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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 orbitEnergy 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 themselvesSlide #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 satelliteSlide #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 lifeGeostationary 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” |