M-ÜBUNGEN — IBF — 27.05.2014

1) Geg.: Gleichschenk. TRAPEZ

$a = 7{,}6\ cm$, $c = 4{,}2\ cm$, $h = 3{,}4\ cm$ G

Ges.: Konstr., A, x, $b = d$, U

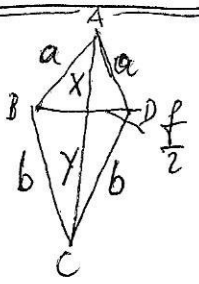
2) Geg.: Gleichsch. TRAPEZ

$A = 16{,}8\ cm^2$, $a = 7{,}2\ cm$, $c = 4{,}4\ cm$ V

Ges.: h (Formel umformen), Konstr., b, d, U

3) Geg.: DELTOID

$e = 8{,}6\ cm$
$f = 6{,}4\ cm$
$x = 3{,}2\ cm$



Ges.: A, y, a, b, U, Konstr.

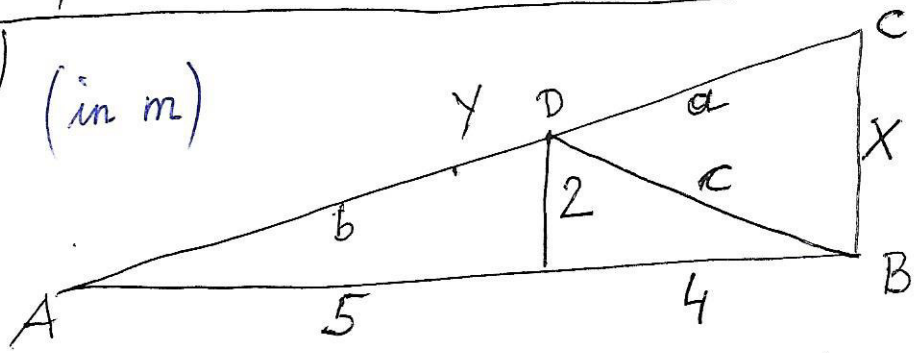
4) a) $3 : (2x - 4) = 5 : 2$ (PROP.) Ges.: x

b) $10 : 4 = 6 : x$ Ges.: x

5) a) $7x - 3 = 11x + 1$ Ges.: x, PROBE

b) $12 + 4x = 2x - 2$

6) (in m)



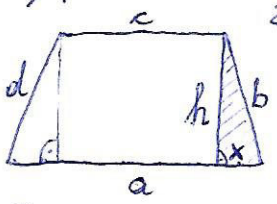
$Y = \overline{AC}$
$a = \overline{CD}$
$b = \overline{AD}$

Ges.: x (PROP.), b (PYTH.), Y (PYTH), a, c;

A_{BCD} (allg. DREIECK → HERON-FORMEL annehmen!)

Lösungen zu M-ÜBUNGEN (IBF) vom 27.05

1) $A = \frac{(a+c)\cdot h}{2} = \frac{(7{,}6+4{,}2)\cdot 3{,}4}{2} = \frac{11{,}8\cdot 3{,}4}{2} = \underline{20{,}06\ cm^2}$



$x = \frac{a-c}{2} = \frac{7{,}6-4{,}2}{2} = \frac{3{,}4}{2} = 1{,}7$ $\quad \underline{x = 1{,}7\ cm}$

$b = \sqrt{x^2+h^2} = \sqrt{1{,}7^2+3{,}4^2} = \sqrt{2{,}89+11{,}56} = \sqrt{14{,}45}$

$a = 7{,}6\ cm$
$c = 4{,}2\ cm$
$h = 3{,}4\ cm$

$\underline{b = 3{,}80\ cm}$ (gerundet)

$\underline{d = 3{,}80\ cm}$

$U = a+b+c+d$
$\underline{U = 19{,}40\ cm}$

Lös: $A = 20{,}6\ cm^2$, $x = 1{,}7\ cm$, $b = d = 3{,}8\ cm$, $U = 19{,}4\ cm$

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2) $A = \frac{(a+c)\cdot h}{2} \mid \cdot 2 \qquad h = ?$

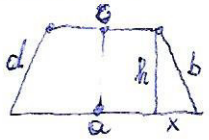
$2A = (a+c)\cdot h \mid : (a+c)$

$\frac{2A}{(a+c)} = h$

$h = \frac{2A}{(a+c)} = \frac{2\cdot 16{,}8}{7{,}2+4{,}4} = \frac{33{,}6}{11{,}6} = 2{,}90$ (gerundet)

$\underline{h = 2{,}90\ cm}$

KONSTR.: 1) a 2) a halbieren → h → $\frac{c}{2}, \frac{c}{2}$ → VERBIND.



