Lösung zu Algebra 2007

1) die Hälfte von a:

a) $a \cdot 0{,}5$ ✓

b) $a - 0{,}5$ ○

c) $a - 50\%$ ○

d) $a \cdot 50\%$ ✓

e) $a : \frac{1}{2} = 2a$ ○

f) $\frac{(2a)^2}{2^3 a} = \frac{4a^2}{28a} = \frac{a}{2}$ ✓

g) $\sqrt{\frac{a^4}{12}} \cdot \sqrt{\frac{3}{a^2}} = \sqrt{\frac{3 \cdot a^{4^2}}{12 \, 2 \, a^2}} = \sqrt{\frac{a^2}{4}} = \frac{a}{2}$ ✓

h) $\frac{(a^2)^3}{2a^4} = \frac{a^{6^2}}{2a^4} = \frac{a^2}{2}$ ○

richtige Schreibweisen: a); d); f); g)

2) a) 1) $0,25m^2 - 0,6mn + 0,36n^2 =$

$\underline{\underline{(0,5m - 0,6n)^2}}$

2) $\frac{16e^2}{9} - \frac{f^2}{4} = \underline{\underline{\left(\frac{4e}{3} + \frac{f}{2}\right)\left(\frac{4e}{3} - \frac{f}{2}\right)}}$

b) $-3^2 - \{(-6) - 3[2 + (-1)] - (-2)(-6) + 3\} + (-2)^4$

$-3^2 - \{-6 - 3[2 - 1] - (12) + 3\} + 16$

$-9 - \{-6 - 3 \cdot 1 - 12 + 3\} + 16$

$-9 - \{-6 - 3 - 12 + 3\} + 16$

$-9 - \{-18\} + 16$

$-9 + 18 + 16$

$\underline{\underline{25}}$

c) $b^2 - [2b - (b+1)^2] =$

$b^2 - [2b - (b^2 + 2b + 1)] =$

$b^2 - [2b - b^2 - 2b - 1] =$

$b^2 - [-b^2 - 1] =$

$b^2 + b^2 + 1 = \underline{\underline{1 + 2b^2}}$

3) $T(x,y) = 5x - (3x + 4y)$ $\quad \left| \begin{array}{l} x = (2a-5b)^2 \\ y = (3a+4b)(3a-8b) \end{array} \right.$

$5[(2a-5b)^2] - [3(2a-5b)^2 + 4(3a+4b)(3a-8b)]$

$5[4a^2-20ab+25b^2] - [3(4a^2-20ab+25b^2)+4(9a^2-24ab+12ab-32b^2$

$5[4a^2-20ab+25b^2] - [12a^2-60ab+75b^2+36a^2-96ab+48ab-128b^2]$

$20a^2 - 100ab + 125b^2 - 12a^2 + 60ab - 75b^2 - 36a^2 + 96ab - 48ab + 128b^2$

$-28a^2 + 8ab + 178b^2$

4) a) Horizontal : 1 Häuschen = 5min
Vertikal : 1 Häuschen = 1km

Zahlenpaare: 10min - 0m 50min - 40km
20min - 10km 60min - 50km
30min - 20km 70min - 60km
40min - 30km

→ $t_A = 10\text{min}$ $s_A = 0\text{m}$
$t_B = 70\text{min}$ $s_B = 60\text{km}$

$t = t_B - t_A = 70\text{min} - 10\text{min} = 60\text{min} = 1\text{h}$
$s = s_B - s_A = 60\text{km} - 0\text{km} = 60\text{km}$
$v = \frac{s}{t} = \frac{60\text{km}}{1\text{h}} = 60\ \frac{\text{km}}{\text{h}}$

b) $y = -120x + 140$

$x = 0{,}5 \rightarrow y = -120 \cdot 0{,}5 + 140 = -60 + 140 = 80$
$x = 1 \rightarrow y = -120 \cdot 1 + 140 = -120 + 140 = 20$

c) Aus Diagramm: 50min

- Gleichung Zug A $y = a \cdot x + b$
$20 = a \cdot 0{,}5 + b$
$b = 20 - 0{,}5a$ ①
$50 = a \cdot 1 + b$
$b = 50 - a$ ②

