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| **Lesson Number: 21.5** | | |
| **Lesson Title: Satellite Motion** | | |
| **Specification Reference** | | **3.7.2.4** |
| **Learning Objectives** | | |
| Orbital period and speed related to radius of circular orbit  Energy considerations for an orbiting satellite.  Total energy of an orbiting satellite.  Escape velocity.  Synchronous orbits. | | |
| **Opportunities for Assessment** | | |
| Page 353 questions | | |
| **Starter:** | Slides #1 and #2 should outline preconceptions about orbits and enable a link to be made to centripetal force | |
| **Main:** | Slide #3 recaps radial velocity calculations and links this into the satellite lesson. Optional higher level mathematics allows pupils to find the link to Kepler’s Third Law themselves  Slide #4 shows Kepler’s third law again as the final step in the precious work and extends pupils to qualitatively think about how you control the orbital period of a satellite  Slide #5 introduces geostationary satellites and the calculation of their heights. Note that the common student mistake is to forget to subtract the radius of the Earth from the final answer!  Slides #5 and #6 go through the calculation (and derivation) of the energy formulae for satellites | |
| **Plenary:** | Slide #7 is a summary | |

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| **Homework:** | Page 353 questions, research on different types of satellites (or a specific satellite) | |
| **Differentiation / Extension / S&C** | | |
| Research into Keplar’s Laws of motion | | |
| **Numeracy / Literacy** | | **SMSC / Fundamental British Values** |
| Use and derivation of gravitation formulae; drawing of 1/r graphs | | Use of satellites in everyday life  Geostationary satellites and military satellites and their orbits |
| **RESOURCES:** | | |
| None | | |
| **Risk Assessment** e.g. CLEAPSS card reference | | |
| None | | |
| **Working Scientifically (HSW)** | | |
| GPS systems and SatNav, page 352 “Vehicle Tracking” | | |