

Using symbols and the periodic table

Grade 8 science (Year 9 · Class 8) · Worksheet

Name: _____ Date: _____ Class: _____

These problems train you to write and read element symbols, tell elements from compounds and mixtures, and find your way around the periodic table. Early problems are quick recall; later ones use data, patterns and predictions.

They match standard MS-PS1-1 and suit Year 9, KS3 and Class 8 students.

Level: Grade 8 science (Year 9 · Class 8) · **Curriculum:** MS-PS1-1

Problem 1 Writing symbols (easy)

Ravi in Hyderabad is labelling element cards.

1. Write the symbol for carbon, oxygen, sodium, iron and calcium.
2. State how many of these symbols have two letters.

Problem 2 Co or CO (easy)

A student writes "Co" on one card and "CO" on another.

1. Explain the difference in meaning.
2. State which one is an element.

Problem 3 Element or compound (easy)

Classify each substance as an element or a compound: copper, table salt (NaCl), helium, water (H₂O), aluminium foil, baking soda (NaHCO₃).

Problem 4 Group and period (easy)

Use the figure to state the group and period of each element: magnesium, potassium, chlorine and neon.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	H																	He
2	Li	Be											B	C	N	O	F	Ne
3	Na	Mg											Al	Si	P	S	Cl	Ar
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr

metal
 metalloid
 non-metal
 noble gas

The table for Problem 4.

Problem 5 Order by atomic number (easy)

The atomic numbers are: neon 10, magnesium 12, boron 5, potassium 19, silicon 14.

- Write the elements in order, smallest atomic number first.
- State which of them are in period 2 (use the table).

Problem 6 Property cards (easy)

Zainab in Dhaka tests three samples and fills in a card. A is a bar, B a lump, C a wire.

Property card	Sample A	Sample B	Sample C
Looks shiny	yes	no	yes
Conducts electricity	yes	no	yes
Breaks when hit	no	yes	no

- Identify which samples are probably metals.
- Identify which sample is probably a non-metal.
- Name one test result that supports your choice.

Problem 7 Cables and coatings (easy)

An electrician in Kano strips a cable. Inside is a copper wire covered by plastic.

- State the property of copper that makes it right for the wire.
- State the property of plastic that makes it right for the coating.
- Explain why the wire is not made of sulfur.

Problem 8 Latin symbols (medium)

A sign at a mine in Johannesburg shows the symbol Au.

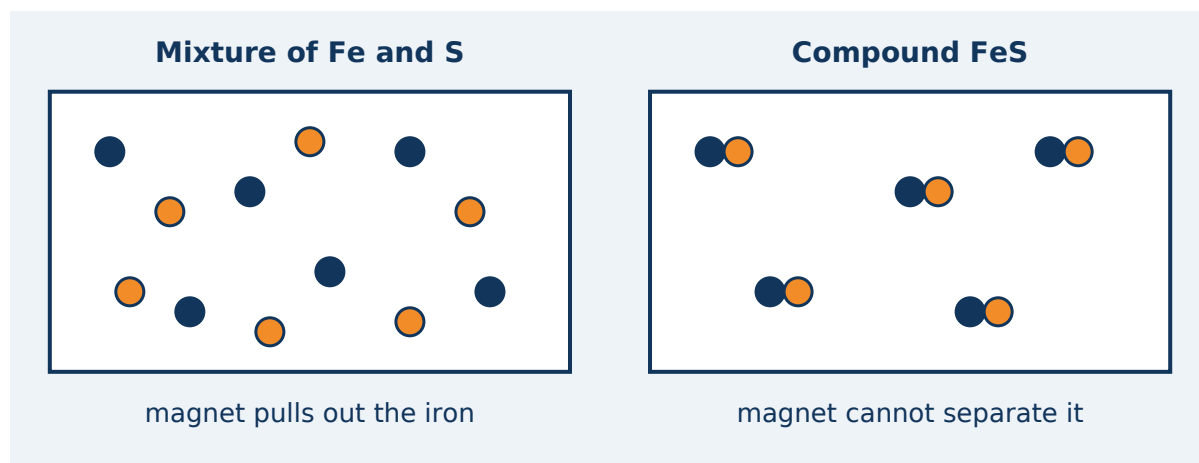
- State the English name of this element.
- Explain why its symbol is not G or Go.
- Write the symbols for lead and silver.

