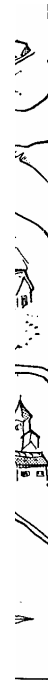


9 Roosterdam



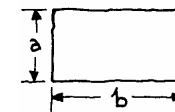
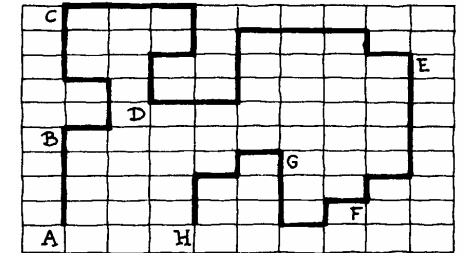
$$700 \text{ m} \times 1000 \text{ m} = 700.000 \text{ m}^2 = 0,7 \text{ km}^2$$

$$2 \cdot 700 + 2 \cdot 1000 = 3400 \text{ m} = 3,4 \text{ km}$$

$$1,4 \text{ km} \times 2 \text{ km} = 2,8 \text{ km}^2$$

$$2 \cdot 1,4 + 2 \cdot 2 = 6,8 \text{ km}^2$$

De lengte en breedte zijn in het 2^e geval
2 keer zo groot als in het 1^e geval
De omtrek wordt dan
2 keer zo groot, de
oppervlakte 4 keer.



$$BC: 5a + 2b$$

$$CD: 4a + 4b$$

$$DE: 4a + 6b$$

$$EF: 6a + b$$

$$FG: 4a + 2b$$

$$GH: 3a + 2b$$

$$3 \cdot 600 + 2 \cdot 1000 = 3800 \text{ m}$$

$$\text{lengthe } AB + \text{lengthe } BC = \text{lengthe } AC$$

$$\underline{4a} + \underline{5a+2b} = \underline{9a+2b}$$

$$\text{lengthe } CD + \text{lengthe } DE = \text{lengthe } CE$$

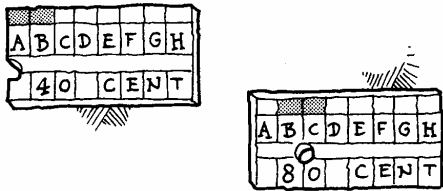
$$\underline{4a+4b} + \underline{4a+6b} = \underline{8a+10b}$$

$$\text{lengthe } EF + \text{lengthe } FG + \text{lengthe } GH = \text{lengthe } EH$$

$$\underline{6a+b} + \underline{4a+2b} + \underline{3a+2b} = \underline{13a+5b}$$

$$30a + 17b$$

$$30 \cdot 60 + 17 \cdot 100 = 3500 \text{ m}$$



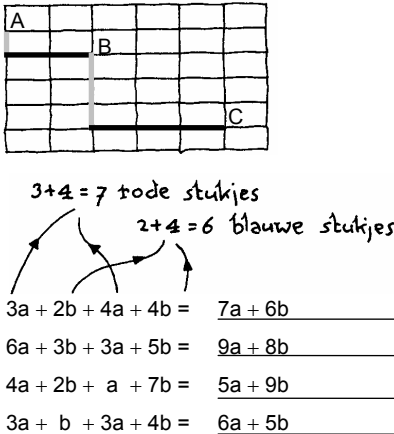
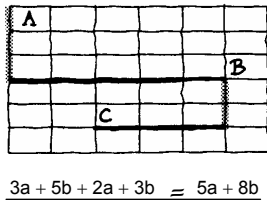
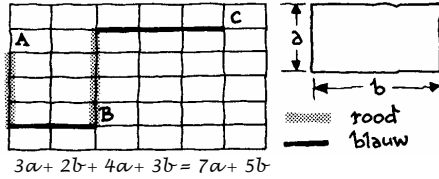
$$4; \text{ prijs per kort stukje} = \frac{40}{4} = 10 \text{ cent.}$$

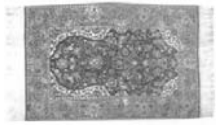
De vijf korte stukjes kosten samen 50 cent.
De twee lange stukjes kosten samen dus 30 cent.
Eén lang stukje kost dus 15 cent.

$$4 \cdot 10 + 4 \cdot 15 = 100 \text{ cent}$$

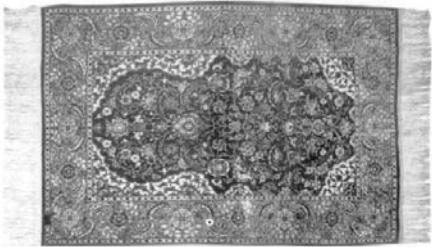
	A	B	C	D	E	F	G	H	
A	40	120	220	350	425	495	555		A
B		80	180	310	385	455	515		B
C			100	230	305	375	435		C
D				130	205	275	335		D
E					75	145	205		E
F						70	130		F
G							60		G
H									H

