

0 1

Table 1 shows the electron arrangement of the atoms of four elements. The letters are not the correct symbol for the elements.

| Element | Electron arrangement in the atoms |
|---------|-----------------------------------|
| A       | 2 : 1                             |
| B       | 2                                 |
| C       | 2 : 8 : 1                         |
| D       | 2 : 8 : 8                         |
| E       | 2 : 8 : 4                         |

0 1 . 1

Give the letter or letters that matches the description of the elements given.

Use **Table 1** to help you answer. **[5 marks]**

An element in group 4 of the periodic table ..... **E [1]**

Elements with a full outer shell ..... **B [1] D [1]**

An element that has one electron in its outer shell ..... **A [1] or C [1]**

Unreactive elements..... **B and D [1]**

**NOTE:**  
Element B is helium.  
It has two electrons on the outer shell but remember, the first shell only holds two electrons.

| 1 2  |                             |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            | 3 4 5 6 7 0                 |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
|--|-----------------------------|--|-------------------------------------|------------------------------|----------------------------------|--|-------------------------------|----------------------------------|------------------------------------|-----------------------------------|----------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|-------------------------------|----------------------------|---|---|---|------------------------|----------|--------|---|-----------------|--|--|--|--|--|--|---|--|-----------------------|------------------------|--------------------------|------------------------|--------------------------|------------------------|-----------------------------|---------------------------|-----------------------------|-------------------------|------------------------------|-------------------------|
|  |                             | <table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">1<br/>H<br/>hydrogen<br/>1</td> </tr> </table> |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            | 1<br>H<br>hydrogen<br>1     |                             |                             |                               |                               |                            |   | <table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">4<br/>He<br/>helium<br/>2</td> </tr> </table> |   | 4<br>He<br>helium<br>2 |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 1<br>H<br>hydrogen<br>1  |                             |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 4<br>He<br>helium<br>2   |                             |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| <table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">7<br/>Li<br/>lithium<br/>3</td> <td style="text-align: center;">9<br/>Be<br/>beryllium<br/>4</td> </tr> <tr> <td style="text-align: center;">23<br/>Na<br/>sodium<br/>11</td> <td style="text-align: center;">24<br/>Mg<br/>magnesium<br/>12</td> </tr> </table> |                             | 7<br>Li<br>lithium<br>3  | 9<br>Be<br>beryllium<br>4           | 23<br>Na<br>sodium<br>11     | 24<br>Mg<br>magnesium<br>12      | <table border="1" style="margin: auto;"> <tr> <th colspan="2">KEY</th> </tr> <tr> <td style="text-align: center;">1</td> <td>→ relative atomic mass</td> </tr> <tr> <td style="text-align: center;">H</td> <td>→ atomic symbol</td> </tr> <tr> <td style="text-align: center;">hydrogen</td> <td>→ name</td> </tr> <tr> <td style="text-align: center;">1</td> <td>→ atomic number</td> </tr> </table> |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               | KEY                           |                            | 1 | → relative atomic mass  | H | → atomic symbol        | hydrogen | → name | 1 | → atomic number |  |  |  |  |  |  | <table border="1" style="margin: auto;"> <tr> <td style="text-align: center;">11<br/>B<br/>boron<br/>5</td> <td style="text-align: center;">12<br/>C<br/>carbon<br/>6</td> <td style="text-align: center;">14<br/>N<br/>nitrogen<br/>7</td> <td style="text-align: center;">16<br/>O<br/>oxygen<br/>8</td> <td style="text-align: center;">19<br/>F<br/>fluorine<br/>9</td> <td style="text-align: center;">20<br/>Ne<br/>neon<br/>10</td> </tr> <tr> <td style="text-align: center;">27<br/>Al<br/>aluminium<br/>13</td> <td style="text-align: center;">28<br/>Si<br/>silicon<br/>14</td> <td style="text-align: center;">31<br/>P<br/>phosphorus<br/>15</td> <td style="text-align: center;">32<br/>S<br/>sulfur<br/>16</td> <td style="text-align: center;">35.5<br/>Cl<br/>chlorine<br/>17</td> <td style="text-align: center;">40<br/>Ar<br/>argon<br/>18</td> </tr> </table> |  | 11<br>B<br>boron<br>5 | 12<br>C<br>carbon<br>6 | 14<br>N<br>nitrogen<br>7 | 16<br>O<br>oxygen<br>8 | 19<br>F<br>fluorine<br>9 | 20<br>Ne<br>neon<br>10 | 27<br>Al<br>aluminium<br>13 | 28<br>Si<br>silicon<br>14 | 31<br>P<br>phosphorus<br>15 | 32<br>S<br>sulfur<br>16 | 35.5<br>Cl<br>chlorine<br>17 | 40<br>Ar<br>argon<br>18 |
