Langfristige HA - Ma 10 — Lösungen

1. geg.: $d = 1{,}90\,m$ ∧ $r = 0{,}95\,m$ ges.: A_M

$h = 3{,}10\,m - 0{,}6\,m = 2{,}50\,m$

$A_M = 2\pi r h$

$\underline{A_M = 14{,}92\,m^2}$

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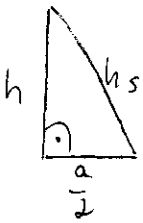
2. geg.: $a = 3\,cm$ ges.: A_M, A_O, V

$h_s = 4\,cm$

b) 

$h_s^2 = h^2 + \left(\frac{a}{2}\right)^2$

$h^2 = h_s^2 - \left(\frac{a}{2}\right)^2$

$\underline{h = 3{,}7\,cm}$

$V = \frac{1}{3} a^2 \cdot h$

$\underline{V = 11{,}1\,cm^3}$

$A_M = 2 \cdot a \cdot h_s$

$\underline{A_M = 24\,cm^2}$

$A_O = A_G + A_M$

$\underline{A_O = 33\,cm^2}$

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3. geg.: $d = h = 82\,mm = 8{,}2\,cm$

$\rho = 7{,}8\,\frac{g}{cm^3}$

a) $V_Z = \pi r^2 \cdot h$ $V_K = \frac{4}{3}\pi r^3$

$V_Z = 433\,cm^3$ $V_K = 288{,}7\,cm^3$

→ Abfall $144{,}3\,cm^3$ $\rho = \frac{m}{V}$ ∧ $m = \rho \cdot V$

$\underline{m = 1125{,}6\,g}$

b) $\frac{144{,}3\,cm^3}{433\,cm^3} = 0{,}333$ ∧ $\underline{33{,}3\,\%}$

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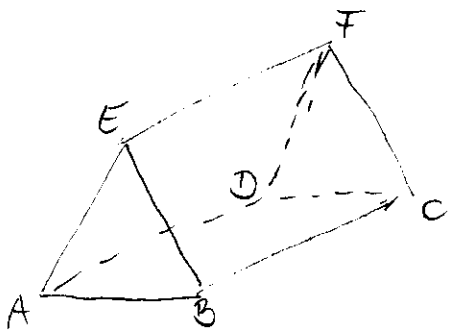
4. a) 

b) geg.: $a = 5\ cm$ $\quad V_Q = a \cdot b \cdot c$

$b = 6\ cm$ $\quad \underline{V_Q = 90\ cm^3}$

$c = 3\ cm = h$ $\quad V_Z = \pi r^2 h$

$d = 2\ cm \Rightarrow r = 1\ cm$ $\quad \underline{V_Z = 9{,}4\ cm^3}$

$\rho = 7{,}8\ \frac{g}{cm^3}$ $\quad \rightarrow \underline{V_K = 80{,}6\ cm^3}$

$m = \rho \cdot V = \underline{628{,}5\ g}$

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5. geg.: $d_{Ku} = 120\ mm = 12\ cm = d_K = d_Z$ $\quad$ ges.: A_O

$h_Z = 5\ cm$ $\quad \Rightarrow r = 6\ cm$ $\quad V$

$h_{Ke} = 16\ cm$ $\quad m$

$\rho = 8{,}9\ \frac{g}{cm^3}$

b) $A_{O\,Hku} = 2\pi r^2 = 226{,}2\ cm^2$

$A_{M\,Z} = 2\pi r h = 188{,}5\ cm^2$

$A_{M\,Ke} = \pi r s = \underline{322{,}1\ cm^2}$

$\Rightarrow \underline{A_O = 736{,}8\ cm^2}$

$s^2 = r^2 + h^2$

$s = 17{,}1\ cm$

c) $V_{Hku} = \frac{2}{3}\pi r^3 = 452{,}4\ cm^3$

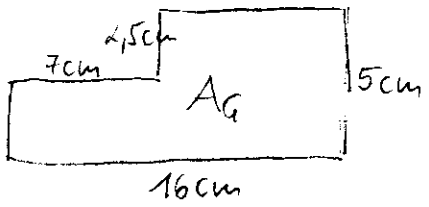
$V_Z = \pi r^2 h = 94{,}2\ cm^3$

$V_{Ke} = \frac{1}{3}\pi r^2 h = \underline{603{,}2\ cm^3}$

$\Rightarrow \underline{V = 1149{,}8\ cm^3}$

d) $m = \rho \cdot V = 9658{,}2\ g \approx \underline{9{,}7\ kg}$

6.



