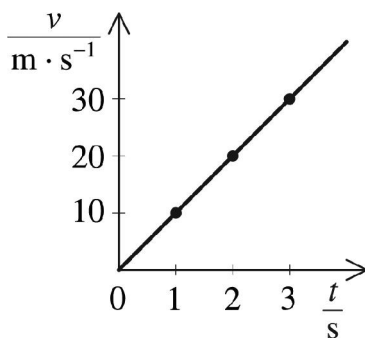


# Prověra "volný pad kruhový pohyb" - řešení

**R2.59**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $t_1 = 1 \text{ s}$ ,  $t_2 = 2 \text{ s}$ ,  $t_3 = 3 \text{ s}$ ;  $v_1 = ?$ ,  $v_2 = ?$ ,  $v_3 = ?$

Ze vztahu pro rychlost volného pádu  $v = gt$  dostaneme  $v_1 = 10 \text{ m} \cdot \text{s}^{-1}$ ,  $v_2 = 20 \text{ m} \cdot \text{s}^{-1}$ ,  $v_3 = 30 \text{ m} \cdot \text{s}^{-1}$ . Graf je na obr. R2-59.



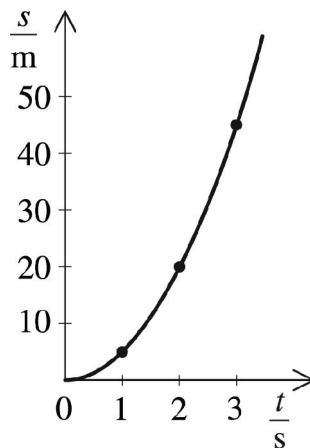
Obr. R2-59

**R2.60**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $t_1 = 1 \text{ s}$ ,  $t_2 = 2 \text{ s}$ ,  $t_3 = 3 \text{ s}$ ;  $s_1 = ?$ ,  $s_2 = ?$ ,  $s_3 = ?$

Ze vztahu pro dráhu volného pádu

$$s = \frac{1}{2}gt^2$$

dostaneme  $s_1 = 5 \text{ m}$ ,  $s_2 = 20 \text{ m}$ ,  $s_3 = 45 \text{ m}$ . Graf je na obr. R2-60.



Obr. R2-60

**R2.61**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $t_1 = 3 \text{ s}$ ,  $t_2 = 4 \text{ s}$ ;  $s = ?$

$$s = s_2 - s_1 = \frac{1}{2}g(t_2^2 - t_1^2) = 35 \text{ m}$$

**R2.62**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $h = 80 \text{ m}$ ; a)  $t = ?$ , b)  $v = ?$

$$\text{a) } h = \frac{1}{2}gt^2 \Rightarrow t = \sqrt{\frac{2h}{g}} = 4 \text{ s}$$

$$\text{b) } v = gt = \sqrt{2gh} = 40 \text{ m} \cdot \text{s}^{-1}$$

**R2.63**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $t = 5,25 \text{ s}$ ;  $h = ?$

$$h = \frac{1}{2}gt^2 = 138 \text{ m}$$

**R2.64**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $h = 1,5 \text{ m}$ ;  $v = ?$

$$h = \frac{1}{2}gt^2 \Rightarrow t = \sqrt{\frac{2h}{g}}$$

$$v = gt = \sqrt{2gh} = 5,5 \text{ m} \cdot \text{s}^{-1}$$

**R2.65**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $v = 100 \text{ m} \cdot \text{s}^{-1}$ ;  $h = ?$

$$t = \frac{v}{g}$$

$$h = \frac{1}{2}gt^2 = \frac{v^2}{2g} = 500 \text{ m}$$

**R2.66**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $s_1 = 1 \text{ m}$ ,  $s_2 = 2 \text{ m}$ ;  $t_1 = ?$ ,  $t_2 = ?$

a)  $t_1 = \sqrt{\frac{2s_1}{g}} = 0,45 \text{ s}$

b)  $t_2 = \sqrt{\frac{2s_2}{g}} - \sqrt{\frac{2s_1}{g}} = 0,63 \text{ s} - 0,45 \text{ s} = 0,18 \text{ s}$

