Nacionalni centar
za vanjsko vrednovanje
obrazovanja

Identifikacijska
naljepnica

PAŽLJIVO NALIJEPITI

FIZIKA

DRŽAVNA MATURA

šk. god. 2023./2024.

KNJIŽICA FORMULA

FIZ.60.HR.R.T1.08

57255

POPIS FORMULA I KONSTANTI

Kinematika

$\bar{v} = \frac{\Delta s}{\Delta t}$ $\bar{a} = \frac{\Delta v}{\Delta t}$ $s = v_0 t + \frac{1}{2} a t^2$ $v = v_0 + at$

$v^2 = v_0^2 + 2as$ $a_{cp} = \frac{v^2}{r}$ $f = \frac{1}{T}$

Dinamika

$a = \frac{F}{m}$ $F_{tr} = \mu F_P$ $F_{elas} = kx$ $p = mv$

$F\Delta t = \Delta p$ $W = \Delta E$ $W = Fs\cos\alpha$ $E_k = \frac{mv^2}{2}$

$\Delta E_{gp} = mg\Delta h$ $E_{ep} = \frac{1}{2} kx^2$ $P = \frac{W}{t}$ $F_G = G\frac{m_1 m_2}{r^2}$

Hidromehanika

$p = \frac{F}{S}$ $p = \rho g h$ $F_u = \rho g V$ $S_1 v_1 = S_2 v_2$

$p_1 + \frac{\rho v_1^2}{2} = p_2 + \frac{\rho v_2^2}{2}$ $\rho = \frac{m}{V}$

Termodinamika

$$n = \frac{N}{N_\mathrm{A}} = \frac{m}{M} \qquad \overline{E_\mathrm{k}} = \frac{3}{2} k_\mathrm{B} T \qquad U = \frac{3}{2} N k_\mathrm{B} T \qquad pV = nRT$$

$$\ell = \ell_0 (1 + \alpha \Delta t) \qquad Q = mc\Delta t \qquad Q_\mathrm{t} = m\lambda \qquad Q_\mathrm{i} = mr$$

$$Q = W + \Delta U \qquad W = p\Delta V \qquad \eta = 1 - \frac{T_2}{T_1}$$

Elektricitet i magnetizam

$$F = \frac{k}{\varepsilon_\mathrm{r}} \frac{q_1 q_2}{r^2} \qquad E = \frac{F}{q} \qquad E = \frac{k}{\varepsilon_\mathrm{r}} \frac{q}{r^2} \qquad W = qU$$

$$E = \frac{U}{d} \qquad \varphi = \frac{k}{\varepsilon_\mathrm{r}} \frac{q}{r} \qquad C = \frac{q}{U} \qquad C = \varepsilon_0 \varepsilon_\mathrm{r} \frac{S}{d}$$

$$W = \frac{CU^2}{2} \qquad I = \frac{\Delta q}{\Delta t} \qquad I = \frac{U}{R} \qquad R = \rho \frac{\ell}{S}$$

$$I = \frac{\varepsilon}{R_\mathrm{u} + R_\mathrm{v}} \qquad P = UI \qquad B = \mu_0 \mu_\mathrm{r} \frac{I}{2r\pi} \qquad B = \mu_0 \mu_\mathrm{r} \frac{NI}{\ell}$$

$$F = BI\ell \sin\alpha \qquad F_\mathrm{L} = qvB \sin\alpha \qquad \Phi = BS \cos\alpha \qquad U_i = -N \frac{\Delta\Phi}{\Delta t}$$

$$U_i = -B\ell v \sin\alpha \qquad I = \frac{U}{Z} \qquad R_\mathrm{L} = L\omega \qquad R_\mathrm{C} = \frac{1}{C\omega}$$

$$Z = \sqrt{R^2 + (R_\mathrm{L} - R_\mathrm{C})^2}$$

Titranje i valovi

$T = 2\pi\sqrt{\frac{m}{k}}$ $T = 2\pi\sqrt{\frac{\ell}{g}}$ $T = 2\pi\sqrt{LC}$ $\omega = \frac{2\pi}{T}$

$y = A\sin(\omega t + \varphi_0)$ $v = v_0\cos(\omega t + \varphi_0)$ $v_0 = \frac{2\pi A}{T}$ $v = \frac{\lambda}{T}$

$a = -a_0\sin(\omega t + \varphi_0)$ $a_0 = \frac{4\pi^2 A}{T^2}$ $y = A\sin\left(\omega t - \frac{2\pi x}{\lambda}\right)$ $L = 10\log\frac{I}{I_0}$

$f_\mathrm{p} = f_\mathrm{i}\frac{v + v_\mathrm{p}}{v - v_\mathrm{i}}$ $I = \frac{P}{S}$

Optika

$n = \frac{c}{v}$ $\frac{\sin\alpha}{\sin\beta} = \frac{n_2}{n_1}$ $\frac{1}{a} + \frac{1}{b} = \frac{1}{f}$ $\frac{y'}{y} = -\frac{b}{a}$

$j = \frac{1}{f}$ $\lambda = \frac{sd}{a}$ $d\sin\alpha_\mathrm{k} = k\lambda$ $\mathrm{tg}\,\alpha_\mathrm{B} = n$

Moderna fizika

$L = L_0\sqrt{1 - \frac{v^2}{c^2}}$ $T = \frac{T_0}{\sqrt{1 - \frac{v^2}{c^2}}}$ $E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}$ $E_\mathrm{f} = hf$

