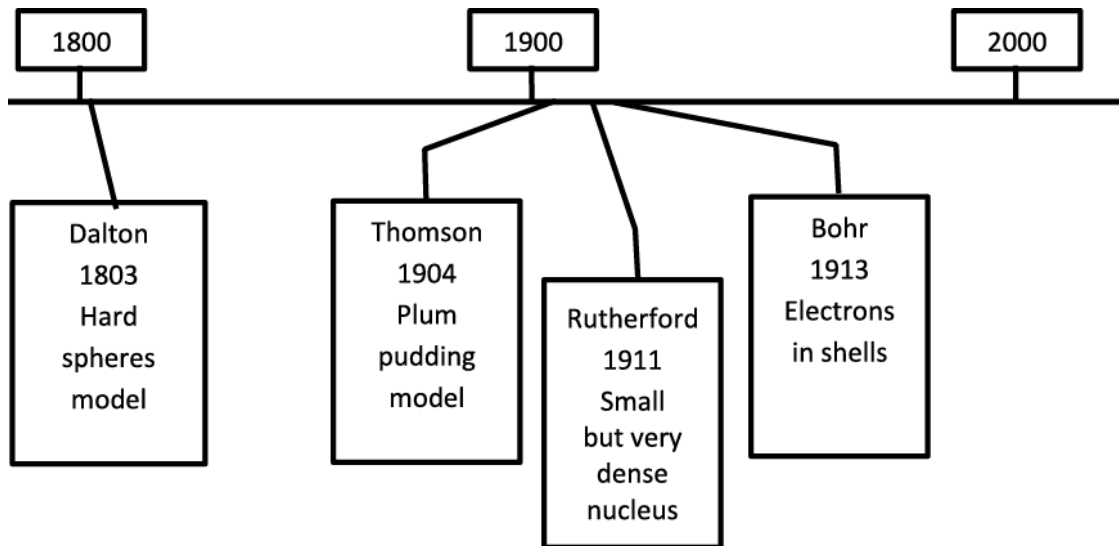


1(a). The models scientists use to describe atoms have changed over the last 200 years.

This timeline shows some of the main ideas.



Which scientist's model could be represented by a ball?



Put a **ring** around the correct answer.

Dalton

Thomson

Rutherford

Bohr

[1]

(b). Which scientist's model could be represented by this diagram?



Put a **ring** around the correct answer.

Dalton

Thomson

Rutherford

Bohr

[1]

2. Joe does some research about Group 1 elements of the Periodic Table.

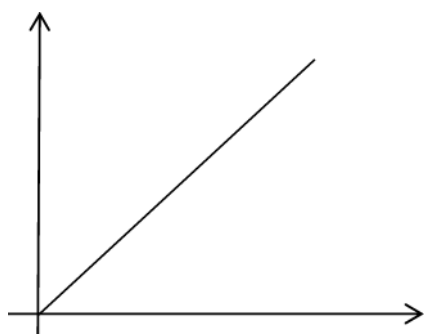
He finds out the radius of the atoms of the first three elements in the group.



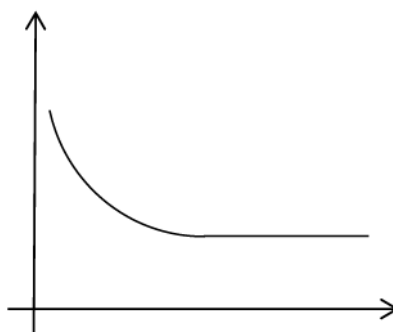
Element	Total number of electrons in each	Radius of the atom (pm)
lithium	3	152
sodium	11	186
potassium	19	231

Which sketch graph, A, B, C or D, is the best representation of the trend shown by the data?

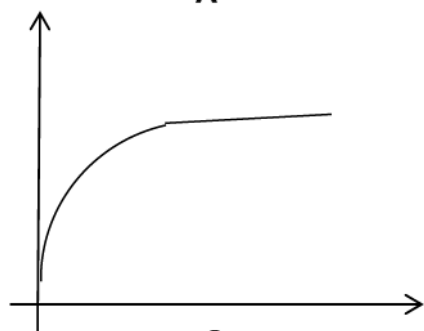
Explain how you used the data to make your choice.



