



Nacionalni centar  
za vanjsko vrednovanje  
obrazovanja

Identifikacijska  
naljepnica

PAŽLJIVO NALIJEPI!

# FIZ

## FIZIKA

Knjižica formula

FIZ T D

FIZ.40.HR.R.T1.08



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# Fizika

## POPIS FORMULA I KONSTANTI

### Kinematika

$$\bar{v} = \frac{\Delta s}{\Delta t}$$

$$\bar{a} = \frac{\Delta v}{\Delta t}$$

$$s = v_0 t + a \frac{t^2}{2}$$

$$v = v_0 + at$$

$$v^2 = v_0^2 + 2as$$

$$a_{\text{cp}} = \frac{v^2}{r}$$

$$f = \frac{1}{T}$$

### Dinamika

$$F = ma$$

$$F_{\text{tr}} = \mu F_p$$

$$F_{\text{elas}} = -kx$$

$$p = mv$$

$$F \Delta t = \Delta p$$

$$W = \Delta E$$

$$W = Fs \cos \alpha$$

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

$$\Delta E_{\text{gp}} = mg \Delta h$$

$$E_{\text{ep}} = k \frac{x^2}{2}$$

$$P = \frac{W}{t}$$

$$F_G = G \frac{m_1 m_2}{r^2}$$

### Hidromehanika

$$p = \frac{F}{S}$$

$$p = \rho gh$$

$$F_u = \rho g V$$

$$S_1 v_1 = S_2 v_2$$

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

$$\rho = \frac{m}{V}$$



# Fizika

## Termodinamika

$$n = \frac{N}{N_A} = \frac{m}{M}$$

$$\overline{E_k} = \frac{3}{2} k_B T$$

$$U = \frac{3}{2} N k_B T$$

$$pV = nRT$$

$$l = l_0 (1 + \alpha \Delta t)$$

$$Q = mc \Delta t$$

$$Q_i = m \lambda$$

$$Q_i = m r$$

$$Q = W + \Delta U$$

$$W = p \Delta V$$

$$\eta = 1 - \frac{T_2}{T_1}$$

## Elektricitet i magnetizam

$$F = \frac{k}{\epsilon_r} \frac{q_1 q_2}{r^2}$$

$$k = \frac{1}{4\pi\epsilon_0}$$

$$F = qE$$

$$E = \frac{k}{\epsilon_r} \frac{q}{r^2}$$

$$W = qU$$

$$U = Ed$$

$$\varphi = \frac{k}{\epsilon_r} \frac{q}{r}$$

$$C = \frac{q}{U}$$

$$C = \epsilon_0 \epsilon_r \frac{S}{d}$$

$$W = \frac{CU^2}{2}$$

$$I = \frac{\Delta q}{\Delta t}$$

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

$$R = \rho \frac{l}{S}$$

$$I = \frac{E}{R_u + R_v}$$

$$P = UI$$

$$B = \mu_0 \mu_r \frac{I}{2r\pi}$$

$$B = \mu_0 \mu_r \frac{NI}{l}$$

$$F = BIl \sin \alpha$$

$$F_L = qvB \sin \alpha$$

$$\Phi = BS \cos \alpha$$

$$U_i = -N \frac{\Delta \Phi}{\Delta t}$$

$$U_i = -Blv \sin \alpha$$

$$I = \frac{U}{Z}$$

$$R_L = L\omega$$

$$R_C = \frac{1}{C\omega}$$

$$Z = \sqrt{R^2 + (R_L - R_C)^2}$$



# Fizika

## Titranje i valovi

$$T = 2\pi\sqrt{\frac{m}{k}}$$

$$T = 2\pi\sqrt{\frac{l}{g}}$$

$$T = 2\pi\sqrt{LC}$$

$$\omega = \frac{2\pi}{T}$$

$$x = A \sin(\omega t + \varphi_0)$$

$$v = v_0 \cos(\omega t + \varphi_0)$$

$$v_0 = \frac{2\pi A}{T}$$

$$v = \frac{\lambda}{T}$$

$$a = -a_0 \sin(\omega t + \varphi_0)$$

$$a_0 = \frac{4\pi^2 A}{T^2}$$

$$y = A \sin\left(\omega t - \frac{2\pi x}{\lambda}\right)$$

$$L = 10 \log \frac{I}{I_0}$$

$$f_p = f_i \frac{v + v_p}{v - v_i}$$

$$I = \frac{P}{S}$$

## Optika

$$n = \frac{c}{v}$$

$$\frac{\sin \alpha}{\sin \beta} = \frac{n_2}{n_1}$$

$$\frac{1}{a} + \frac{1}{b} = \frac{1}{f}$$

$$\frac{y'}{y} = -\frac{b}{a}$$

$$f = \frac{R}{2}$$

$$j = \frac{1}{f}$$

$$\lambda = \frac{sd}{a}$$

$$d \sin \alpha_k = k\lambda$$

$$\operatorname{tg} \alpha_B = n$$

