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| **Lesson Number: 28.12** | | |
| **Lesson Title: Exo-planets** | | |
| **Specification Reference** | | **3.9.3.4** |
| **Learning Objectives** | | |
| Difficulties in the direct detection of exoplanets.  Detection techniques will be limited to variation in Doppler shift (radial velocity method) and the transit method.  Typical light curve. | | |
| **Opportunities for Assessment** | | |
| Recapping calculations and units for light years, parsecs, parallax angles and arcsec | | |
| **Starter:** | Slide #1 enables a discussion as to what an exoplanet is and what might be the difficulties in finding them  <http://exoplanets.org/> is a good resource to create an interactive or research based activity that is up to date | |
| **Main:** | Slide #2 explains the main difficulties in observing exoplanets directly and enables the calculations of the angles of arc that would need to be resolved to see an Earth like planet in our orbit from 500ly away. There is also a calculation to note the huge difference in brightness of the sun against an orbiting planet – These calculations can be performed by more able students  Slide #3 introduces the two main methods for finding exoplanets  Slides #4 - #6 explains the transiting method – there is a wealth of real data online that is up to date; a possible task would be to obtain and analyse this data for homework  Slides #7 - #8 explain the radial velocity method and compare the two methods qualitatively  Slide #9 is an optional slide that points out the selection bias that appears in finding exoplanets and they types found. | |
| **Plenary:** | Slide #10 is a summary | |

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| **Homework:** | Research the planet seeking satellites and their data; obtain actual transitting data and write a report on it | |
| **Differentiation / Extension / S&C** | | |
| Calculations on the resolution required for resolving an exoplanet and the size of aperture needed (or array) to resolve it | | |
| **Numeracy / Literacy** | | **SMSC / Fundamental British Values** |
| Ratio calculations; area and spheres | | The search for Earth like planets in the goldilocks zone – what would alien life mean for religion on Earth? |
| **RESOURCES:** | | |
| None | | |
| **Risk Assessment** e.g. CLEAPSS card reference | | |
| None | | |
| **Working Scientifically (HSW)** | | |
| None | | |

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