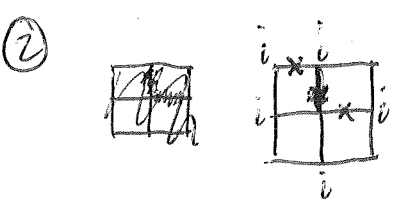


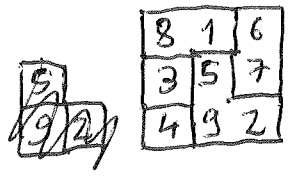
①  $\begin{array}{|c|} \hline \square \\ \hline \square \\ \hline \end{array} + \begin{array}{|c|} \hline \square \\ \hline \square \\ \hline \end{array} = \cancel{12} / \begin{array}{|c|} \hline \square \\ \hline \square \\ \hline \end{array}$



$12 - 3 = \underline{\underline{9}}$

③ ~~at 72~~  
 $S_1 = 66$   $S_2 = 72$   
 $- 5$   $at$   $11$   
 $\hline$   $\hline$   
 $61$   $61$

④  $S = 15$



⑤  $K = 2P$   
 $V = C + 3K$   
 $C = 2K + 2P$

$V \rightarrow C + 3K \rightarrow 5K + 2P \rightarrow \underline{\underline{12P}}$

⑦  $24 = 4 \times 6 \rightarrow (4+6) \times 2 = \underline{\underline{20}}$

⑧  $C + M$   
 $C$  et  $M - 3$   
 $C - 1$  et  $M - 3$

$C + M - 4 = 13$

$C + M = 17 \rightarrow C = 3$   
 $M = 14$  (max)  $\rightarrow \begin{pmatrix} C=2 \\ M=11 \end{pmatrix}$

9

$$n \geq 17$$

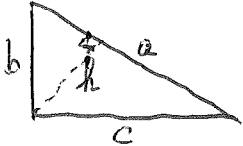
$$n \leq 39$$

$$7 | n$$

$$n - 2/7 n = \frac{5n}{7} \quad 2 | \frac{5n}{7} \rightarrow 2 | n$$

$$\Rightarrow 14 | n \Rightarrow n = \underline{\underline{28}} \Rightarrow n = \frac{5n}{7} = \underline{\underline{20}}$$

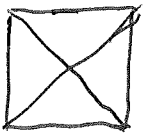
10



$$abc = 2hbc$$

$$\rightarrow a = 2h$$

$$bc = ah = 2h^2$$



$$\rightarrow 45$$

11

$$n \equiv 4n [9] \rightarrow 3 | n$$

$$da (10a + b) = 4(10b + a)$$

$$39b = 36a$$

$$13b = 12a \text{ non}$$

$$(100a + 10b + c) = 4(100c + 10b + a)$$

$$399c + 30b = 36a, \quad c \text{ pair}$$

$$\rightarrow c = 2$$

$$133c + 10b = 32a$$

$$\underline{\quad \quad \quad}$$
  
$$266$$

$$b = \frac{32a - 266}{10} \rightarrow a = 8 \text{ imp.}$$

$$2ab8 \xrightarrow{\times 4} 8ba2$$

$$4\overline{ab} + 3 = \overline{ba}$$

$$40a + 4b + 3 = 10b + a$$

$$39a - 6b + 3 = 0$$

$$13a - 2b + 1 = 0$$

$$a = 1, \quad b = 7$$

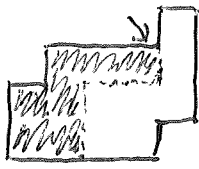
$$\underline{\underline{2178}} \times 4 = 8712$$

or

$$2ba \rightarrow \dots 2$$

$$2.8 \rightarrow 8.2$$

⑥ 7+7



⑬ (7x5)

