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SPECA

GCSE Combined Science (AQA Trilogy) · Physics

Waves · Tiered Worksheet

Section A: Foundation

Wave properties and calculations

1) State one similarity and one difference between a transverse wave and a longitudinal wave. **[2]**

2) A sound wave travels through air as a longitudinal wave. State the names given to the regions where air particles are pushed close together, and where they are spread further apart. **[2]**

3) Define wavelength. **[1]**

4) A wave has a frequency of 5 Hz. Calculate its period, using T = 1 ÷ f. **[2]**

5) A wave travels at a speed of 340 m/s and has a wavelength of 0.68 m. Calculate its frequency, using v = f × λ. **[3]**

6) A transverse wave has a maximum displacement of 3 cm from its undisturbed position, and the distance between two adjacent crests is 12 cm. State the wave's amplitude and its wavelength. **[2]**

The electromagnetic spectrum

7) Name the seven types of electromagnetic wave, in order from longest wavelength to shortest. **[2]**

8) State which part of the electromagnetic spectrum is detected by the human eye. **[1]**

9) Give one everyday use of microwaves, and one everyday use of infrared radiation. **[2]**

10) Explain why X-rays and gamma rays are considered ionising radiation, and why this can make them hazardous to human tissue. **[2]**

11) Describe a method for measuring the speed of sound in air. **[3]**

12) The table below shows the typical radiation dose received from three medical procedures: chest X-ray 0.02 mSv; CT scan 10 mSv; dental X-ray 0.005 mSv. Which procedure delivers the greatest radiation dose, and by roughly how many times greater is it than the chest X-ray? **[2]**

Section B: Higher (in addition to Section A)

Refraction and radio waves

13) Explain, in terms of wave speed, why a wave refracts (changes direction) when it crosses at an angle from one medium into another. **[3]**

14) A wave slows down as it enters a denser medium, while its frequency stays the same. Using v = f × λ, explain what must happen to its wavelength as a result. **[2]**

15) Explain how radio waves can be produced by an alternating current oscillating in a transmitting aerial (circuit). **[2]**

16) Explain what happens when a radio wave is absorbed by a receiving aerial (circuit). **[2]**

Why each wave type suits its use

17) Explain, in terms of absorption by human tissue, why X-rays are useful for imaging bones but give much less useful detail when imaging soft tissue. **[3]**

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18) Explain why gamma rays, rather than radio waves, are suitable for treating a tumour deep inside the body. **[2]**

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