



# Year 12 Curriculum Overview: **Physics**



|             | Topics/ content outline:                                                                                     | Powerful Knowledge (key concepts, skills)                                                                                                                                                                                                                                                                                                                                                                                                                                                     | What will you be assessed on?                                                                                  | How can you help at home?                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Autumn Term | Mechanics (Statics & Dynamics)                                                                               | Newton's Laws of Motion. "suvat equations" (kinematic equations), vectors – resolving & combining. Projectiles. Momentum & impulse. Work done in dynamics situations. Moments.                                                                                                                                                                                                                                                                                                                | Mechanics<br>Bulk Properties of Solids                                                                         | <ul style="list-style-type: none"> <li>- Question students to test their recall of the topics</li> <li>- Encourage students to turn superglossaries into fact cards</li> <li>- Encourage students to use fact cards properly</li> <li>- Encourage students to use practice topic questions, or work on them together</li> </ul> <p>Links, topic questions etc are available in the Showbie class "Physics ALL Y12".</p> |
|             | Electricity                                                                                                  | Density. Hooke's law. The Young modulus, strain & stress. Stiffness & ultimate tensile strength.                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Spring Term | Current as a flow of charge, work done by & on charge. Current-PD characteristics. Practical details/issues. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             |                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Spring Term | Progressive & Stationary Waves                                                                               | Progressive waves. Stationary waves. Polarisation. Longitudinal & transverse waves. Harmonics on a string. Refractive index. Total internal reflection. Fibre optics, pulse broadening, material & modal dispersion. Resistivity. Superconductors. Potential dividers. Electromotive force & internal resistance. Diffraction. Superposition. Interference (single slit, double slit & diffraction gratings). The photoelectric effect. Emission & absorption spectra. Wave particle duality. | Progressive & Stationary Waves<br>Refraction<br>Electricity<br>Interference & Diffraction<br>Quantum Phenomena | <ul style="list-style-type: none"> <li>- Question students to test their recall of the topics</li> <li>- Encourage students to turn superglossaries into fact cards</li> <li>- Encourage students to use fact cards properly</li> <li>- Encourage students to use practice topic questions, or work on them together</li> </ul> <p>Links, topic questions etc are available in the Showbie class "Physics ALL Y12".</p> |
|             | Refraction                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Spring Term | Electricity                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             | Interference & Diffraction                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Spring Term | Quantum Phenomena                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             |                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Summer Term | Particles                                                                                                    | Nuclear model. Isotope notation. The strong nuclear force. Alpha, beta-, beta + (antimatter), and gamma decay. Neutrinos, antimatter, annihilation & pair production. Exchange particle model of forces.                                                                                                                                                                                                                                                                                      | Particles                                                                                                      | <ul style="list-style-type: none"> <li>- Question students to test their recall of the topics</li> <li>- Encourage students to turn superglossaries into fact cards</li> <li>- Encourage students to use fact cards properly</li> <li>- Encourage students to use practice topic questions, or work on them together</li> </ul> <p>Links, topic questions etc are available in the Showbie class "Physics ALL Y12".</p> |
|             | Circular Motion (part of "Further Dynamics")                                                                 | Circular Motion. Centripetal acceleration.                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Summer Term | Electric Fields                                                                                              | Electrical fields and potential. Orbits of a "classical electrons" in an atom.                                                                                                                                                                                                                                                                                                                                                                                                                |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             |                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                         |



# Year 13 Curriculum Overview: **Physics**



|             | Topics/ content outline:                    | Powerful Knowledge (key concepts, skills)                                                                                                                                                                                       | What will you be assessed on?                                                                                                     | How can you help at home?                                                                                                                                                                                                                                                                                                                                                                                               |
|-------------|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Autumn Term | Electric Fields                             | Forces between charges. Electric field strength & potential. Uniform & radial fields.                                                                                                                                           | Electric Fields<br>Circular Motion & Gravity<br>Periodic Motion<br>Capacitors                                                     | <ul style="list-style-type: none"> <li>- Question students to test their recall of the topics</li> <li>- Encourage students to turn superglossaries into fact cards</li> <li>- Encourage students to use fact cards properly</li> <li>- Encourage students to use practice topic questions, or work on them together</li> </ul> <p>Links, topic questions etc are available in the Showbie class "Physics ALL Y12".</p> |
|             | Circular Motion & Gravity                   | Circular motion & centripetal force. Simple harmonic motion. Forced vibrations and resonance.                                                                                                                                   |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             | Periodic Motion inc. Simple Harmonic Motion | Gravitational fields and potential. Orbits of planets and satellites. Escape velocity.                                                                                                                                          |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             | Capacitors                                  | Parallel plate capacitors. Equations re capacitance, area, PD, electric permittivity.                                                                                                                                           |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             | Electromagnetism                            | Internal energy, specific heat capacity & latent heat capacity. Ideal gases and equations modelling their behaviour. Brownian Motion.                                                                                           |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Spring Term | Thermal Physics                             |                                                                                                                                                                                                                                 | Y12 Topics & Electric Fields<br>Circular Motion & Gravity<br>Periodic Motion<br>Capacitors<br>Electromagnetism<br>Thermal Physics | <ul style="list-style-type: none"> <li>- Question students to test their recall of the topics</li> <li>- Encourage students to turn superglossaries into fact cards</li> <li>- Encourage students to use fact cards properly</li> <li>- Encourage students to use practice topic questions, or work on them together</li> </ul> <p>Links, topic questions etc are available in the Showbie class "Physics ALL Y12".</p> |
|             | Electromagnetism                            | Magnetic fields. The motor effect. Faraday & Lenz's laws of electromagnetic induction. Alternating currents and transformers.                                                                                                   |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             | Thermal Physics                             | Radioactivity, Rutherford scattering, Nuclear radiations. Exponential decay. N-Z plot & how N:Z ratios determine decay paths. Investigating the nuclear structure. Mass-energy equivalence. Nuclear reactors & induced fission. |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             | Nuclear Physics                             |                                                                                                                                                                                                                                 |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|             | Astrophysics                                |                                                                                                                                                                                                                                 |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Summer Term | Astrophysics                                | Telescopes: Optical & radio telescopes. Classification of stars by luminosity. Absolute magnitude. Black-body radiation. The Hertzsprung-Russell diagram. Supernovae, neutron stars & black holes.                              | All topics.                                                                                                                       | <ul style="list-style-type: none"> <li>- Question students to test their recall of the topics</li> <li>- Encourage students to turn superglossaries into fact cards</li> <li>- Encourage students to use fact cards properly</li> <li>- Encourage students to use practice topic questions, or work on them together</li> </ul> <p>Links, topic questions etc are available in the Showbie class "Physics ALL Y12".</p> |
|             | Revision of all Y12 & Y13 topics            | Cosmology: Doppler effect and red shift. Hubble's law. Quasars. Detection of exoplanets.                                                                                                                                        |                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                         |