

Unit P1 - Revision Lesson 3 The Universe				
Specification learning outcomes	HSW statements	Exemplar teaching activities	Main differentiation	Resource sheets
<p>3.1 Recall that the Solar System is part of the Milky Way galaxy.</p> <p>3.2 Describe a galaxy as a collection of stars.</p> <p>3.3 Recall that the Universe includes all of the galaxies.</p> <p>3.4 Compare the relative sizes of and the distances between the Earth, the Moon, the planets, the Sun, galaxies and the Universe.</p> <p>3.5 Describe the use of other regions of the electromagnetic spectrum by some modern telescopes.</p> <p>3.6 Describe the methods used to gather evidence for life beyond Earth, including space probes, soil experiments by landers, Search for Extraterrestrial Intelligence (SETI).</p> <p>3.7 Demonstrate an understanding of the impact of data gathered by modern telescopes on our understanding of the Universe, including a) the observation of galaxies because of improved magnification, b) the discovery of objects not detectable using visible light, c) the ability to collect more data.</p> <p>3.8 Construct a simple spectrometer, from a CD or DVD, and use it to analyse common light sources.</p> <p>3.9 Explain why some telescopes are located outside the Earth's atmosphere.</p> <p><b>H</b> 3.10 Analyse data provided to support the location of telescopes outside the Earth's atmosphere.</p> <p>3.11 Describe the evolution of stars of similar mass to the Sun through the following stages: a) nebula b) star (main sequence) c) red giant d) white dwarf.</p> <p>3.12 Describe the role of gravity in the life cycle of stars</p>	<p>HSW 1, 2, 3, 4, 11, 12, 14</p>	<p><u>The theme of this lesson is the Universe and how we explore it.</u></p> <p><b>Starter:</b> <i>Sure, unsure, know more.</i> Ask pupils to individually write down one thing about gathering data on the stars and the Universe that they are sure about, one thing that they are unsure about and one thing that they would like to know more about. Ask them to work in groups of 5-6 to come up with group lists. Revisit these lists at the end of the lesson and come to a consensus as a class about what things students are generally confident about, what things they are less confident about and what they would like to know more about.</p> <p><b>Main:</b> <i>The Universe.</i> Worksheet P1.11e allows students to revise material on the Solar system and galaxies. <i>Rainbows.</i> Hand around some old CDs and ask students to suggest where the rainbow colours seen come from. Remind them that the CDs can be (or were) used to make spectrometers and that spectrometers allow us analyse light. You could remind pupils that the atmosphere absorbs some types of waves and this can be seen with a spectrometer and is why telescopes are sometimes put into space. <i>Finding out.</i> Worksheet P1.14a is a cut and stick exercise which covers telescopes and ways of searching for extraterrestrial life. As an introduction to this worksheet it is a good idea to explain to students that modern telescopes use other regions of the EM spectrum rather than visible light, and the impact that this has had. <i>Star Life Cycles.</i> Worksheet P1.15b helps students to revise the life cycle of stars and the role of gravity. <i>Different theories.</i> Worksheet P1.16b helps students to revise the different theories about the origin of the Universe.</p> <p><b>Plenary:</b> <i>Key facts.</i> Each student writes down three facts they have learnt during the topic. Share the facts in groups and compile a master list - including the most common fact and the least common fact. Select a spokesperson for a group at random to share their ideas with the class. Then ask if other groups had the same 'most common fact'.</p> <p><b>Homework:</b> Worksheet P1.17d tops of type missing provides questions on interpreting red-shift data.</p>	<p><b>Stretch:</b> Give students a picture of an absorption spectrum for the EM spectrum and ask them to work out which regions are better studied from telescopes in space and which regions can be studied from the Earth.</p> <p>Ask students to add an alternative evolution route on question 2 of Worksheet P1.15b which would show what would happen to a star with a mass larger than the Sun.</p> <p><b>Support:</b> Give students worksheet P1.16b for homework and discuss red shift in class.</p>	<p>Worksheet P1.11e Worksheet P1.14a Worksheet P1.15b Worksheet P1.16b Worksheet P1.17d [Old CDs] [Diagram to show absorption of different parts of the EM spectrum by the Earth's atmosphere.]</p>

**P1: Universal physics**

**H** 3.13 Describe how the evolution of stars with a mass larger than the Sun is different, and may end in a black hole or neutron star.

3.14 Demonstrate an understanding of the Steady State and Big Bang theories.

3.15 Describe evidence supporting the Big Bang theory, limited to red-shift and the cosmic microwave background (CMB) radiation.

3.16 Recognise that as there is more evidence supporting the Big Bang theory than the Steady State theory, it is the currently accepted model for the origin of the Universe.

3.17 Describe that if a wave source is moving relative to an observer there will be a change in the observed frequency and wavelength.

**H** 3.18 Demonstrate an understanding that if a wave source is moving relative to an observer there will be a change in the observed frequency and wavelength.

**H** 3.19 Describe the red-shift in light received from galaxies at different distances away from the Earth.

**H** 3.20 Explain why the red-shift of galaxies provides evidence for the Universe expanding.

**H** 3.21 Explain how both the Big Bang and Steady State theories of the origin of the Universe both account for red-shift of galaxies.

**H** 3.22 Explain how the discovery of the CMB radiation led to the Big Bang theory becoming the currently accepted model.