Fill in the Blanks

a) The number of protons in the nucleus of an atom is known as the _____.

b) An atom with the same number of protons but a different number of neutrons is called an _____.

c) The total number of protons and neutrons in an atom is called the _____.

d) A _____ is a subatomic particle with no electric charge.

e) The _____ is a positively charged particle found in the nucleus of an atom.

True or False

a) Neutrons carry a positive charge.

b) The mass number of an atom is the sum of the number of protons and neutrons.

c) Isotopes of an element have the same number of protons but different numbers of electrons.

d) Electrons are found in the nucleus of an atom.

Puzzles and Challenges

Crossword Puzzle

Complete the crossword puzzle using the clues related to the chapter on nuclei.

Across

2. Relating to the atom's core

5. Process of splitting atomic nuclei

7. Substance of atoms with same protons

9. Atoms with different neutron numbers

10. Proton or neutron in nucleus

Down

1. Combining of nuclei, releases energy

3. Smallest unit of an element

4. Negatively charged particle

6. Neutral particle in an atom

8. Positively charged particle

7 across: E L E M E N T
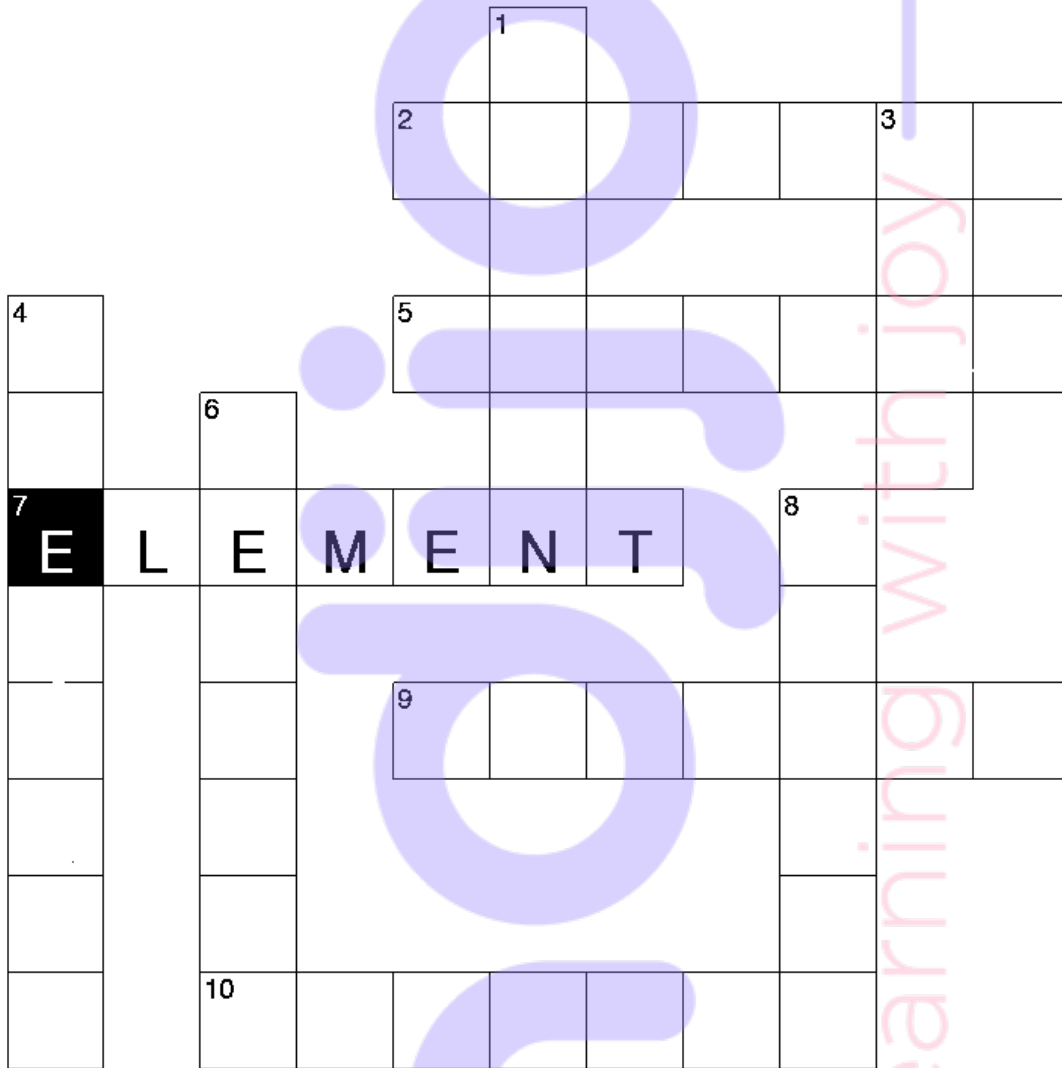
Match the Following

Match the terms in Column A with their correct descriptions in Column B.

Column A	Column B
a) Alpha particles	1. Particles with a positive charge
b) Beta particles	2. The central core of an atom
c) Gamma rays	3. High-energy electromagnetic radiation
d) Nucleus	4. Electrons ejected from a nucleus

1. Nuclear Decay Problem

Radioactive decay follows the formula $N(t) = N_0 e^{-\lambda t}$, where:

- $N(t)$ is the number of radioactive atoms at time t,
- N_0 is the initial number of atoms,
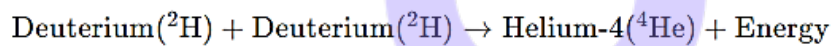- λ is the decay constant.

Given:

- Initial number of atoms, N_0 = 1000
- Decay constant, λ = 0.01
- Time, t = 100 years

Calculate the number of atoms remaining after 100 years.

2. Nuclear Fusion Puzzle

Fill in the missing values to complete the nuclear fusion equation:

$$\text{Deuterium}(^2\text{H}) + \text{Deuterium}(^2\text{H}) \rightarrow \text{Helium-4}(^4\text{He}) + \text{Energy}$$

Use the following information:

- Deuterium (H) has 1 proton and 1 neutron.
- Helium-4 has 2 protons and 2 neutrons.

Hint: Make sure to balance the protons and neutrons on both sides of the equation.

3. Decode the Message

Use the letter-number code below to decode the following message. Each number corresponds to a letter in the alphabet (e.g., 1 = A, 2 = B, etc.).

Message: 8 5 1 18 4 21 19 9 14 7

Deciphered Message: _____