Physics Reference Sheet

Useful Equations

\[ v_{av} = \frac{d}{t} \]
\[ v_{av} = \text{average velocity} \]
\[ d = \text{displacement} \]
\[ t = \text{time} \]

\[ a_{av} = \frac{v_f - v_i}{t} \]
\[ a_{av} = \text{average acceleration} \]
\[ v_f = \text{final velocity} \]
\[ v_i = \text{initial velocity} \]
\[ t = \text{time} \]

\[ F = ma \]
\[ F = \text{net force} \]
\[ m = \text{mass} \]
\[ a = \text{acceleration} \]

\[ W = mg \]
\[ W = \text{weight} \]
\[ m = \text{mass} \]
\[ g = \text{acceleration due to gravity} \]

\[ F = G \frac{m_1 m_2}{d^2} \]
\[ F = \text{force} \]
\[ G = \text{gravitational constant} \]
\[ m_1 = \text{mass of first object} \]
\[ m_2 = \text{mass of second object} \]
\[ d = \text{distance between the objects} \]

\[ F = k \frac{q_1 q_2}{d^2} \]
\[ F = \text{force} \]
\[ k = \text{Coulomb’s constant} \]
\[ q_1 = \text{charge on first object} \]
\[ q_2 = \text{charge on second object} \]
\[ d = \text{distance between the objects} \]

\[ KE = \frac{1}{2}mv^2 \]
\[ KE = \text{kinetic energy} \]
\[ m = \text{mass} \]
\[ v = \text{speed} \]

\[ PE = mgh \]
\[ PE = \text{potential energy} \]
\[ m = \text{mass} \]
\[ g = \text{acceleration due to gravity} \]
\[ h = \text{height} \]

\[ T = \frac{1}{f} \]
\[ T = \text{period} \]
\[ f = \text{frequency} \]

Useful Equations (continued)

\[ v = \lambda f \]
\[ v = \text{speed} \]
\[ \lambda = \text{wavelength} \]
\[ f = \text{frequency} \]

\[ E = hf = h \left( \frac{C}{\lambda} \right) \]
\[ E = \text{energy} \]
\[ h = \text{Planck’s constant} \]
\[ f = \text{frequency} \]
\[ c = \text{speed of light} \]
\[ \lambda = \text{wavelength} \]

\[ a^2 + b^2 = c^2 \]

Values of Physical Constants

\[ g = 9.8 \text{ m/s}^2 \]
\[ G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2 \]
\[ k = 9.0 \times 10^9 \text{ Nm}^2/\text{C}^2 \]
\[ h = 6.63 \times 10^{-34} \text{ Js} \]
\[ c = 3.00 \times 10^8 \text{ m/s} \]

Physical Quantities and Units

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Unit (abbreviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>electric charge</td>
<td>coulomb (C)</td>
</tr>
<tr>
<td>energy</td>
<td>joule (J)</td>
</tr>
<tr>
<td>force</td>
<td>newton (N)</td>
</tr>
<tr>
<td>frequency</td>
<td>hertz (Hz)</td>
</tr>
<tr>
<td>length</td>
<td>meter (m)</td>
</tr>
<tr>
<td>mass</td>
<td>kilogram (kg)</td>
</tr>
<tr>
<td>temperature</td>
<td>degrees Celsius (°C)</td>
</tr>
<tr>
<td>time</td>
<td>second (s)</td>
</tr>
</tbody>
</table>