03 Atomic Structure

Set A Foundations

Name	Time 50 minutes	Total 28 marks	Score ____ / 28

Use a copy of the Periodic Table where you need one.

A From the lesson

9 MARKS

1 Which statement about atoms of chlorine-35 and chlorine-37 is correct?

A They have the same number of neutrons.

B They have the same nucleon number.

C They have the same number of electrons.

D They have the same mass.

/1

Answer ☐ [1]

Source: Learners' Alley, Atomic Structure slides

2 Calcium has proton number 20. What is its electronic configuration?

A 2.4.6.8 **B** 2.6.8.4 **C** 2.8, 10 **D** 2.8.8.2

/1

Answer ☐ [1]

Source: Learners' Alley, Atomic Structure slides

3 Complete the table. The first row is done for you.

particle	protons	neutrons	electrons
$^{184}_{74}W$	74	110	74
an atom of uranium-235 (proton number 92)			
a sodium ion with a charge of +1 (a sodium atom has 11 protons and 12 neutrons)			
$^{32}_{16}S^{2-}$			

/3

[3]

Source: Learners' Alley, Atomic Structure slides

4 Boron-11 is the most common isotope of boron. Boron has proton number 5.

(a) How many protons, neutrons and electrons does an atom of boron-11 have?

.....

.....

[1]

(b) What is its electronic configuration?

/2

.....

[1]

Source: Learners' Alley, Atomic Structure slides

5 CHALLENGE Arsenic is a toxic element with proton number 33. Arsenic and its compounds react in the same way as phosphorus and its compounds. Phosphorus has proton number 15. Arsenic has 5 valence electrons.

Suggest why arsenic and its compounds react in the same way as phosphorus and its compounds.

.....

.....

/2

.....

[2]

Source: Learners' Alley, Atomic Structure slides

B Practice

19 MARKS

6 Which option correctly describes the locations of the sub-atomic particles in an atom?

	proton	neutron	electron
A	in the nucleus	in the nucleus	orbiting the nucleus
B	in the nucleus	in the nucleus	in the nucleus
C	orbiting the nucleus	in the nucleus	orbiting the nucleus
D	orbiting the nucleus	orbiting the nucleus	in the nucleus

/1

Answer ☐ **[1]**

Source: 2023 GESS Sec 3 End-of-Year P1 Q8

7 Which statement about an atom is true?

A The proton number can be more than the nucleon number.

B The proton number of all atoms of an element is the same.

C The nucleon number cannot be equal to the proton number.

D The nucleon number cannot be equal to the number of electrons.

/1

Answer ☐ **[1]**

Source: 2023 HYSS Sec 3 End-of-Year P1 Q6

8 In which of the following sets do all the particles have the same number of electrons?

A F^-, Cl^-, Br^-

B H^+, He, N^{3-}

C K^+, Ca^{2+}, P^{3-}

D Na^+, Mg^{2+}, S^{2-}

/1

Answer ☐ **[1]**

Source: 2023 GESS Sec 3 End-of-Year P1 Q11

9 Chlorine-37 is an isotope of chlorine.

(a) Explain what is meant by the term isotope.

.....

..... **[2]**

(b) An ion of chlorine-37 contains the particles in Table 9.1. Identify particles X, Y and Z.

particle	number	name of particle
X	20	
Y	18	
Z	17	

[2]

(c) Chlorine-35 is another isotope of chlorine. Complete Table 9.2 to show the number of each type of particle in an atom of chlorine-35.

particle	number
X	
Y	
Z	

[2]

/6

Source: BLSS 2024 Sec 4 Prelim P2 Q3, adapted

10 **(a)** Table 10.1 describes the properties of some sub-atomic particles. Complete Table 10.1.

	relative mass	relative charge
proton		
neutron		
electron		

[2]

The symbol of an atom of aluminium is $^{27}_{13}Al$.

(b) Answer the following about this atom of aluminium.

(i) State the number of neutrons it has.

.....

..... **[1]**

(ii) Write the electronic configuration of this atom of aluminium.

.....

..... **[1]**

(iii) The symbol for another atom of aluminium is $^{26}_{13}Al$. State and explain the relationship between these two atoms of aluminium.

.....

.....

..... **[1]**

/5

Source: 2023 GESS Sec 3 End-of-Year P2 Q5

11 Flerovium, Fl, has proton number 114. It was first made in research laboratories in 1998. Two isotopes of flerovium are ^{286}Fl and ^{289}Fl.

(a) Define the term isotope.

.....

.....

[1]

(b) Complete Table 11.1 to show the number of protons, neutrons and electrons in the isotopes shown.

isotope	protons	neutrons	electrons
^{286}Fl			
^{289}Fl			

[2]

/3

Source: CHS Sec 3 End-of-Year Section B Q5(b)

12 Table 12.1 shows information about two atoms. Complete Table 12.1.

atom	protons	neutrons	electrons
$^{39}_{19}K$			
		28	24

[2]

/2

Source: 2025 TKGS Sec 4 Prelim P2 Q2(a)