Másodfokú egyenletek

①

$$x^2 - 8x + 7 = 0$$

$$[x^2 - 8x] + 7 = [(x-4)^2 - 16] + 7 = (x-4)^2 - 9 = 0$$

$$(x-4)^2 = 9$$

$$x - 4 = \pm 3$$

$$x - 4 = 3 \quad /+4$$
$$x = 7$$

$$x - 4 = -3 \quad /+4$$
$$x = 1$$

②

$$\frac{(3x-2)^2}{7} - \frac{(2x+3)(2x-3)}{2} = 3 - \frac{11x^2 + 16x - 22}{14}$$

– közös nevezőre hozás
– beszorzás a közös nevezővel

$$2(3x-2)^2 - 7(2x+3)(2x-3) = 14 \cdot 3 - (11x^2 + 16x - 22)$$

$$2(9x^2 - 12x + 4) - 7(4x^2 - 9) = 42 - 11x^2 - 16x + 22$$

$$18x^2 - 24x + 8 - 28x^2 + 63 = 42 - 11x^2 - 16x + 22$$

$$-10x^2 - 24x + 71 = -11x^2 - 16x + 64$$

rendezés egy oldalra

$$x^2 - 8x + 7 = 0$$

$$x_{1,2} = \frac{8 \pm \sqrt{64 - 28}}{2} = \frac{8 \pm 6}{2} \quad \begin{array}{l} \nearrow 7 \\ \searrow 1 \end{array} \qquad \text{Ellenőrzés kötséges!}$$

③

$$\frac{x+35}{x^2-25} + \frac{2}{x+5} = \frac{6}{x-5} \qquad / \cdot x^2 - 25 \qquad \text{mert } x^2 - 25 = (x+5)(x-5)$$

$$x + 35 + 2(x-5) = 6(x+5)$$

$$x + 35 + 2x - 10 = 6x + 30$$

$$3x + 25 = 6x + 30$$

$$-5 = 3x$$

$$x = -\frac{5}{3} \qquad \text{Ellenőrzés kötséges!}$$

(6)

$$x^2 + 8x - 9 = 0$$

$$[x^2 + 8x] - 9 = [(x+4)^2 - 16] - 9 = (x+4)^2 - 25 = 0$$

$$(x+4)^2 = 25$$

$$x + 4 = 5 \qquad x + 4 = -5$$
$$x = 1 \qquad x = -9$$

Ell:
$$1 + 8 - 9 = 0 \qquad\qquad 81 - 72 - 9 = 0$$
$$0 = 0 \qquad\qquad 81 - 81 = 0$$
$$0 = 0$$

(7)

$$(x-2)^2 - (3x-1)(3x+1) + 7 = 0$$

$$x^2 - 4x + 4 - ((3x)^2 - 1) + 7 = 0$$

$$x^2 - 4x + 4 - 9x^2 + 1 + 7 = 0$$

$$-8x^2 - 4x + 12 = 0$$

$$8x^2 + 4x - 12 = 0$$

$$2x^2 + x - 3 = 0$$

$$x_{1/2} = \frac{-1 \pm \sqrt{1 + 24}}{4} = \frac{-1 \pm 5}{4} \nearrow 1 \searrow -\frac{6}{4} \qquad \text{Ellenörés}$$

(8)

$$\frac{-2x^2 - 2h0}{x^2 - 64} - \frac{1 - 3x}{x - 8} = \frac{2h}{x + 8} \qquad /\cdot (x^2 - 64) \qquad x \neq \pm 8$$

$$-2x^2 - 2h0 - (1 - 3x)(x + 8) = 2h(x - 8)$$

$$-2x^2 - 2h0 - x + 3x^2 - 8 + 2hx = 2hx - 192$$

$$x^2 - x - 56 = 0$$

$$x_{1/2} = \frac{1 \pm \sqrt{1 + 224}}{2} = \frac{1 \pm 15}{2} = \nearrow 8 \searrow -7 \qquad \text{Ellenörés!}$$

Szövegesek

(4)

	egyedül	1ó alatt	60' alatt
apa	$t-2$	$\dfrac{1}{t-2}$	$\dfrac{6}{t-2}$
fiú	t	$\dfrac{1}{t}$	$\dfrac{6}{t}$

$$\frac{6}{t-2} + \frac{6}{t} = 1$$
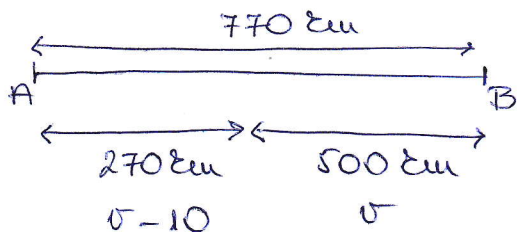
$$6t + 6(t-2) = t(t-2)$$
$$6t + 6t - 12 = t^2 - 2t$$
$$t^2 - 14t + 12 = 0$$

$$t_{1/2} = \frac{14 \pm \sqrt{196-48}}{2} = \frac{14 \pm \sqrt{148}}{2} \nearrow 13,1$$
$$\searrow 0,92$$
nyilván hamis

fiú: 13,1 óra
apa: 11,1 óra

(5)

770 km (A to B)
270 km ($v-10$) + 500 km (v)

$$s = v \cdot t$$
$$t = \frac{s}{v}$$

$$\frac{270}{v-10} + \frac{500}{v} = 8$$

$$270v + 500v - 5000 = 8v(v-10)$$
$$770v - 5000 = 8v^2 - 80v$$
$$8v^2 - 850v + 5000 = 0$$

$$v_{1/2} = \frac{850 \pm \sqrt{562500}}{16} \nearrow 100 \frac{km}{h}$$
$$\searrow \frac{100}{16} \frac{km}{h} \sim 6,25 \text{ hamis}$$

1. szakasz: $100-10 = 90 \frac{km}{h}$

2. szakasz: $100 \frac{km}{h}$

(9)

	egyedül	1ó alatt	2ó alatt:
1. cső	$t+0,5$	$\dfrac{1}{t+0,5}$	
2. cső	t	$\dfrac{1}{t}$	

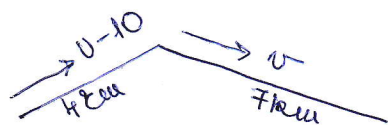$$\frac{2}{t+0,5} + \frac{2}{t} = 1$$

$$2t + 2t + 2 \cdot 0,5 = t(t+0,5)$$
$$4t + 1 = t^2 + 0,5t$$
$$t^2 - 3,5t - 1 = 0$$

$$t_{1/2} = \frac{3,5 \pm \sqrt{12,25+4}}{2} = \frac{3,5 \pm 4,03}{2}$$

$$t_1 = 3,765 \qquad t_2 = \text{negatív (hibás)}$$

(10)

$v-10$, 4 km ; v, 7 km

$$s = v \cdot t$$
$$t = \frac{s}{v}$$
$$45 \text{ perc} = \frac{3}{4} \text{ óra}$$

$$\frac{4}{v-10} + \frac{7}{v} = 0,75$$

$$4v + 7(v-10) = 0,75(v-10)v$$
$$4v + 7v - 70 = 0,75v^2 - 7,5v$$
$$0,75v^2 - 18,5v + 70 = 0$$

$$v_{1/2} = \frac{18,5 \pm \sqrt{342,25-210}}{1,5} = \frac{18,5 \pm 11,5}{1,5}$$

egyik hamis

$$v_1 = 20 \frac{km}{h} \qquad v_2 = 10 \frac{km}{h}$$