

$$\begin{array}{l} ① \quad 0+6 \\ 1+5 \\ 2+4 \rightarrow \underline{4} \\ 3+3 \end{array}$$

$$② \quad 3635220$$

③ Aug: 24 ans à l'ave 2.
14 ans

$$④ \quad \{M, P, S\} = \{4, 5, 6\}$$

$$M+P \neq 10 \quad S < M$$

$$P+S \neq 10$$

$$\Rightarrow P=5, S=4, M=6$$

$$⑤ \quad 11 \times 7,5 = 82,5$$

$$5 \times 8,5 + 6 \times 7,5 = 87,5$$

$$5 \times 2 + 6 = \underline{16 \text{ EUR}}$$

$$⑥ \quad 19 \dots \quad 1+2+\dots+9 = 45$$

$$\dots \quad 2010 \equiv 3 \quad 3+6 \equiv 45$$

~~7~~ man

↳ chiffre manquant

$$7+8+5 = 20$$

$$\text{OK man} \quad 2+3+4$$

$$\begin{array}{r} 1842 \\ 73 \\ \hline 95 \end{array}$$

$$4+7+9$$

$$\hline 2010$$

$$⑦ \quad A: C \text{ est } 00 \quad F$$

$$B: D \text{ est } 00 \quad V$$

$$C: A \text{ est } 00 \quad F$$

$$D: B \text{ est } 00 \quad V$$

$$⑧ \quad \underbrace{2 \times 2 \times 2 \times \dots \times 2}_{11} \times 5$$

$$2^{11} \times 5 = 2^{10} \times 10 = 10240$$

③ Attention! $\times 2$

$$\begin{array}{r} 1005 \times 20 = 20100 \\ 21105 \\ 22110 \\ 23115 \\ \hline \times 2 \\ \hline \underline{\underline{46230}} \end{array}$$

⑩ $n \times \left(\frac{p}{q}\right)^n$ $3 \times 96 = 288$ $3 \times 324 = 972$
 $128 \times \left(\frac{3}{2}\right)^n$ $3 \times 144 = 432$
 $3 \times 216 = 648$

128, 192, 288, 432, 648, 972 $\leftarrow n=5$

Si ~~p/q~~ $p/q = 5/4, \dots q/4^5 = 1024$ non

Si ~~p/q~~ $p/q = 4/3$ idem pour $p/q = 4/3$

⑪ $c = \frac{10}{\sqrt{2}}$

$c' = c\sqrt{2} \times 4 = 4 \times 10/4$

$12c' = \frac{120}{4} = \underline{\underline{30}}$

⑫ $20 \mid 2010, \dots, 2010, 10,$

$$\begin{aligned} 2 \times 2010 + X &= 4444 + 10k \\ X &= 4444 - 4020 + 10k \\ &= 424 + 10k \end{aligned}$$

$0 \leq k \leq 12$

13 solutions 424, 434, ...

$$\begin{array}{r} 20 \quad 10 \times y \\ \hline 2010 \end{array}$$

$20 \times 10 \mid 20 \times 10 \dots \times 10$

$$\begin{aligned} X + a + b &= 1990 \\ X + b + 30 &= 2010 \\ X + b &= 1980 \end{aligned}$$

$20 \mid X, 10, b \mid 20 \mid X, 10, b \mid 20 \mid X, 10,$

$$\begin{cases} X + b = 1980 \\ 3X + 2b = 4444 \end{cases}$$

Si $b = 10$: $3X = 4444$ imp
 $b = 20$:

$X = 4444 - 2 \times 1980$

$= 4444 + 40 - 4000$

$= \underline{\underline{484}}$

$b = 1496$

(13)

$$201 = 3 \times 67$$

$$201000 = 2^3 \times 3 \times 5^3 \times 67$$

$$2|a, 5|b$$

$$4|a, 25|b, 67|c \rightarrow c = 67 \text{ ou } 2 \times 67$$

• $c = 67$

$$8|a \text{ et } 125|b$$

$$\Rightarrow 3|a$$

$$a = 2^3 \times 3 = 24$$

$$b = 5^3 = 125$$

$$c = 67 = 67$$

$$S = 149 + 67 = \underline{216}$$

• $c = 2 \times 67$

$$4|a, b = 125, c = 2 \times 67$$

$$a = 4 \times 3 = 12$$

$$b = 5^3 = 125$$

$$c = 2 \times 67 = 134$$

$$S = \underline{271}$$

2 sol^o

14) $0 \leq d \leq 7$

Si $\exists d=7$: 1 - 8 - 15

$d=6$ imp.