$A_G = (16\,cm \cdot 5\,cm) - (7\,cm \cdot 2{,}5\,cm)$

$A_G = 62{,}5\,cm^2$

$V_P = A_G \cdot h$

$\underline{V_P = 1562{,}5\,cm^2}$

$V_Z = \pi r^2 h$

$V_Z = 62{,}8\,cm^3 \cdot 2$

$= \underline{125{,}7\,cm^3}$

$\underline{V_{ges} = 1436{,}9\,cm^3}$

$m = \varrho \cdot V = 11380\,g = \underline{11{,}38\,kg}$

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7. geg.: $d_a = 16\,m$ ∧ $r_a = 8\,m$ ges.: A_O

$\underline{d_i = 15{,}96\,m}$ ∧ $r_i = 7{,}98\,m$ V

a) $A_O = 4\pi r^2$

$\underline{A_O = 804{,}2\,m^2}$

b) $V = \frac{4}{3}\pi r^3$

$\underline{V = 2128{,}6\,m^3}$

c) $V_a = \frac{4}{3}\pi r^3 = 2144{,}7\,m^3$

∧ $V_{Hülle} = 16{,}1\,m^3 = 16\,100\,000\,cm^3$

∧ $m = \varrho \cdot V = 127\,029\,000\,g$

$\underline{m \approx 127\,t}$

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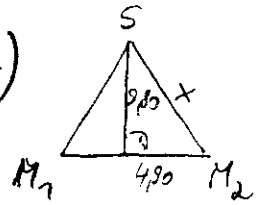
8. geg.: $a = 9{,}80\,m$

$h = 9{,}80\,m$

b) $A = 9{,}80\,m \cdot 4{,}90\,m = \underline{48{,}02\,m^2}$

c)

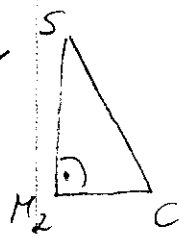


$x^2 = (9{,}80\,m)^2 + (4{,}90\,m)^2$

$\underline{x = 10{,}96\,m}$

$A = \frac{1}{2} \cdot 4{,}90\,m \cdot x$

$\underline{A = 26{,}85\,m^2}$



→ sind vier solche Dreiecksflächen

→ $\underline{A = 107{,}4\,m^2}$

9. $a = 11{,}6\ cm$

$c = 7{,}6\ cm$

$h_a = 3{,}6\ cm$

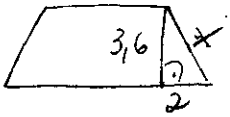
$h = 10\ cm$

$A_G = \frac{a+c}{2} \cdot h_a$

$A_G = 34{,}56\ cm^2 \cdot 2 = \underline{69{,}12\ cm^2}$

$A_M = u \cdot h$

$\underline{A_M = 274\ cm^2}$



$x^2 = (3{,}6\ cm)^2 + (2\ cm)^2$

$x = 4{,}1\ cm$

$\rightarrow u = 27{,}4\ cm$

$A_O = 2A_G + A_M$

$A_O = 343{,}12\ cm^2 \cdot 15\%$

$+ \ 51{,}47\ cm^2$

$\underline{\underline{394{,}6\ cm^2}}$

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10. geg.: $a = 4\ cm$

$b = \frac{1}{4}a = 1\ cm$

$h = 2a = 8\ cm$

b) $A_Q = a^2 = 16\ cm^2$

$A_D = \frac{a \cdot b}{2} = 2\ cm^2$

$\Big\} \ A_G = A_Q - A_D \cdot 4 = \underline{8\ cm^2}$

$V = A_G \cdot h = \underline{\underline{63\ cm^3}}$

c) $V = A_G \cdot h \quad h = 2a \quad A_G = a^2 - 4A_D \quad A_D = \frac{1}{2}a \cdot b$

