

Q1.

| Question number | Answer   | Mark       |
|-----------------|--|------------|
|                 | <div style="border: 1px solid black; padding: 5px; display: inline-block;"> <b>A</b> same atomic number    different number of neutrons         </div> <p>Options B, C and D have wrong combinations</p> | <b>(1)</b> |

Q2.

|       | Answer            | Acceptable answers | Mark       |
|-------|-------------------|--------------------|------------|
| (iii) | ${}^9\text{Be}$ A |                    | <b>(1)</b> |

Q3.

|     | Answer  | Mark                     |
|-----|---|--------------------------|
| (i) | C ${}^{245}_{95}\text{Am}$<br><b>A, B and D</b> are incorrect as these are not isotopes of americium. | <b>(1)</b><br><b>AO1</b> |

Q4.

| Question Number | Answer                 | Acceptable answers | Mark       |
|-----------------|------------------------|--------------------|------------|
| (ii)            | <b>A</b><br>39<br>19 K |                    | <b>(1)</b> |

Q5.

| Question number | Answer   | Additional guidance                             | Mark                     |
|-----------------|--|---|--------------------------|
|                 | same number of protons (1)<br><br>different number of neutrons (1) | same atomic number<br><br>different mass number | <b>(2)</b><br><b>AO2</b> |

Q6.

| Question number | Answer  | Mark       |
|-----------------|---|------------|
|                 | one from <ul style="list-style-type: none"><li>• same atomic number (1)</li><li>• same number of protons (1)</li><li>• same element (1)</li></ul> and one from <ul style="list-style-type: none"><li>• different numbers of neutrons (1)</li><li>• different mass numbers (1)</li></ul> | <b>(2)</b> |

Q7.

| Question Number | Answer   | Acceptable answers  | Mark       |
|-----------------|--|---|------------|
| <b>(c)(i)</b>   | Comparison including any two from<br>Same number of protons (1)<br>Different number of neutrons (1)<br>Cobalt-60 is unstable (1) | Same atomic/proton number/charge<br>Different nucleon number/mass number/atomic mass<br>Cobalt 60 is radioactive<br>Ignore reference to electrons | <b>(2)</b> |

Q8.

|  | Answer  | Acceptable answers  | Mark       |
|--|---|---------------------|------------|
|  | P and M<br>OR M and P<br>OR N and Q<br>OR Q and N | one mark for a pair | <b>(1)</b> |