$d=5$: 2 - 7 - 12 seul poss / sym.

$\overline{AB \quad C \quad BAC \quad BC \quad A}$ imp
 1 2 4 5 6 7 8 9 10 12 13 15
 $\overline{ABEEECBADA DCDBDCA}$
 6 10 14
) $d=4$

$\rightarrow 1, 2, 4, 5, 7 \rightarrow$ sol

$d=4$

$d=1, 2, 3, 4$

$\overline{AB \quad B \quad A \quad B \quad A}$ $\rightarrow d=3$ imp
 2 3 4 5 6 7 8 9 10

$\overline{A \quad B \quad B \quad A \quad B \quad E \quad E \quad E \quad A}$ \rightarrow E à droite pour $d=3$
 2 4 5 6 9 10 12 13 14
 $d=3$ imp

$d=6$:

$\overline{A \quad A \quad A}$
 1 7 8 13 15

$\overline{A \quad A \quad A}$
 1 2 4 7 8 10 13 15

Si $\exists d=5$:

$\overline{A \quad B \quad A \quad B \quad A \quad B}$ $\Rightarrow d=2, 3, 4$
 1 2 4 7 8 9 13 15 \rightarrow imp pour 15

$\overline{A \quad B \quad AC \quad BC \quad ACB}$ $\Rightarrow 14: d=3$
 1 5 7 8 9 10 11 12 13 14 15
 imp.

$\overline{A \quad B \quad A \quad B \quad A \quad B}$
 1 4 7 9 12 15

$d=1, 2, 3, 4$

$\overline{ABEEEB A \quad A}$ \Rightarrow E à gauche
 1 2 4 6 7 8 9 10 11 12 14 15 \rightarrow imp pour 2

$\overline{A \quad B \quad ABEEEB A}$ \Rightarrow E
 1 2 3 6 8 10 13 15
 imp

$\overline{AE E E D B A D \quad B D \quad A B}$ \Rightarrow E
 3 5 6 8 9 10 12 14 15
 imp 4

(14) serie

$d=6$:

A				A				A		
1	2	4		7	8	10		13	14	15

- Si $\exists d=5$:

BA				B	A			B	A	
1	2	3	4	6	8	11	12	13		

- Si $\exists d=4$:

BA				CB				AC				B		CA
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

 imp.

$d=3$:

BAE	E	E	B		A			B		A				
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

 imp.

- $d=1, 2, 3, 4$

BA				B				EE			A			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

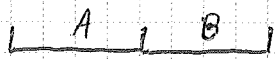
 imp

AB	E	E	E	B	A			B			A			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

 imp

1 sol^o

15



$$N = (A+B)^2$$

$$= A^2 + B^2 + 2AB = 10000A + B$$

$$B^2 + (2A-1)B + (A^2 - 10^4A) = 0$$

~~AB~~ ~~(2A-1)B~~

$$\Delta = (2a-1)^2 - 4(a^2 - 10^4a)$$

$$= 4a^2 - 4a + 1 - 4a^2 + 4 \times 10^4 a$$

$$= (40000 - 4)a + 1$$

$$= 39996a + 1 = k^2$$

~~39996a~~

$$(200^2 - 2^2)a = k^2 - 1$$

$$202 \times 198 a = (k-1)(k+1)$$

$$101 \times 2^2 \times 3^2 \times 11 a = (k-1)(k+1)$$

$$101 \times 3^2 \times 11 a = m(m+1)$$

$$9999 a = m(m+1)$$

$$a = 9998 \text{ imp.}$$

~~3999~~

~~11~~

$$9999 \rightarrow \text{non}$$

$$3333 \rightarrow 3a \text{ non}$$

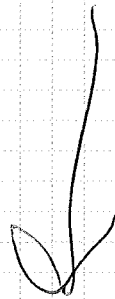
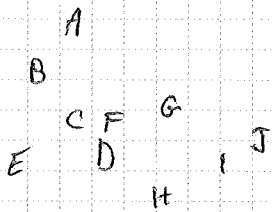
$$1111 \rightarrow 9a = \text{non}$$

