Inside the Atom

Use periodic table clues to describe atomic structure

PS.4.a "Obtain, evaluate, and communicate information from the periodic table concerning the structure of an atom and the arrangement of the atom's protons, neutrons, and electrons."

NAME _____ DATE _____

1 READ AND MARK

Read it twice

YOUR JOB Circle what the passage says atomic number and decimal atomic mass mean, underline where each type of particle is found, and number the two facts you need to find an isotope's neutron count.

What the Table Can Tell You

1. A periodic table is a compact clue sheet for atoms. The atomic number beside each element counts protons in its nucleus. In a neutral atom, electrons outside the nucleus equal the proton count. Compare the atomic numbers in the table below: even when two elements look alike, different numbers mean different proton counts and different elements.

ENTRIES FROM A PERIODIC TABLE

Element	Atomic number	Average atomic mass (u)
Lithium (Li)	3	6.94
Nitrogen (N)	7	14.01
Magnesium (Mg)	12	24.31
Argon (Ar)	18	39.95

2. Neutrons share the nucleus with protons, but their count can vary within an element. An isotope's mass number equals its protons plus neutrons. Carbon-13, for example, has six protons and seven neutrons. The decimal atomic mass in the table is an average for naturally occurring isotopes, not the mass number of a particular atom.

3. Electrons occupy the space around the nucleus. Losing electrons makes a positive ion; gaining electrons makes a negative ion. A sodium atom has eleven protons and eleven electrons, while Na^+ has eleven protons and ten electrons. Its element stays the same because its proton count stays the same.

2 ANSWER WITH EVIDENCE

Use the passage

1. Lithium-7 is neutral. How many protons, neutrons, and electrons does it have? State where each type of particle is found.

2. How many neutrons are in a nitrogen-14 atom? Explain which two numbers you used.

3. How many protons and electrons does Mg^{2+} have? Where are those particles found?

4. A classmate says every magnesium atom has 24.31 protons and neutrons combined. Use the table and passage to correct the claim.

3 YOUR TURN

Your own words

Use the table to describe two different neutral isotopes of argon with mass numbers 36 and 40. In four or five sentences, give each atom's proton, neutron, and electron counts, locate the particles, and explain what changes and what stays the same.

ANSWER KEY

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PART 1 · READ AND MARK

Circle what the passage says atomic number and decimal atomic mass mean, underline where each type of particle is found, and number the two facts you need to find an isotope's neutron count. Accept any marking that follows this job and points at the right text.

PART 2 · ANSWERS

#	QUESTION	ANSWER
1	Lithium-7 is neutral. How many protons, neutrons, and electrons does it have? State where each type of particle is found.	**It has 3 protons and 4 neutrons in its nucleus, plus 3 electrons outside the nucleus.**
2	How many neutrons are in a nitrogen-14 atom? Explain which two numbers you used.	**It has 7 neutrons: its mass number is 14, and the table gives 7 protons, so 14 minus 7 equals 7.**
3	How many protons and electrons does Mg^{2+} have? Where are those particles found?	**It has 12 protons in its nucleus and 10 electrons outside the nucleus. The positive charge means it has lost two electrons.**
4	A classmate says every magnesium atom has 24.31 protons and neutrons combined. Use the table and passage to correct the claim.	**24.31 is an average atomic mass, not an individual atom's mass number. Each magnesium atom has 12 protons, but its neutron count can vary.**

PART 3 · YOUR TURN (SAMPLE ANSWER)

Argon-36 has 18 protons, 18 neutrons, and 18 electrons. Argon-40 has 18 protons, 22 neutrons, and 18 electrons. In both atoms, protons and neutrons are in the nucleus, while electrons are outside it. Only the neutron count changes, so both atoms remain argon.

Accept equivalent wording for particles outside the nucleus. For the open task, check that both atoms have 18 protons and 18 electrons, with neutron counts of 18 and 22.