# End of topic quiz

# Topic P4: Waves and radioactivity

## Learner Activity

**Topic: P4 of J250**

**Total marks: 40**

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| **1.** | Which of the following definitions are true? **[1 mark]**   1. Wavelength is the length a wave travels in one second. 2. Wavelength is the length of one wave. 3. Frequency is the number of waves that occur in one second. 4. Frequency is time it takes for one wave to occur. | |
|  |  | |
|  | **A** | 1 and 3 |
|  | **B** | 1 and 4 |
|  | **C** | 2 and 3 |
|  | **D** | 2 and 4 |
|  | Your answer | |
|  |  | |

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| **2.** | Which type of radiation is missing from the following list? **[1 mark]**  X Rays  ---------------  Visible Light | |
|  |  | |
|  | **A** | Radio waves |
|  | **B** | Infra-Red |
|  | **C** | Ultraviolet |
|  | **D** | Microwaves |
|  | Your answer | |
|  |  | |

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| **3.** | Which of the following is the least penetrating? **[1 mark]** | |
|  |  | |
|  | **A** | Alpha |
|  | **B** | Beta |
|  | **C** | Gamma |
|  | **D** | X-Rays |
|  | Your answer | |
|  |  | |

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| **4.** | What is the speed of a wave of wavelength 4 mm and a frequency of 10 Hz? **[1 mark]** | |
|  |  | |
|  | **A** | 0.04 m/s |
|  | **B** | 0.4 m/s |
|  | **C** | 4 m/s |
|  | **D** | 40 m/s |
|  | Your answer | |
|  |  | |

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| **5.** | The diagram below shows light being passed through a glass block.  Diagram showing light being passed through a glass block  What property of waves is shown above? **[1 mark]** | |
|  |  | |
|  | **A** | Reflection |
|  | **B** | Refraction |
|  | **C** | Diffraction |
|  | **D** | Dispersion |
|  | Your answer | |
|  |  | |

**[**

**[1]**

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| **6.** | Plutonium undergoes radioactive decay to become Uranium. The incomplete decay equation for this is shown below. | | |  |
|  | **(a)** | **(i)** | Complete the above decay equation. **[3 marks]** |
|  |  | **(ii)** | What is the other type of particle radiation? **[1 mark]** |
|  | **(b)** | **(i)** | Plutonium- 239 is an isotope. What is an isotope? **[2 marks]** |

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| **7.** | Light travels at a speed of 300,000,000 m/s. | | |  |
|  | **(a)** | **(i)** | What sort of wave is light? **[1 mark]** |
|  |  | **(ii)** | What are the main differences between transverse and longitudinal waves in terms of energy and particle movement? **[3 marks]** |
|  | **(b)** | **(i)** | Radio waves have a frequency which ranges from 3 kHz to 300 GHz. What is the smallest possible wavelength they could have? **[2 marks]** |

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| **8.** | Microwave ovens use microwaves to heat food.  Microwave oven | | |  |
|  | **(a)** | **(i)** | How does this happen? **[4 marks]** |
|  |  | **(ii)** | Microwaves have a frequency of 2,450 MHz. What is their wavelength? **[2 marks]** |
|  | **(b)** | **(i)** | Name another use of microwaves. **[1 mark]** |

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| **9.**  Activity | The graph below shows the decay curve of a radioactive substance.  Graph showing the decay curve of a radioactive substance  Time / days | | |  |
|  | **(a)** | **(i)** | Use the above graph to work out the half-life of this isotope. **[2 marks]** |
|  |  | **(ii)** | What is meant by half life? **[2 marks]** |
|  | **(b)** | **(i)** | The above isotope is a gamma emitter. Why would it be suitable for use as a tracking isotope in a human? **[3 marks]** |
|  |  | **(ii)** | When an isotope emits gamma radiation it does not change to a different atom or isotope. Why not? **[2 marks]** |
| **10.** | X Rays and Gamma Rays are both ionising Electromagnetic Waves. | | |  |
|  | **(a)** | **(i)** | Why is ionisation dangerous to humans? **[2 marks]** |
|  |  | **(ii)** | What safety precautions can be taken by medical staff to minimise their exposure to this radiation? **[4 marks]** |
|  | **(b)** | **(i)** | A chest CT scan exposes the patient to a large amount of ionising radiation. Why are chest CT scans used, even though they are risky? **[2 marks]** |