

| Question number | Answer | | | | Notes | Marks | | | | | | | | | | | | | | | | |
|-----------------|---|------------------|--------------|--|--|--------------|------------------|-------------|-----------------|---------|---------|---------|----------------|--------------|---------|---------|-----------------|--------------|--------------|--------------|--|-----|
| 7 (a) | <div><div><div>description</div><div>type of radiation</div></div><div><div>electromagnetic waves</div><div>particles with a negative charge</div><div>particles with a positive charge</div></div><div><div>alpha</div><div>beta</div><div>gamma</div><div>neutron</div></div></div> <div>positive charge to alpha; negative charge to beta; electromagnetic waves to gamma;</div> | | | | One mark for each correct line Minus one mark for two lines from any one box on the left | (3) | | | | | | | | | | | | | | | | |
| (b) (i) | in this order only: gamma, beta, alpha; | | | | | (1) | | | | | | | | | | | | | | | | |
| (ii) | any two from: can damage cells; can cause mutation; can cause cancer; | | | | allow kill cells/tissues radiation burns radiation poisoning change genes | (2) | | | | | | | | | | | | | | | | |
| (c) | <table><tr><td></td><td>0.1 cm paper</td><td>0.5 cm aluminium</td><td>0.5 cm lead</td></tr><tr><td>alpha radiation</td><td>stopped</td><td>stopped</td><td>stopped</td></tr><tr><td>beta radiation</td><td>goes through</td><td>stopped</td><td>stopped</td></tr><tr><td>gamma radiation</td><td>goes through</td><td>goes through</td><td>goes through</td></tr></table> Each row correct for 1 mark;;; | | | | | 0.1 cm paper | 0.5 cm aluminium | 0.5 cm lead | alpha radiation | stopped | stopped | stopped | beta radiation | goes through | stopped | stopped | gamma radiation | goes through | goes through | goes through | | (3) |
| | 0.1 cm paper | 0.5 cm aluminium | 0.5 cm lead | | | | | | | | | | | | | | | | | | | |
| alpha radiation | stopped | stopped | stopped | | | | | | | | | | | | | | | | | | | |
| beta radiation | goes through | stopped | stopped | | | | | | | | | | | | | | | | | | | |
| gamma radiation | goes through | goes through | goes through | | | | | | | | | | | | | | | | | | | |
| (d) | any suitable device e.g. (thin window) GM tube; cloud chamber; spark chamber; semiconductor detector; | | | | accept spelling mistakes Geiger counter NB do not accept repeat of stem (film badge or photographic film) | (1) | | | | | | | | | | | | | | | | |

Total for Question 7 = 10 marks