$E_\mathrm{f} = W_\mathrm{i} + E_\mathrm{k}$ $\lambda = \frac{h}{p}$ $E_\mathrm{f} = E_\mathrm{n} - E_\mathrm{m} = -13{,}6\ \mathrm{eV}\left(\frac{1}{n^2} - \frac{1}{m^2}\right);\ n > m$

$E = \Delta mc^2$ $N = N_0 2^{-\frac{t}{T}} = N_0 e^{-\lambda t}$ $\lambda = \frac{\ln 2}{T}$ $A = \lambda N$

Konstante

gravitacijska konstanta	$G = 6{,}67 \cdot 10^{-11}\ \mathrm{N\,kg^{-2}\,m^2}$
ubrzanje slobodnoga pada pri površini Zemlje	$g = 9{,}81\ \mathrm{m\,s^{-2}}$ (u zadatcima uzeti $10\ \mathrm{m\,s^{-2}}$)
masa Zemlje	$M = 6 \cdot 10^{24}\ \mathrm{kg}$
polumjer Zemlje	$R = 6\,370\ \mathrm{km}$
normirani atmosferski tlak	$p_\mathrm{a} = 101325\ \mathrm{Pa}$
unificirana atomska masa	$u = 1{,}66 \cdot 10^{-27}\ \mathrm{kg}$
Avogadrova konstanta	$N_\mathrm{A} = 6{,}022 \cdot 10^{23}\ \mathrm{mol^{-1}}$
opća plinska konstanta	$R = 8{,}314\ \mathrm{J\,K^{-1}\,mol^{-1}}$
brzina svjetlosti u vakuumu	$c = 3 \cdot 10^{8}\ \mathrm{m\,s^{-1}}$
elementarni naboj	$e = 1{,}6 \cdot 10^{-19}\ \mathrm{C}$
masa elektrona	$m_\mathrm{e} = 9{,}11 \cdot 10^{-31}\ \mathrm{kg}$
masa protona	$m_\mathrm{p} = 1{,}67 \cdot 10^{-27}\ \mathrm{kg}$
Coulombova konstanta	$k = 9 \cdot 10^{9}\ \mathrm{N\,m^2\,C^{-2}}$
permitivnost vakuuma	$\varepsilon_0 = 8{,}85 \cdot 10^{-12}\ \mathrm{F\,m^{-1}}$
permeabilnost vakuuma	$\mu_0 = 4\pi \cdot 10^{-7}\ \mathrm{T\,m\,A^{-1}}$
prag čujnosti	$I_0 = 10^{-12}\ \mathrm{W\,m^{-2}}$
Boltzmannova konstanta	$k_\mathrm{B} = 1{,}38 \cdot 10^{-23}\ \mathrm{J\,K^{-1}}$
Planckova konstanta	$h = 6{,}626 \cdot 10^{-34}\ \mathrm{J\,s}$

Periodni sustav elemenata IUPAC

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1 H 1,01																	2 He 4,00
3 Li 6,94	4 Be 9,01											5 B 10,8	6 C 12,0	7 N 14,0	8 O 16,0	9 F 19,0	10 Ne 20,2
11 Na 23,0	12 Mg 24,3											13 Al 27,0	14 Si 28,1	15 P 31,0	16 S 32,1	17 Cl 35,5	18 Ar 39,9
19 K 39,1	20 Ca 40,1	21 Sc 45,0	22 Ti 47,9	23 V 50,9	24 Cr 52,0	25 Mn 54,9	26 Fe 55,8	27 Co 58,9	28 Ni 58,7	29 Cu 63,5	30 Zn 65,4	31 Ga 69,7	32 Ge 72,6	33 As 74,9	34 Se 79,0	35 Br 79,9	36 Kr 83,8
37 Rb 85,5	38 Sr 87,6	39 Y 88,9	40 Zr 91,2	41 Nb 92,9	42 Mo 95,9	43 Tc [98]	44 Ru 101	45 Rh 103	46 Pd 106	47 Ag 108	48 Cd 112	49 In 115	50 Sn 119	51 Sb 122	52 Te 128	53 I 127	54 Xe 131
55 Cs 133	56 Ba 137	57-71 lantanoidi	72 Hf 178	73 Ta 181	74 W 184	75 Re 186	76 Os 190	77 Ir 192	78 Pt 195	79 Au 197	80 Hg 201	81 Tl 204	82 Pb 207	83 Bi 209	84 Po [209]	85 At [210]	86 Rn [222]
87 Fr [223]	88 Ra [226]	89-103 aktinoidi	104 Rf [261]	105 Db [262]	106 Sg [266]	107 Bh [264]	108 Hs [277]	109 Mt [268]	110 Ds [269]	111 Rg [272]	112 Cn [285]						

57 La 139	58 Ce 140	59 Pr 141	60 Nd 144	61 Pm [145]	62 Sm 150	63 Eu 152	64 Gd 157	65 Tb 159	66 Dy 163	67 Ho 165	68 Er 167	69 Tm 169	70 Yb 173	71 Lu 175
89 Ac [227]	90 Th 232	91 Pa 231	92 U 238	93 Np [237]	94 Pu [244]	95 Am [243]	96 Cm [247]	97 Bk [247]	98 Cf [251]	99 Es [252]	100 Fm [257]	101 Md [258]	102 No [259]	103 Lr [262]