$1 \times 1 \rightarrow 4 \times 6 = 24$

$2 \times 2 \rightarrow 3 \times 5 = 15$

$3 \times 3 \rightarrow 2 \times 4 = 8$

$4 \times 4 \rightarrow 1 \times 3 = 3$

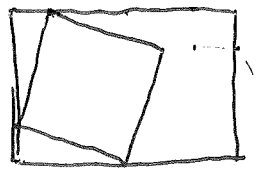
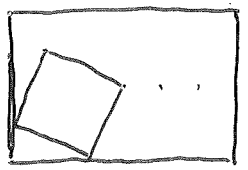
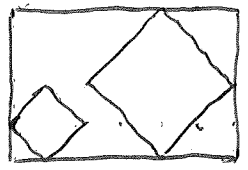
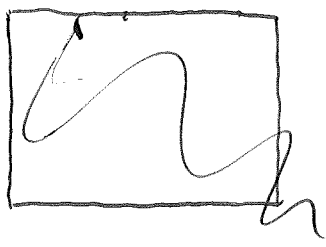
$45^\circ \rightarrow 3 \times 5 = 15$

"  $\rightarrow 1 \times 3 = 3$

$[1, 2] \rightarrow 2 \times 2 \times 4 = 16$

$[1, 3] \rightarrow 2 \times 3 = 6$

90



$$(12) \quad n \rightarrow \frac{n(n-1)}{2}$$

$$\frac{(n-2)(n-3)}{2} + 5006 = 83$$

$$\underbrace{\hspace{10em}}_{78} = \frac{13 \times 12}{2} \rightarrow n = \underline{\underline{15}}$$

$$(14) \quad k(a+b+c+\dots) = 2010 = 2 \times 3 \times 5 \times 67$$

$$\geq 13$$

$$\downarrow$$

$$15 \quad k = 2010 \rightarrow k = 2010/15 = 2 \times 67 = \underline{\underline{134}}$$

$$(15) \quad n^6 \rightarrow 3 \text{ ch.}$$

$$n^6 \equiv 0 [9] \rightarrow 3 | n$$

$$10^6 \text{ non}$$

$$2^6 = 64$$

$$3^6 = 729$$

$$24^6? \quad 4^6 \equiv 6 [10] \text{ imp.}$$

$$27^6?$$

$$7^6 \equiv 9 [10] \rightarrow \text{OK?}$$

$$30^6 \text{ non}$$

$$33^6$$

$$21^6$$

$$\begin{array}{r} 21 \\ \times 21 \\ \hline \end{array}$$

$$441$$

$$\times 21$$

$$\hline 3261$$

$$\times 21$$

$$\hline 9261$$

$$\times 21$$

$$\hline 18522$$

$$\hline 194481$$

$$= 21^3 < 10^4$$

$$21^6 < 10^8$$

$$\begin{array}{r} 27 \\ \times 27 \\ \hline \end{array}$$

$$729$$

$$\times 27$$

$$\hline 6561$$

$$\times 27$$

$$\hline 19683$$

$$\times 27$$

$$\hline 178047$$

$$\times 27$$

$$\hline 534141$$

$$\times 27$$

$$\hline 4807269$$

$$= 27^2$$

$$= 27^3$$

$$= 27^4$$

$$\begin{array}{r} 4807269 \\ \times 9 \\ \hline \end{array}$$

$$43265421$$

$$\times 9$$

$$\hline 389388789$$

$$\underline{\underline{27?}}$$

(15) suite

$$\begin{array}{r} 33 \\ \times 33 \\ \hline 1089 \end{array} = 33^2$$

$$\begin{array}{r} \times 33 \\ \hline 3267 \\ 3267 \\ \hline 35937 \end{array} = 33^3$$

$$\begin{array}{r} \times 33 \\ \hline 107811 \\ 107811 \\ \hline 1185921 \end{array} = 33^4$$

$$\begin{array}{r} \times 33 \\ \hline 3557763 \\ 3557763 \\ \hline 39135393 \end{array} = 33^5$$

$$\begin{array}{r} \times 33 \\ \hline 117406179 \\ \hline 117 \end{array}$$

(16)