| 7<br>Li<br>lithium<br>3  | 9<br>Be<br>beryllium<br>4   |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 23<br>Na<br>sodium<br>11   | 24<br>Mg<br>magnesium<br>12 |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| KEY  |                             |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 1  | → relative atomic mass      |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| H  | → atomic symbol             |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| hydrogen   | → name                      |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 1  | → atomic number             |  |                                     |                              |                                  |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 11<br>B<br>boron<br>5  | 12<br>C<br>carbon<br>6      | 14<br>N<br>nitrogen<br>7   | 16<br>O<br>oxygen<br>8              | 19<br>F<br>fluorine<br>9     | 20<br>Ne<br>neon<br>10           |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 27<br>Al<br>aluminium<br>13  | 28<br>Si<br>silicon<br>14   | 31<br>P<br>phosphorus<br>15  | 32<br>S<br>sulfur<br>16             | 35.5<br>Cl<br>chlorine<br>17 | 40<br>Ar<br>argon<br>18          |  |                               |                                  |                                    |                                   |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 39<br>K<br>potassium<br>19   | 40<br>Ca<br>calcium<br>20   | 45<br>Sc<br>scandium<br>21   | 48<br>Ti<br>titanium<br>22          | 51<br>V<br>vanadium<br>23    | 52<br>Cr<br>chromium<br>24       | 55<br>Mn<br>manganese<br>25  | 56<br>Fe<br>iron<br>26        | 59<br>Co<br>cobalt<br>27         | 59<br>Ni<br>nickel<br>28           | 63.5<br>Cu<br>copper<br>29        | 65<br>Zn<br>zinc<br>30     | 70<br>Ga<br>gallium<br>31   | 73<br>Ge<br>germanium<br>32 | 75<br>As<br>arsenic<br>33   | 79<br>Se<br>selenium<br>34    | 80<br>Br<br>bromine<br>35     | 84<br>Kr<br>krypton<br>36  |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 85<br>Rb<br>rubidium<br>37   | 88<br>Sr<br>strontium<br>38 | 89<br>Y<br>yttrium<br>39   | 91<br>Zr<br>zirconium<br>40         | 93<br>Nb<br>niobium<br>41    | 96<br>Mo<br>molybdenum<br>42     | [98]<br>Tc<br>technetium<br>43   | 101<br>Ru<br>ruthenium<br>44  | 103<br>Rh<br>rhodium<br>45       | 106<br>Pd<br>palladium<br>46       | 108<br>Ag<br>silver<br>47         | 112<br>Cd<br>cadmium<br>48 | 115<br>In<br>indium<br>49   | 119<br>Sn<br>tin<br>50      | 122<br>Sb<br>antimony<br>51 | 128<br>Te<br>tellurium<br>52  | 127<br>I<br>iodine<br>53      | 131<br>Xe<br>xenon<br>54   |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| 133<br>Cs<br>caesium<br>55   | 137<br>Ba<br>barium<br>56   | 139<br>La<br>lanthanum<br>57   | 178<br>Hf<br>hafnium<br>72          | 181<br>Ta<br>tantalum<br>73  | 184<br>W<br>tungsten<br>74       | 186<br>Re<br>rhenium<br>75   | 186<br>Os<br>osmium<br>76     | 192<br>Ir<br>iridium<br>77       | 195<br>Pt<br>platinum<br>78        | 197<br>Au<br>gold<br>79           | 201<br>Hg<br>mercury<br>80 | 204<br>Tl<br>thallium<br>81 | 207<br>Pb<br>lead<br>82     | 209<br>Bi<br>bismuth<br>83  | [209]<br>Po<br>polonium<br>84 | [210]<br>At<br>astatine<br>85 | [222]<br>Rn<br>radon<br>86 |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |
| [223]<br>Fr<br>francium<br>87  | [226]<br>Ra<br>radium<br>88 | [227]<br>Ac<br>actinium<br>89  | [261]<br>Rf<br>rutherfordium<br>104 | [262]<br>Db<br>dubium<br>105 | [266]<br>Sg<br>seaborgium<br>106 | [264]<br>Bh<br>bohrium<br>107  | [277]<br>Hs<br>hassium<br>108 | [268]<br>Mt<br>meitnerium<br>109 | [271]<br>Ds<br>darmstadtium<br>110 | [272]<br>Rg<br>roentgenium<br>111 |                            |                             |                             |                             |                               |                               |                            |   |   |   |                        |          |        |   |                 |  |  |  |  |  |  |   |  |                       |                        |                          |                        |                          |                        |                             |                           |                             |                         |                              |                         |

|   |   |   |   |
|---|---|---|---|
| 0 | 1 | . | 2 |
|---|---|---|---|

The modern periodic table is an arrangement of the elements in terms of their atomic structures.

Explain how.

[5 marks]

**TOP TIP:**

This is quite an open ended question, but requires logical order of information. Could easily be a 6 marks question so worth learning thoroughly.

**Any five from the list below:**

.....  
The elements arranged in proton or atomic number order [1]

.....  
Elements in the same group or column have the same number of electrons in the outer or outermost shell. [1]

.....  
The number of shells increase down group [1]

.....  
Elements in the same period / row have the same number of shells / energy levels [1]

.....  
Period: number of protons / electrons increase across period [1]

.....  
The atomic numbers give the number of protons [1]

.....  
The atomic number gives number of electrons. [1]

.....

.....

.....

(Total 10 marks)

End