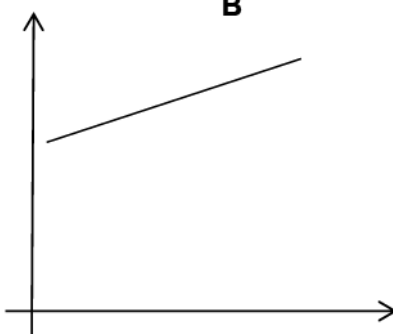
**A**



**B**



**C**



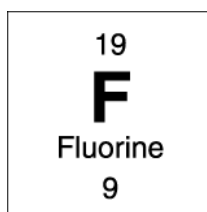
**D**

Graph .....

Explanation .....



3. This is the symbol for fluorine on the Periodic Table.



(i) Complete the sentence.

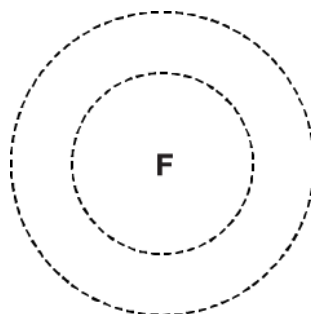
The nucleus of a fluorine atom contains 9 protons and 10 -----

[1]

(ii) The diagram shows part of the structure of a fluorine atom.

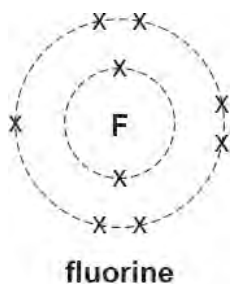
Complete the diagram to show the arrangement of electrons.

Use x to represent each electron.



[2]

4(a). The diagram shows the arrangement of electrons in an atom of fluorine.

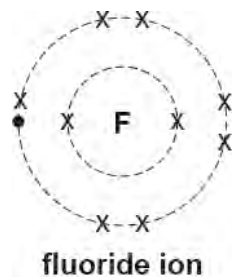


Use the diagram and the Periodic Table provided to complete the missing information in the table.

Name of atom	fluorine
Atomic Number	9
Number of electrons	9
Number of protons	
Number of neutrons	
Periodic Table Group	

[3]

(b). This diagram shows the arrangement of electrons in a fluoride ion.



(i) Describe one way that an atom of fluorine and a fluoride ion are the same and one way that they are different.

Same -----

-----

Different -----

----- [2]

(ii) What is the formula of a fluoride ion?

Put a ring around the correct answer.

F      F<sup>-</sup>      F<sub>2</sub>      F<sup>+</sup>

[1]

END OF QUESTION PAPER

Question			Answer/Indicative content	Marks	Guidance
1	a		Dalton ✓	1	
	b		Thomson ✓	1	
			<b>Total</b>	<b>2</b>	
2			D ✓  the more electrons, the larger the radius / both increase idea ✓  does not go through the origin / data for radius starts at 150 / data for number of electrons starts at 3 ✓	3	
			<b>Total</b>	<b>3</b>	
3		i	neutrons;	1	<b>Reject newtons/neurons</b>
		ii	Inner shell 2; Outer shell 7;	2	<b>Examiner's Comments</b>  The identity of the missing particles in fluorine as neutrons for (i) was better known although a significant number chose electrons instead. Most candidates were able to gain at least 1 mark for the electron arrangement in (ii) by putting 2 electrons in the inner shell although a significant number lost the second mark by putting 8 electrons in the outer shell.
			<b>Total</b>	<b>3</b>	
4	a		protons: 9 ✓ neutrons: 10 ✓ Group :17 / 7✓	3 (AO 3 × 2.1)	<b>Examiner's Comments</b>  Most candidates were able to gain credit on this question and a number could use the Periodic Table to get full marks.



Question			Answer/Indicative content	Marks	Guidance
	b	i	same number of protons / atomic number / neutrons / electron shells / (relative) mass ✓  different number of electrons ✓	2 (AO 2 × 1.1)	ALLOW: one more electron (in the ion) ALLOW: ion is charged and atom is neutral  <u>Examiner's Comments</u>  Lower ability candidates limited themselves to describing the two diagrams. Ideally, candidates should be able to identify the difference in the number of electrons and a similarity from the other particles present.
		ii	F✓	1 (AO 1.1)	
			Total	6	