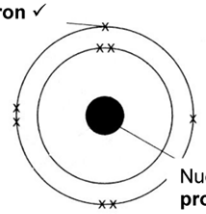
Mark scheme – Atomic Structure (F)

<table>
<tr><th colspan="3">Question</th><th>Answer/Indicative content</th><th>Marks</th><th>Guidance</th></tr>
<tr><td>1</td><td></td><td></td><td>C</td><td>1
(AO2.1)</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>1</td><td></td></tr>
<tr><td>2</td><td></td><td></td><td>B</td><td>1
(AO2.1)</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>1</td><td></td></tr>
<tr><td>3</td><td></td><td></td><td>A</td><td>1
(AO
2.1)</td><td><u>Examiner's Comments</u>

B and D were quite common incorrect responses.</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>1</td><td></td></tr>
<tr><td>4</td><td></td><td></td><td>D</td><td>1
(AO
1.1)</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>1</td><td></td></tr>
<tr><td>5</td><td></td><td>i</td><td>Unreactive ✓

Full outer shell (of electrons) ✓</td><td>2
(AO2.1
1.1)</td><td>ALLOW doesn't bond / doesn't lose or gain electrons / doesn't share electrons

ALLOW (argon has a) stable electronic structure / 8 electrons in outer shell</td></tr>
<tr><td></td><td></td><td>ii</td><td>
<table>
<tr><th></th><th>$^{20}_{10}$Ne</th><th>$^{22}_{10}$Ne</th></tr>
<tr><td>Proton</td><td>10</td><td>10</td><td>✓</td></tr>
<tr><td>Neutron</td><td>10</td><td>12</td><td>✓</td></tr>
<tr><td>Electron</td><td>10</td><td>10</td><td>✓</td></tr>
</table>
</td><td>3
(AO2.1)</td><td>1 mark for each row</td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>0</td><td></td></tr>
<tr><td>6</td><td>a</td><td>i</td><td>electron ✓
 
Nucleus containing
protons and neutrons ✓

(Need both for the mark)</td><td>2
(AO1.1)</td><td>ALLOW either order

<u>Examiner's Comments</u></td></tr>
</table>

					A small number of candidates used biology terms including chromosomes and DNA or labelled the nucleus protons and electrons.
		ii	Has equal numbers of (positive) protons and (negative) electrons ✓	1 (AO2.1)	q asks for particles **IGNORE** protons cancel electrons **Examiner's Comments** Many referred to protons cancelling electrons with no reference to charges or numbers or stated that electrons are negative and protons positive with no further explanation or discussed neutrons and protons.
	b		Isotopes have same number of protons (and electrons) ✓ Isotopes have different numbers of neutrons ✓	2 (AO1.1)	**ALLOW** same proton number/same atomic number **ALLOW** different mass number/number of nucleons/atomic mass **DO NOT ALLOW** different RAM/M_r **ALLOW** 1 mark for same protons and different neutrons **Examiner's Comments** Some candidates reversed atomic number and mass number or referred to mass number as relative atomic mass. Atomic number was better known than mass number.

<table>
<tr><td></td><td></td><td></td><td>Total</td><td>5</td><td></td></tr>
<tr><td>7</td><td>a</td><td></td><td>graphite – has a layered structure (1)
electrons can move / electrons between layers or delocalised (1)
diamond – no free electrons or ions (1)</td><td>3</td><td></td></tr>
<tr><td></td><td>b</td><td></td><td>it can bond to itself (and make chains and rings) (1)</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>4</td><td></td></tr>
<tr><td>8</td><td>a</td><td></td><td>
<table>
<tr><th>Particle</th><th>Atomic number</th><th>Mass number</th><th>Number of protons</th><th>Number of neutrons</th><th>Number of electrons</th><th>Electronic structure</th></tr>
<tr><td>A</td><td>11</td><td>23</td><td>11</td><td>12</td><td>11</td><td>2.8.1</td></tr>
<tr><td>B</td><td>9</td><td>19</td><td>9</td><td>10</td><td>9</td><td>2.7</td></tr>
<tr><td>C</td><td>17</td><td>37</td><td>17</td><td>20</td><td>17</td><td>2.8.7</td></tr>
<tr><td>D</td><td>13</td><td>27</td><td>13</td><td>14</td><td>10</td><td>2.8</td></tr>
</table>
</td><td>4</td><td>one mark scored for each correct line</td></tr>
<tr><td></td><td>b</td><td></td><td>particle A – one electron in outer shell or energy level (1)
particle D – has more protons than electrons (1)</td><td>2</td><td></td></tr>
<tr><td></td><td>c</td><td></td><td>group 7 (1) as 7 electrons in outer shell (1)
period 3 (1) as 3 shells occupied (1)</td><td>4</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>8</td><td></td></tr>
<tr><td>9</td><td></td><td></td><td>B</td><td>1</td><td></td></tr>
<tr><td></td><td></td><td></td><td>Total</td><td>1</td><td></td></tr>
</table>