

Karta wybranych wzorów i stałych fizycznych

Mechanika

$v(t) = v_0 + at$ $s(t) = s_0 + v_0 t + \frac{at^2}{2}$ $\vec{a} = \frac{\Delta \vec{v}}{\Delta t} \quad \vec{a} = \frac{\vec{F}}{m}$ $\vec{p} = m\vec{v}$ $\vec{F} = \frac{\Delta \vec{p}}{\Delta t}$ $F_T = \mu F_N$ $W = Fs \cos \angle (\vec{F}, \vec{s})$ $E_{kin} = \frac{mv^2}{2}$	$P = \frac{\Delta W}{\Delta t}$ $\omega = \frac{\Delta \phi}{\Delta t} = \frac{2\pi}{T}$ $f = \frac{1}{T}$ $a_d = \frac{v^2}{r}$ $F_d = \frac{mv^2}{r}$ $F_g = G \frac{Mm}{r^2}$	$\vec{\gamma} = \frac{\vec{F}_g}{m}$ $E_{pot} = -G \frac{Mm}{r}$ $\Delta E_{pot} = mgh \quad h \ll R_z$ $V = \frac{E_{pot}}{m}$ $v_I = \sqrt{\frac{GM}{R_z}}$ $v_{II} = \sqrt{\frac{2GM}{R_z}}$	$\frac{T^2}{R^3} = \text{const.}$ $F = -kx$ $x(t) = A \sin(\omega t + \phi)$ $v(t) = A\omega \cos(\omega t + \phi)$ $a(t) = -A\omega^2 \sin(\omega t + \phi)$ $E_{pot} = \frac{1}{2} kx^2$ $T = 2\pi \sqrt{\frac{l}{g}} \quad T = 2\pi \sqrt{\frac{m}{k}}$
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Termodynamika i własności materii

$p = \frac{F}{S}$ $d = \frac{m}{V}$ $\Delta Q = mc_w \Delta T$ $\Delta Q = mL \quad \Delta Q = mR$	$pV = nRT$ $\kappa = \frac{c_p}{c_v}$ $c_p = c_v + R$ $\Delta U = Q + W$	$W = p\Delta V$ $\eta = \frac{W_u}{W_c} \quad \eta = \frac{W}{Q}$ $\eta = \frac{Q_1 - Q_2}{Q_1}$
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Elektryczność, magnetyzm, fale, optyka i fizyka współczesna

$F = \frac{1}{4\pi\epsilon_0\epsilon_r} \frac{Qq}{r^2}$ $\vec{E} = \frac{\vec{F}}{q}$ $E_{pot} = \frac{1}{4\pi\epsilon_0\epsilon_r} \frac{Qq}{r}$ $V = \frac{E_{pot}}{q}$ $ E = \frac{U}{d}$ $C = \frac{Q}{U} \quad C = \epsilon_0\epsilon_r \frac{S}{d}$ $\frac{1}{C_{calk}} = \frac{1}{C_1} + \frac{1}{C_2} + \dots + \frac{1}{C_n}$ $C_{calk} = C_1 + C_2 + \dots + C_n$ $I = \frac{\Delta Q}{\Delta t}$ $U = IR$	$R = \rho \frac{l}{S}$ $R_{calk} = R_1 + R_2 + \dots + R_n$ $\frac{1}{R_{calk}} = \frac{1}{R_1} + \frac{1}{R_2} + \dots + \frac{1}{R_n}$ $I_{calk} = \sum_{k=1}^n I_k$ $I = \frac{\epsilon}{R_z + r_w}$ $P = IU$ $F = qvB \sin \angle (\vec{v}, \vec{B})$ $F = BIl \sin \angle (\vec{l}, \vec{B})$ $\Phi = BS \cos \angle (\vec{B}, \vec{S})$ $B = \frac{\mu_0\mu_r I}{2\pi r} \quad B = \frac{\mu_0\mu_r I}{2r}$ $B = \mu_0\mu_r n \frac{I}{l} \quad F = \frac{\mu_0\mu_r I_1 I_2 l}{2\pi r}$	$\epsilon_{SEM} = -\frac{\Delta \Phi}{\Delta t} \quad \epsilon_{SEM} = -L \frac{\Delta I}{\Delta t}$ $L = \mu_0\mu_r n^2 \frac{S}{l}$ $\frac{U_2}{U_1} = \frac{n_2}{n_1} = \frac{I_1}{I_2}$ $\lambda = \frac{v}{f} \quad n\lambda = d \sin \alpha$ $\frac{v_1}{v_2} = \frac{\sin \alpha}{\sin \beta} = \frac{n_2}{n_1} \quad n = \frac{c}{v}$ $\frac{1}{f} = \frac{1}{x} + \frac{1}{y} \quad D = \frac{1}{f}$ $\frac{1}{f} = \left(\frac{n_1}{n_2} - 1 \right) \left(\frac{1}{R_1} + \frac{1}{R_2} \right)$ $E = mc^2$ $E = hf$ $\lambda = \frac{h}{p}$
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Przedrostki

