.26: word/symbol equations, state symbols, and relative formula mass from relative atomic masses.

Allow about 50 minutes. Follow the student sequence and use the answers to check reasoning.

Requisition • class of 30, working in 15 pairs

Item	Per pair / setup	Class total
Booklet / writing tools	1 per learner	30 sets
Calculator / periodic table	1 calculator each; 1 table per pair	30 calculators; 15 tables

Immediate safety

Desk activity only. Keep counters out of mouths and off the floor.

Preparation and delivery

Read alongside the student method

YEAR 10 / LESSON 41 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

1. Supply 30 booklets/calculators and 15 periodic tables. Use the rounded values on the sheet, not mixed tables of different precision. No chemicals or balances are needed.

2. Use counters only as an atom-counting aid, not as a scale model of molecular shapes. Preserve chemical formulae when changing coefficients.

3. Model brackets explicitly: $Al_2(SO_4)_3$ contains 2 Al, 3 S and 12 O. A coefficient scales particle numbers but does not redefine the substance's relative formula mass.

4. Replace the inherited truncated typeset lesson text with these original complete tasks. Keep A_r/M_r subscripts and chemical subscripts in every format.

5. Allow 15 minutes formula masses, 15 equations, 10 state/meaning comparisons and 10 corrections. Distinguish molecules from formula units when discussing ionic solids.

Close of lesson

- Retain worked solutions and corrections; return shared tables/counters.

Check before teaching

Check the cards, reference data and quantities against this requisition. Keep the staff answer guide separate until the checking stage. Supplied numerical practice datasets are labelled examples; they are not class measurements.

Answers and teaching notes

Expected explanations • do not give as experimental observations

YEAR 10 / LESSON 41 / CHEMISTRY + SCIENCE (DOUBLE AWARD)

• NaCl: 23 + 35.5 = 58.5. $Ca(OH)_2$: 40 + 2(16 + 1) = 74. $Al_2(SO_4)_3$: 2(27) + 3(32 + 4×16) = 342. NH_4NO_3: 2(14) + 4(1) + 3(16) = 80.

• $2Mg + O_2 \rightarrow 2MgO$; $4Al + 3O_2 \rightarrow 2Al_2O_3$. Each element count is conserved.

• Magnesium + hydrochloric acid → magnesium chloride + hydrogen. $Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$.

• $2H_2O$ represents two water molecules (4 H and 2 O atoms). H_2O_2 represents one hydrogen peroxide molecule (2 H and 2 O); changing a subscript changes the substance.

• $M_r(CO_2)$ = 44 without units. $M(CO_2)$ = 44 g mol^{-1}. The coefficient 2 describes two molecules or two moles in an equation; it does not change CO_2's M_r.

• Compare each element count with the formula to detect subscript mistakes. Recalculate each element's mass contribution separately and sum again to detect arithmetic errors.

References and provenance

Pearson Chemistry specification

Prepared 22 November 2026. Original wording, tables and questions. Sources inform the concepts and technique; the lesson scope and classroom quantities are explicitly described here. No laboratory trial or final school risk approval is claimed.