Element Drawer Mystery

Use element cards to uncover the periodic table's organization.

PHS.3.1 "Use contextual evidence to determine the organization of the periodic table, including metals, metalloids, and nonmetals; symbols; atomic number; atomic mass; chemical families/groups; and periods/series."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Underline clues about rows and columns, circle clues about metals, nonmetals, and metalloids, and number the meanings of atomic number and atomic mass 1 and 2.

Sorting the Element Drawers

1. Imagine labeling drawers for a school collection of elements. Each periodic-table tile has a one- or two-letter symbol, an atomic number, and an atomic mass. The atomic number counts protons in one atom. The atomic mass is a weighted average for naturally occurring atoms of that element, measured in atomic mass units (amu), so it is often a decimal.

2. The table orders elements by increasing atomic number across each horizontal period, then continues on the next line. Vertical columns are groups, also called chemical families; members often have similar properties. Below hydrogen, group 1 contains alkali metals, while group 17 contains reactive nonmetals called halogens. A shared period means the elements occupy the same row, not the same family.

3. Metals conduct electricity and occupy much of the left and center of the table. Nonmetals tend to be poor conductors and appear mostly on the right. Between these regions, metalloids have mixed properties. In period 3, the zigzag border crosses the group 14 position; tiles farther right in that row fall in the nonmetal region.

CARDS FROM THE ELEMENT DRAWERS

Symbol	Atomic number	Atomic mass (amu)	Group	Period
Li	3	6.94	1	2
Na	11	22.99	1	3
Si	14	28.09	14	3
P	15	30.97	15	3
Cl	17	35.45	17	3

2 ANSWER WITH EVIDENCE

Use the passage

1. Which two cards belong to the same chemical family? Give their symbols and the evidence.

2. Which card is likely a metalloid? Use its group and a clue from the passage.

3. Which period 3 card belongs to the halogen family? Give its symbol and atomic number.

4. For the P card, what do 15 and 30.97 each tell you about its atoms?

3 YOUR TURN

Your own words

A new drawer card reads Al, atomic number 13, atomic mass 26.98 amu, group 13, period 3. In four sentences, place it among the listed period 3 cards and explain its position using atomic number, what its mass means, and whether it shares a family with any listed card.

ANSWER KEY

Element Drawer Mystery

HIGH SCHOOL · PHS.3.1

PART 1 · READ AND MARK

Underline clues about rows and columns, circle clues about metals, nonmetals, and metalloids, and number the meanings of atomic number and atomic mass 1 and 2. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Which two cards belong to the same chemical family? Give their symbols and the evidence.	**Li and Na are both in group 1, so they belong to the same chemical family.**
2	Which card is likely a metalloid? Use its group and a clue from the passage.	**Si is in group 14, where the zigzag border crosses period 3. The passage places metalloids between the metal and nonmetal regions.**
3	Which period 3 card belongs to the halogen family? Give its symbol and atomic number.	**Cl is in group 17, the halogen family. Its atomic number is 17.**
4	For the P card, what do 15 and 30.97 each tell you about its atoms?	**Each phosphorus atom has 15 protons. Its atomic mass is a weighted average of 30.97 amu for naturally occurring phosphorus atoms.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Al belongs in period 3 between Na and Si because its atomic number, 13, falls between 11 and 14. Atomic number 13 means each aluminum atom has 13 protons. Its atomic mass of 26.98 amu is a weighted average for naturally occurring aluminum atoms, not a proton count. Al shares no group with any listed card, so it shares no chemical family with them.

Accept equivalent explanations that use the passage and card data. For the open task, the response must place Al between Na and Si and distinguish atomic mass from atomic number.