Het scheelt steeds 60 cent. Dat komt omdat en rit van G naar H 60 cent kost.





lb	2l + 2b
----	---------



4lb	4l + 4b
-----	---------

$-10^2 = -100$
 $(-10)^2 = 100$
 $-3 \cdot -10^2 = 300$
 $-3 \cdot (-10)^2 = -300$
 $(-3 \cdot -10)^2 = 900$
 $-3 \cdot -10 - 10^2 = -70$
 $-3 \cdot (-10 - 10)^2 = -1200$
 $-3 \cdot (-10 - 10^2) = 330$
 $(-3 \cdot -10 - 10)^2 = 400$
 $(-3 \cdot -10 - 10)^2 = -1600$

a	b	-2a	1½b	-2a · 1½b	ab	-3ab
-3	5	6	7½	45	-15	45
½	-1	-1	-1½	1½	-½	1½
1	-2	-2	-3	6	-2	6
-5	2	10	3	30	-10	30
⅓	1	-⅓	1½	-1	⅓	-1

de 5 ^e en de 7 ^e	$-2a \cdot 1\frac{1}{2}b = -3ab$
--	----------------------------------

$-3a \cdot -\frac{1}{2}b = \frac{1}{2}b$
 $-1\frac{1}{5}a \cdot 10b = -12ab$
 $-a \cdot -b = ab$

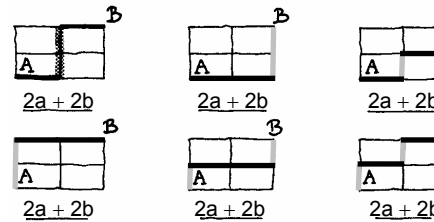
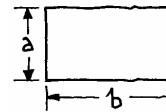
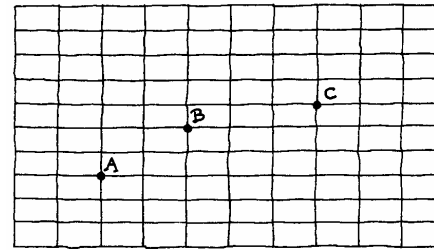
$-\frac{1}{4}a + \frac{1}{5}b = 2 + -1 = 1$

$-\frac{1}{4}a + \frac{1}{5}b + \frac{3}{4}a + \frac{4}{5}b = \frac{1}{2}a + b$
 $-2a + \frac{1}{3}b - \frac{1}{2}a - \frac{1}{3}b = -2\frac{1}{2}a$
 $-\frac{3}{5}a - 1\frac{2}{3}b + 1\frac{3}{5}a - \frac{1}{3}b = a - 2b$

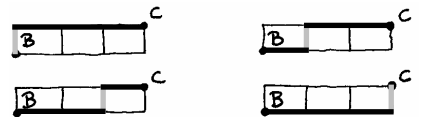
a	b	½a	-4a	-3b	-4a + -3b	½a · (-4a + -3b)
1	-3	½	-4	9	5	2½
-3	2	-1½	12	-6	6	-9
2	½	1	-8	-1½	-9½	-9½
3	-1	1½	-12	3	-9	-13½
1	1	½	-4	-3	-7	-3½

$-2a \cdot (1\frac{1}{2}a + -3b) = -3a^2 + 6ab$
 $3a \cdot (\frac{2}{3}a + -1\frac{1}{3}b) = 2a^2 - 4ab$
 $\frac{1}{5}a \cdot (-5a + 5b) = -a^2 + ab$

$a = -2: -3a \cdot (a - 2) = 6 \cdot -4 = -24$
 $-3a^2 + 6a = -3 \cdot 4 + -12 = -12 + -12 = -24$
 Klopt!
 $a = \frac{1}{3}: -3a \cdot (a - 2) = -1 \cdot -1\frac{2}{3} = 1\frac{2}{3}$
 $-3a^2 + 6a = -3 \cdot \frac{1}{9} + 2 = -\frac{1}{3} + 2 = 1\frac{2}{3}$
 Klopt!



