# 1. KINEMATYKA: Ruch w jednym wymiarze - odpowiedzi

1.1. $S = vt = 4\text{mm}$

1.2. $S = \frac{1}{2}v(t_1 + 2t_2 + t_3) = 4{,}8\text{km}$

1.3. $t = \frac{2(v_A - v_{B0})}{a_B}$

1.4. kula drugiego strzelca, o $t = \frac{S}{v_1} - \frac{S}{v_2} - \Delta t \approx 0{,}005\text{s}$

1.5. $v_{śr} = \frac{2v_1v_2}{v_1+v_2} = 13\frac{1}{3}\ \frac{\text{m}}{\text{s}}$

1.6. Biegacz B wyprzedził biegacza A o 75 m.

1.7.* $v_{śr} = \frac{a\tau^2}{3} + \frac{b\tau}{2}$

1.8*. odpowiednio: 40, 16 i 0 m/s; $v = 40 - 8t\ [\frac{\text{m}}{\text{s}}]$; $a = -8\ [\frac{\text{m}}{\text{s}^2}]$

1.9. $t = \frac{4l}{3v_k} = 48\ \text{s}$

1.10. $t = \frac{S_1v_1 + S_2v_2}{v_1^2 + v_2^2} = 0{,}8\ \text{h}$

1.11. 3 km/h

1.12. a) $x = \left(v\sqrt{1 - \left(\frac{h}{L}\right)^2} - v_{W1}\right)\frac{(h_1 - h_2)L}{vh} = 276\ \text{m}$;

b) $x = \left(v\sqrt{1 - \left(\frac{h}{L}\right)^2} + v_{W2}\right)\frac{(h_1 - h_2)L}{vh} = 456\ \text{m}$

1.14. a. $v_R = 0{,}5\frac{\text{m}}{\text{s}}$; b. $\alpha = 82^{\circ}$; $v_Ł = v_y\sqrt{1 + \frac{x^2}{y^2}} = 3{,}63\ \frac{\text{m}}{\text{s}}$

1.15. $v_s = \sqrt{\left(v_{wyp} + v_w\cos\alpha\right)^2 + v_w^2\sin^2\alpha}$; $\beta = \text{arctg}\left(\frac{v_w\sin\alpha}{v_w\cos\alpha + v_{wyp}}\right)$

1.16. $t = 1\ \text{h}$

1.17. $t = \frac{d}{\sqrt{v_Ł^2 - v_R^2}} = 6\ \text{min}\ 40\text{s}$

1.18. $S = \frac{7b}{6v_Ł} = 245\ \text{m}$

1.19. $v = \frac{kt^3}{3}$; $S = \frac{kt^4}{12} + 5$

1.20. $v_0 = 58{,}86\ \frac{\text{m}}{\text{s}}$; $h_{max} = 176{,}58\ \text{m}$; $\Delta S_3 = 34{,}335\ \text{m}$

1.21. $h = \frac{gt_1^2}{2} - v_0t_1$

1.22. $t_A = \frac{\sqrt{v_0^2 + 2gh} + v_0}{g}$; $t_B = \frac{\sqrt{v_0^2 + 2gh} - v_0}{g}$

1.23. $t = \frac{\sqrt{v_0^2 + 2gh} - v_0}{g} + \frac{h}{v_{dź}}$

1.24. $h_{max} = \frac{v_0^2}{2g}$; $t_w = \frac{v_0}{g}$; $t_{1/2} = \frac{v_0(1 + \frac{\sqrt{2}}{2})}{g}$ i $t_{1/2} = \frac{v_0(1 - \frac{\sqrt{2}}{2})}{g}$