C1.2 Summary questions

1. a. the smallest particle of an element (with a nucleus containing protons and neutrons, and electrons arranged around it)
   b. two or more non-metal atoms chemically joined together by covalent bonds
   c. an attractive force between two particles
   d. a chart in which the elements are arranged in rows / periods and columns / groups, in order of increasing atomic number
   e. the number of protons in the nucleus of an atom
   f. the total number of protons and neutrons in the nucleus of an atom
   g. atoms with the same number of protons (and electrons) but different numbers of neutrons, or atoms with the same atomic number but different mass numbers
   h. charged particle formed when an atom, or group of atoms, loses or gains electrons

2. a. proton
   b. shell / energy level
   c. neutron
   d. electron
   e. nucleus

3. | Subatomic particle | Location in the atom | Relative mass | Relative charge |
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>proton</td>
<td>nucleus</td>
<td>1</td>
<td>+1</td>
</tr>
<tr>
<td>neutron</td>
<td>nucleus</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>electron</td>
<td>shells / energy levels</td>
<td>0.0005</td>
<td>–1</td>
</tr>
</tbody>
</table>

4. | Isotope | Atomic number | Mass number | Number of: |
<table>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>protons</td>
</tr>
<tr>
<td>$^1_1$H</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>$^2_1$H</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>$^{12}_{6}$C</td>
<td>6</td>
<td>12</td>
<td>6</td>
</tr>
<tr>
<td>$^{14}_{6}$C</td>
<td>6</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>$^{35}_{17}$Cl</td>
<td>17</td>
<td>35</td>
<td>17</td>
</tr>
<tr>
<td>$^{238}_{92}$U</td>
<td>92</td>
<td>238</td>
<td>92</td>
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</tbody>
</table>
5  a  protons, electrons (either order)
    b  electrons
    c  protons, neutrons

6  a  Dalton: any two from the following:
     all matter made from atoms
     elements have identical atoms
     different elements have different atoms
    b  J. J. Thompson: any three from the following:
     discovered the electron
     concluded that electrons must be smaller than atoms / negatively charged
     proposed the plum pudding model
     sphere of positive charge with electrons inside
    c  Rutherford: any three from the following:
     encouraged Geiger and Marsden to test the plum pudding model
     proposed nuclear model of atom
     positively charged nucleus
     with electrons orbiting it
    d  Bohr: improved Rutherford’s model, electrons must occupy fixed energy levels / shells

7  a  Most of the particles went straight through the foil.
    b  Alpha particles are positively charged so they were repelled by the positively charged nucleus, only some particles were deflected so the nucleus must be small.