

FIZIKA OKO NAS 7

Numerička rješenja **radne bilježnice** za fiziku u sedmom razredu osnovne škole

TIJELA I TVARI

2. Mjerimo duljinu

1. 2 mm; $d = 1,8 \text{ cm}$
2. $d = 6,2 \text{ cm} - 2,7 \text{ cm} = 3,5 \text{ cm}$
3. $150\,000\,000 / 400\,000 = 375$
4. $30 \text{ mm} : 60 = 0,5 \text{ mm} = 0,05 \text{ cm}$
6. $1\,220 \cdot 60 \text{ cm} = 73\,200 \text{ cm} = 732 \text{ m}$

Mjerenje ploštine površine pravilnih ploha

7. $278 \text{ mm} \cdot 208 \text{ mm} = 57\,824 \text{ mm}^2 = 578,24 \text{ cm}^2$

Mjerenje ploštine nepravilne površine

9. a) $12 \text{ (kvadratić)} \cdot 1 \text{ cm}^2 = 12 \text{ cm}^2$, b) $21,5 \text{ (kvadratić)} \cdot 1 \text{ cm}^2 = 21,5 \text{ cm}^2$
11. a) 2 dm^2 , b) isto
12. $n = (96 \text{ dm} \cdot 40 \text{ dm}) / 16 \text{ dm}^2 = 240$

3. Mjerimo volumen

Mjerenje volumena tekućina

2. $V_1 = 36 \text{ mL}$ $V_2 = 250 \text{ mL}$ $V_3 = 300 \text{ mL}$

Mjerenje volumena nepravilnog tijela

3. a) 20 mL , b) $V_1 = 400 \text{ mL}$, c) $V_2 = 700 \text{ mL}$; $V = 300 \text{ mL}$.
5. $V = (a \cdot b \cdot c) = 32 \text{ cm} \cdot 8 \text{ cm} \cdot 4 \text{ cm} = 1\,024 \text{ cm}^3$, $n = 1\,024 / 64 = 16$

4. Mjerimo masu vagon

1. Utege od: 1 kg ($2 \cdot 0,5 \text{ kg}$) i 200 g ili 20 dag (100 g i 10 dag ili $100 \text{ g} + 50 \text{ g} + 5 \text{ dag}$ ili $10 \text{ dag} + 50 \text{ g} + 5 \text{ dag}$)
4. za košarkašku loptu $1,22 \text{ kg}$; za rajčice 220 dag
5. $383 \text{ g} - 160 \text{ g (čaja)} = 223 \text{ g}$; $223 \text{ g} / 200 = 1,115 \text{ grama}$

5. Gustoća tvari

8. a) $V = V_2 - V_1 = 37 \text{ mL} - 25 \text{ mL} = 12 \text{ mL}$; b) $\rho = m / V = 94,8 \text{ g} / 12 \text{ cm}^3 = 7,9 \text{ g/cm}^3$; c) željezo

Provjerite svoje znanje

2. $n = 10\,000 \text{ m} / 400 \text{ m} = 25$
3. $A = a \cdot b = 50 \text{ dm} \cdot 20 \text{ dm} = 1\,000 \text{ dm}^2$; $n = 1\,000 / 10 = 100$ keramičkih pločica
4. $m = \rho \cdot V = 1\,000 \text{ kg/m}^3 \cdot 20 \text{ m}^3 = 20\,000 \text{ kg} = 20 \text{ t}$
6. a) $A = a \cdot b = 4 \text{ m} \cdot 5 \text{ m} = 20 \text{ m}^2$, b) $V = A \cdot c = 20 \text{ m}^2 \cdot 2,5 \text{ m} = 50 \text{ m}^3$, c) $m = \rho \cdot V = 1,29 \text{ kg/m}^3 \cdot 50 \text{ m}^3 = 64,5 \text{ kg}$
7. $V = m / \rho = 0,57 \text{ kg} / 760 \text{ kg/m}^3 = 0,00075 \text{ m}^3 = 0,75 \text{ L}$

MEĐUDJELOVANJE TIJELA

7. Sastavljanje sila

2. $F_{\text{prosjeck}} = 800 \text{ N} / 8 = 100 \text{ N}$
3. $F = 2 \cdot 750 \text{ N} = 1\,500 \text{ N}$
4. Franji; $R = 70 \text{ N}$
5. $R = F_1 + F_2 = 7,3 \text{ N}$
6. $R = F_2 - F_1 = 15 \text{ N}$ u smjeru veće sile
7. $R = F_1 + F_2 - F_3 + F_4 - F_5 = 10 \text{ N}$ (ekipa A)

8. Elastična sila

1. a) $\Delta l = 4 \text{ cm}$; b) $F = 14 \text{ N}$; c) $k = F / \Delta l = 2 \text{ N/cm}$

2. $\Delta l = 40 \text{ mm}$; $\Delta l = 20 \text{ mm}$; $l = 120 \text{ mm}$; $l = 100 \text{ mm}$; $k_I = F_I / \Delta l = 2 \text{ N/cm}$; $k_J = F_J / \Delta l = 4 \text{ N/cm}$