## Moderna fizika

$$L = L_0 \sqrt{1 - \frac{v^2}{c^2}}$$

$$T = \frac{T_0}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$E = \frac{mc^2}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}$$

$$P = \sigma ST^4$$

$$\lambda_{\max} T = b = \text{konst}$$

$$E_f = hf$$

$$E_k = E_f - W_i$$

$$\lambda = \frac{h}{p}$$

$$E_f = E_n - E_m = -13,6 \text{ eV} \left( \frac{1}{n^2} - \frac{1}{m^2} \right); n > m$$

$$E = \Delta mc^2$$

$$N = N_0 2^{-\frac{t}{T}} = N_0 e^{-\lambda t}$$

$$\lambda = \frac{\ln 2}{T}$$

$$A = \lambda N$$



# Fizika

## Konstante

|   |   |
|---|---|
| gravitacijska konstanta                         | $G = 6,67 \cdot 10^{-11} \text{ N kg}^{-2} \text{ m}^2$                   |
| ubrzanje slobodnoga pada<br>pri površini Zemlje | $g = 9,81 \text{ m s}^{-2}$<br>(u zadatcima uzeti $10 \text{ m s}^{-2}$ ) |
| masa Zemlje                                     | $M = 6 \cdot 10^{24} \text{ kg}$  |
| polumjer Zemlje                                 | $R = 6370 \text{ km}$   |
| normirani atmosferski tlak                      | $p_a = 101325 \text{ Pa}$   |
| unificirana atomska masa                        | $u = 1,66 \cdot 10^{-27} \text{ kg}$                                      |
| Avogadrova konstanta                            | $N_A = 6,022 \cdot 10^{23} \text{ mol}^{-1}$                              |
| opća plinska konstanta                          | $R = 8,314 \text{ J K}^{-1} \text{ mol}^{-1}$                             |
| brzina svjetlosti u vakuumu                     | $c = 3 \cdot 10^8 \text{ m s}^{-1}$                                       |
| elementarni naboj                               | $e = 1,6 \cdot 10^{-19} \text{ C}$  |
| masa elektrona                                  | $m_e = 9,11 \cdot 10^{-31} \text{ kg}$                                    |
| masa protona                                    | $m_p = 1,67 \cdot 10^{-27} \text{ kg}$                                    |
| Coulombova konstanta                            | $k = 9 \cdot 10^9 \text{ Nm}^2\text{C}^{-2}$                              |
| permitivnost vakuumu                            | $\epsilon_0 = 8,85 \cdot 10^{-12} \text{ F m}^{-1}$                       |
| permeabilnost vakuumu                           | $\mu_0 = 4\pi \cdot 10^{-7} \text{ N A}^{-2}$                             |
| prag čujnosti                                   | $I_0 = 10^{-12} \text{ Wm}^{-2}$  |
| Boltzmannova konstanta                          | $k_B = 1,38 \cdot 10^{-23} \text{ J K}^{-1}$                              |
| Planckova konstanta                             | $h = 6,626 \cdot 10^{-34} \text{ J s}$                                    |
| Stefan-Boltzmannova konstanta                   | $\sigma = 5,67 \cdot 10^{-8} \text{ W m}^{-2} \text{ K}^{-4}$             |
| Wienova konstanta                               | $b = 2,89 \cdot 10^{-3} \text{ K m}$                                      |