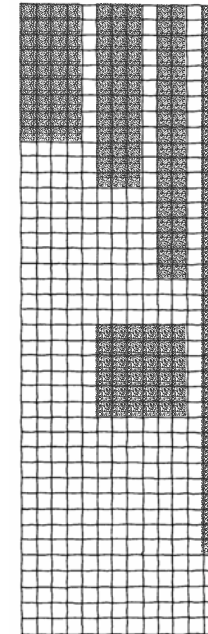
4



$a + 3b$

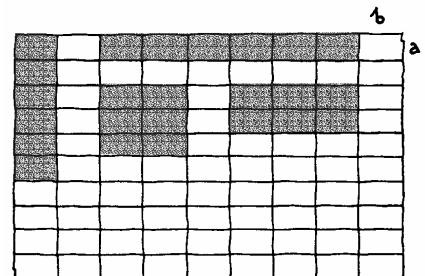
$6 \cdot 4 = 24$ routes

$3a + 5b$

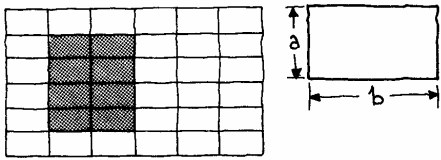


lengte (meter)	36	18	12	9	6
breedte (meter)	1	2	3	4	6
omtrek (meter)	74	40	30	26	24

6 bij 6 meter



$6 \cdot 6000 = 36000 \text{ m}^2$



1° manier: lengte x breedte

de lengte is 4a

de breedte is 2b

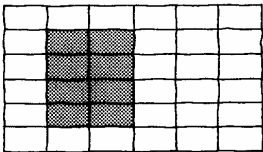
de oppervlakte is dus $4a \cdot 2b$

2° manier: hokjes tellen

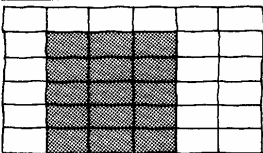
de rechthoek bestaat uit 8 hokjes

elk hokje heeft oppervlakte ab

de oppervlakte is dus $8 \cdot ab$



$4a \cdot 2b = 8 \cdot ab$



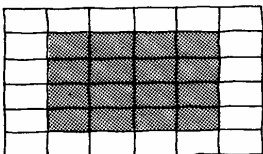
$5a \cdot 3b = 15 \cdot ab$

1° manier: lengte x breedte:

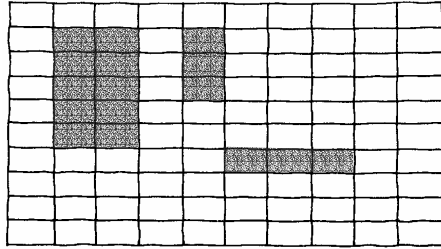
$5a \cdot 3b$

2° manier: hokjes tellen:

$15 \cdot ab$



$4a \cdot 4b = 16 \cdot ab$



$a \cdot 3b = 3 \cdot ab$

in de lengte zitten 4 hokjes

in de breedte zitten 5 hokjes

totaal dus $4 \cdot 5 = 20$ hokjes

$4a \cdot 5b = 20ab$

$6a \cdot 3b = 18ab$

$a \cdot 7b = 7ab$

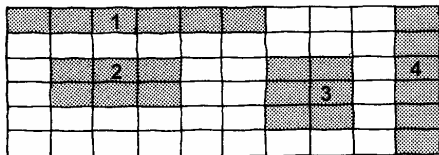
$10a \cdot 8b = 80ab$

$8a \cdot b = 8ab$

$5a \cdot 9b = 45ab$

$2a \cdot 3b = 6ab$

$6a \cdot 4b = 24ab$



$6ab = a \cdot 6b$

$6ab = 2a \cdot 3b$

$6ab = 3a \cdot 2b$

$6ab = 6a \cdot b$

1: $2a + 12b$

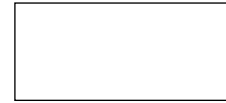
3: $6a + 4b$

2: $4a + 6b$

4: $12a + 2b$

MULES, ROOSTERKWARTIER

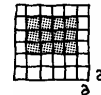
a of $2a+b=2ab$
goede formule
eem $a = 2$ en



p de foute for-
s door:

$2a + 3b = 5ab$
 $2a \cdot 3b = 5ab$
 $a \cdot 2b = 2ab$

ormule die bij
laatje hoort is:



ijf zo eenvoud-
nogelijk:

$(4a)^2 =$ _____
 $3a^2 + 4a^2 =$ _____

NEGATIEVE GETALLEN

roleer de for-
 $5a \cdot 4b = 20ab$
 $a = -1$ en $b = -4$.



de formule
 $(a+2b) = a^2 + 2b$
 $a = -2$ en $b = \frac{1}{2}$?



getal stelt $4a^2$
als $a = -3$?

