Formula and data book

Engineering 2025

Queensland Government | QCAA Queensland Curriculum & Assessment Authority

Formulas

Statics

$c^2 = a^2 + b^2$	$F_H = F\cos\theta$
$\sin\theta = \dfrac{\text{opposite}}{\text{hypotenuse}}$	$F_V = F\sin\theta$
$\cos\theta = \dfrac{\text{adjacent}}{\text{hypotenuse}}$	$F_T = \sqrt{{F_H}^2 + {F_V}^2}$
$\tan\theta = \dfrac{\text{opposite}}{\text{adjacent}}$	$\tan\theta = \dfrac{F_V}{F_H}$
$M = Fd$	$M_T = M_1 + M_2 + M_3 + \ldots$

Materials

$\text{density} = \dfrac{\text{mass}}{\text{volume}}$	$E = \dfrac{FL}{A\Delta L} = \dfrac{\sigma}{\varepsilon}$
$\sigma = \dfrac{F}{A}$	$\text{fos} = \dfrac{\text{yield stress}}{\text{allowable working stress}}$
$\varepsilon = \dfrac{\Delta L}{L}$	$\text{UTS} = \dfrac{\text{maximum load}}{\text{original cross-sectional area}}$

Dynamics

$F = ma$	$v_{av} = \dfrac{s}{t}$	$a = \dfrac{v-u}{t}$	$MA = \dfrac{F_L}{F_E}$
$VR = \dfrac{d_E}{d_L}$	$\text{VR} = \dfrac{\text{radius, diameter, circumference of driven pulley}}{\text{radius, diameter, circumference of driver pulley}}$		
$\text{VR} = \dfrac{\text{input speed}}{\text{output speed}}$	$\text{GR or VR for gears} = \dfrac{\text{radius, diameter, circumference or no.teeth of driven gear}}{\text{radius, diameter, circumference or no.teeth of driver gear}}$		
$W = Fs$	$\text{GR or VR for gears} = \dfrac{\text{angular movement of driven gear (effort)}}{\text{angular movement of driver gear (load)}}$		
$P = \dfrac{W}{t}$	$KE = \dfrac{1}{2}mv^2$	$PE = mgh$	$\eta = \dfrac{MA}{VR}$
$v = u + at$	$v^2 = u^2 + 2as$	$s = ut + \dfrac{1}{2}at^2$	$\mu_s = \tan\theta$
$F_f = \mu F_N$	$F_f = \mu_s F_N$	$F_f = \mu_k F_N$	

Electrical circuits		
$V = IR$	$P = VI$	$E = Pt$
$R_T = R_1 + R_2 + R_3 + \ldots$	$V_T = V_1 + V_2 + V_3 + \ldots$	$I_T = I_1 + I_2 + I_3 + \ldots$
$\frac{1}{R_T} = \frac{1}{R_1} + \frac{1}{R_2} + \ldots$	$\eta = \frac{Pout}{Pin} = \frac{power\ output}{power\ input}$	$\eta = \frac{Eout}{Ein} = \frac{energy\ output}{energy\ input}$

Constant

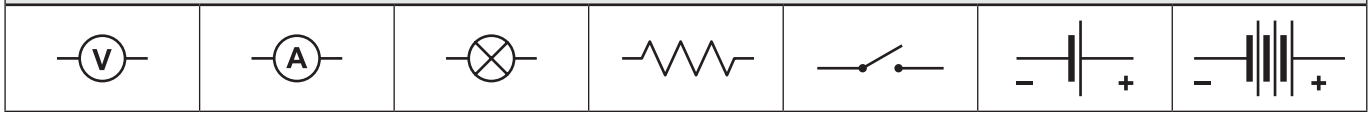
Acceleration due to gravity
$g = 9.8\ \text{m s}^{-2}$

Unit prefixes

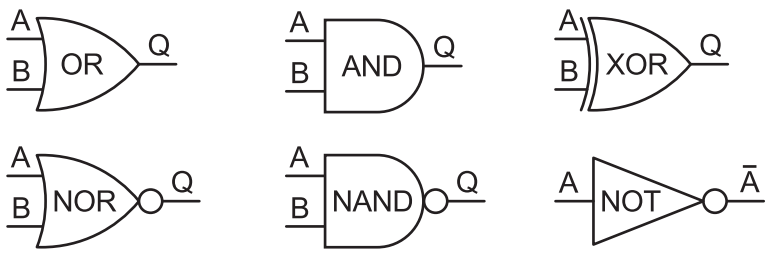
Ratio to basic unit	Prefix	Abbreviation
10^3	kilo	k
10^6	mega	M
10^9	giga	G
10^{12}	tera	T
10^{-1}	deci	d
10^{-2}	centi	c
10^{-3}	milli	m

Standard symbols

Electric circuits



Logic gate



© State of Queensland (QCAA) 2025
Licence: https://creativecommons.org/licenses/by/4.0 | Copyright notice: www.qcaa.qld.edu.au/copyright — lists the full terms and conditions, which specify certain exceptions to the licence. | Attribution: © State of Queensland (QCAA) 2025