

Name _____ Class _____ Date _____

1 Complete the formulae using the words from the box.

electrons	neutral	neutrons	protons
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- a atomic number (Z) = number of _____
- b mass number (A) = number of protons + number of _____
- c number of protons = number of _____ because an atom is _____.

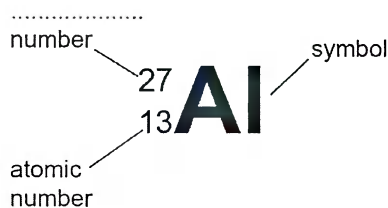
2 Complete this table.

Element's symbol	Atomic number	Mass number	The number of ...		
			protons	electrons	neutrons
O	8	16			
Zn	30	65			
Au	79	197			

3 Complete the missing information below and in the figure opposite.

number of protons = _____

number of neutrons = _____



S1 An atom can be represented in the form ${}^{65}_{29}\text{Cu}$. What does this tell you about this atom?

4 Complete the table below by adding in the missing information.

Symbols	protons	electrons	neutrons
${}^{81}_{35}\text{Br}$			
${}^{40}_{20}\text{Ca}$			

EASIER

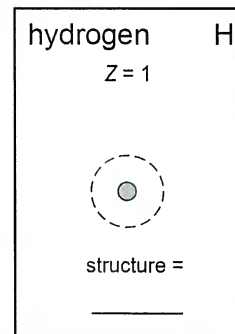
HARDER

Name _____ Class _____ Date _____

1 The atomic number of hydrogen is 1, so its atoms each have one proton (and so one **electron**). This means that the **electronic configuration** of hydrogen is 1 and the electron can be drawn as a dot or cross on the circle representing a shell.

On the diagram on the right:










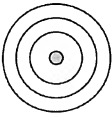
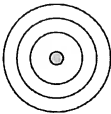
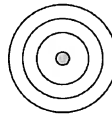
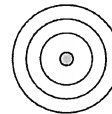
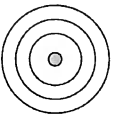
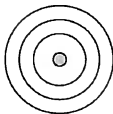
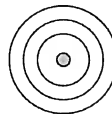
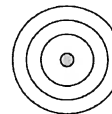
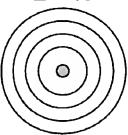
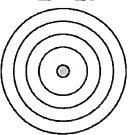
- a write the electronic configuration in the blank space after 'structure ='
- b add the electron on the dashed circle as a cross.



2 The diagram below contains incomplete information about 19 other elements.

The written electronic configuration for lithium is given (atomic number, Z = 3, structure = 2.1).

Work out the electronic configurations for the other 18 elements, and write down their structures.

								helium He Z = 2 
lithium Li Z = 3  structure = 2.1	beryllium Be Z = 4  structure = _____	boron B Z = 5  structure = _____	carbon C Z = 6  structure = _____	nitrogen N Z = 7  structure = _____	oxygen O Z = 8  structure = _____	fluorine F Z = 9  structure = _____	neon Ne Z = 10  structure = _____	
sodium Na Z = 11  structure = _____	magnesium Mg Z = 12  structure = _____	aluminium Al Z = 13  structure = _____	silicon Si Z = 14  structure = _____	phosphorus P Z = 15  structure = _____	sulfur S Z = 16  structure = _____	chlorine Cl Z = 17  structure = _____	argon Ar Z = 18  structure = _____	
potassium K Z = 19  structure = _____	calcium Ca Z = 20  structure = _____							

3 The electronic configuration diagram for lithium has been done for you. Each electron is shown as a cross. Use your answers to question 2 to help you to draw the electron configurations of the other 18 elements.

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- 1 These names describe three models of the **atom**. Write numbers next to each name to show the order in which they were suggested.

plum pudding model Rutherford's model atoms as spheres

- 2 Tick (✓) the correct columns to show which statements apply to each model.

	Plum pudding model	Rutherford's model	Atoms as spheres
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- a An atom is a solid sphere.
- b An atom consists of parts with negative and positive charges.
- c Negative charges in the atom are called electrons.
- d The atom is a mass of positively charged material with electrons scattered through it.
- e Most of the atom is empty space.
- f The mass of the atom is concentrated in a central nucleus.
- g The positive charge in an atom is concentrated in the central nucleus.

- 3 One of Rutherford's experiments fired **alpha particles** at gold foil. Which statement explains what Rutherford should have found if the plum pudding model were correct?

Some particles could bounce back from the atomic nuclei.

All the alpha particles would go through the foil, because there would not be enough mass concentrated in one place to deflect them.

- 4 Which *two* of the following statements describe what Rutherford did find in his experiment?

Some alpha particles passed straight through the foil.

All the alpha particles passed straight through the foil.

All the alpha particles were scattered through large angles.

Some alpha particles were scattered, some of them by large angles.

- 5 Explain Rutherford's results by drawing lines to match the sentence halves.

The particles that went straight through ...

... passed close to the positively charged nucleus.

The particles that were deflected by small angles ...

... passed through the empty space between the nucleus and the electrons in the atoms.

The particles that were deflected by large angles ...

... hit the dense, positively charged nucleus.

Appendix 3: Periodic table

The Periodic Table of the Elements

1	2	3	4	5	6	7	0										
7 Li lithium 3	9 Be beryllium 4	11 Na sodium 11	12 Mg magnesium 12	13 Al aluminium 13	14 Si silicon 14	15 P phosphorus 15	16 S sulfur 16	17 Cl chlorine 17	18 Ar argon 18								
19 K potassium 19	20 Ca calcium 20	23 Sc scandium 21	24 Ti titanium 22	25 V vanadium 23	26 Cr chromium 24	27 Mn manganese 25	28 Fe iron 26	29 Co cobalt 27	30 Ni nickel 28	31 Cu copper 29	32 Zn zinc 30	35 Br bromine 35	36 Kr krypton 36				
37 Rb rubidium 37	38 Sr strontium 38	39 Y yttrium 39	40 Zr zirconium 40	41 Nb niobium 41	42 Mo molybdenum 42	43 Tc technetium [98]	44 Ru ruthenium 44	45 Rh rhodium 45	46 Pd palladium 46	47 Ag silver 47	48 Cd cadmium 48	51 Sb antimony 51	52 Te tellurium 52	53 I iodine 53	54 Xe xenon 54		
55 Cs caesium 55	56 Ba barium 56	57 La* lanthanum 57	72 Hf hafnium 72	73 Ta tantalum 73	74 W tungsten 74	75 Re rhenium 75	76 Os osmium 76	77 Ir iridium 77	78 Pt platinum 78	79 Au gold 79	80 Hg mercury 80	81 Tl thallium 81	82 Pb lead 82	83 Bi bismuth 83	84 Po polonium [209]	85 At astatine [210]	86 Rn radon [222]
87 Fr francium [223]	88 Ra radium [226]	89 Ac* actinium [227]	104 Rf rutherfordium [261]	105 Db dubnium [262]	106 Sg seaborgium [266]	107 Bh bohrium [264]	108 Hs hassium [277]	109 Mt meitnerium [268]	110 Ds darmstadtium [271]	111 Rg roentgenium [272]	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

1	H	1
	hydrogen	

relative atomic mass
atomic symbol
name
atomic (proton) number

* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.

The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.