$\hookrightarrow V = A_G \cdot 2a$

mit $b = \frac{1}{4}a$

folgt $A_D = \frac{1}{8}a^2$

$\hookrightarrow A_G = a^2 - 4 \cdot \frac{1}{8}a^2$

$A_G = a^2 - \frac{1}{2}a^2$

$A_G = \frac{1}{2}a^2$

$V = \frac{1}{2}a^2 \cdot 2a$

$\underline{\underline{V = a^3}}$

11. a) geg.: $h_K = 0{,}33\,m$

$d_K = 1{,}76\,m \rightarrow r_K = 0{,}88\,m$

$A_M = \pi r s$ $\qquad s^2 = h^2 + r^2$

$\underline{A_M = 2{,}6\,m^2}$ $\qquad \underline{s = 0{,}94\,m}$

A für 6 Säulen: $\underline{15{,}6\,m^2}$

$15{,}6\,m^2 \cdot 9\,\% = 1{,}4\,m^2$

$15{,}6\,m^2 + 1{,}4\,m^2 = \underline{17\,m^2}$

Der Gesamtbedarf für 6 Dächer beträgt $17\,m^2$.

b) geg.: $d_Z = 1{,}60\,m \rightarrow r_Z = 0{,}80\,m$

$h_Z = 2{,}20\,m$

$A_M = 2\pi r h$

$A_M = 11{,}06\,m^2$

$6 \cdot A_M = \underline{66{,}4\,m^2}$

$66{,}4\,m^2 \cdot 9{,}50\,€/m^2 = 630{,}80\,€$ je Woche

$\rightarrow \underline{32\,801{,}60\,€}$ im Jahr

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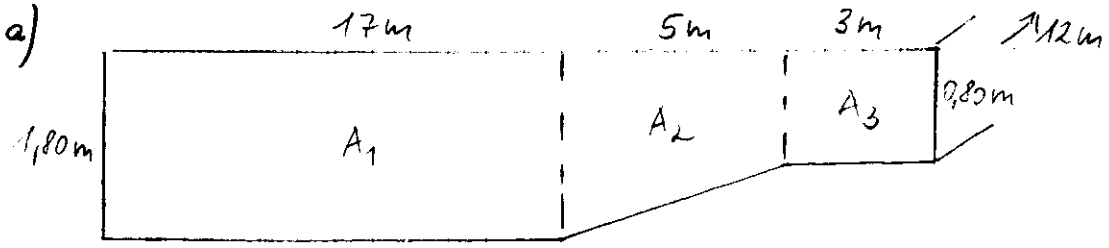
12. a)



$A_1 = 17\,m \cdot 1{,}80\,m$ $\qquad A_2 = \frac{1{,}80 + 0{,}80\,m}{2} \cdot 5\,m$ $\qquad A_3 = 3\,m \cdot 0{,}80\,m$

$A_1 = 30{,}6\,m^2$ $\qquad A_2 = 6{,}5\,m^2$ $\qquad A_3 = 2{,}4\,m^2$

$\hookrightarrow \underline{A_{ges} = 39{,}5\,m^2}$

$V = A_G \cdot h$

$\underline{V = 474\,m^3}$

Es sind $474\,m^3$ Wasser enthalten, wenn das Becken bis zum Rand gefüllt ist.

