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Sala	(Potenz	rejeln)			
		mens.]	Davn jelten		
(1)	an. k	n = (a.b	$\frac{a^n}{b^n} =$	$\left(\begin{array}{c} a \\ b \end{array}\right)$ n $p \neq 0$)
			$\frac{a^n}{a^m} =$		
(3)	(a')	= a	$\sqrt{a^n} = a$	spezaill	$a^{-1} = \frac{1}{a^{-1}}$
	Q° = 1.				
Beispel:	Ves	einfadre so	oweit als mögli	:0-	
1.	<u> </u>	1/2 -3/4 a a =	1/2-3/4 = a-1/4 =	1 = 1 ant = 1	
a ⁻	7 15				
2. (<u>a</u>	6m-1	$\frac{a^{3n+m}}{b^{m-2}}$	$= \frac{5^{n-2n}}{5^{6m-1}}.$	$a^{\text{SK+M}} = a^{-3m}$. 6
			= a ^{-3m} · b ^{-sm}	$a^{-1} = \frac{1}{a^{3m} \cdot b^{5}}$	5m+1
-> loa	arithme	1/1			
			Dann besilat	de flich ung	
		$a^{\times} = b$			
füs	<i>y</i> èdes	6>0	Steds eine teella	¿ Läsory X.	
	a [×] =	b (=>	$x = \log_a(b)$		
loga	(6)	st derjeinige	2 Exponent m	it dem man d	u Basis a
			um b zu estra		
		a loga(b) =	b .		