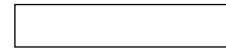


DER PLAATJES

k de bereke-
en hiernaast.

$2 \cdot -5^2 =$ _____
 $(2 \cdot -5)^2 =$ _____
 $2 \cdot (-5)^2 =$ _____

getal is $-3a^2$
 $a = -5$?

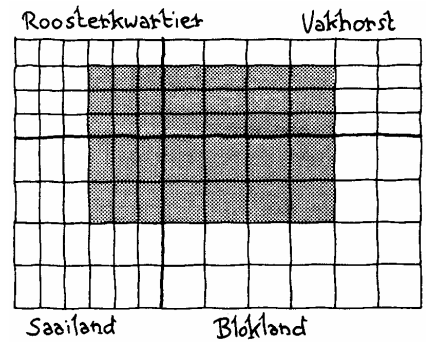


roleer de for-
 $-2a \cdot \frac{1}{2}b = -ab$
 $a = \frac{1}{2}$ en $b = 6$.



ijf zonder
jes en zo een-
ig mogelijk :

$a - 3a - 5b =$ _____
 $-7a \cdot -\frac{2}{7}b =$ _____
 $-3a \cdot (-a+2b) =$ _____



Saailand

Blokland

a^2	ab	ab	b^2
-------	------	------	-------

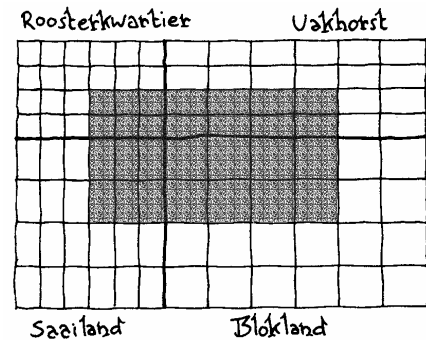
1° manier: lengte x breedte

oppervlakte = $(3a + 2b) \cdot (3a + 4b)$

2° manier: opp. Roosterkwartier + opp. Vakhorst + opp. Saailand + opp. Blokland

oppervlakte = $9a^2 + 18ab + 8b^2$

$(3a + 2b) \cdot (3a + 4b) = 9a^2 + 18ab + 8b^2$



Saailand

Blokland

$(2a + 2b) \cdot (3a + 4b) = 6a^2 + 14ab + 8b^2$

$-3^2 = -9$
 $(-3)^2 = -3 \cdot -3 = 9$
 $-3 - 3^2 = -3 - 9 = -12$
 $(-3 - 3)^2 = (-6)^2 = -6 \cdot -6 = 36$

$-\frac{1}{2} \cdot -2 + \frac{1}{3} \cdot 6 = 1 + 2 = 3$

waakt $-2a + 3a = -5a$
en $4b + 8b = 12b$

$-2a + 4b + -3a + 8b = -5a + 12b$

$-3a + -5b + 2a + b = -a - 4b$
 $-1\frac{1}{2}a + -3\frac{1}{2}a + \frac{1}{2}a + -b = -4\frac{1}{2}a - b$
 $-2\frac{1}{2}a + 3\frac{3}{4}b + -5a + 1\frac{1}{4}b = -7\frac{1}{2}a + 5b$

$6a - 4a = 2a$
 $3a - 9a = -6a$
 $-2b - 5b = -7b$

$4a + -5a = -a$
 ~~$4a + -5a = -a$~~
 ~~$-2a - 3a = -5a$~~
 ~~$-a + a = 0$~~
 $-2a - 3a = -5a$
 $-a + a = 0$

+	3a	-2a	-a
-5a	-2a	-7a	-6a
4a	7a	2a	3a
-2a	a	-4a	-3a

+	-4b	-2b	-5b
5b	b	3b	0
3b	-b	b	-2b
6b	2b	4b	b

$3\frac{1}{2}a \cdot -2b = 10\frac{1}{2} \cdot 1 = 10\frac{1}{2}$

$3\frac{1}{2}a \cdot -2b = 3\frac{1}{2} \cdot -2 \cdot a \cdot b = -7ab$

$3\frac{1}{3}a \cdot -3b = -10ab$

$-8a \cdot -\frac{1}{2}b = 4ab$

$-\frac{5}{8}a \cdot 8a = -5a^2$

$2a \cdot \frac{1}{2}b = ab$ ~~$2a \cdot \frac{1}{2}b = 2\frac{1}{2}ab$~~

~~$2a \cdot 3a = 6a$~~ $2a \cdot 3a = 6a^2$

~~$2a \cdot 2a = 2a^2$~~ $2a \cdot 2a = 4a^2$

•	2a	-2a	-5a
$-\frac{7}{2}a$	-a ²	a ²	$2\frac{1}{2}a^2$
$\frac{1}{2}a$	a ²	-a ²	$-2\frac{1}{2}a^2$
$1\frac{1}{2}a$	3a ²	-3a ²	$-7\frac{1}{2}a^2$

