School administrators, Heads of Learning Area –Science and teachers of Physics ATAR Year 12 are requested to note for 2023 the following minor syllabus changes. The syllabus is labelled as 'For teaching from 2023'.

Syllabus changes

The content identified by ~~strikethrough~~ has been deleted from the syllabus and the content identified in *italic*s has been revised in the syllabus for teaching from 2023

For teaching from 2023

Unit 3 – Science Understanding
Gravity and motion

- when an object experiences a net force at a distance from a pivot and at an angle to the lever arm, it will experience a torque or moment about that point

  This includes applying the relationship:

  $\tau = rF\sin\theta$ *where* θ *= angle between the force* F *and the lever arm*

Electromagnetism

- magnets, magnetic materials, moving charges and current-carrying wires experience a force in a magnetic field when they cut flux lines; this force is utilised in DC electric motors and particle accelerators

  This includes applying the relationships:

  $F = qvB\sin\theta$ *where* θ *= angle between the field* B *and the velocity* v
  $F = I\ell B\sin\theta$ *where* θ *= angle between the field* B *and the conductor length* ℓ
  ~~$F = q\,v\,B$ where $v \perp B$,~~ ~~$F = I\,\ell\,B$ where $\ell \perp B$~~

- the force due to a current in a magnetic field in a DC electric motor produces a torque on the coil in the motor

  This includes applying the relationship:

  $\tau = rF\sin\theta$ *where* θ *= angle between the force* F *and the lever arm*

- an induced emf is produced by the relative motion of a straight conductor in a magnetic field when the conductor cuts flux lines

  This includes applying the relationship:

  induced emf: $\varepsilon = \ell vB\sin\theta$ *where* θ *= angle between the field* B *and the conductor length* ℓ

  ~~induced emf $= \ell\,v\,B$ where $v \perp B$~~

- magnetic flux is defined in terms of magnetic flux density and area

  This includes applying the relationship:

  $\Phi = BA_{\perp}$ *where* A *= area perpendicular to the field* B

- a changing magnetic flux induces a potential difference; this process of electromagnetic induction is used in step-up and step-down transformers, DC and AC generators

  This includes applying the relationships:

  $$\text{induced emf: } \varepsilon = -N\frac{(\Phi_2-\Phi_1)}{t} = -N\frac{\Delta\Phi}{t} = -N\frac{\Delta BA_\perp}{t}$$

  where A = area perpendicular to the field B

  $$\varepsilon_{max} = 2N\ell vB = 2\pi NBAf \qquad \varepsilon_{rms} = \frac{\varepsilon_{max}}{\sqrt{2}}$$

Examination design brief – Year 12

Instructions to the candidate state:
When calculating numerical answers, show your working or reasoning clearly. *Unless otherwise instructed*, give final answers to three significant figures and include appropriate units where applicable.