

Year 12: Physics (Strand 1)

| | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
|---|--|--|--|---|--|--|
| | Chapter 3: Motion | Chapter 4: Forces in Action | Chapter 5: Work, Energy and Power | Chapter 6: Materials | Chapter 7: Laws of Motion | Chapter 14: Thermal Physics |
| Content: What will students know | Students will learn about vectors and scalars and what terms such as velocity, acceleration mean. They will learn to analyse motion graphs and how to analyse projectile motion using SUVAT equations. | Students will learn about different forces and how they interact in nature. They will learn how to draw free body diagrams and how forces effect the motion of objects. Students will learn about moments and equilibrium as well as density and pressure. | Students will learn about energy as a concept and how to analyse problems using energy. They will learn about different types of energy such as gravitational potential energy and kinetic energy. | Students will recap learning of materials from GCSE science and cover concepts such as Hooke's Law, elasticity and elastic potential energy. They will further their knowledge by looking at stress-strain curves as well as a detailed analyse of materials using Young's Modulus. | Students will look at Newton's Laws of Motion and look at how the previous chapters can be summarised by them. Students will look at momentum as a concept and see how this is how Newton originally formed his laws. Students will also use momentum to analyse collisions. | Students will move onto an A Level course at the end of the year. They will look at temperature versus heat as a concept and have a look at the particle model. Students will look at internal energy and how this relates to Chapter 8. Students will learn about specific heat capacity an specific latent heat. |
| Assessment and PAGES | End of topic assessment on Chapter 1-3. PAG 1.2 – Terminal Velocity | | | PAG 2.2 – Springs in Series and Parallel | End of topic assessment on Chapters 4-7. PAG 12 – Research Report | PAG 11.2 – Determining the specific heat capacity of a material |

Year 12: Physics (Strand 2)

| | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
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| | Chapter 11: Waves | Chapter 12: Waves 2 | Chapter 13: Quantum Physics | Chapter 8: Charge and Current | Chapter 9: Energy, Power and Resistance | Chapter 10: Electrical Circuits |
| Content: What will students know | Students will be introduced to waves as a concept and learn key vocabulary when describing them. Students will look at how waves interact in the world and will learn about reflection, refraction, diffraction and polarisation. | Students will take what they have learnt in Chapter 11 and take it to the next step. They will learn about how waves interact with one another and look at superposition, interference and harmonics. Students will also be introduced to the double slit experiment. | Students will look back at the double slit experiment and be introduced into how particles interact with it. They will look at wave-particle duality and look at Einstein's and Young's experiments to prove it. | Students will look at charge as a basic property of matter and how charges move with respect to one another. Students will be introduced to the term 'current' and will have a closer look at how electrons move in different materials as well as Kirchhoff's First Law. | Students will learn the key terms 'potential difference' and 'resistance' and how these two terms and current relate to one another. Students will get a chance to use electrical circuits and have a closer look at components such as the thermistor and the LDR. Students will also look at electrical energy and how to pay for electricity. | Students will extend their knowledge by learning about both of Kirchhoff's laws. They will use these when analysing circuits in theory and in practice and learn about internal resistance of a battery. Students will also take what they learnt in Chapter 9 and learn about potential dividers, sensing circuits and their uses. |
| Assessment and PAGES | PAG 6.1 – Experiments with Light and PAG 5.4 – Diffraction from a CD | PAG 5.2 – Speed of Sound Using a Resonant Tube | End of topic assessment on Chapters 11-13. | | PAG 3.1 – Resistivity of a Metal | End of topic assessment on Chapters 8-10. PAG 4.1 – Investigating Electrical Circuits |

