**PHYSICS FORMULA SHEET**

Vectors are indicated by arrows. If only the magnitude of a vector quantity is used, the arrow is not used.

 **Symbols of common quantities**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| acceleration | $\vec{a}$  | force | $\vec{F}$  | mass | $m$  | time | $t$  |
| displacement | $\vec{s}$  | frequency | $f$  | momentum | $\vec{p}$  | velocity | $\vec{v}$  |
| quantity of heat  | $Q$  | kinetic energy | $E\_{k}$  | period | $T$  | wavelength | $λ$  |
| electric current | $I$  | resistance | $$R$$ | potential difference | $ΔV$  | power | $P$  |

**Magnitude of physical constants**

|  |  |  |  |
| --- | --- | --- | --- |
| Acceleration due to gravity at the Earth’s surface | $g=9.80$ m s-2 | charge of the electron | $e=1.60×10^{-19}$ C |
| speed of light in a vacuum | $c=3.00×10^{8}$ m s-1 | mass of the electron | $m\_{e}=9.11×10^{-31}$ kg |
|  |  | mass of the proton | $m\_{p}=1.67×10^{-27}$ kg |

**Topic 1: Linear Motion and Forces**

|  |  |
| --- | --- |
| $\vec{v}=\frac{\vec{s}}{t}$  | $\vec{v}=\vec{v}\_{0}+\vec{a}t$ $\vec{v}=$ velocity at time $t$ $\vec{v}\_{0}=$ velocity at time 0 |
| $\vec{a}=\frac{Δ\vec{v}}{Δt}$ $Δ\vec{v}=\vec{v}-\vec{v}\_{0}$  $Δt=$ time interval | $\vec{s}=\vec{v}\_{0}t+\frac{1}{2}\vec{a}t^{2}$  |
| $\vec{F}=m\vec{a}$  | $v^{2}=v\_{0}^{2}+2as$  |

**Topic 2: Electric Circuits**

|  |  |
| --- | --- |
| $W=qΔV$ $W$= work done (also known as $ΔE$) | Resistors in series:$R\_{t}=R\_{1}+R\_{2}+…$  |
| $I=\frac{q}{Δt}$ *q* = charge | Resistors in parallel:$R\_{t}=\frac{1}{\frac{1}{R\_{1}}+\frac{1}{R\_{2}}+…}$  |
| $ΔV=IR$  | $P=ΔVI$  |
| $P=\frac{W}{Δt}$ $W$= work done (also known as $ΔE$) | $cost=ΔE×price$ *cost* is in c $ΔE$ is in kWh (J ÷ 3.6×106) *price* is in c/kWh |
| $\%efficiency=\frac{output}{input}×100$  |

**Topic 3: Heat**

|  |  |
| --- | --- |
| $Q=mcΔT$ $c=$ specific heat capacity | $Q=mL$ $L=$ latent heat capacity |
| $T\_{f}=\frac{m\_{A}c\_{A}T\_{A}+m\_{B}c\_{B}T\_{B}}{m\_{A}c\_{A}+m\_{B}c\_{B}}$ $T\_{f}=$ equilibrium temperature |

**Topic 4: Energy and Momentum**

|  |  |
| --- | --- |
| $W=Fs$  | $P=\frac{W}{Δt}$ $W$= work done (also known as $ΔE$) |
| $E\_{k}=\frac{1}{2}mv^{2}$  | $P=Fv$  |
| $E\_{p}=mgh$ $h=$ height | $p=mv$  |
| $\%efficiency=\frac{output}{input}×100$  | $F=\frac{Δp}{Δt}$  |

**Topic 5: Waves**

|  |  |
| --- | --- |
| $v=fλ$  | $n\_{1}sinθ\_{i}=n\_{2}sinθ\_{r}$ $n=$ refractive index $θ=$ angle to the normal |
| $f=\frac{1}{T}$  |  |

**Topic 6: Nuclear Models and Radioactivity**

|  |  |
| --- | --- |
| $E=Δmc^{2}$  |  |

|  |
| --- |
| **Table of prefixes** |
| **Prefix** | **Symbol** | **Value** |
| tera | T | 1012 |
| giga | G | 109 |
| mega | M | 106 |
| kilo | k | 103 |
| centi | c | 10-2 |
| milli | m | 10-3 |
| micro | μ | 10-6 |
| nano | n | 10-9 |
| pico | p | 10-12 |
| femto | f | 10-15 |