| Subject: VCE PHYSICS | | |
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| Unit: 3 & 4 | | |
| Week | **Area of Study** | **Learning Focus** |
| Head Start | Kinematics and Newton's laws of Motion | Review of motion and force concepts, including applications in 2 dimensions. |
| 1 | Kinematics and Newton's laws of Motion | Review of force and motion concepts, including applications in 2 dimensions. |
| 2 | Circular Motion | Describe and calculate aspects of motion for objects that experience circular motion in the horizontal and vertical planes and on banked tracks. |
| 3 | Projectile Motion | Describe and calculate aspects of motion for horizontal and oblique projectiles. |
| 4 | Conservation of Momentum | Calculate impulse and momentum for interactions of objects.  Describe and calculate momentum changes for an Isolated System, including use of alternate forms of Newton's Laws of Motion. |
| 5 | Work and energy | Use the concept of work in motion. Calculate energy in some of its different forms, including kinetic, gravitational and elastic potential energy. |
| 6 | Conservation of energy | Use the principle of conservation of energy to calculate characteristics of a masses undergoing energy transformations, including Elastic and Inelastic interactions. |
| 7 | Special Relativity | Describe how Einstein's postulates of special relativity challenged Newton's theories of classical motion. Describe time dilation and length contraction, and calculate them using the Lorentz factor. |
| 8 | Einstein's Mass-Energy Relationship | Analyse data about the motion of objects travelling at relativistic speeds. Describe and calculate relativistic mass, momentum, and energy. |
| 9 | Universal Gravitation | Describe Newton's Law of Universal Gravitation and use it to calculate gravitational force between objects.   Calculate gravitational potential energy. |
| 10 | Satellite Motion | Calculate characteristics of the orbit of natural and artificial satellites using Kepler's Laws. |
| 11 | **Unit 3 Outcome 1 SAC.** | **Completion of SAC 1 - Part 1: Data Analysis Task.** |
| 12 | Electric Fields | Describe electric fields and how particles behave in electrical fields. Describe Coulomb's Law and use it to calculate the electrostatic force between two particles. |
| 13 | Magnetic Fields | Describe magnetic fields for permanent magnets and for moving charges. Describe and calculate related aspects of the interaction between an electric current and a magnetic field. |
| 14 | Applications of electromagnetism | Describe the function of motors, alternators and particle accelerators. |
| 15 | **Unit 3 Outcome 1 SAC.** | **Completion of SAC 1 - Part 2: Practical Activity.** |
| 16 | **Unit 3 Outcome 3 SAC.** | **Preparation and completion of SAC 3: Test.** |
| 17 | Electromagnetic Induction | Describe and calculate induced EMF and current. Describe and calculate magnetic flux. Describe, calculate, and analyse the generation of electricity using Faraday's and Lenz's laws. |
| 18 | Power Distribution | Describe and calculate AC voltage transformations. Describe transmission and calculate the transmission losses through power lines. |
| 19 | Properties of Waves | Qualitatively and quantitatively describe waves and wave motion, including Reflection and Refraction of waves, Superposition Principle and Interference of waves in 1-D and 2-D (including Resonance ).  Doppler Effect. |
| 20 | Light as a Wave. | Describe and give evidence for the fact that light is a form of electromagnetic radiation.  Polarization and Dispersion of light. |
| 21 | Behaviour of Light | Young's double slit experiment as evidence for wave behaviour. Diffraction of Light.  Electromagnetic waves. |
| 22 | **Unit 3 Outcome 2 SAC.** | **Preparation and completion of SAC 2: Response to structured questions.** |
| 23 | Matter as particles or waves. | Describe and calculate related aspects of the Photoelectric effect and the Quantum model of light, including for photon momentum. |

| 24 | Similarities between light and matter. | Describe the Bohr model of the Hydrogen atom.  Qualitatively and quantitatively analyse and interpret atomic absorption and emission spectra. |
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| 25 | Similarities between light and matter. | Qualitatively and quantitatively analyse and interpret De Broglie's matter waves, including calculations of the De Broglie wavelength. Qualitatively and quantitatively interpret electron diffraction patterns and Heisenberg's Uncertainty Principle. |
| 26 | **Unit 4 Outcome 1 SAC.** | **Preparation and completion of SAC 1: Folio of Practical Activities.** |
| 27 | **Unit 4 Outcome 3 SAC:** Practical investigation. | Understand the physics concepts relevant to a practical investigation and the scientific methodology required to undertake the task. Maintain a logbook that records all plans (including modifications), observations, and reflections on progress, relating to the conduct of the practical investigation. |
| 28 | **Unit 4 Outcome 3 SAC:** Practical investigation. | (Continue as above…)  Conduct the practical investigation, ensuring sufficient data is collected and performing appropriate data analysis to realize the intended outcomes. |
| 29 | **Unit 4 Outcome 3 SAC:** Practical investigation. | (Continue as above...)  Plan and commence a scientific poster presentation to summarize the practical investigation which will be submitted, in conjunction with the logbook, for the Unit 4 Outcome 3 SAC in Week 31. |
| 30 | Unit 3 & 4 Trial Exam | Complete a trial exam under exam conditions and review this in class. |
| 31 | **Unit 4 Outcome 2 SAC.** | **Preparation and completion of SAC 3: Test** |
| 32 | Revision and past papers | Revise the Unit 3 & 4 concepts and apply them to past exam questions. |
| 33 | Revision and past papers | Revise the Unit 3 & 4 concepts and apply them to past exam questions. |