

Physical Quantities: Dimensions and Units

Quantities	Dimensions	MKS and CGS Units
mass	mass	<u>MKS</u> : kilograms (kg) <u>CGS</u> : grams (gm or g)
distance, depth, length, height, width	distance	<u>MKS</u> : meters (m) <u>CGS</u> : centimeters (cm)
time	time	seconds (sec or s)
temperature*	temperature	Kelvin (K) and Centigrade (degrees C)
area	distance x distance	<u>MKS</u> : m ² <u>CGS</u> : cm ²
volume	distance x distance x distance (<i>i.e.</i> , distance ³)	<u>MKS</u> : m ³ <u>CGS</u> : cm ³
density	mass/volume (<i>i.e.</i> , mass/distance ³)	<u>MKS</u> : kg/m ³ <u>CGS</u> : gm/cm ³
speed; velocity (motion) (rate of change of position)	distance/time	<u>MKS</u> : m/s <u>CGS</u> : cm/s
acceleration (rate of change of an object's velocity with respect to time)	(distance/time)/time (<i>i.e.</i> , distance/time ²)	<u>MKS</u> : m/s ² <u>CGS</u> : cm/s ²
force ("push" or "pull" that can change an object's motion) (Note that <u>weight</u> is just a special case of a force— the force of gravity)	mass x acceleration <i>or</i> mass x distance/time ²	<u>MKS</u> : kg x m/s ² (Newton) <u>CGS</u> : gm x cm/s ² (dyne)

<p>Quantities (cont'd)</p>	<p>Dimensions</p>	<p>MKS and CGS Units</p>
<p>pressure (collective force exerted by random molecular collisions against each unit of area of an object's surroundings)</p>	<p>force/area or (mass x distance/s²)/ area</p>	<p><u>MKS</u>: N/ m² or (kg x m/s²)/m² (Pascal) <u>CGS</u>: dyne/cm²</p>
<p>work (force times distance over which the force is applied to an object as the object moves under the influence of the force); energy (the capacity to do work)</p>	<p>force x distance or mass x acceleration x distance or pressure x volume</p>	<p><u>MKS</u>: Newton x m or kg x m²/s² or Pa x m³ (Joule) <u>CGS</u>: dyne x cm or gm x cm²/s² (erg)</p>
<p>power (energy transferred or gained or lost per unit time)</p>	<p>energy/time or force x distance/time or force x velocity etc.</p>	<p><u>MKS</u>: J/s or N x m/s or kg x (m/s²) x m/s (Watt) <u>CGS</u>: erg/s</p>
<p>energy flux (rate at which energy is transferred, absorbed, or lost per unit time per unit surface area)</p>	<p>(energy/time)/area or force x (distance/time)/area etc.</p>	<p><u>MKS</u>: (J/s)/m² or W/m² <u>CGS</u>: (erg/s)/cm²</p>