

Školsko natjecanje iz fizike 2021./2022.

9. veljače 2022.

Osnovna škola – rješenja i smjernice za bodovanje

Napomena: u svim zadacima uzmite $g = 10 \text{ N/kg}$

1. (10 bodova) RJEŠENJE:

$$A = 80 \text{ dm}^2 = 0,8 \text{ m}^2 \quad 1 \text{ bod}$$

$$A_{uk} = 2,4 \text{ m}^2 \quad 1 \text{ bod}$$

$$p = \frac{F}{A} \quad 1 \text{ bod}$$

$$G = p \cdot A_{uk} = 152\,250 \text{ N} \quad 1 \text{ bod}$$

$$m = \frac{G}{g} = 15\,225 \text{ kg} \quad 1 \text{ bod}$$

$$m_P = m + m_K = 15\,355 \text{ kg} \quad 1 \text{ bod}$$

$$g_P = 7,5 \text{ N/kg} \quad 1 \text{ bod}$$

$$G_P = m_P \cdot g_P \quad 1 \text{ bod}$$

$$G_P = 115\,162,5 \text{ N} \quad 1 \text{ bod}$$

$$p_P = \frac{G_P}{A_{uk}} = 47\,984,38 \text{ Pa} \quad 1 \text{ bod}$$

2. (11 bodova) RJEŠENJE:

$$U_1 = 4 \text{ V} \quad 1 \text{ bod}$$

$$U_{12} = U_3 = 8 \text{ V} \quad 1 \text{ bod}$$

$$R_s = R_1 + R_2 \quad 1 \text{ bod}$$

$$\frac{1}{R_p} = \frac{1}{R_{12}} + \frac{1}{R_3} \quad 1 \text{ bod}$$

$$R_{12} = 2R \quad 1 \text{ bod}$$

$$R_{123} = R \quad 1 \text{ bod}$$

$$U = IR \quad 1 \text{ bod}$$

$$\frac{U_4}{R_4} = \frac{U_{123}}{R_{123}} \quad 1 \text{ bod}$$

$$U_4 = 24 \text{ V} \quad 1 \text{ bod}$$

$$U_{ukupno} = U_{12} + U_4 \quad 1 \text{ bod}$$

$U_{ukupno} = 32 V$	1 bod
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3. (8 bodova) RJEŠENJE:

$F_1 \cdot k_1 = F_2 \cdot k_2$	1 bod
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$k_2 = \frac{3}{4} l$	1 bod
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$k_1 = \frac{1}{4} l$	1 bod
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$F_2 = 3 \cdot 200 N$	1 bod
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$F_2 = 600 N$	1 bod
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$F_1 = 1800 N$	1 bod
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$F_1 = m \cdot g$	1 bod
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$m = 180 kg$	1 bod
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4. (10 bodova) RJEŠENJE:

$l_{Ivan} = H - h = 55 m - 11 m = 44 m$	1 bod
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$\Delta l_{Ivan} = l_{Ivan} - l_0$	1 bod
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$\Delta l_{Ivan} = 14 m$	1 bod
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$F_{g,Ivan} = F_{el,Ivan}$	1 bod
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$F_{g,Ivan} = 700 N$	1 bod
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$F_{el,Ivan} = k \cdot \Delta l$	1 bod
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$k = 50 N/m$	1 bod
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$\Delta l_{Mihael} = \frac{F_{g,Mihael}}{k}$	1 bod
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$\Delta l_{Mihael} = 10 m$	1 bod
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$h_{Mihael} = H - l_0 - \Delta l_{Mihael} = 15 m$	1 bod
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5. (11 bodova) RJEŠENJE:

$$m = \rho \cdot V \quad 1 \text{ bod}$$

$$m = 0,8 \text{ kg} \quad 1 \text{ bod}$$

$$t = 2 \text{ min } 20 \text{ s} = 140 \text{ s} \quad 1 \text{ bod}$$

$$\Delta T = 75^\circ\text{C} \quad 1 \text{ bod}$$

$$P \cdot t = m \cdot c \cdot \Delta T \quad 2 \text{ boda}$$

$$P = \frac{m \cdot c \cdot \Delta T}{t} = 1800 \text{ W} \quad 1 \text{ bod}$$

$$\eta = \frac{P_{\text{kamenac}}}{P} \quad 1 \text{ bod}$$

$$P_{\text{kamenac}} = 1350 \text{ W} \quad 1 \text{ bod}$$

$$m_2 = 1,2 \text{ kg} \quad 1 \text{ bod}$$

$$t_2 = 280 \text{ s} \quad 1 \text{ bod}$$