Mnożnik	10 ⁹	10 ⁶	10 ³	10 ²	10 ¹	10 ⁻¹	10 ⁻²	10 ⁻³	10 ⁻⁶	10 ⁻⁹
Przedrostek	giga	mega	kilo	hekto	deka	decy	centy	mili	mikro	nano
Oznaczenie	G	M	k	h	da	dc	c	m	μ	n

Uwaga! Ta karta jest załącznikiem do obu arkuszy egzaminacyjnych.

Układ okresowy pierwiastków																	4,0026 ² He Hel	
1,0079 ¹ H Wodór												10,811 ⁵ B Bor	12,011 ⁶ C Węgiel	14,006 ⁷ N Azot	15,999 ⁸ O Tlen	18,998 ⁹ F Fluor	20,179 ¹⁰ Ne Neon	
6,941 ³ Li Lit	9,01218 ⁴ Be Beryl												26,982 ¹³ Al Glin	28,085 ¹⁴ Si Krzem	30,974 ¹⁵ P Fosfor	32,066 ¹⁶ S Siarka	35,45 ¹⁷ Cl Chlor	39,948 ¹⁸ Ar Argon
22,9897 ¹¹ Na Sód	24,305 ¹² Mg Magnez	44,9559 ²¹ Sc Skand	47,88 ²² Ti Tytan	50,941 ²³ V Wanad	51,996 ²⁴ Cr Chrom	54,938 ²⁵ Mn Mangan	55,847 ²⁶ Fe Żelazo	58,933 ²⁷ Co Kobalt	58,69 ²⁸ Ni Nikiel	63,546 ²⁹ Cu Miedź	65,39 ³⁰ Zn Cynk	69,723 ³¹ Ga Gal	72,921 ³² Ge German	74,921 ³³ As Arsen	78,96 ³⁴ Se Selen	79,90 ³⁵ Br Brom	83,80 ³⁶ Kr Krypton	
85,467 ³⁷ Rb Rubid	87,62 ³⁸ Sr Stront	89,905 ³⁹ Y Itr	91,224 ⁴⁰ Zr Cyrkon	92,906 ⁴¹ Nb Niob	95,94 ⁴² Mo Molibden	96,905 ⁴³ Tc Technet	101,07 ⁴⁴ Ru Ruten	102,905 ⁴⁵ Rh Rod	106,42 ⁴⁶ Pd Pallad	107,868 ⁴⁷ Ag Srebro	112,411 ⁴⁸ Cd Kadm	114,82 ⁴⁹ In Ind	118,710 ⁵⁰ Sn Cyna	121,75 ⁵¹ Sb Antymon	127,60 ⁵² Te Tellur	126,904 ⁵³ I Jod	131,29 ⁵⁴ Xe Ksenon	
132,905 ⁵⁵ Cs Cez	137,327 ⁵⁶ Ba Bar	La - Lu 57- 71	178,49 ⁷² Hf Hafn	180,947 ⁷³ Ta Tantal	183,85 ⁷⁴ W Wolfram	186,207 ⁷⁵ Re Ren	190,2 ⁷⁶ Os Osm	192,22 ⁷⁷ Ir Iryd	195,08 ⁷⁸ Pt Platyna	196,966 ⁷⁹ Au Złoto	200,59 ⁸⁰ Hg Rtęć	204,383 ⁸¹ Tl Tal	207,2 ⁸² Pb Ołów	208,980 ⁸³ Bi Bizmut	208,982 ⁸⁴ Po Polon	209,987 ⁸⁵ At Astat	222,018 ⁸⁶ Rn Radon	
223,02 ⁸⁷ Fr Frans	226,025 ⁸⁸ Ra Rad	Ac – Lr 89-103	261,1 ¹⁰⁴ Unq 104	262,1 ¹⁰⁵ Unp 105	263,1 ¹⁰⁶ Unh 106	262,1 ¹⁰⁷ Uns 107	265,1 ¹⁰⁸ Uno 108	266,1 ¹⁰⁹ Une 109										