

Q1.

Question Number	Answer	Mark
	B $10^{-10}$ m	(1)

Q2.

Question number	Answer	Mark
	B	(1)

Q3.

Question number	Answer	Mark
	B $10^{-10}$ m	(1)

Q4.

	Answer	Acceptable answers	Mark
(i)	A 92		(1)
(ii)	neutron(s) (1)	allow phonetic spelling nutron, newtron, nuetron	(1)

Q5.

Question number	Answer	Mark
(i)	<input checked="" type="checkbox"/> <b>A</b> 38 B is number of neutrons C is mass number D is an irrelevant addition of two numbers	(1)

Question number	Answer	Mark
(ii)	<input checked="" type="checkbox"/> <b>B</b> 52 A is number of protons C is mass number D is an irrelevant addition of two numbers	(1)

Q6.

	Answer	Acceptable answers	Mark
(i)	<input checked="" type="checkbox"/> <b>C</b> the same as the charge on the proton		(1)
(ii)	<input checked="" type="checkbox"/> <b>A</b> electrons		(1)

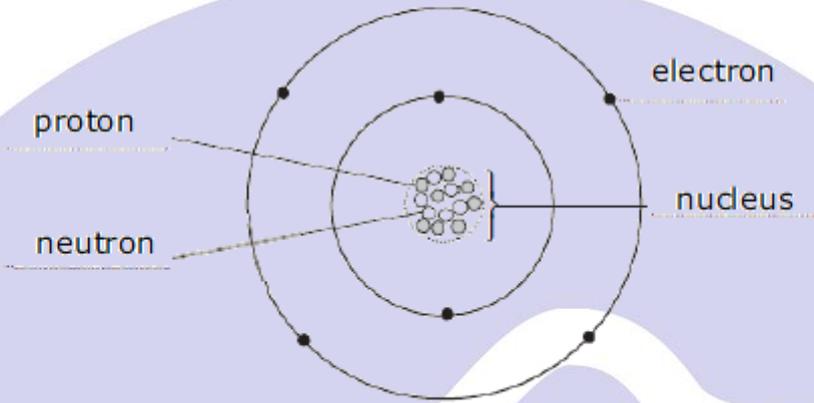
Q7.

	Answer	Acceptable answers	Mark
(ii)	${}^9_4\text{Be}$ <b>B</b> 5		(1)
(iii)	${}^9_4\text{Be}$ <b>A</b>		(1)

Q8.

Question Number	Answer	Acceptable answers	Mark
(i)	<b>B</b> 21		(1)

Q9.

Question number	Answer	Mark
(i)	One mark for each correct label (4)	
 <p>The diagram shows a central nucleus composed of several small circles representing protons and neutrons. Two concentric circles represent electron shells. Six small black dots representing electrons are distributed on the shells: two on the inner shell and four on the outer shell. Labels with leader lines point to a proton and neutron within the nucleus, and an electron on the outer shell. A bracket on the right side of the nucleus is labeled 'nucleus'.</p>		(4)

Question number	Answer	Mark
(ii)	B	(1)

Question number	Answer	Mark
(iii)	zero/0/no charge	(1)

Q10.

	Answer	Additional guidance	Mark										
	<table border="0"><thead><tr><th data-bbox="167 340 703 405">type of particle</th><th data-bbox="703 340 976 405">number of particles</th></tr></thead><tbody><tr><td data-bbox="167 472 395 577">proton</td><td data-bbox="703 472 911 577">35</td></tr><tr><td data-bbox="167 741 395 846">neutron</td><td data-bbox="703 674 911 779">16</td></tr><tr><td data-bbox="167 987 395 1093">nucleon</td><td data-bbox="703 898 911 1003">51</td></tr><tr><td></td><td data-bbox="703 1122 911 1227">19</td></tr></tbody></table>	type of particle	number of particles	proton	35	neutron	16	nucleon	51		19	<p>1 mark for each correct line</p> <p>more than one line from a box in the left column ("type of particle") box loses the mark for the box</p>	<p>(3) AO2</p>
type of particle	number of particles												
proton	35												
neutron	16												
nucleon	51												
	19												

Q11.

Question Number	Answer	Additional guidance	Mark
(i)	6 / six		(1) AO1

Question Number	Answer	Additional guidance	Mark
ii	8 / eight		(1) AO2

Q12.

Question Number	Answer	Mark		
(i)	<p>C</p> <table border="1"><tr><td>1</td><td>+1</td></tr></table> <p>A is incorrect the proton has a mass of 1 not 0 B is incorrect the proton has a mass of 1 not 0 D is incorrect the proton has a charge of +1 not -1</p>	1	+1	(1) AO1
1	+1			

Question Number	Answer	Additional guidance	Mark
(ii)	substitution (1) $\text{ratio} = \frac{10^{-10}}{10^{-15}}$  evaluation (1) $10^5$	$10^{-10} : 10^{-15}$  accept suitable equivalent ratios e.g. $1 \times 10^5 : 1$ $1 : 10^{-5}$ or $10^5 : 1$ $1 : 0.00001$ or $100000 : 1$  allow 1 mark for inverted ratios e.g. $10^{-15} : 10^{-10}$ $0.00001 : 1$ or $1 : 100000$  award full marks for the correct answer with no working	(2) AO2

Question Number	Answer	Additional guidance	Mark
(iii)	an explanation linking same number / amount of (1)  electrons and protons (1)	equal number / amount of  allow balanced (number / amount of)  negative and positive charges ignore (neutral) neutrons  reject positive/negative neutrons for 2 <sup>nd</sup> marking point	(2) AO1

**Q13.**

Question Number	Answer	Acceptable answers	Mark
	<p>A description including any four from:</p> <p>(there are) 89 particles in the nucleus (1)</p> <p>protons (1)</p> <p>(there are) 36 (protons) (1)</p> <p>neutrons (1)</p> <p>(there are) 53 (neutrons) (1)</p> <p>i.e. 36 protons and 53 neutrons gains four marks</p>	<p>ignore all references to electrons</p> <p>(its) {mass/nucleon} number / RAM / <math>A_r</math> / <math>A</math> is <u>89</u></p> <p>{atomic/proton} number / positive charge / <math>Z = \underline{36}</math></p> <p>Numbers must be correctly linked to gain credit e.g. 36 neutrons gets 1 mark (for neutrons)</p> <p>53 protons and 36 neutrons gains two marks (for protons and neutrons)</p> <p>89 protons and neutrons gets 3 marks</p> <p>(altogether there are) 89 protons and neutrons. 36 are protons gains 4 marks</p>	<p><b>(4)</b></p>

Q14.

Question Number	Answer	Additional guidance	Mark									
	<table border="1" data-bbox="352 465 751 701"><tr><td></td><td></td><td></td></tr><tr><td></td><td>7</td><td>6</td></tr><tr><td></td><td>8</td><td>6</td></tr></table> <p data-bbox="416 757 459 801">(1)</p> <p data-bbox="600 757 643 801">(1)</p>					7	6		8	6	<p data-bbox="815 427 1246 461">one mark for each column</p> <p data-bbox="807 510 1318 595">must have both numbers in a column correct to get the mark</p>	<p data-bbox="1350 427 1398 461"><b>(2)</b></p>
	7	6										
	8	6										