Year 13: Physics (Strand 1)

| | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
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| | Chapter 15: Ideal Gases | Chapter 22: Electric Fields Chapter 21: Capacitance | Chapter 23: Magnetic Fields | Chapter 24: Particle Physics Chapter 27: Medical Imaging | Revision | |
| Content: What will students know | Students will use their knowledge gained from Chapter 14 and use it to analyse gases. They will learn about the kinetic theory of gases and will learn the gas laws that can be used. Students will learn about a measure called root mean squared speed and the Boltzmann constant. | Students will use their knowledge from Chapter 8 and extend this to look precisely at why charges move that way. Students will look at electric fields as a concept and will learn about Coulomb's law. Students will then learn about uniform electric fields and how charged particles move in them using knowledge gained in Chapter 3. | Students will then move onto the trickier concept of magnetic fields and the similarities and differences that they have with electric fields. Students will again look at how charged particles move in respect to a field and will look at how electromagnetic induction is linked with this. Students will finally look at Lenz' law and Faraday's law as well as learning about transformers. | Students will start this module off by looking at Rutherford's famous alpha scattering experiment and what we can learn from the atom from this. Students will then look at the standard model of physics and how particles can be grouped by terms such as spin, charge and mass. This will then be followed by medical imaging where students will learn how waves and radioactivity can help image the body. Students will look at the precise physics of this imaging and look at the pros and cons of using both. Students will then end the module by having a closer look at acoustic imaging and how this is created. | Students will revise this half term in preparation for their A Level Assessments. | |
| Assessment and PAGES | End of topic assessment on Chapters 14-15. PAG 8 – Estimating absolute zero from gas volume and temperature. | PAG 9.1 – Investigating charging and discharging a capacitor. | End of topic assessment on Chapters 21-23. | | A Level terminal assessment. | |

Year 13: Physics (Strand 2)

| | Autumn 1 | Autumn 2 | Spring 1 | Spring 2 | Summer 1 | Summer 2 |
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| | Chapter 16: Circular Motion Chapter 18: Gravitational Fields | Chapter 17: Oscillations Chapter 19: Stars | Chapter 20: Cosmology Chapter 25: Radioactivity | Chapter 26: Nuclear Physics | Revision | |
| Content: What will students know | Students will start off my learning about the radian. They will then look at key concepts such as angular velocity and acceleration and how this is different from linear. Students will learn how to analyse circular motion and what are the prerequisites for circular motion to occur. Students will then apply this knowledge on a cosmic scale and look at how you can analyse the movements of the planets from this as well as Kepler's Laws. They will look at gravitational fields as a concept and will look at gravitational potential energy in greater depth. | Students will then move onto periodic oscillations and will look at the similarities this have with Chapters 16 and 18. Students will learn about simple harmonic motion and look at analysing this motion. Students will then look at energy in simple harmonic motion and how damping and driving can affect this and how resonance can occur. Students will then take a closer look at the stars and at various objects n the Universe. Students will look at the HR diagram for stars and how we can analyse starlight to understand which stars are which. This will utilise knowledge from Chapter 13. | Students will learn about the cosmo on the grand scale in this module and will learn just how big the cosmo is. Students will learn about how the Doppler effect gives rise to such huge questions that humanity has and how this has brought us the Big Bang Theory and how the Universe has evolved over time. Students will then look at radioactivity as a concept and the various types of radioactivity. Students will learn how to use nuclear equations and how radioactivity changes in respect to time. They will learn some models for radioactive decay and uses of radioactivity. | Students will end their learning in this strand by looking at Einstein's mass-energy equivalency and how nuclear changes leads to energy changes. They will look at binding energy as a concept and look at how nuclear fission and fusion both use this concept to release huge amounts of energy. | Students will revise this half term in preparation for their A Level Assessments. | |
| Assessment and PAGES | End of topic assessment on Chapters 16 and 18. | PAG 10.1 – Factors affecting simple harmonic motion. | End of topic assessment on Chapters 19 and 20. PAG 7.2 – Investigating the absorption of radioactive particles and rays. | End of topic assessment on Chapters 25 and 26. | A Level terminal assessment. | |