Atomic Number and Mass Number

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Use the 2025 Chemistry Reference Tables as needed. Each atom has a whole-number mass number, A, and atomic number, Z.

1 An atom contains 8 protons and 10 neutrons. Which pair describes its nucleus?

(1) Z = 10, A = 18

(2) Z = 8, A = 18

(3) Z = 8, A = 10

(4) Z = 18, A = 8

2 A phosphorus atom has a mass number of 31. Use the periodic table to determine its number of neutrons. Show your calculation. [1]

Answer and work

3 Which two nuclei are isotopes of the same element?

(1) 7 protons and 7 neutrons; 8 protons and 7 neutrons

(2) 6 protons and 8 neutrons; 7 protons and 7 neutrons

(3) 7 protons and 7 neutrons; 7 protons and 8 neutrons

(4) 6 protons and 7 neutrons; 8 protons and 7 neutrons

4 The periodic table lists 35.45 for chlorine’s atomic mass. Explain why 35.45 cannot be the mass number of a single chlorine atom. [1]

Answer and work

Water Tracers

Use the information below to answer the questions.

A research team uses stable oxygen isotopes as water tracers. The model represents the nuclei of three atoms found in different samples.

Nucleus	Protons	Neutrons
R	8	8
S	8	10
T	1	1

5 What is the mass number of nucleus S?

(1) 8

(2) 10

(3) 16

(4) 18

6 Identify the elements represented by S and T. Use proton counts to justify both identifications. [1]

Answer and work

7 A student claims that R and S are different elements because their masses differ. Explain how the model shows that they are isotopes of one element. [1]

Answer and work

8 If atom T is neutral, how many electrons does it have?

(1) 0

(2) 1

(3) 2

(4) 3