3. $1 \text{ N} / 4 \text{ (podjeljka)} = 0,25 \text{ N}$

4. $\Delta l = F / k = 18 \text{ N} / 150 \text{ N/m} = 0,12 \text{ m} = 12 \text{ cm}$

6. $F = k \cdot \Delta l = 200 \text{ N/m} \cdot 0,12 \text{ m} = 24 \text{ N}$

7. 30 N; 50 N; 40 N

8. (b) $k = F / \Delta l = 15 \text{ N} / 5 \text{ cm} = 3 \text{ N/cm}$, c) $F = k \cdot \Delta l = 3 \text{ N/cm} \cdot 6 \text{ cm} = 18 \text{ N}$, $\Delta l = F / k = 33 \text{ N} / 3 \text{ N/cm} = 11 \text{ cm}$

9. Sila teža i težina

6. a) $m_1 = 0,3 \text{ kg}$; $m_2 = 0,2 \text{ kg}$; $m_3 = 0,15 \text{ kg}$; $m_4 = 0,25 \text{ kg}$; b) $G = m \cdot g = 0,9 \text{ kg} \cdot 10 \text{ N/kg} = 9 \text{ N}$

9. $G = G_{\text{ANA}} - F_{\text{UZGON}} = 700 \text{ N} - 150 \text{ N} = 550 \text{ N}$

10. a) 450 N, b) 55 kg

11. a) $G = m \cdot g_Z = 0,3 \text{ kg} \cdot 10 \text{ N/kg} = 3 \text{ N}$, b) $G = m \cdot g_M = 0,3 \text{ kg} \cdot 1,6 \text{ N/kg} = 0,48 \text{ N}$

12. a) $g_{\text{MERKUR}} = G / m = 0,38 \text{ N} / 0,1 \text{ kg} = 3,8 \text{ N/kg}$; $g_{\text{VENERA}} = 9 \text{ N/kg}$; $g_{\text{ZEMLJA}} = 10 \text{ N/kg}$; $g_{\text{MARS}} = 3,8 \text{ N/kg}$; $g_{\text{JUPITER}} = 26,4 \text{ N/kg}$; $g_{\text{SATURN}} = 10,46 \text{ N/kg}$

13. $G = m \cdot g = (900 \text{ kg/m}^3 \cdot 0,001 \text{ m}^3) \cdot 10 \text{ N/kg} = 0,9 \text{ N}$

14. $F_{\text{UZGON}} = 1 \text{ N} - 0,75 \text{ N} = 0,25 \text{ N}$

10. Sila trenja

9. $G = F_{\text{tr}} / \mu = 120 \text{ N} / 0,5 = 240 \text{ N}$, $m = G / g = 24 \text{ kg}$

10. $\mu = F_{\text{tr}} / G = 5 \text{ N} / 40 \text{ N} = 0,125$

11. $F_V = \mu \cdot G = 0,07 \cdot 8\,000 \text{ N} = 560 \text{ N}$

12. $\mu = F_{\text{tr}} / G_M = 60 \text{ N} / 750 \text{ N} = 0,8$

13. $F_V = \mu \cdot G_{\text{UK}} = 0,09 \cdot 410 \text{ N} = 36,9 \text{ N}$

12. Zakon poluge

5. $F_A = 6 \text{ N}$; $F_B = 3 \text{ N}$; $F_C = 2 \text{ N}$

6. $l = (3F \cdot 1,5 \text{ m}) / F = 4,5 \text{ m}$

7. $F = G \cdot l_1 / l_2 = 300 \text{ N} \cdot 0,2 \text{ m} / 1 \text{ m} = 60 \text{ N}$

8. 30 cm od lijevog kraja poluge

13. Tlak

6. a) 2 300 Pa, b) 200 000 Pa, c) 1 200 Pa, d) 3 500 kPa i e) 1,05 bar

10. $p = F / A = 900 \text{ N} / 2 \cdot 0,3 \text{ m}^2 = 1\,500 \text{ Pa}$

11. $F = p \cdot A = 200 \text{ Pa} \cdot 0,01 \text{ m}^2 = 2 \text{ N}$

12. $A = F / p = 6 \text{ N} / 3\,000\,000 \text{ Pa} = 0,000\,002 \text{ m} = 0,002 \text{ mm}$

13. $p = F / A = 520 \text{ N} / 0,000\,1 \text{ m}^2 = 5,2 \text{ MPa}$

14. Atmosferski i hidrostatski tlak

4. $p = \rho \cdot g \cdot h = 1020 \text{ kg/m}^3 \cdot 10 \text{ N/kg} \cdot 2000 \text{ m} = 20,4 \text{ MPa}$

