

## Topic 3

### Waves and the Universe

- 3.1 Recall that the Solar System is part of the Milky Way galaxy
- 3.2 Describe a galaxy as a collection of stars
- 3.3 Recall that the Universe includes all of the galaxies
- 3.4 Compare the relative sizes of and the distances between the Earth, the Moon, the planets, the Sun, galaxies and the Universe
- 3.5 Describe the use of other regions of the electromagnetic spectrum by some modern telescopes
- 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)
- 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
- 3.8 *Construct a simple spectrometer, from a CD or DVD, and use it to analyse common light sources*
- 3.9 Explain why some telescopes are located outside the Earth's atmosphere
- 3.10 **Analyse data provided to support the location of telescopes outside the Earth's atmosphere**

- 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
- 3.12 Describe the role of gravity in the life cycle of stars
- 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
- 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**
- 3.19 **Describe the red-shift in light received from galaxies at different distances away from the Earth**
- 3.20 **Explain why the red-shift of galaxies provides evidence for the Universe expanding**
- 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**
- 3.22 **Explain how the discovery of the CMB radiation led to the Big Bang theory becoming the currently accepted model**