**SACE Stage 1 Physics Program 2**

This program articulates with LAP 2

| **Week** | **Topic** | **Science Understanding and Activities** |
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| **Linear Motion and Forces** |
| **Energy and Momentum** |
| 1 | Work, energy and power | * Work and Energy
* Power
 |
| 1 | Potential and kinetic energy | * Gravitation potential energy
* Kinetic energy
 |
| 2 | Conservation of energy | * Conservation of energy
	+ Experimentally investigate conservation of energy using motion sensors and falling objects of inclined tracks. (SIS)
	+ <https://phet.colorado.edu/en/simulation/legacy/energy-skate-park>
* Energy efficiency
 |
| 3 | Momentum | * Momentum
 |
| 4 | Conservation of momentum | * Conservation of momentum
	+ Investigate collisions of explosions using air track or motion carts (SIS)
	+ <https://phet.colorado.edu/en/simulation/legacy/collision-lab>
* Elastic and inelastic collisions
 |
| 5 | **Practical Investigation** | * Conservation of energy
 |
| 6 | **SAT** | * Energy and momentum test
 |
| **Waves** |
| 7 | Wave Model | * Wave model
* Transverse and longitudinal waves
	+ Demonstrate using slinky spring
* Frequency, period, wavelength, and amplitude
* Wave equation
 |
| 8 | Mechanical Waves | * Sound Waves
	+ Bell jar demonstration
* Resonance
* Superposition and interference
	+ Ripple tank
	+ <https://phet.colorado.edu/en/simulation/legacy/wave-interference>
 |
| 9 | Light | * Electromagnetic waves
	+ Mobile phone in bell jar demonstration
* Electromagnetic spectrum
* Reflection and refraction (Snell’s Law)
	+ Optics experiments using light box (SIS)
* Diffraction
* Polarisation
	+ Polaroid filters (or sunglasses) (SHE)
 |
| 10-11 | **SHE Task** | Communication |
| **Nuclear Models and Radioactivity** |
| 12 | Nucleus | * Structure of the atom
	+ <https://phet.colorado.edu/en/simulation/build-an-atom>
* Atomic symbols
* Forces within the nucleus
	+ <https://www.youtube.com/watch?v=mpDDQ4uEH6M>
 |
| 13 | Radioactive decay | * Unstable nuclei
* Alpha decay
	+ <https://phet.colorado.edu/en/simulation/legacy/alpha-decay>
* Beta decay
	+ <https://phet.colorado.edu/en/simulation/legacy/beta-decay>
* Gamma decay
 |
| 14 | Radioactive half-life | * Random nature of decay
* Constant probability of decay and half-life
	+ Simulate decay using dice
* Activity
	+ Use Geiger counter to test activity of various samples (SIS/SHE)
* Estimating age using radioisotopes
	+ <https://phet.colorado.edu/en/simulation/legacy/radioactive-dating-game>
 |
| 15 | Properties of ionising radiation | * Penetrating ability
	+ Use Geiger counter to investigate penetration of various radiation through various materials
* Ionising ability
 |
| 15 | Radioactivity and health | * Somatic effects (SHE)
* Genetic effects
* Medical applications
	+ ANSTO website
 |
| 16-17 | Extension –Standard Model | * Introduce fundamental particles of Standard Model
* Structure of proton and neutron
* Fundamental forces
* Anti-particles and annihilation/pair production
* Beta decay (introduce neutrino/antineutrino)
	+ <http://www.particleadventure.org/index.html>
 |
| 18 | **SAT** | * Nuclear Models and Radioactivity test
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