Note: Cambridge O’level 5054 syllabus is divided into 6 sections. Formulae’s or equations are written under each topic with specified sub topic.

SECTION I: GENERAL PHYSICS

Vernier Caliper,

Final Reading = Main scale reading + (Vernier scale reading X least count)
\[ F.R = MSR + (VSR \times LC) \]
Least counts are 0.01 for cm and 0.1 for mm

Micrometer screw gauge,

Final Reading = Main scale reading + (thimble scale reading X least count)
\[ F.R = MSR + (TSR \times LC) \]
SECTION II: NEWTONIAN MECHANICS

**Speed** = \( \frac{\text{distance}}{\text{Time}} \) \quad V = \frac{s}{t}

**Velocity** = \( \frac{\text{displacement}}{\text{Time}} \) \quad V = \frac{s}{t}

**Acceleration** = \( \frac{\text{Changing Velocity} (\text{Final velocity} - \text{Initial velocity})}{\text{Time}} \) \quad a = \frac{V-u}{t}

**Dynamics:**

*Force* = mass \( \times \) acceleration, \( F = ma \)

*Stopping distance* = *Thinking distance* + *braking distance*, \( SD = TD + BD \)

**Mass, Weight and Density:**

*Weight* = mass \( \times \) gravitational field strength, \( W = mg \)

**Density** = \( \frac{\text{Mass}}{\text{Volume}} \) \quad \rho = \frac{m}{V}
Turning effect of force:

Moment = Force X perpendicular distance, \( m = F \times d \)

Pressure:

\[
Pressure = \frac{Force}{Area} \quad P = \frac{F}{A}
\]

Hydraulic system, \( \text{Pressure}_1 = \text{pressure}_2 \)

Pressure = density \times \text{gravitational field strength} \times \text{height}, \quad p = \rho gh.

Pressure and volume, \( \text{Pressure}_1 \times \text{volume}_1 = \text{Pressure}_2 \times \text{volume}_2 , \quad p_1V_1 = p_2V_2. \)
SECTION III: ENERGY AND THERMAL PHYSICS

Energy Sources and Transfer of Energy

Kinetic energy =½ mass X square of velocity, \( E_k = \frac{1}{2}mv^2 \)

Potential energy= mass X gravitational field strength X height, \( E_P = mgh \)

Mass-energy equation, Energy = mass X square of light speed \( E = mc^2 \).

Work = force \times distance moved in the line of action of the force, \( W = F \times d \)

Power = \( \frac{Work done}{time} \), \( P = \frac{W.d}{t} \),

Efficiency = \( \frac{energy converted to be required form}{total energy input} \) \times 100 or

Efficiency = \( \frac{power output}{power input} \) \times 100

Thermal Properties of Matter

Thermal energy = mass \times specific heat capacity \times change in temperature. \( E = mc(Q_2 - Q_1) \)

Thermal energy = mass \times specific latent heat. \( E = mL \)
SECTION IV: WAVES

General Wave Properties

\[ \text{Frequency} = \frac{1}{\text{time period}} \quad f = \frac{1}{T} \]

\[ \text{Velocity} = \text{frequency} \times \text{wavelength} \quad V = f \lambda \]

Light

\[ \text{Refractive index} = \frac{\sin i}{\sin r} \quad n = \frac{\sin i}{\sin r} \]

Sound (echo)

\[ \text{Speed of sound} = \frac{2 \times \text{distance}}{\text{time}} \quad V = \frac{2S}{t} \]
SECTION V: ELECTRICITY AND MAGNETISM

Static Electricity

charge = current \times time \quad Q=It

e.m.f = \frac{Workdone}{charge} \quad V = \frac{W}{Q}

Potential difference (Voltage) = Current \times Resistance \quad V=IR

Series Circuit,

Resistors, \quad R=R_1 + R_2 + R_3.

Voltage across resistors, \quad V= V_1+V_2+V_3.

Current in Circuit, \quad I = I_1=I_2=I_3

Parallel circuit,

Resistors in parallel, \quad \frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}...

Voltage across resistors \quad V_1=V_2=V_3..

Current in circuit. \quad I=I_1+I_2+I_3
Practical Electricity

power = voltage × current  \quad P = VI

energy = voltage × current × time. \quad E = VIt

SECTION VI: ATOMIC PHYSICS

Radioactivity:

Alpha decay:

\[ \frac{A}{Z}X \rightarrow \frac{4}{2}\alpha + \frac{A-4}{Z-2}Y \]

Beta decay:

\[ \frac{A}{Z}X \rightarrow ^{0}_{-1}\beta + ^{A}_{Z+1}Y \]

Gamma decay:

\[ \frac{A}{Z}X \rightarrow ^{0}_{0}\gamma + ^{A}_{Z}Y \]