# Answers to Unit 2, Chapter 3, Lesson 2 Questions : U2Ch3L2

## Essential Question

1. What can the atomic number and mass number of an element tell us about it?  
 - The atomic number reveals the number of protons in an atom, which determines the element's identity. For example, carbon always has 6 protons. The mass number represents the total number of protons and neutrons, providing information about the specific isotope of the element.

## Progress Check 1

2. What charge would an atom that lost one electron have?  
 - If an atom loses one electron, it becomes positively charged with a charge of +1 because electrons are negatively charged.

3. What charge would an atom that gained two electrons have?  
 - An atom that gains two electrons becomes negatively charged with a charge of -2 due to the additional negative charges.

## Progress Check 2

4. In a neutral atom (atom that has no charge), how does the number of protons compare to the number of neutrons?  
 - In a neutral atom, the number of protons is equal to the number of electrons. However, the number of neutrons can vary depending on the isotope of the element.

## Group Discussion (Pathfinder: Building Atomic Models)

5. What are protons and neutrons collectively known as?  
 - Protons and neutrons are collectively known as nucleons because they reside in the nucleus of an atom.

6. What are the numbers of electrons, protons, and neutrons in Cl, H, and O?  
 - Chlorine (Cl): 17 protons, 17 electrons, and typically 18 neutrons.  
 - Hydrogen (H): 1 proton, 1 electron, and 0 neutrons (in its most common isotope).  
 - Oxygen (O): 8 protons, 8 electrons, and typically 8 neutrons.

7. For chlorine (Cl), how many red beads are glued in the third circle to represent electrons?  
 - For chlorine, 7 red beads are glued in the third circle to represent the 7 electrons in its outermost energy level.

## Progress Check 3

8. An atom contains 17 electrons, 17 protons, and 18 neutrons. Assign the proper Z and A for this atom.  
 - Z (atomic number) = 17 (number of protons)  
 - A (mass number) = 17 (protons) + 18 (neutrons) = 35

## Power Up

9. Reflect on the following prompts to think critically about the content:  
 - A standard unit of mass quantifies the mass of atomic and subatomic particles.  
 - An atom is overall electrically neutral when it has an equal number of protons and electrons.  
 - The mass of an atom is concentrated in its nucleus, where the protons and neutrons reside.  
 - The number of protons in the nucleus determines the identity of the atom (atomic number).

## Lesson Check

10. Choose an element and describe how its atomic number, mass number, and atomic mass in grams amu provide information about its structure.  
 - Example: For oxygen, atomic number 8 indicates it has 8 protons. Its most common mass number is 16, which includes 8 protons and 8 neutrons. Its atomic mass is approximately 16 amu, reflecting the weighted average of its isotopes.

11. If an atom has 12 protons and 15 neutrons, calculate its mass number.  
 - Mass number = Number of protons + Number of neutrons = 12 + 15 = 27

12. What is an atomic mass unit (amu), and why is it important in chemistry? Give an example.  
 - An atomic mass unit (amu) is defined as one-twelfth the mass of a carbon-12 atom. It is important for comparing the masses of atoms and molecules. For example, hydrogen has a mass of about 1 amu, while oxygen has a mass of about 16 amu.

13. Define atomic number, and how does it help identify an element? Give an example.  
 - The atomic number is the number of protons in an atom's nucleus. It identifies the element because each element has a unique number of protons. For example, carbon has an atomic number of 6.

14. Which factor helps in identifying an atom?  
 - C) Protons of the atom

15. Which subatomic particle/s determines the atomic number of an element?  
 - B) Protons in the nucleus of the atom

16. The element has a mass number of 14, and the number of electrons is 6. Calculate its number of neutrons in the atom:  
 - Mass number = Protons + Neutrons, so Neutrons = Mass number - Protons = 14 - 6 = 8  
 Correct answer: D) 8

## Beyond the Lesson

17. How do atomic and mass numbers impact daily life, such as in healthcare and energy production?  
 - Atomic and mass numbers are crucial for identifying elements and isotopes, which have applications in various fields. In healthcare, isotopes like those used in PET scans help in medical imaging. In energy production, elements like uranium are identified by their atomic number and specific isotopes are used in nuclear fission.