•	a	2a	$1\frac{1}{2}a$
$\frac{1}{2}b$	$\frac{1}{2}ab$	ab	$\frac{3}{4}ab$
$\frac{2}{3}b$	$\frac{2}{3}ab$	$\frac{4}{3}ab$	ab
b	ab	2ab	$1\frac{1}{2}ab$

$-3 \cdot (-2)^2 = -3 \cdot 4 = -12$

$1\frac{1}{2} \cdot (-9 + -1) = 1\frac{1}{2} \cdot -10 = -15$

$-\frac{1}{2}a \cdot (3a + -2b) = -\frac{1}{2}a \cdot 3a + -\frac{1}{2}a \cdot -2b$
 $= -1\frac{1}{2}a^2 + ab$

$-2a \cdot (-3a + 1\frac{1}{2}b) = 6a^2 - 3ab$

$1\frac{1}{3}a \cdot (6a + -2b) = 8a^2 - 2\frac{2}{3}ab$

$-4a \cdot (-\frac{3}{4}a + -b) = 3a^2 + 4ab$

$8 \cdot 6 = 48$ $8 \cdot (2 \cdot 3) = 48$

$40 \cdot 10 = 400$ $8 \cdot (10 \cdot 5) = 400$

$2 + 6 = 8$ $5 \cdot 2 = 10$

$3 + 10 = 13$ $2 \cdot 15 = 30$

Nee

Neem bijvoorbeeld a = 3 en b = 1.
 $3a \cdot 3b = 9 \cdot 3 = 27$
 $3ab = 3 \cdot 3 = 9$
 Geen juiste formule!

$3a + 2b + 2a = 5a + 2b$ ~~$3a + 2b = 5ab$~~
 ~~$3b + 2a + b = 2a + 3b$~~ ~~$3a \cdot 2b = 5ab$~~
 $3a + 5b = 5b + 3a$ $3a \cdot 2b = 6ab$

$3a + 2b + 7a + 8b = 10a + 10b$

$4a + 3b + 5a + b = 9a + 4b$

$5a \cdot 7b = 35ab$

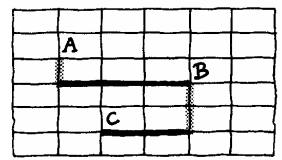
$a \cdot b = ab$

a	b	2a	6b	2a · 6b	3a	4b	3a · 4b
5	2	10	12	120	15	8	120
3	4	6	24	144	9	16	144
10	3	20	18	360	30	12	360
8	2	16	12	192	24	8	192
1	5	2	30	60	3	20	60

Ja: $2a \cdot 6b = 12ab$ en $3a \cdot 4b = 12ab$

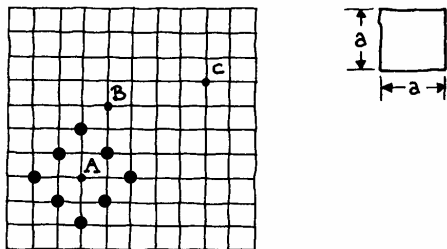
a	b	6a	3b	6a · 3b	a ²	18ab
5	7	30	21	51	630	35 630
3	8	18	24	42	432	24 432
2	3	12	9	21	108	6 108
1	1	6	3	9	18	1 18
4	$\frac{1}{6}$	24	$\frac{1}{2}$	$24\frac{1}{2}$	12	$\frac{2}{3}$ 12

De 6^e en de 8^e $6a \cdot 3b = 18ab$



$3a + 5b$

$3a = 3 \cdot 40 = 120$ meter
 $5b = 470 - 120 = 350$ meter
 Dus $b = 70$ meter.