① = ② $20 - 0{,}5a = 50 - a$
$a - 0{,}5a = 50 - 20$
$0{,}5a = 30$
$a = 60$ ③

③ in ② $b = 50 - 60 = -10$ → $y = 60x - 10$

A = B => $60x - 10 = -120x + 140$
$180x = 150$
$x = \frac{150}{\ } = \frac{15}{\ } = \frac{5}{\ }\text{h} = 50\text{min}$

5 ✍

$$\frac{(x-3)(x+2)}{2} - \frac{(2x-1)x}{4} + \frac{4x-3}{8} + 2x = 0$$

$$\frac{x^2+2x-3x-6}{2} - \frac{2x^2-x}{4} + \frac{4x-3}{8} + 2x = 0$$

$$\frac{x^2-x-6}{2} - \frac{2x^2-x}{4} + \frac{4x-3}{8} + 2x = 0$$

$$\frac{4(x^2-x-6)}{8} - \frac{2(2x^2-x)}{8} + \frac{4x-3}{8} + \frac{16x}{8} = 0$$

$$\frac{4x^2-4x-24-4x^2+2x+4x-3+16x}{8} = 0$$

$$\frac{18x-27}{8} = 0$$

$$18x-27 = 0$$

$$18x = 27$$

$$2x = 3$$

$$x = \frac{3}{2} = 1{,}5$$

6)

20 Fragen

Richtige Antwort → 12P
Falsche Antwort → -10P
} 108P

r = anzahl richtige Antworten

f = anzahl falsche Antworten

$r + f = 20$ ①

$r \cdot 12 - f \cdot 10 = 108$ ②

aus ①: $f = 20 - r$ ①'

①' in ②: $r \cdot 12 - (20 - r) \cdot 10 = 108$

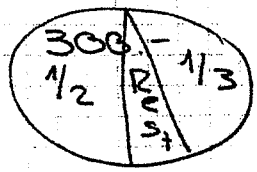
$12r - 200 + 10r = 108$

$12r + 10r = 308$

$22r = 308$

$r = 14$

7b)



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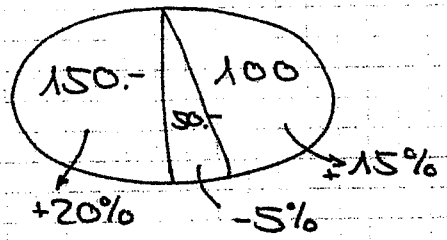


50 x -.14

1min = .40.

Gewinn 1 = 150 · 0.2 = 30.-

Gewinn 2 = 100 · 0.15 = 15.-

Gewinn 3 = 50(-0.05) = -2,50.-

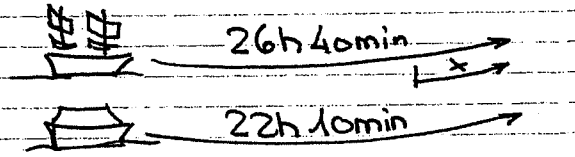
42,50.-

zu bezahlen: 25.- + 50 · -.14 = 32.-

zum telephonieren: 42.50 - 32.- = 10.50

$t = \frac{10.5}{0.4} = 26.25\,\text{min} \rightarrow \underline{26\,\text{min}}$

8) Genua — Athen



a) $t_P = 26h + 40min = 26h + \frac{1}{3}h = 26,333h$

$t_V = 22h + 10min = 22h + \frac{1}{6}h = 22,167h$

$v_V = \frac{s}{t_V} = \frac{1052\,km}{22,167h} = 47,4586\,\frac{km}{h} \Rightarrow \underline{47,5\,\frac{km}{h}}$

b) $v_P = \frac{s}{t_P} = \frac{1052\,km}{26,333h} = 39,949\,\frac{km}{h}$

$s_P = v_P \cdot t_V = 39,949\,\frac{km}{h} \cdot 22,167h = 885,544km$

$x = s - s_P = 1052km - 885,544km = 166,456km$

$= \underline{166,5km}$

b) $v_P = \frac{s}{t_P} = \underline{\qquad\qquad}$