1. $\log_{x_0}(A00) = 2$, deun $10^2 = 100$ 2. $\log_a(a^*) = x$, deun $a^* = a^*$ 3. $\log_3(A25) = 3$, deun $5^3 = 125$ 4. $\log_a(A) = 0$, deun $a^0 = 1$ $\log_a(a) = 1$, deun $a^1 = a$ Sala (logarithmen eyeln) Fir den logarithmen que enas feden Basis a gelten folgologian Negen $A = \log_a(a^*) = \log(a) + \log(v)$ 2. $\log_a(a^*) = \log(a) - \log(v)$ 3. $\log_a(a^*) = \log(a) - \log(v)$ 3. $\log_a(a^*) = \log(a) - \log(v)$ Specie II $\log_a(a^*) = \log(a) + \log(a) + \log(a)$ Specie II $\log_a(a^*) = \log(a) + \log(a) + \log(a)$ $\log_a(a^*) = \log(a) + \log(a) + \log(a) + \log(a)$ $\log_a(a^*) = \log_a(a^*) + \log_a(a^*)$ $\log_a(a^*) = \log_a(a^*) + \log_a(a^*)$	
3. $\log_3(125) = 3$ 7 deum $5^3 = 125$ 4. $\log_a(1) = 0$ 7 deum $a^0 = 1$ $\log_a(a) = 1$ 7 deum $a^1 = a$ Sala (loganithmentejeln) Fir den loganthmus que emes fester Basis a gelten folg Regeln 1. $\log_a(u \cdot v) = \log_a(u) + \log_a(v)$ 2. $\log_a(u \cdot v) = \log_a(u) - \log_a(v)$ 3. $\log_a(u \cdot v) = \log_a(u) - \log_a(v)$ Servis: The Regeln lassen side and an Potenzyesetzen her seite $a^{x+y} = a^x \cdot a^y + \log_a(u)$	
It. $\log_{\alpha}(1) = 0$, denn $\alpha^0 = 1$ $\log_{\alpha}(\alpha) = 1$, denn $\alpha^1 = \alpha$ Salt (loganthueutelln) Tir den loganthums que enest festen Basis a gellen folgologien 1. $\log_{\alpha}(u \cdot v) = \log_{\alpha}(u) + \log_{\alpha}(v)$ 2. $\log_{\alpha}(u \cdot v) = \log_{\alpha}(u) - \log_{\alpha}(v)$ 3. $\log_{\alpha}(u \cdot v) = \log_{\alpha}(u) - \log_{\alpha}(v)$ Sperre II $\log_{\alpha}(\frac{1}{v}) = \log_{\alpha}(u) + \log_{\alpha}(v)$ benzis: The Regeln lassen sich aus den Potenzjeseten Lerieiten $\alpha^{x+y} = \alpha^x - \alpha^y + \log_{\alpha}(u)$ $\log_{\alpha}(\alpha^{x+y}) = \log_{\alpha}(\alpha^x \cdot \alpha^y)$	
Sala (loganithmentegeln) Fix den loganthmus an emas festen Basis a gelten folgologanthmus an emas festen Basis a gelten folgologanthmus an emas festen Basis a gelten folgologanthmus an emas festen Basis a gelten folgologal A . $\log (u \cdot v) = \log (u) + \log (v)$ 2. $\log \left(\frac{u}{v}\right) = \log (u) - \log (v)$ 3. $\log \left(u^{v}\right) = v \cdot \log (u)$, Spene il $\log \left(\frac{\Lambda}{v}\right) = -\frac{1}{2}$ Servis: The Regelin lassen side and don Potenzyesethen her reite $a^{x+y} = a^{x} \cdot a^{y} + \log a^{y} \cdot a^{y}$ $\log a \left(a^{x+y}\right) = \log a \left(a^{x} \cdot a^{y}\right)$	
Salt (logarithmentejeln) Fir den logarithmens an enest fæsten Bassis a gelten folg Negeln 1. $\log (u \cdot v) = \log (u) + \log (v)$ 2. $\log (\frac{u}{v}) = \log (u) - \log (v)$ 3. $\log (u^{v}) = v \cdot \log (u)$, Sperre il $\log (\frac{t}{v}) = -\frac{t}{v}$ Benzis: The Regeln lassen sid and Potenzjeseten her leite $a^{x+y} = a^{x} \cdot a^{y} + \log (a^{x} \cdot a^{y})$ $\log_a (a^{x+y}) = \log_a (a^{x} \cdot a^{y})$	
Fir den logarth was que enes festen basis a gelten folgo (Negel no. 1. $\log (u \cdot v) = \log (u) + \log (v)$ 2. $\log (\frac{u}{v}) = \log (u) - \log (v)$ 3. $\log (u^{v}) = v \cdot \log (u)$, Sperie II $\log (\frac{1}{v}) = -\frac{v}{2}$ Benseis: The Regelin lassen side and some Potenzyeselven be Fleite a $x + y = a^{x} \cdot a^{y} + \log (a^{x} \cdot a^{y})$ $\log a(a^{x+y}) = \log a(a^{x} \cdot a^{y})$	
Negel $1 \cdot \log(u \cdot v) = \log(u) + \log(v)$ $2 \cdot \log\left(\frac{u}{v}\right) = \log(u) - \log(v)$ $3 \cdot \log(u^{v}) = v \cdot \log(u), \text{ Speriell } \log\left(\frac{v}{v}\right) = -\frac{v}{u}$ Benzis: The Regel lassen side and Potenzyeseben her leite $a^{x+y} = a^{x} \cdot a^{y} + \log_{a}\left(\frac{v}{v}\right)$ $\log_{a}\left(a^{x+y}\right) = \log_{a}\left(a^{x} \cdot a^{y}\right)$	
$1. \log (u \cdot v) = \log(u) + \log(v)$ $2. \log \left(\frac{u}{v}\right) = \log(u) - \log(v)$ $3. \log \left(u^{v}\right) = v \cdot \log(u), \text{ Speriell } \log\left(\frac{a}{v}\right) = -\frac{a}{v}$ Benzis: The Regelin lassen side and Potenz geselven harteite $a^{x+y} = a^{x}. a^{y} + \log_{a}\left(\frac{a}{v}\right)$ $\log_{a}\left(\frac{a^{x+y}}{v}\right) = \log_{a}\left(\frac{a^{x}}{v}\right)$	ende
3. $\log (u^{\vee}) = v \cdot \log (u)$, Speriell $\log (\frac{1}{U}) = -\frac{1}{2}$ Benzis: The Regelin lassen side aus don Potenzyeseten her leiter $a^{\times + 3} = a^{\times} \cdot a^{\times} + \log_a (u^{\times})$	
3. $\log (u^{\vee}) = v \cdot \log (u)$, Speriell $\log (\frac{1}{U}) = -\frac{1}{2}$ Benzis: The Regelin lassen 81 dr aus dan Potenzyeseten Lapleiter $a^{\times + 3} = a^{\times} \cdot a^{3} + \log_{a}()$ $\log_{a}(a^{\times + 3}) = \log_{a}(a^{\times} \cdot a^{3})$	
Benveis: The Regelin lassen side our don Potenzjeselsen her leite $a^{x+y} = a^x \cdot a^y + \log_a(a^x \cdot a^y)$.09(v)
$a^{x+y} = a^{x} \cdot a^{y} \mid \log_{a}()$ $\log_{a}(a^{x+y}) = \log_{a}(a^{x} \cdot a^{y})$	
$\log_a\left(\alpha^{x+y}\right) = \log_a\left(\alpha^{x} \cdot \alpha^y\right)$	٦ >
$x + y = \log_{\alpha} (a^{x} - a^{y})$	
Selve $u := a^{\times}$, $v := a^{y} \Leftrightarrow x = \log_a(v)$	
y = loga (v)	
$\Rightarrow \log_{\alpha}(v) + \log_{\alpha}(v) = \log_{\alpha}(u - v)$	
the audosen Rogelin Zeijt wan entsprocland.	

