3 The table shows information about four different particles.

particle	nucleon number	number of protons	number of neutrons	number of electrons
Na	23	11	W	11
Na^+	23	11	12	X
O	16	8	Y	8
O^{2-}	16	8	8	Z

What are the values of W, X, Y and Z?

	W	X	Y	Z
A	11	10	10	8
B	11	11	8	10
C	12	10	8	10
D	12	11	10	8

5 Symbols representing four particles are shown.

$^{40}_{20}W$ $^{41}_{20}X^{2+}$ $^{37}_{18}Y$ $^{37}_{17}Z$

The letters are **not** the chemical symbols.

Which particles have the same number of neutrons?

A W and X^{2+} **B** W and Z **C** X^{2+} and Y **D** Y and Z

5 Which statement about atoms or ions is correct?

A The mass number of an atom is the total number of nucleons and protons.

B The electronic configuration of an aluminium ion, Al^{3+}, is 2,8,3.

C Hydrogen is the only atom that has an incomplete first electron shell.

D Most of the volume of an atom is taken up by its nucleus.

3 Which statement defines nucleon number?

A It is the total number of protons in the nucleus of an atom.

B It is the total number of electrons surrounding the nucleus of an atom.

C It is the total number of neutrons in the nucleus of an atom.

D It is the total number of protons and neutrons in the nucleus of an atom.

1 Protons, neutrons and electrons are particles found in atoms.

(a) Complete Table 1.1 to show the relative mass and relative charge of a proton, a neutron and an electron.

Table 1.1

particle	relative mass	relative charge
proton		+1
neutron		
electron	$\frac{1}{1840}$	

[2]

(b) Some elements have many isotopes.

(i) Define the term isotopes.

.....

.....

..... [2]

(ii) Explain why all isotopes of the same element have the same chemical properties.

.....

..... [1]

(c) Complete Table 1.2.

Table 1.2

atom or ion	number of protons	number of neutrons	number of electrons
$^{40}_{18}Ar$	18		18
$^{32}_{16}S^{2-}$		16	
	22	28	20

[5]

(d) The term mass number is defined as the total number of protons and neutrons in the nucleus of an atom.

State the name of **one other** term which is defined as the total number of protons and neutrons in the nucleus of an atom.

..... [1]

(e) Calculate the number of atoms in 2.00 g of argon.

Give your answer in standard form.

number of atoms = ... [2]

[Total: 13]

3 Which row gives the number of protons, electrons and neutrons in an atom of zinc?

	protons	electrons	neutrons
A	30	30	35
B	30	35	35
C	35	30	30
D	35	35	30

4 Which particles have the electronic configuration 2,8,8?

1 an argon atom, Ar

2 an aluminium ion, Al^{3+}

3 a sodium ion, Na^{+}

4 a chloride ion, Cl^{-}

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

2 Atoms are made of electrons, neutrons and protons.

(a) Complete Table 2.1.

Table 2.1

particle	relative charge	relative mass
electron		$\frac{1}{1840}$
neutron	0	
proton		

[2]

(b) Atoms of the same element are known as isotopes.

$^{39}_{19}K$ and $^{41}_{19}K$ are isotopes of potassium.

(i) Complete Table 2.2 to show the number of electrons, neutrons and protons in one atom or ion of these isotopes.

Table 2.2

isotope	electrons	neutrons	protons
$^{39}_{19}K$			
$^{41}_{19}K^{+}$			

[3]

(ii) Table 2.3 shows the relative masses and the percentage abundances of the two isotopes in a sample of potassium.

Table 2.3

relative mass of isotope	percentage abundance of isotope
39	90
41	10

Calculate the relative atomic mass of this sample of potassium to **one** decimal place.

relative atomic mass = [2]

(iii) An isotope of aluminium has a nucleon number of 27.

Aluminium has a relative atomic mass of 27.

State what conclusion can be made from this information.

.....

..... [1]

(c) A calcium atom has the electronic configuration of 2,8,8,2.

Give the formula of one atom and one negative ion that has the same electronic configuration as Ca^{2+}.

- atom .....
- negative ion .....

[2]

[Total: 10]

4 Sulfur atoms can form the negative ion S^{2-}.

Three other atoms or ions are listed.

- argon, Ar
- calcium, Ca
- oxide, O^{2-}

How many of these atoms or ions have the same electronic configuration as S^{2-}?

A 0 **B** 1 **C** 2 **D** 3