# Periodni sustav elemenata IUPAC

| 1   | 2  | 3  | 4  | 5           | 6     | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18 |
|---|----|--|----|-------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|
| <div>1</div> <div>H</div> <div>1,01</div> |    | <div>2</div> <div>He</div> <div>4,00</div> |    |             |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 3   | Li | 4  | Be |             |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 6,94                                      |    | 9,01                                       |    |             |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 11  | Na | 12   | Mg |             |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 23,0                                      |    | 24,3                                       |    |             |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 19  | K  | 20   | Ca | 21          | 22    | 23    | 24    | 25    | 26    | 27    | 28    | 29    | 30    |       |       |       |    |
| 39,1                                      |    | 40,1                                       |    | Sc          | Ti    | V     | Cr    | Mn    | Fe    | Co    | Ni    | Cu    | Zn    |       |       |       |    |
|   |    |  |    | 45,0        | 47,9  | 50,9  | 52,0  | 54,9  | 55,8  | 58,9  | 58,7  | 63,5  | 65,4  |       |       |       |    |
| 37  | Rb | 38   | Sr | 39          | 40    | 41    | 42    | 43    | 44    | 45    | 46    | 47    | 48    |       |       |       |    |
| 85,5                                      |    | 87,6                                       |    | Y           | Zr    | Nb    | Mo    | Tc    | Ru    | Rh    | Pd    | Ag    | Cd    |       |       |       |    |
|   |    |  |    | 88,9        | 91,2  | 92,9  | 95,9  | [98]  | 101   | 103   | 106   | 108   | 112   |       |       |       |    |
| 55  | Cs | 56   | Ba | 57-71       | 72    | 73    | 74    | 75    | 76    | 77    | 78    | 79    | 80    |       |       |       |    |
| 133                                       |    | 137  |    | lantanoidei | Hf    | Ta    | W     | Re    | Os    | Ir    | Pt    | Au    | Hg    |       |       |       |    |
|   |    |  |    |             | 178   | 181   | 184   | 186   | 190   | 192   | 195   | 197   | 201   |       |       |       |    |
| 87  | Fr | 88   | Ra | 89-103      | 104   | 105   | 106   | 107   | 108   | 109   | 110   | 111   | 112   |       |       |       |    |
| [223]                                     |    | [226]                                      |    | aktinoidi   | Rf    | Db    | Sg    | Bh    | Hs    | Mt    | Ds    | Rg    | Cn    |       |       |       |    |
|   |    |  |    |             | [261] | [262] | [266] | [264] | [277] | [268] | [269] | [272] | [285] |       |       |       |    |
|   |    |  |    |             |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 57  | La | 58   | Ce | 59          | 60    | 61    | 62    | 63    | 64    | 65    | 66    | 67    | 68    | 69    | 70    | 71    |    |
|   |    |  |    | Pr          | Nd    | Pm    | Sm    | Eu    | Gd    | Tb    | Dy    | Ho    | Er    | Tm    | Yb    | Lu    |    |
|   |    |  |    | 141         | 144   | [145] | 150   | 152   | 157   | 159   | 163   | 165   | 167   | 169   | 173   | 175   |    |
| 89  | Ac | 90   | Th | 91          | 92    | 93    | 94    | 95    | 96    | 97    | 98    | 99    | 100   | 101   | 102   | 103   |    |
| [227]                                     |    | 232  |    | Pa          | U     | Np    | Pu    | Am    | Cm    | Bk    | Cf    | Es    | Fm    | Md    | No    | Lr    |    |
|   |    |  |    | 231         | 238   | [237] | [244] | [243] | [247] | [247] | [251] | [252] | [257] | [258] | [259] | [262] |    |



Prazna stranica



# Fizika

Prazna stranica