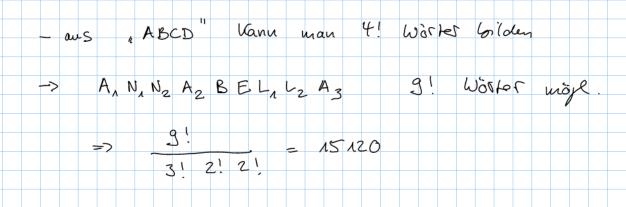
Beispiele:			
1. log x (Tab	<u>-c</u>) =	log x (fab · c)	- logx (a)
= logx (-	(ab) + 6	$g_{\times}(c) - \log_{\times}(a)$	
$=\frac{1}{2}\log$	(ab) +	logx (c) - logx	(a)
$=\frac{1}{2}\log_X$	a) + 1 l	09×(b) + (09×(c	c) - log _x (a)
$= -\frac{1}{2} \left(o_9 \right)$	x (a) + 3	1 logx (b) + log	3×(c)
$2. \log_3\left(\frac{81}{27}\right) =$	1093 (81)) - (09 3 (27) =	log3 (34) -log3 (33)
*	4 log 3 (3) - 3 lo ₅₃ (3)	= 4-3 = 1
wideling logarithe	nen:		
(g(x):= 6g10(۲)	10-es Logarithe	uns, deleadischer Log
In (x) := loge	×) <u> </u>	naturliches Log	anifums Basis e
[d(x):= log2	(x)	duales logarith	uns Basis 2
Basis wedsel			
2000 000 000	loga (b	$) = \frac{\log_{c}(b)}{\log_{c}(b)}$	
		log_(a)	
deun: a loga (b)		(log_() =7	$\log_{\mathcal{C}}\left(a^{\log_{a}(G)}\right) = \log_{\mathcal{C}}(G)$
		$(a) = \log_c(b)$	
=7 (09	a (5) =	log_(b)	

 $\log_{10}(7) = \log_{e}(7) = \ln(7) = 0.845.$ $\log_{e}(10) = \ln(10)$ Clude: $10^{0.845.} = 7$

hbrup blatt 1

Aufgabe 7

a) Wieviele Wörter kann man aus den Buchstaben des Worts "ANNABELLA" bilden?



Aufgabe 8

Zur Markierung von Werkstücken mit Farbstrichen stehen n Farben zur Verfügung. Wieviele Markierungen sind möglich, wenn ein Werkstück

- a) zwei verschiedenfarbige Striche und
- b) drei Striche, die untereinander auch gleichfarbig sein können erhalten? Wie viele Farben braucht man im Falle von 20 Werkstücken bei a) und b) mindestens?