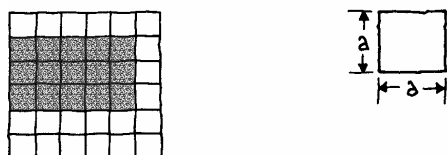
4a	5a	9a
----	----	----

4	5	4 · 5 = 20
---	---	------------

in plaats van a · a schrijven we a²

a ²

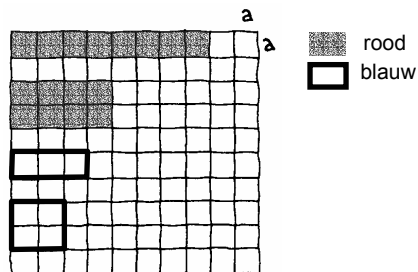
100 · a ²	40a
----------------------	-----



$3a \cdot 5a = 15 \cdot a^2$

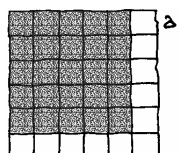
1502250 = 37500	16 · 50 = 800
-----------------	---------------

300 · 500 = 150000	16 · 100 = 1600
--------------------	-----------------



die van 2a bij 4a	12a
-------------------	-----

die van 2a bij 2a	4a ²
-------------------	-----------------



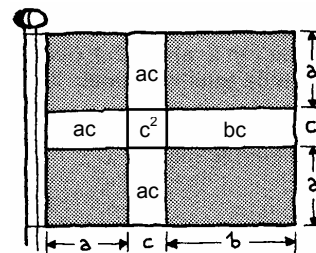
$5a \cdot 5a = 25a^2$

$5a^2 = a \cdot 5a$ ~~$5a^2 = 5a \cdot 5a$~~

~~$5a^2 = (5a)^2$~~ ~~$5a^2 = 25a^2$~~

$(5a)^2 = 5a \cdot 5a$ $(5a)^2 = 25a^2$

- $5 \cdot 4^2 = 5 \cdot 16 = 80$
- $(5 \cdot 4)^2 = 20^2 = 400$
- $(5 - 4)^2 = 1^2 = 1$
- $5 \cdot (5 - 4)^2 = 5 \cdot 1^2 = 5 \cdot 1 = 5$
- $4 \cdot 5^2 - 5 \cdot 4^2 = 4 \cdot 25 - 5 \cdot 16 = 100 - 80 = 20$



$2a^2 + 2ab \text{ cm}^2$

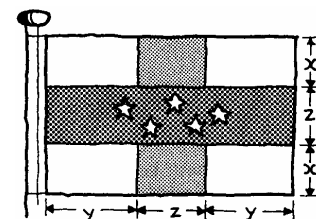
zie plaatje

2a + c	a + b + c
--------	-----------

$(2a + c) \cdot (a + b + c) = 2a^2 + 2ab + 3ac + bc + c^2$

lengte: $2a + c = 50$
 breedte: $a + b + c = 70$
 oppervlakte = $50 \cdot 70 = 3500 \text{ cm}^2$

$3ac + bc + c^2 = 600 + 400 + 100 = 1100 \text{ cm}^2$



$(2x + z) \cdot (2y + z) = 4xy + 2xz + 2yz + z^2$

$-(2 \cdot a) = -(2 \cdot 4) = -(8) = -8$
 $-2 \cdot a = -2 \cdot 4 = -8$
 Klopt.

$-(2 \cdot a) = -(2 \cdot -\frac{1}{2}) = -(-1) = 1$
 $-2 \cdot a = -2 \cdot -\frac{1}{2} = 1$
 Klopt.

$-(-6) = 6$

$3a = 6$. Klopt dus voor $a = 2$.

$-(-3a) = -(12) = -12$
 $3a = -12$
 Klopt dus ook voor $a = -4$

Dat lijkt teveel op $a - 2$ (2 aftrekken van a)

$$2a \cdot 3b = -4 \cdot 12 = -48$$

$$6ab = 6 \cdot -8 = -48$$

Klopt.

$$2a \cdot 3b = -1 \cdot 2 = -2$$

$$6ab = 6 \cdot -\frac{1}{3} = -2$$

Klopt.

$$2b \cdot 4b = 2 \cdot 4 = 8$$

$$8b = 8$$

Klopt.

Neem bijvoorbeeld $b = 2$.

$$2b \cdot 4b = 4 \cdot 8 = 32$$

$$8b = 16$$

Klopt niet!

$$2b \cdot 4b = 8b^2$$

$$2b \cdot 4b = -4 \cdot -8 = 32$$

$$8b^2 = 8 \cdot (-2)^2 = 8 \cdot 4 = 32$$

$$3a \cdot (2a + 4b) =$$

$$-6 \cdot (-4 + -16) = -6 \cdot -20 = 120$$

$$6a^2 + 12ab =$$

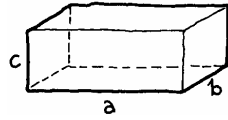
$$6 \cdot (-2)^2 + 12 \cdot 8 = 6 \cdot 4 + 96 = 24 + 96 = 120$$

Klopt!