Provjerite svoje znanje

2. $F = k \cdot \Delta l = 0,6 \text{ N/cm} \cdot 3 \text{ cm} = 1,8 \text{ N}$

3. $m = G / g = 240 \text{ N} / 10 \text{ N/kg} = 24 \text{ kg}$

5. $F_{\text{tr}} = \mu \cdot G = 0,015 \cdot 420 \text{ N} = 6,3 \text{ N}$

7. $l = (360 \text{ N} \cdot 3 \text{ m}) / 240 \text{ N} = 4,5 \text{ m}$

10. a) $p = F / A = 30 \text{ kPa}$; b) $p = 3 \text{ kPa}$

11. a) $p = 1,7 \cdot 7840 \text{ Pa} = 13\,328 \text{ Pa}$; b) $F = p \cdot A = 37,718 \text{ kN}$

12. $A = F / p = 25 \text{ N} / 50\,000 \text{ Pa} = 0,0005 \text{ m}^2 = 5 \text{ cm}^2$

ENERGIJA

15. Rad

6. $W = F \cdot s = 5 \text{ N} \cdot 0,8 \text{ m} = 4 \text{ J}$ za guranje i $W = G \cdot h = 28 \text{ N} \cdot 0,8 \text{ m} = 22,4 \text{ J}$ za podizanje

7. $F = W / s = 4\,500 \text{ J} / 15 \text{ m} = 300 \text{ N}$

8. $h = s = W / F = 225\,000\text{ J} / 750\text{ N} = 300\text{ m}$

16. Snaga

8. a) $120\,000\text{ W}$, b) $2,35\text{ W}$, c) $9\,000\text{ W}$ i d) $0,013\text{ MW}$

9. $P = W / t = 480\text{ J} / 12\text{ s} = 40\text{ W}$

10. $W = P \cdot t = 180\text{ W} \cdot 86\,400\text{ s} = 15\,552\text{ kJ}$

11. $P = (F \cdot h) \cdot t = (500\text{ N} \cdot 6\text{ m}) \cdot 5\text{ s} = 15\text{ kW}$

12. $P_M = W / t = (400\text{ N} \cdot 5\text{ m}) / 10\text{ s} = 200\text{ W}$, $P_1 = W / t = (480\text{ N} \cdot 5\text{ m}) / 12\text{ s} = 200\text{ W}$

13. a) $W_1 = F \cdot h = 5\,000\text{ N} \cdot 8\text{ m} = 40\text{ kJ}$, b) $W_2 = F \cdot s = 2\,000\text{ N} \cdot 5\text{ m} = 10\text{ kJ}$, $t = (W_1 + W_2)$

$/ P = 50\,000\text{ J} / 2\,500\text{ W} = 20\text{ s}$

18. Pretvorbe energije

6. a) $E_{GP} = G \cdot h = 20\text{ N} \cdot 12\text{ m} = 240\text{ J}$; b) $W = 0\text{ J}$; c) $E_K = 240\text{ J}$

Provjerite svoje znanje

7. $\Delta E = E_2 - E_1 = 0,5\text{ J} - 0,4\text{ J} = 0,1\text{ J}$

8. $F = W / s = 6\text{ J} / 0,2\text{ m} = 30\text{ N}$

9. a) $E_{GP} = G \cdot h = 12\text{ N} \cdot 1\text{ m} = 12\text{ J}$; b) $W = 12\text{ J}$; c) $P = W / t = 12\text{ J} / 2\text{ s} = 6\text{ W}$

10. za Maricu $E_{GP} = G \cdot h = 400\text{ N} \cdot 15\text{ m} = 6\text{ kJ}$; za Ivicu $E_{GP} = G \cdot h = 500\text{ N} \cdot 12\text{ m} = 6\text{ kJ}$

11. $E_K = E_{GP} = G \cdot h = 8\text{ N} \cdot 2,5\text{ m} = 20\text{ J}$

UNUTARNJA ENERGIJA I STRUKTURA TVARI

24. Mjerenje temperature

4. $21,6\text{ }^\circ\text{C}$; $4\text{ }^\circ\text{C}$; $22,5\text{ }^\circ\text{C}$; $94\text{ }^\circ\text{C}$; $-4\text{ }^\circ\text{C}$; $36\text{ }^\circ\text{C}$

5. a) $315,8\text{ K}$, b) 237 K , c) $\Delta t = 78,8\text{ }^\circ\text{C}$, $\Delta T = 78,8\text{ K}$

26. O čemu ovisi toplina

6. $Q = m \cdot c \cdot \Delta T = 1\text{ kg} \cdot 4\,200\text{ J/kg K} \cdot 20\text{ K} = 84\text{ kJ}$

7. $c = Q / (m \cdot \Delta T) = 7\,200\text{ J} / 8\text{ kg}^\circ\text{C} = 900\text{ J/(kg}^\circ\text{C)}$, aluminij

8. $m = Q / (c \cdot \Delta T) = 168\,000\text{ J} / 336\,000\text{ J/kg} = 0,5\text{ kg}$

Provjerite svoje znanje

9. $\Delta T = 26\text{ K}$

13. $Q = m \cdot c \cdot \Delta T = 0,5\text{ kg} \cdot 460\text{ J/kg K} \cdot 24\text{ K} = 5520\text{ J}$