(16) nb comb:  $\binom{9}{6} = \binom{9}{3} = \frac{9 \times 8 \times 7}{6} = 3 \times 4 \times 7 = 84$

~~84~~

A  
0  
1  
0  
0  
0  
0

1 serrure ~~comb~~ → 9 bits

A: 0000<sup>1</sup>111<sup>1</sup>11  
B: 100100011

A	101	101
B	011	011
C	110	110
		101 101
		011 011
		110 110
	101	101
	011	011
	110	110

→ ~~6~~ × 3 = 18      ~~12~~ × 2 = 24

≥ 4 clés / serrure

6 serrures

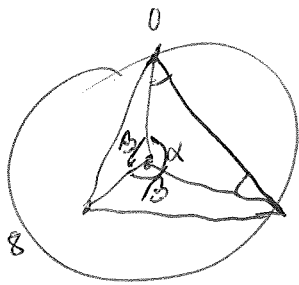
~~4~~ × 84 = ?

3060

$$\frac{9 \times 8 \times 7 \times 6}{24} = 3 \times 7 \times 2 = 126$$

$$126 \times 4 = \underline{\underline{504}} \quad ?$$

17



$$\alpha < 120^\circ$$

$$\alpha \leq 120^\circ$$

$$\beta \approx 120^\circ \quad \beta > 120^\circ$$

8h 00' 00'' ?

$$1h \rightarrow 360/12 = 30^\circ \rightarrow \text{multiple de } 2 \text{ min?}$$

8h 12' 00''

$$M \text{ min} \rightarrow 6M^\circ$$

$$H h. \rightarrow 30H + M/2^\circ$$

$$\beta = 30H + M/2 - 6M$$

$$= 30H - \frac{11M}{2} = 360 - (30H + M/2)$$

$$H=7 \rightarrow \beta = 210 - \frac{11M}{2}$$



$$360 = 60H + M - 6M$$

$$60H - 5M = 360$$

$$12H - M = 72$$

$$H=7 \rightarrow M = 84 - 72 = 12$$

→ 7h 12' 00'' ?

1810

10 | n

... 201 = 3 x 7 x 11 x 13 x

3 x 7 = 21  
21 x 11 = 231

201 = 3 x 67

1000k + 201

1001 = 7 x 143 = 7 x 11 x 13

2001 = 3 x 667

3 x 7 x 11 x k = ... 201

k = 13 x 67 = 871 [1000]

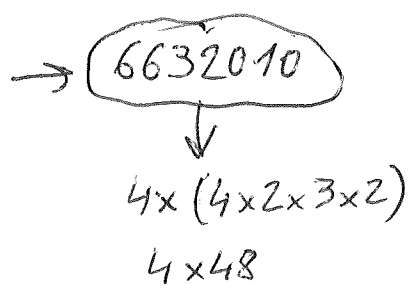
21 x 11 = 231

k = 1871 =

k = 2871 = 3^2 x 319 = 3^2 x 11 x 29 -> 3^3 x 7 x 11^2 x 29

k = 3871 = 7 x 553 = 7 x 7 x 79

462  
+ 201  
-----  
663



7472010 = (10x) 3 x 7^2 x 13 x 17 x 23

2012010? non  
-> 4 x 2^5  
= 4 x 32

3 x 7 x 13 x k = ... 201

k = 11 x 67 = 737 [1000]

1737 = 3^2 x 193

2737 = 7 x 391 = 7 x 17 x 23

3737 non

21 x 13 = 273

x 2  
-----  
546 000  
201 201  
-----  
747 201

319

↓  
319  
-----  
3509

x 7  
-----  
24563  
x 9  
-----  
221067  
x 3  
-----  
663201

17 x 23 = 391

x 13  
-----  
1173  
391  
-----  
5083

x 7  
-----  
35581

x 7  
-----  
249067  
x 3 = 747201