b) Rohr 1 : $x+17$
Rohr 2 : x
} 6 Stunden

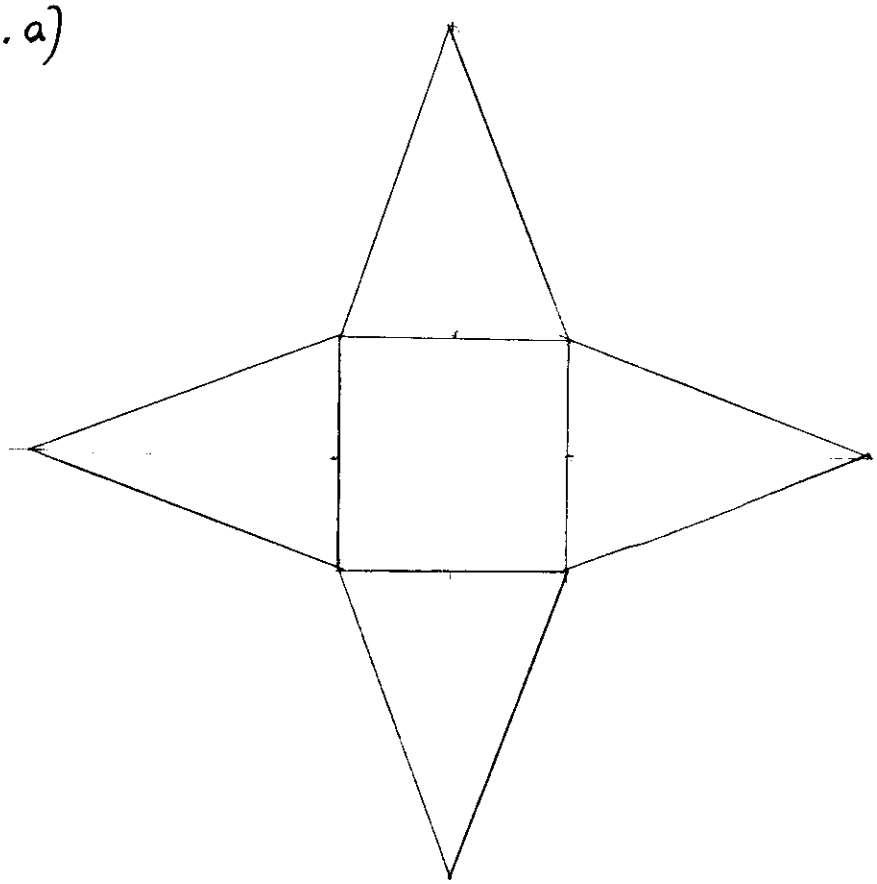
$$(x+x+17)\cdot 6 = 474$$
$$12x + 102 = 474$$
$$12x = 372$$
$$\underline{x = 31}$$
$$x + 17 \quad \underline{= 48}$$

Aus dem ersten Rohr fließen $48\,m^3$ und dem zweiten Rohr $31\,m^3$ Wasser pro Stunde.

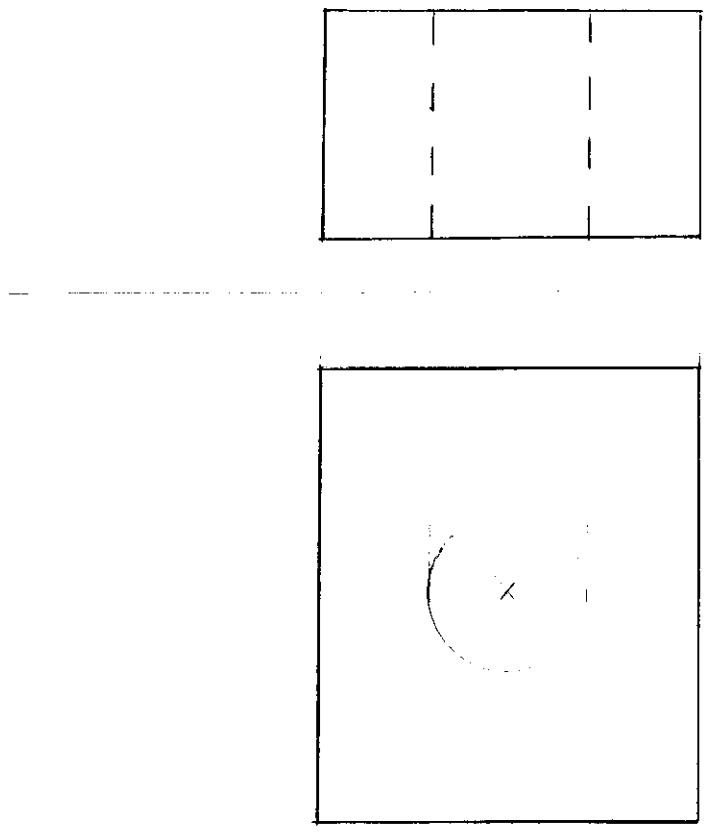
c) $2 \cdot A_1 = 61{,}2\,m^2$
$2 \cdot A_2 = 13\,m^2$
$2 \cdot A_3 = 4{,}8\,m^2$
$A_4 = 1{,}8\,m \cdot 12\,m = 21{,}6\,m^2$
$A_5 = 0{,}8\,m \cdot 12\,m = 9{,}6\,m^2$
$\rightarrow \underline{A_{ges} = 110{,}2\,m^2}$