Problem 9 Elements inside compounds (medium)

List the elements and the total number of atoms in each formula: MgO , Fe_2O_3 (rust), CaCO_3 (limestone).

Problem 10 Mixture or compound (medium)

Aarav stirs iron filings and sulfur powder together and the magnet picks out the iron. He then heats the mixture strongly and gets a black solid that the magnet does not attract.



Iron and sulfur as a mixture (left) and as the compound iron sulfide (right).

1. Identify which material is a mixture.
2. Identify which is a compound.
3. Explain the evidence.

Problem 11 Salt from two elements (medium)

Sodium is a soft reactive metal and chlorine is a poisonous green gas. Together they make table salt.

1. State two differences between salt and the elements it is made of.
2. Explain why the properties of a compound are different from its elements.

Problem 12 Group 1 pattern (medium)

Look at the data for four group 1 metals.

Element	Atomic number	Melting point (°C)
Lithium	3	181
Sodium	11	98
Potassium	19	63
Rubidium	37	39

1. Describe the trend in melting point down the group.
2. Predict whether the melting point of caesium (below rubidium) is higher or lower than 39 °C.
3. State which metal would be liquid on a 70 °C day.

Problem 13 Noble gases at work (medium)

Helium fills party balloons, and argon fills some light bulbs to protect the filament.

1. State the group number of helium and argon.
2. Explain why these gases are used for these jobs.
3. State the period of argon.

Problem 14 Silicon (medium)

Silicon is used in the chips in a phone.

A purple square box representing the element Silicon (Si) from the periodic table. In the top left corner is the atomic number 14. In the center is the chemical symbol Si in large bold letters. Below the symbol, the word 'silicon' is written in a smaller font, and at the bottom is the atomic weight 28.1.

14
Si
silicon
28.1

The box for silicon (Problem 14).

1. State the atomic number of silicon.
2. State its period and group.
3. Explain why silicon is called a metalloid.

Problem 15 Mass of metal blocks (medium)

The table shows densities of four metals.

Metal	Density (g/cm ³)
Aluminium	2.70
Iron	7.87
Copper	8.96
Lead	11.3

1. Calculate the mass of a 10.0 cm³ block of each metal using mass = density × volume.
2. State which block is the heaviest and which is the lightest.

Problem 16 Predict from position (hard)

Three unknown elements are described by position only: X is in period 3, group 17; Y is in period 4, group 1; Z is in period 2, group 18.

1. Identify each element using the periodic table.
2. Predict the type of element and one property of each.
3. Explain why Y is stored differently from Z.

Problem 17 Kitchen compounds (hard)

Hadiza in Abuja lists compounds from her kitchen.

Substance	Formula
Baking soda	NaHCO_3
Table sugar (sucrose)	$\text{C}_{12}\text{H}_{22}\text{O}_{11}$
Vinegar acid	$\text{C}_2\text{H}_4\text{O}_2$
Table salt	NaCl
Chalk	CaCO_3

1. State the number of different elements in each.
2. Calculate the number of atoms in one unit of each formula.
3. Identify which compounds contain a metal.

Problem 18 Why gold shines in rivers (hard)

Gold is found as nuggets in river sand, but sodium is never found as a metal in nature, only in compounds such as table salt.

1. Explain the difference in terms of reactivity.
2. Predict whether potassium would be found as a metal in nature, giving a reason.
3. Suggest why gold is used for jewellery.

Problem 19 Halogens data (hard)

The table shows four halogens.

Halogen	Symbol	Atomic number	State at 20 °C
Fluorine	F	9	gas
Chlorine	Cl	17	gas
Bromine	Br	35	liquid
Iodine	I	53	solid

1. Calculate the differences in atomic number between neighbouring halogens.

2. Use the differences to state how many elements are in periods 3, 4 and 5.
3. Describe the trend in state down the group and predict the state of astatine.

Problem 20 Fixed ratio in water (hard)

A school in Pretoria splits water into hydrogen and oxygen. Sample A: 9.0 g of water gives 1.0 g hydrogen and 8.0 g oxygen. Sample B: 36.0 g of water gives 4.0 g hydrogen and 32.0 g oxygen.

1. Show that the ratio of hydrogen to oxygen is the same.
2. Predict the mass of hydrogen in 27.0 g of water.
3. Explain why a mixture of hydrogen and oxygen gas could have any ratio.