

# SCIENCE *physics laws & formulas*

## Mass Density

$$\text{mass density} = \frac{\text{mass}}{\text{volume}}$$

## Speed

$$\text{average speed} = \frac{\text{distance covered}}{\text{elapsed time}}$$

## Acceleration

$$a = \frac{\Delta v}{\Delta t} \text{ or } \frac{v_F - v_I}{t_F - t_I}$$

(a=average acceleration; v=velocity; t=time;  
v<sub>F</sub>=final velocity; v<sub>I</sub>=initial velocity; t<sub>F</sub>=final time;  
t<sub>I</sub>=initial time)

## Law of Universal Gravitation

$$F = G \frac{m_1 m_2}{d^2}$$

(F=force of attraction; m<sub>1</sub> and m<sub>2</sub>=masses of the two bodies; d=distance between centers of m<sub>1</sub> and m<sub>2</sub>; G=gravitational constant)

## Work Done by a Force

$$\text{work} = (\text{force})(\text{distance})$$

## Power

$$\text{power} = \frac{\text{work}}{\text{time}} \text{ (see above definition of work)}$$

## Kinetic Energy

$$KE = \frac{mv^2}{2}$$

(KE=kinetic energy; m=mass; v=velocity)

## Specific Heat

$$Q = cm\Delta t$$

(Q=quantity of heat; c=specific heat; m=mass; Δt=change in temperature)

## Electric Current - Strength

$$I = \frac{Q}{t}$$

(I=the current strength; Q=quantity of charge; t=time)

## Momentum

$$\text{momentum} = (\text{mass})(\text{velocity})$$

## Mass-Energy Equivalence

$$E = mc^2$$

(E=the energy [measured in ergs] equivalent to a mass m [measured in grams]; c=speed of light [measured in centimeters per second])

## Power Expended in an Electric Appliance

$$P = IV$$

(P=power in watts; I=current; V=voltage)

## Newton's Second Law of Motion

$$\text{force} = (\text{mass})(\text{acceleration})$$

## Torque

$$T = FR$$

(T=torque; F=tangential force; R=radius)

## Boyle's Law when temperature constant:

$$p_1 V_1 = p_2 V_2$$

(p<sub>1</sub>=original pressure; p<sub>2</sub>=new pressure;  
V<sub>1</sub>=original volume; V<sub>2</sub>=new volume)

## Wave Motion

$$V = nl$$

(V=wave velocity; n=wave frequency; l=wavelength)

## Illumination on a Surface Perpendicular to the Light

$$E = \frac{I}{r^2}$$

(E=illumination; I=intensity of the source; r=distance from source to surface perpendicular to the beam)

## Focal Length of Mirrors and Lenses

$$\frac{1}{f} = \frac{1}{d_o} + \frac{1}{d_i}$$

(f=focal length; d<sub>o</sub>=object distance; d<sub>i</sub>=image distance)

## Images in Mirrors and Lenses

$$\frac{h_i}{h_o} = \frac{d_i}{d_o}$$

(h=image height; h<sub>o</sub>=object height; d<sub>i</sub>=image distance; d<sub>o</sub>=object distance)

## Ohm's Law

$$I = \frac{V}{R}$$

(I=current in amperes; V=voltage applied to its ends; R=its resistance)

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