Die zu fliesende Fläche beträgt $110{,}2\,m^2$

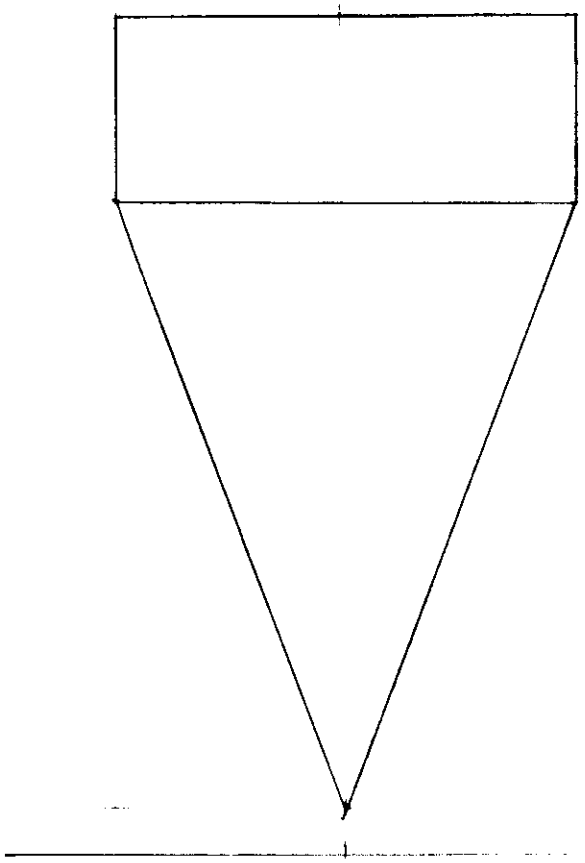
2. a)



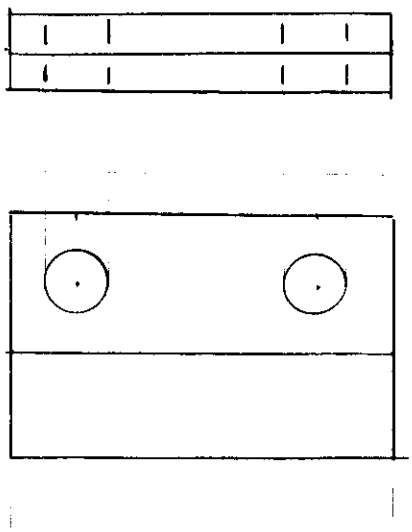
4. b)



