

Work of a constant force (Force is parallel to displacement) (Work of force of friction)	$W = F \Delta x \cos \alpha$ $W = F \Delta x$ $W = -F_{FRIC} \Delta x$
Kinetic energy	$E_K = \frac{1}{2} m v^2$
Gravitational potential energy (Near a planet surface)	$E_P = m g h$
Gravitational potential energy	$E_P = -G \frac{M m}{r}$
Elastic potential energy	$E_P = \frac{1}{2} k \Delta x^2$
Mechanical (total) energy	$E_M = E_K + E_P$
Mechanical energy conservation	$\Delta E_M = 0$ (all forces are conservative) $\Delta E_M = W_{NCF}$ (there are non-conservative forces)
Inelastic collision	$\vec{p}_{BEFORE} = \vec{p}_{AFTER} \rightarrow m_1 \vec{v}_1 + m_2 \vec{v}_2 = (m_1 + m_2) \vec{v}$
Elastic collision	$\vec{p}_{BEFORE} = \vec{p}_{AFTER} \rightarrow m_1 \vec{v}_1 + m_2 \vec{v}_2 = m_1 \vec{v}'_1 + m_2 \vec{v}'_2$ $E_{K\ Before} = E_{K\ After}$
Power	$P_m = \frac{W}{\Delta t}; \quad P_m = F_u v_m$
Unit conversions	1 cal = 4.184 J 1 J = 0.239 cal 1 HP = 736 W (nevertheless there are many definitions) 1 kW·h = 3.6 · 10 ⁶ J

Symbol	Description	S.I. Unit
W	Work	J
E_K	Kinetic energy	J
E_P	Potential energy	J
E_M	Mechanical energy	J
F	Force	N
Δx	Displacement	m
r	Distance	m
h	Hight	m
M, m	Mass	kg
α	Force-displacement angle	°
v	Speed	m/s
v_m	Mean speed	m/s
g	Gravitational acceleration (9.8 m/s ² in Earth surface)	m/s ²
G	Gravitational constant: 6.67·10 ⁻¹¹	N·m ² /kg ²
k	Elastic constant of the spring	N/m
p	Momentum	kg·m/s
P_m	Mean power	W

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