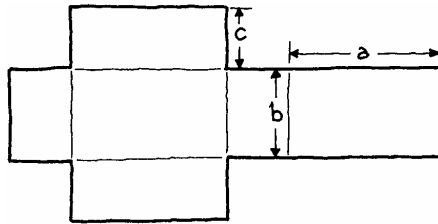
$$3a \cdot (2a + 4b) = 0 \cdot -4 = 0$$

$$6a^2 + 12ab = 0 + 0 = 0$$

Klopt



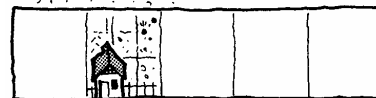
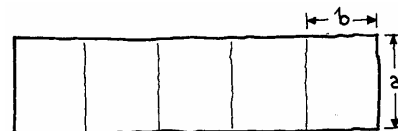
$$abc \text{ cm}^3$$



$$2ab + 2ac + 2bc \text{ cm}^2$$

$$4a + 2b + 8c \text{ cm}$$

$$2a + 4b + 8c \text{ cm}$$



$$18a + 30b \text{ meter}$$

$$7a + 5a = 12a$$

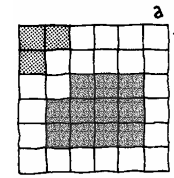
$$3a + 6a + 8a = 17a$$

$$4a + a + 10a = 15a$$

$$6a \cdot 2a = 12a^2$$

$$(4a)^2 = 16a^2$$

$$a \cdot 7a = 7a^2$$



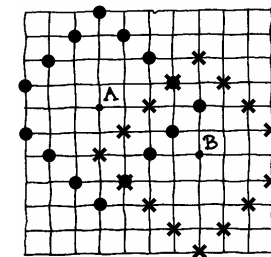
$$11a^2 + 3a^2 = 14a^2$$

$$5a^2 + 8a^2 = 13a^2$$

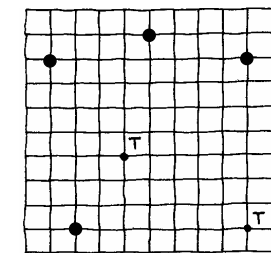
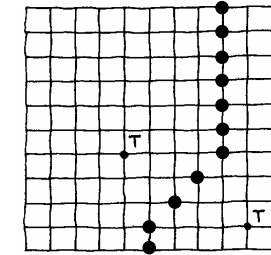
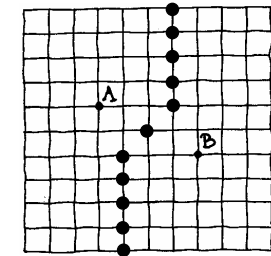
$$a^2 + 4a^2 = 5a^2$$



Plattegrond van de Romeinse stad Timgad in Numidië



● rood
× blauw



Er zijn meer mogelijkheden!

$$3a \cdot 2b = 6ab$$

$$4a \cdot 4a = 16a^2$$

$$2a + 4b + 3a = 5a + 4b$$

$$(3a)^2 + a^2 = 10a^2$$

$$2a \cdot 5b + 25 \cdot ab = 35ab$$

$$3a + 2b + 5a + b = 8a + 3b$$

$$a \cdot 6a + 2a \cdot 3a = 12a^2$$

$$3 \cdot 5^2 + 2 \cdot 5 \cdot 4 = 3 \cdot 25 + 40 = 115$$

$$10^2 + 10 = 110$$

$$3a^2 + 5a^2 = 8a^2$$

$$3a + 5a = 8a^{\times}$$

$$3a \cdot 5a = 15a^2$$

$$3a + 5b = 6 + 20 = 26$$

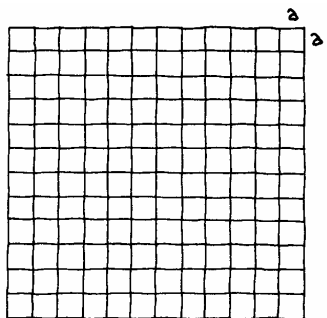
$$5ab = 5 \cdot 20 = 100$$

Foute formule dus!