**R2.67**  $g = 10 \text{ m} \cdot \text{s}^{-2}$ ,  $s = 10 \text{ m}$ ,  $h = 2 \text{ m}$ ;  $t = ?$ ,  $v_p = ?$

$$t = \sqrt{\frac{2(s+h)}{g}} - \sqrt{\frac{2s}{g}} = 0,13 \text{ s}$$

$$v_p = \frac{h}{t} = 15 \text{ m} \cdot \text{s}^{-1}$$

**R2.68**  $r = 50 \text{ cm} = 0,5 \text{ m}$ ,  $f = 2 \text{ Hz}$ ;  $T = ?$ ,  $v = ?$

$$T = \frac{1}{f} = 0,5 \text{ s}$$

$$v = 2\pi rf = 6,3 \text{ m} \cdot \text{s}^{-1}$$

**R2.69**  $T = 5 \text{ s}$ ;  $f = ?$ ,  $\omega = ?$

$$f = \frac{1}{T} = 0,2 \text{ Hz}$$

$$\omega = \frac{2\pi}{T} = 1,3 \text{ rad} \cdot \text{s}^{-1}$$

**R2.70**  $r = 3,84 \cdot 10^5 \text{ km} = 3,84 \cdot 10^8 \text{ m}$ ,  $T = 27,3 \text{ d} = 2,36 \cdot 10^6 \text{ s}$ ;  $v = ?$

$$v = \frac{2\pi r}{T} \approx 1,0 \cdot 10^3 \text{ m} \cdot \text{s}^{-1} = 1,0 \text{ km} \cdot \text{s}^{-1}$$

**R2.71**  $T = 24 \text{ h} = 86\,400 \text{ s}$ ,  $\varphi = 2$ ;  $\omega = ?$

$$\omega = \frac{2\pi}{T} = 7,3 \cdot 10^{-5} \text{ rad} \cdot \text{s}^{-1}$$

**R2.72**  $T_1 = 12 \text{ h}$ ,  $T_2 = 24 \text{ h}$ ;  $\omega_1/\omega_2 = ?$

$$\omega_1 = \frac{2\pi}{T_1}$$

$$\omega_2 = \frac{2\pi}{T_2}$$

$$\frac{\omega_1}{\omega_2} = \frac{T_2}{T_1} = 2$$

Úhlová rychlost hodinové ručičky je dvakrát větší než úhlová rychlost otáčení Země.

**R2.73**  $\omega = 200 \text{ rad} \cdot \text{s}^{-1}$ , a)  $r = 1,5 \text{ m}$ ;  $v = ?$ , b)  $v = 540 \text{ km} \cdot \text{h}^{-1} = 150 \text{ m} \cdot \text{s}^{-1}$ ;  $s = ?$

a)  $v = r\omega = 300 \text{ m} \cdot \text{s}^{-1}$

b)  $s = vT = v \frac{2\pi}{\omega} = 4,7 \text{ m}$

**R2.74**  $r = 0,4 \text{ m}$ ,  $\omega = 31,4 \text{ rad} \cdot \text{s}^{-1}$ ;  $v = ?$ ,  $a_n = ?$

$$v = \omega r = 13 \text{ m} \cdot \text{s}^{-1}$$

$$a_n = \omega^2 r = 400 \text{ m} \cdot \text{s}^{-2}$$

**R2.75**  $r = 50 \text{ m}$ ,  $v = 36 \text{ km} \cdot \text{h}^{-1} = 10 \text{ m} \cdot \text{s}^{-1}$ ;  $a_n = ?$

$$a_n = \frac{v^2}{r} = 2 \text{ m} \cdot \text{s}^{-2}$$

**R2.76**  $f_1 = 450 \text{ ot/min} = 7,5 \text{ Hz}$ ,  $r = 10 \text{ cm} = 0,1 \text{ m}$ ;  $a_n = ?$ ,  $f_2 = 2f_1$ ;  $a_2/a_1 = ?$

$$a_1 = 4\pi^2 f_1^2 r = 220 \text{ m} \cdot \text{s}^{-2}$$

$$\frac{a_2}{a_1} = \frac{f_2^2}{f_1^2} = 4$$

Zrychlení se zvětší čtyřikrát.