$$9999 \rightarrow 11a =$$

~~3999~~ et ~~3a~~

1111 et 9a

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$$A + 3S = 45$$

$$3 | A$$

$$S = 15 \quad A = 0 \rightarrow \text{imp}$$

$$S = 14 \quad A = 3 \quad \left. \begin{array}{l} S = 13 \quad A = 6 \\ S = 12 \quad A = 9 \end{array} \right\} \text{suppr. !!}$$

$$S = 12 \quad A = 9 \rightarrow \text{imp (3 sommes avec A)}$$

• $A = 3$:

$$B + E = F + D = G + H = 11 = 2 + 9 = 4 + 7 = 5 + 6$$

$$C + I + J = 45 - 36 = 9$$

$$H + I + J = 14$$

$$) \quad H - C = 5$$

$$J = 14 - C - G$$

$$= 14 + 5 - (H + G)$$

$$= 8$$

$$\rightarrow H = 5, C = 0, G = 6$$

$$\rightarrow J = 14 - C - G = 8$$

$$J = 8$$

$$H - C = 5 \quad H + I = 6 \Rightarrow H = 5 \text{ ou } 6$$

$$- H = 5, C = 0, G = 6, I = 1, F = 9, D = 2$$

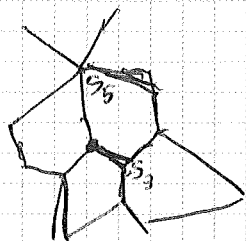
$$F + G = 15 \text{ imp.}$$

$$- H = 6, C = 1, I = 0, G = 5, F = 7, D = 4, E = 2, B = 9$$

2 sol° \uparrow et 9-X

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$$5 \times 67 = 335$$



$$F=6, A=12, S=8$$



$$F=4, A=6, S=4$$

$$F+S=A+2?$$

$$F=60$$

$$S_5 = 60/5 = 12$$

$$A = 5 \times 60/2 = 150$$

$$F + S_5 + S_3 = A + 2$$

$$60 + 12 + S_3 = 152$$

$$S_3 = 152 - 72 = \underline{\underline{80}}$$

(18)

Pb cartes?

$$65 = 2^6 + 1$$

A, B, C, D, E

$\bar{1}11$

A, \bar{B}, C, D, E

$1\bar{0}1$

A, B, \bar{C}, D, E

$10\bar{1}$

A, B, C, \bar{D}, E

3 ① $\bar{0}01$

~~A, B, C, D, E~~

$00\bar{1}$

~~$1010\bar{1}$~~

3 ② $\bar{1}01$

5 ① $\bar{0}0101$

$1\bar{1}1 \rightarrow$ ~~7~~

$0\bar{0}101$

$00\bar{1}01$

$001\bar{1}1$

$0011\bar{0}$

② $00\bar{1}10$

$001\bar{0}0$

5 ③ $00\bar{1}00$

$001\bar{1}0$

$001\bar{1}\bar{1}$

5 ④ $\bar{1}0100$

$1\bar{1}111 \rightarrow$ ~~21~~

$\bar{1}1111111$

$10101010\bar{1}$

5 ① $\bar{0}01010101$

$00\bar{1}010101$

$001\bar{1}10101$

$0011\bar{0}0101$

$001100\bar{1}01$

$0011001\bar{1}1$

$00110011\bar{0}$

5 ② $00\bar{1}100110$

$001\bar{0}00110$

$001000\bar{1}10$

$0010001\bar{0}0$

9 ③ $00\bar{1}000100$

$00111\bar{1}100$

$001111\bar{0}00$

④ $00\bar{1}111000$

$00101000\bar{0}$

⑤ $001\bar{1}10000$

$00110000\bar{0}$

⑥ $00\bar{1}100000$

$00100000\bar{0}$

⑦ $00111111\bar{1}$

9 ⑧ $1\bar{1}111111$

$9 \times 8 + 1$

$$2^k + 1 =$$

$$(2^k + 1) 2^k + 1$$

$$65 \times 64 + 1$$

$$= 2^{12} + 65$$

$$= 4096 + 65$$

$$= \underline{4161}$$