

Unit P1 - Revision Lesson 4 Waves and the Earth				
Specification learning outcomes	HSW statements	Exemplar teaching activities	Main differentiation	Resource sheets
<p>4.1 Recall that sound with frequencies greater than 20 000 hertz, Hz, is known as ultrasound.</p> <p>4.2 Describe uses of ultrasound, including: a) sonar b) communication between animals c) foetal scanning.</p> <p>4.3 Calculate depth or distance from time and velocity of ultrasound</p> <p>4.4 Recall that sound with frequencies less than 20 hertz, Hz, is known as infrasound.</p> <p>4.5 Describe uses of infrasound, including: a) communication between animals b) detection of animal movement in remote locations c) the detection of volcanic eruptions and meteors.</p> <p>1.15 Use of both the equations below for all waves:</p> <p>wave speed (metre/second, m/s) = frequency (hertz, Hz) × wavelength (metre, m)</p> $v = f \times \lambda$ <p>wave speed (metre/second, m/s) = distance(metre, m)/time(second, s)</p> $v = \frac{x}{t}$ <p>4.6 Recall that seismic waves are generated by earthquakes or explosions.</p> <p>4.7 Investigate the unpredictability of earthquakes, through sliding blocks and weights.</p> <p>4.8 Explain why scientists find it difficult to predict earthquakes and tsunami waves even with available data.</p> <p>4.9 Recall that seismic waves can be longitudinal (P) waves and transverse (S) waves and that they can be reflected and refracted at boundaries</p>	<p>HSW 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12</p>	<p><u>The theme for this lesson is Waves and the Earth.</u></p> <p><b>Starter: Writing questions.</b> Give students a set of answers to which they have to write questions (or ask students to write them and swap lists with another group). More able students should be able to write more than one question for each answer. The words could just be the key words from this topic. These could be revisited at the end of the lesson.</p> <p><b>Main: Infrasound questions</b> Worksheet P1.18b contains some questions on infrasound which will help students to revise this material. <i>Using ultrasound.</i> Worksheet P1.19d helps students to revise the uses of ultrasound and wave equations. The extra challenge questions are suitable for those working at a higher level. <i>Seismic wave questions.</i> Worksheet P1.20d contains some questions about seismic waves. Students studying Higher tier should access questions 4 and 5. Students studying Foundation tier should be reminded that P and S waves are reflected and refracted at the boundaries between crust, mantle and core. <i>Sliding blocks investigation.</i> Remind students of/ introduce students to the sliding blocks investigation which is used to investigate the unpredictability of earthquakes. Discuss any results they might have had or a hypothesis that they could have tested with the practical investigation. <i>Floating corks question.</i> Question 4d on Nov' 11 Higher paper (5PH1H) can be used to revise tectonic plates. Although it is in a Higher paper the question in isolation is suitable for Foundation level students. This can then be extended to talk about the way that plates slide past each other and how this causes earthquakes.</p> <p><b>Plenary: Spot the mistake.</b> Students work in pairs. Each student writes a short paragraph summarising waves and their properties that contains five deliberate mistakes. They then swap paragraphs and identify the deliberate mistakes in their partner's work.</p> <p><b>Homework:</b> Worksheet P1.22d will help pupils to revise how seismic waves can be used to identify the locations of earthquakes. The extra challenge question can be used by those working at a higher level.</p>	<p><b>Stretch:</b> Ask students to complete the extra challenge questions on worksheet P1.19d.</p> <p>Students should complete questions 4 and 5 on worksheet P1.20d.</p> <p>Students could complete the extra challenge questions on worksheet P1.22d.</p> <p><b>Support:</b> Students may need help with the wave calculations. They could be worked through as a class exercise.</p> <p>Students may need some help with the exam paper question.</p>	<p>Worksheet P1.18b</p> <p>Worksheet P1.19d</p> <p>Worksheet P1.20d</p> <p>Worksheet P1.22d</p> <p>[Exam paper 5PH1H from Nov'11]</p>

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between the crust, mantle and core.

**4.10** Explain how data from seismometers can be used to identify the location of an earthquake.

**4.11** Demonstrate an understanding of how P and S waves travel inside the Earth including reflection and refraction.

**4.12** Explain how the Earth's outermost layer is composed of (tectonic) plates and is in relative motion due to convection currents in the mantle.

**4.13** Demonstrate an understanding of how, at plate boundaries, plates may slide past each other, sometimes causing earthquakes.