SP4 Waves

SP4a Describing waves

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| --- | --- | --- | --- | --- |
| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Recall that waves transfer energy and information but do not transfer matter. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Describe waves using the terms frequency, wavelength, amplitude, period and velocity. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | Describe the differences between longitudinal and transverse waves. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L4.jpg | Give examples of transverse and longitudinal waves. |  |  |  |

SP4b Wave speeds

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | Recall the equation relating wave speed, frequency and wavelength |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L8.jpg | Use the equation relating wave speed, frequency and wavelength. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | Recall the equation relating wave speed, distance and time. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L8.jpg | Use the equation relating wave speed, distance and time. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Describe how to measure the velocity of sound in air. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Describe how to measure the velocity of waves on the surface of water. |  |  |  |

SP4c Refraction

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Describe what refraction is. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Describe how the direction of a wave changes when it goes from one material to another. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | Explain some effects of the refraction of light (explanations in terms of changing speeds are  not expected). |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | H Explain how a change in wave speed can cause a change in direction. |  |  |  |

SP4d Waves crossing boundaries

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| --- | --- | --- | --- | --- |
| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Describe some effects of waves being reflected. |  |  |  |
|  | Describe some effects of waves being refracted. |  |  |  |
|  | Describe some effects of waves being transmitted and absorbed. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Describe how changes in velocity, frequency and wavelength are related when sound waves go from one medium to another. |  |  |  |

SP4e Ears and hearing

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | H List the parts of the human ear, in the order in which they transmit vibrations. |  |  |  |
|  | H Describe the functions of the parts of the ear. |  |  |  |
|  | H Describe how sound waves in air are converted to vibrations in solids. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | H Describe some factors that affect how well sound waves transfer energy to solids. |  |  |  |
|  | H Explain why the human ear can only detect a certain range of frequencies. |  |  |  |

SP4f Ultrasound

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | H Calculate the depth of water from information about time and wave velocity. |  |  |  |
|  | H Recall that sound with frequencies greater than 20 000 Hz is called ultrasound. |  |  |  |
|  | H Explain how ultrasound is used in sonar. |  |  |  |
|  | H Describe uses of ultrasound in body scanning. |  |  |  |
|  | H Explain how ultrasound is used in foetal scanning. |  |  |  |

SP4g Infrasound

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | H Recall that sound with frequencies less than 20 Hz is called infrasound. |  |  |  |
|  | H Describe some uses of infrasound. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | H Recall that some seismic waves are infrasound waves. |  |  |  |
|  | H Describe P waves and S waves and the substances through which they can travel. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | H Explain how seismic waves can help us to investigate the Earth’s core. |  |  |  |

SP5 Light and the Electromagnetic Spectrum

SP5a Ray diagrams

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| D:\WD\Live Job\2016\Sep-16\regcsesciencewordformattingsb3sc13sp4andsp5\Required_Input\Required_Input\TTPP progression steps icons\Progression_icon_L3.jpg | Recall the law of reflection. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Draw ray diagrams to show how a mirror forms images. |  |  |  |
|  | Draw ray diagrams to show what happens when light is refracted. |  |  |  |
|  | Describe what total internal reflection is and when it happens. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Explain the significance of the critical angle in total internal reflection. |  |  |  |

SP5b Colour

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| --- | --- | --- | --- | --- |
| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Explain the difference between specular and diffuse reflection. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Recall that white light is a mixture of different colours of light. |  |  |  |
|  | Explain why surfaces appear to have different colours in terms of differential absorption. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Explain how filters make coloured light in terms of absorption and transmission. |  |  |  |
|  | Explain the effect of viewing coloured objects in different colours of light. |  |  |  |

SP5c Lenses

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Define the power of a lens (in terms of a more powerful lens bending light through a greater angle – the formula relating power to focal length is not required). |  |  |  |
|  | Describe how the focal length and shape of a lens affect its power. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Use ray diagrams to show how converging and diverging lenses refract light. |  |  |  |
|  | Compare and contrast the way in which converging and diverging lenses refract light. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Explain how diverging lenses produce virtual images. |  |  |  |
|  | Explain the different types of image that can be formed by converging lenses. |  |  |  |

SP5d Electromagnetic waves

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Recall examples of electromagnetic waves. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Describe the common features of electromagnetic waves. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Describe the transfer of energy by electromagnetic waves. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Describe the range of electromagnetic waves that our eyes can detect. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | **H** Describe an effect caused by the different velocities of electromagnetic waves in different substances. |  |  |  |

SP5e The electromagnetic spectrum

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Recall the groups of waves in the electromagnetic spectrum in order. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Recall the colours of the visible spectrum in order. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L5.jpg | Describe how the waves in the electromagnetic spectrum are grouped. |  |  |  |
|  | **H** Describe some differences in the ways that different parts of the electromagnetic spectrum are absorbed and transmitted. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L8.jpg | **H** Describe some differences in the ways that different parts of the electromagnetic spectrum are refracted and reflected. |  |  |  |

SP5f Using the long wavelengths

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | **H** Describe how long wavelength electromagnetic waves are affected by different substances. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | **H** Explain the effects caused by long wavelength electromagnetic waves travelling at different velocities in different substances. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | Describe some uses of radio waves. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | Describe some uses of microwaves. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | Describe some uses of infrared. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | Describe some uses of visible light. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L6.jpg | **H** Describe how radio waves are produced and detected by electrical circuits. |  |  |  |

SP5g Radiation and temperature

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| --- | --- | --- | --- | --- |
| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
|  | Describe how the intensity and wavelength of emitted radiation depends on the temperature of the body. |  |  |  |
|  | H Explain that the power radiated and absorbed must be the same to maintain a body at a constant temperature. |  |  |  |
|  | H Explain what happens to the temperature of a body when the average power radiated is not balanced by the average power absorbed. |  |  |  |
|  | H Describe the factors that affect the energy absorbed and radiated by the Earth. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L8.jpg | H Explain how these factors affect the temperature of the Earth. |  |  |  |

SP5h Using the short wavelengths

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | **H** Describe how short wavelength electromagnetic waves are affected by different substances. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | **H** Explain the effects caused by short wavelength electromagnetic waves travelling at different velocities in different substances. |  |  |  |
|  | Describe some uses of ultraviolet radiation. |  |  |  |
|  | Describe some uses of X-rays. |  |  |  |
|  | Describe some uses of gamma rays. |  |  |  |

SP5i EM radiation dangers

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| Step | Learning outcome | Had a look | Nearly there | Nailed it! |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Describe how the potential danger of electromagnetic radiation depends on its frequency. |  |  |  |
|  | Describe the harmful effects of microwave and infrared radiation. |  |  |  |
|  | Describe the harmful effects of ultraviolet radiation, X-rays and gamma rays. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Recall the nature of radiation produced by changes in atoms and their nuclei. |  |  |  |
| C:\Users\bhuiya_f\Downloads\Steps icons\Steps icons\Progression_icon_L7.jpg | Recall that absorption of radiation can cause changes in atoms and their nuclei. |  |  |  |