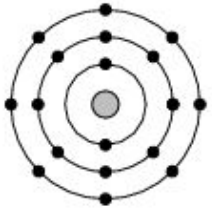
Mark Scheme - 2

1.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		5	symbol / protons / neutrons / electrons fluorine: 10 / 9 calcium: $^{40}_{20}Ca$ / 20 argon: 18 (1) for each correct answer			
	(ii)		1	calcium/Ca and argon /Ar both needed			
	(iii)		1			2,8,8	
(b)			2	Similarity: (same) number of protons (1) Difference: (different) number of neutrons (1)	p for proton n for neutron	reference to atomic number and mass number	reference to electrons

2.

Mark	Answer
6 QWC	Indicative content • element has a mass number of 35 and atomic number of 17 • 17 protons given by atomic number; must have same number of electrons because atoms are neutral • 17 electrons arranged in shells; electronic structure 2, 8, 7 • element is in Period 3; number of occupied electron shells • element is in Group 7; number of electrons in the outer shell • element E is chlorine • number of neutrons is 18; difference between mass number and atomic number 5-6 marks: The candidate constructs an articulate, integrated account correctly linking relevant points, such as those in the indicative content, which shows sequential reasoning. The answer fully addresses the question with no irrelevant inclusions or significant omissions. The candidate uses appropriate scientific terminology and accurate spelling, punctuation and grammar. 3-4 marks: The candidate constructs an account correctly linking some relevant points, such as those in the indicative content, showing some reasoning. The answer addresses the question with some omissions. The candidate uses mainly appropriate scientific terminology and some accurate spelling, punctuation and grammar. 1-2 marks: The candidate makes some relevant points, such as those in the indicative content, showing limited reasoning. The answer addresses the question with significant omissions. The candidate uses limited scientific terminology and inaccuracies in spelling, punctuation and grammar. 0 marks: The candidate does not make any attempt or give a relevant answer worthy of credit.

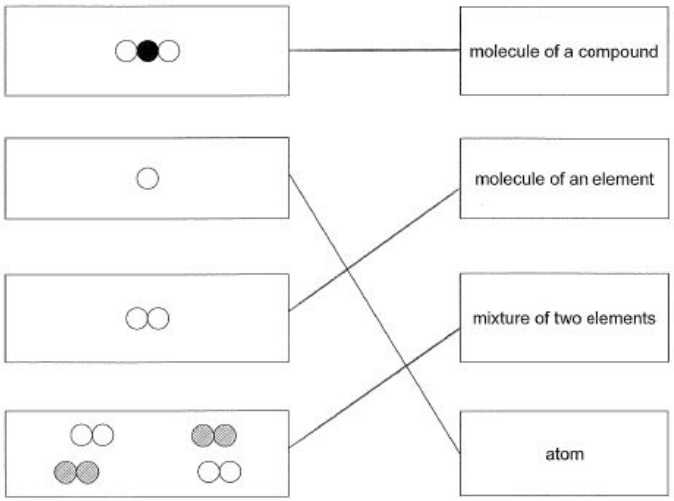
3.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	negative / –1 (1) 1 (1)			
(b)			1	19 9 – both needed			
(c)			2	17 (1) 20 (1)			
(d)			1	2,8,1			
(e)			1	2,8,8,2			

4.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		2	**E** (1) two shells occupied / containing electrons (1)	Ne		
	(ii)		2	**B** and **E** (1) both have **full outer** shells of electrons (1)	Ar and Ne 8 electrons in outer shell		
	(iii)		1		2		
(b)			2	electronic structure is 2,8,7 therefore 17 electrons / atomic number is 17 (1) number of electrons is equal to number of protons (1) both marks may be credited for one statement e.g. **total** number of electrons is equal to number of protons / contains 17 electrons therefore nucleus contains 17 protons (2)		any reference to adding number of electrons in each shell	

5.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	 all three correct for (2) any one for (1)			
(b)			2	A electron negative B nucleus positive all four correct for (2) any two for (1)			

6.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			1	electron		e	
(b)			2	proton (1) neutron (1)		p n	
(c)	(i)		1	14			
	(ii)		1	2,8,4			

7.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	2, 8, 8			
	(ii)		1	D		Al	
	(iii)		2	B and D – both needed (1) they have the same number of electrons in their outer shell / they both have three electrons in their outer shell (1) 2nd mark may be awarded if A and C given	boron and aluminium		A and C
(b)	(i)		1	40			
	(ii)		2	16 ÷ 40 (1) 40 (1) error carried forward from (i) correct answer only (2)			

8.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)	(i)		1	2,8,7			
	(ii)		1	**D** and **E** (both needed)			
	(iii)		1	**A** and **D** (both needed)			
	(iv)		1	5			
(b)			2	1 (1) +1 (1)		1	

9.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			3	*mass number* 7 (1) *atomic number* 6 (1) *number of neutrons* 12 (1)			
(b)	(i)		1	2,8			
	(ii)		2	two shells (containing electrons) outer shell is full / can't accept any more electrons		 8 in outer shell	
(c)			2	**B** and **C** (1) same number of protons but different numbers of neutrons / same atomic number but different mass number (1) [marks linked i.e. second mark cannot be awarded if first is not given]		 reference to electrons	