$b = \sqrt{x^2+h^2} = \sqrt{1{,}4^2+2{,}9^2} = \sqrt{1{,}96+8{,}41} = \sqrt{10{,}37} = 3{,}2$

$x = \frac{a-c}{2} = \frac{7{,}2-4{,}4}{2} = \frac{2{,}8}{2} = 1{,}4$

$\underline{b = 3{,}2\ cm}$ → $\underline{d = 3{,}2\ cm}$

Lös: $h = 2{,}90\ cm$, $b = d = 3{,}20\ cm$, $U = 18{,}04\ cm$

$U = a+b+c+d = 7{,}2+(3{,}2\cdot 2)+4{,}4 = 18{,}04$
$\underline{U = 18{,}04\ cm}$

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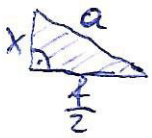
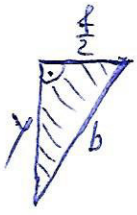
3) $A = \frac{e\cdot f}{2} = \frac{8{,}6\cdot 6{,}4}{2} = 27{,}52$ $\quad \underline{A = 27{,}52\ cm^2}$



$a = \sqrt{x+\left(\frac{f}{2}\right)^2} = \sqrt{3{,}2^2+3{,}2^2} = \sqrt{10{,}24+10{,}24} = \sqrt{20{,}28} = 4{,}53$

$\underline{a = 4{,}53\ cm}$



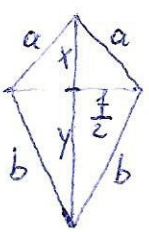
$b = \sqrt{y^2+\left(\frac{f}{2}\right)^2} = \sqrt{5{,}4^2+3{,}2^2} = \sqrt{29{,}16+10{,}24} = \sqrt{39{,}4} = 6{,}28$

$\underline{b = 6{,}28\ cm}$

$y = e-x$
$y = 8{,}6-3{,}2$
$\underline{y = 5{,}4\ cm}$

$U = 2a+2b$
$U = 2\cdot 4{,}53+2\cdot 6{,}28$
$U = 9{,}06+12{,}56 = 21{,}62$

K:



$e = x+y$

$\underline{U = 21{,}62\ cm}$

4) a) $3 : (2x-4) = 5 : 2$

$5(2x-4) = 3 \cdot 2$

$10x - 20 = 6 \quad | +20$

$10x = 26$

$x = 2{,}6$

b) $10 : 4 = 6 : x$

$10x = 24$

$x = 2{,}4$

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5) a) $7x - 3 = 11x + 1 \quad | -7x$ $\quad G = \mathbb{R}$

$-3 = 4x + 1 \quad | \leftrightarrow$

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

$4x = -4 \quad | :4$

$x = -1$

oder: $\quad | -11x$

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

$-4x = +4 \quad | \cdot(-1)$

$4x = -4 \quad | :4$

$x = -1$

Pr.: $7 \cdot (-1) - 3 = 11 \cdot (-1) + 1$

$-7 - 3 = -11 + 1$

$-10 = -10$ w.A $\quad \mathbb{L} = \{-1\}$

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5 b) $12 + 4x = 2x - 2 \quad | -2x$

$12 + 2x = -2 \quad | -12$

$2x = -14$

$x = -7$

Pr.: $12 + 4 \cdot (-7) = 2(-7) - 2$

$12 - 28 = -14 - 2$

$-16 = -16$ w.A

$G = \mathbb{R} \rightarrow \mathbb{L} = \{-7\}$

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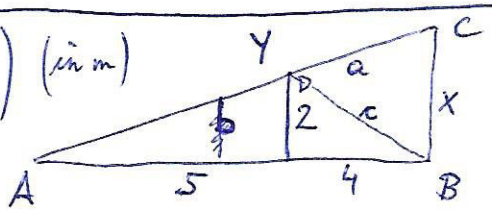
6) (in m)



$y = AC$

$a = AD$

$b = AD$

$9 : x = 5 : 2$

$5x = 18 \quad | :5$

$x = 3{,}6 \text{ m}$

$b = \sqrt{5^2 + 2^2}$

$b = \sqrt{25 + 4}$

$b = \sqrt{29} \approx 5{,}385$

$b = 5{,}39 \text{ cm}$

$c = \sqrt{2^2 + 4^2} = \sqrt{4 + 16} = \sqrt{20}$

$c = 4{,}47 \text{ cm}$

$y = \sqrt{9^2 + 3{,}6^2} = \sqrt{81 + 12{,}96} = 9{,}69$

$y = 9{,}69 \text{ cm}$

$a = y - b$

$a = 9{,}69 - 5{,}39$

$a = 4{,}30 \text{ m}$

PROBE: $y = a + b = 4{,}30 + 5{,}39 = 9{,}69$

$y = 9{,}69 \text{ m}$ ✓

$A_{\Delta BCD} = \sqrt{s \cdot (s-a) \cdot (s-c) \cdot (s-x)}$ $\quad s = \frac{U}{2}$

$A = \sqrt{6{,}185 \cdot (6{,}185 - 4{,}3) \cdot (6{,}185 - 4{,}47) \cdot (6{,}185 - 3{,}6)}$

$A = \sqrt{6{,}185 \cdot 5{,}885 \cdot 1{,}715 \cdot 2{,}585}$

$A = \sqrt{161{,}3356} = 12{,}70$

$A = 12{,}70 \text{ m}^2$

$U = a + c + x$

$U = 4{,}3 + 4{,}47 + 3{,}6$

$U = 12{,}37$

$s = \frac{U}{2} = 6{,}185$