TABLE 1  PHYSICAL CONSTANTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>SYMBOL</th>
<th>VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceleration due to gravity</td>
<td>g</td>
<td>9,8 m·s⁻²</td>
</tr>
<tr>
<td>Speed of light in a vacuum</td>
<td>c</td>
<td>3,0 × 10⁸ m·s⁻¹</td>
</tr>
<tr>
<td>Universal gravitational constant</td>
<td>G</td>
<td>6,7 × 10⁻¹¹ N·m²·kg⁻²</td>
</tr>
<tr>
<td>Coulomb’s constant</td>
<td>k</td>
<td>9,0 × 10⁹ N·m²·C⁻²</td>
</tr>
<tr>
<td>Magnitude of charge on electron</td>
<td>e</td>
<td>1,6 × 10⁻¹⁹ C</td>
</tr>
<tr>
<td>Mass of an electron</td>
<td>mₑ</td>
<td>9,1 × 10⁻³¹ kg</td>
</tr>
<tr>
<td>Planck’s constant</td>
<td>h</td>
<td>6,6 × 10⁻³⁴ J·s</td>
</tr>
<tr>
<td>1 electron volt</td>
<td>eV</td>
<td>1,6 × 10⁻¹⁹ J</td>
</tr>
</tbody>
</table>

TABLE 2  PHYSICS FORMULAE

**MOTION**

\[
\begin{align*}
\text{Velocity:} & \quad v = u + at \quad \text{or} \quad v_f = v_i + a\Delta t \\
\text{Distance:} & \quad s = \left(\frac{v + u}{2}\right)t \quad \text{or} \quad \Delta x = \left(\frac{v_f + v_i}{2}\right)\Delta t \\
\text{Equations:} & \quad v^2 = u^2 + 2as \quad \text{or} \quad v_f^2 = v_i^2 + 2a\Delta x \\
\text{Distance:} & \quad s = ut + \frac{1}{2}at^2 \quad \text{or} \quad \Delta x = v_i\Delta t + \frac{1}{2}a(\Delta t)^2
\end{align*}
\]

**FORCE AND MOMENTUM**

\[
\begin{align*}
F_{\text{net}} &= ma \\
\frac{\Delta p}{\Delta t} &= m\Delta v \\
\Delta p &= mv - mu \quad \text{or} \quad \Delta p = mv_f - mv_i \\
p &= mv \\
w &= F_g = mg \\
F_{\text{max}} &= \mu F_N
\end{align*}
\]

**WORK, ENERGY AND POWER**

\[
\begin{align*}
W &= Fs \quad \text{or} \quad W = F\Delta x \\
\text{or} \quad W &= F\Delta x \cos \theta \\
P &= \frac{W}{t} \\
P &= Fv \\
E_p &= mgh \\
E_k &= \frac{1}{2}mv^2 \\
W_{\text{net}} &= \Delta E_k \\
\text{efficiency} &= \frac{\text{power}_{\text{net}}}{\text{power}_{\text{in}}}
\end{align*}
\]

**GRAVITATIONAL AND ELECTRIC FIELDS**

\[
\begin{align*}
F &= G\frac{m_1m_2}{r^2} \\
g &= GM/r^2 \\
F &= k\frac{q_1q_2}{r^2} \\
E &= \frac{F}{q} \\
E &= \frac{kQ}{r^2}
\end{align*}
\]
# Electric Circuits

<table>
<thead>
<tr>
<th>Equation</th>
<th>Derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I = \frac{Q}{t} )</td>
<td>( V = \frac{W}{q} )</td>
</tr>
<tr>
<td>( R = \frac{V}{I} )</td>
<td>emf ( = I(R_{ext} + r) )</td>
</tr>
<tr>
<td>( R_s = R_1 + R_2 + \ldots )</td>
<td>( \frac{1}{R_p} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots )</td>
</tr>
</tbody>
</table>

\[ P = \frac{W}{t} \quad \text{or} \quad W = Pt \]

\[ W = VIt \quad \text{or} \quad W = I^2Rt \quad \text{or} \quad W = \frac{V^2}{R}t \]

\[ P = VI \quad \text{or} \quad P = I^2R \quad \text{or} \quad P = \frac{V^2}{R} \]

# Electrodynamics

<table>
<thead>
<tr>
<th>Equation</th>
<th>Derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \Phi = BA\cos \theta )</td>
<td>emf ( = -\frac{N\Delta \Phi}{\Delta t} )</td>
</tr>
<tr>
<td>( V_p I_p = V_s I_s )</td>
<td>( \frac{N_s}{N_p} = \frac{V_s}{V_p} )</td>
</tr>
</tbody>
</table>

# Photons and Electrons

<table>
<thead>
<tr>
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<th>Derivation</th>
</tr>
</thead>
<tbody>
<tr>
<td>( c = f \lambda )</td>
<td>( E = hf \quad \text{or} \quad E = \frac{hc}{\lambda} )</td>
</tr>
<tr>
<td>( E = W_0 + E_{K(\text{max})} )</td>
<td>( W_0 = hf_0 ) ( E_{K(\text{max})} = \frac{1}{2}mv_{\text{max}}^2 )</td>
</tr>
</tbody>
</table>