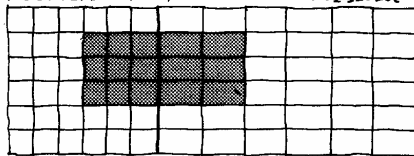
$$3 \cdot (5b)^2 = 3 \cdot 10^2 = 3 \cdot 100 = 300$$

$$(15b)^2 = (30)^2 = 900$$

Alweer een foute formule.



Roosterkwartier Vorkhorst



1^o manier: lengte \times breedte

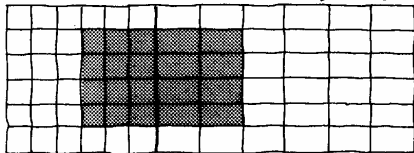
$$\text{oppervlakte} = 3a \cdot (3a + 2b)$$

2^o manier: hokjes tellen

$$\text{oppervlakte} = 9a^2 + 6ab$$

$$9 \cdot 2500 + 6 \cdot 4000 = 46500$$

Roosterkwartier Vorkhorst



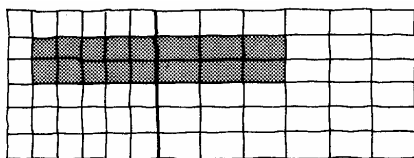
1^o manier: lengte \times breedte

$$\text{oppervlakte} = 4a \cdot (3a + 2b)$$

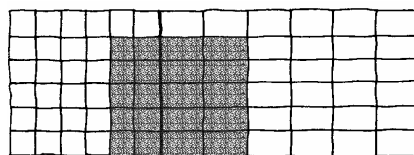
2^o manier: hokjes tellen

$$\text{oppervlakte} = 12a^2 + 8ab$$

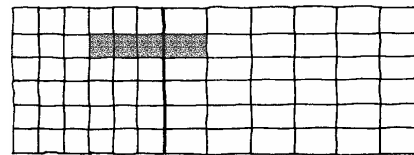
$$4a \cdot (3a + 2b) = 12a^2 + 8ab$$



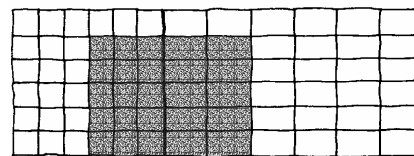
$$2a \cdot (5a + 3b) = 10a^2 + 6ab$$



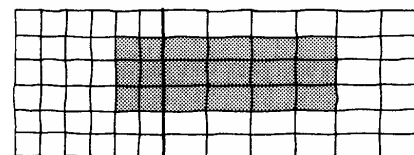
$$5a \cdot (2a + 2b) = 10a^2 + 10ab$$



$$a \cdot (3a + b) = 3a^2 + ab$$



$$5a \cdot (3a + 2b) = 15a^2 + 10ab$$



$$a \cdot (3a + 4b) = 3a^2 + 4ab$$

$$6a \cdot (4a + 3b) = 24a^2 + 18ab$$

$$5a \cdot (5a + b) = 25a^2 + 5ab$$

$$3a^2 + 12ab = 3a \cdot (\underline{a} + \underline{4b})$$

$$a^2 + 6ab = a \cdot (\underline{a} + \underline{6b})$$

$$4a^2 + 20ab = 4a \cdot (\underline{a} + \underline{5b})$$

$$a \cdot (3a + 4b) = a \cdot 3a + a \cdot 4b = 3a^2 + 4ab$$

$$6a \cdot (4a + 3b) = 6a \cdot 4a + 6a \cdot 3b = 24a^2 + 18ab$$

$$5a \cdot (5a + b) = 5a \cdot 5a + 5a \cdot b = 25a^2 + 5ab$$



$$3 \cdot -2 + 2 \cdot -4 = -6 + -8 = -14$$

$$3 \cdot -\frac{1}{2} + 2 \cdot 3\frac{1}{2} = -1\frac{1}{2} + 7 = 5\frac{1}{2}$$

$$(4 \cdot -2\frac{1}{2})^2 = (-10)^2 = 100$$

$$-2 + -8 + -6 + -12 = -28$$

$$-8 + -20 = -28$$

Ja

$$a + 2b + 3a + 3b = -\frac{1}{2} + 7 + -1\frac{1}{2} + 10\frac{1}{2} = 15\frac{1}{2}$$

$$4a + 5b = -2 + 17\frac{1}{2} = 15\frac{1}{2}$$

De formule klopt dus vOor $a = -\frac{1}{2}$ en $b = 3\frac{1}{2}$