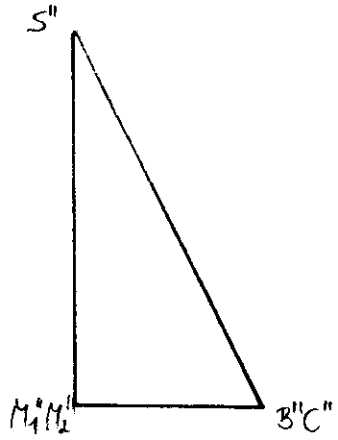
5. Maßstab: 1:2

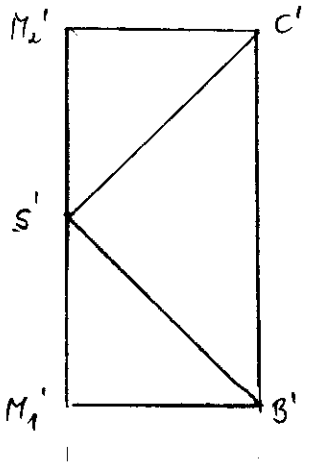


6. a) Maßstab: 1:5

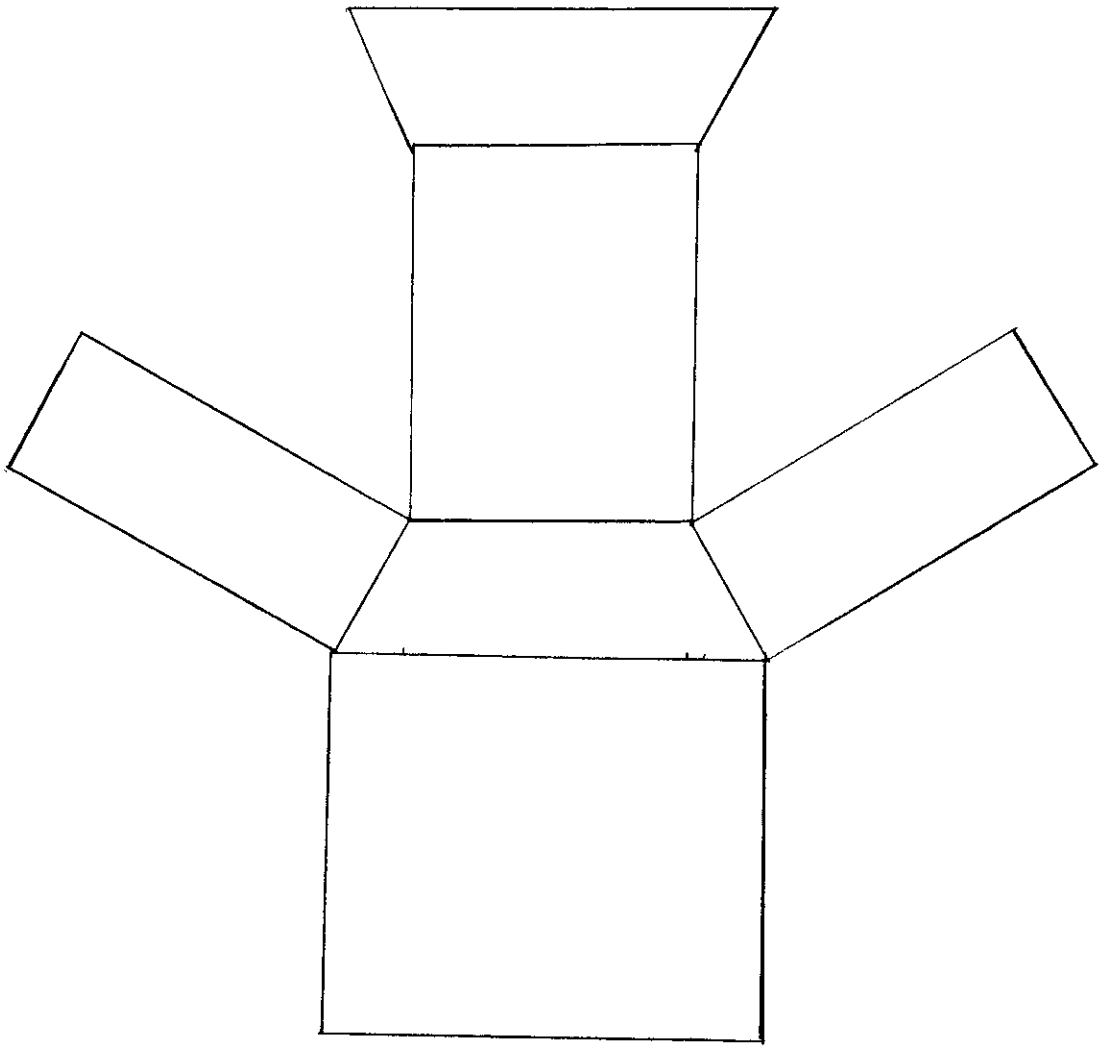


8. a) Maßstab: 1:200





9. a) Maßstab 1 : 2



10. a)