

# Physics Laws |

A list of all laws on the Leaving Cert Physics syllabus.

## Mechanical Laws

- Newton's 3 Laws of Linear Motion
  - ⇒ A body will remain at rest or at a constant velocity, unless acted upon by a resultant external force.
  - ⇒ If a resultant external force acts on a body, the rate of change of momentum with respect to time is proportional to the force applied and takes place in the direction of the force.
  - ⇒ If body A exerts a force on body B, body B exerts a force of equal magnitude but opposite in direction on body A.
- Principle of Conservation of Momentum
  - ⇒ In a closed system, the total momentum before a collision is equal to the total momentum after a collision.
- Newton's Law of Universal Gravitation
  - ⇒ Any two point masses in the universe are attracted to each other by a force which is directly proportional to the product of their masses and inversely proportional to the square of the distance between them.
- Laws of Equilibrium
  - ⇒ Clockwise moments will equal anticlockwise moments about any point.
  - ⇒ The vector sum of the forces will equal 0.
- Boyle's Law
  - ⇒ The volume of a fixed mass of gas is inversely proportional to its pressure as long as temperature remains constant.
- Archimedes Principle
  - ⇒ Whenever an object is totally or partially immersed in a fluid, it experiences an up thrust that is equal to the weight of the fluid it displaces.
- Law of Floatation
  - ⇒ Whenever an object is floating, the weight of the fluid displaced is equal to the objects weight.
- Law of the Conservation of Energy
  - ⇒ Energy can neither be created nor destroyed; it can only be converted from one form into another.
- Hooke's Law
  - ⇒ Whenever an object is deformed through bending, stretching, or compression; there is a restoring force that is directly proportional to the displacement, as long as the elastic limit is not exceeded.

# Optical Laws

- Laws of Reflection
  - ⇒ The incident ray, reflected ray and normal all lie in the same plane.
  - ⇒ The angle of incidence equals the angle of refraction.
- Laws of Refraction
  - ⇒ The incident ray, refracted ray and normal all lie in the same plane.
  - ⇒ The ratio of the sine of the incident angle to that of the refracted angle is a constant, and is known as the refracted index.

# Electrical laws

- Coulomb's Law
  - ⇒ The electrostatic force between two point charges is inversely proportional to the square of the distance between them.
- Joule's Law
  - ⇒ The rate of heat produced in a constant resistance conductor is proportional to the square of the current flowing through it.
  - ⇒  $P = I^2 R$
- Law of Current in a Magnetic Field
  - ⇒ A current carrying conductor in a magnetic field, will experience a force, unless the current is travelling parallel to the field. The direction of the force will be perpendicular to the current and perpendicular to the magnetic field.
- Faraday's Law
  - ⇒ The magnitude of induced EMF is directly proportional to the rate of change of flux.
- Lenz' Law
  - ⇒ The direction of an induced current is always such as to oppose the change producing it.

# MODERN PHYSICS

- Law of Radioactive Decay
  - ⇒ The activity of a radioactive sample is proportional to the number of un-decayed nuclei present.
- Einstein's Photoelectric Law
  - ⇒ The kinetic energy of the fastest moving electron emitted is calculated as the difference between the energy of the incident photon and the work function of the metal.