

$$\textcircled{1} \quad 29-09-2003 \rightarrow \underline{31}$$

$$\textcircled{2} \quad 4 + 4 \times 3 + 8 = \underline{24}$$

$$\textcircled{3} \quad \begin{array}{c} 5 \\ 4 \ 5 \\ 3 \ 4 \ 5 \\ 2 \ 3 \ 4 \ 5 \\ 1 \ 2 \ 3 \ 4 \ 5 \end{array}$$

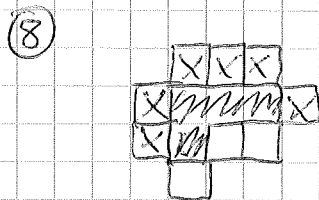
$$\textcircled{4} \quad \begin{array}{l} 1: \text{28} \ 32 \\ 2: 5+5+3+3 = 16 \end{array} \quad \underline{48}$$

$$\textcircled{5} \quad 2012/4 = \text{503}$$

$$2008 + 503 = \underline{2511}$$

$$\textcircled{6} \quad \left. \begin{array}{l} 8 \times 1,75 = 14 \\ 10 \times 1,5 = 15 \\ 12 \times 1,25 = 15 \\ 14 \times 1 = 14 \\ 16 \times 0,75 = 12 \end{array} \right\} \underline{70}$$

$$\textcircled{7} \quad \begin{array}{r} 1963 \\ \times \quad 4 \\ \hline 7852 \end{array}$$



$$\textcircled{9} \quad F = \frac{2}{5}(F+G) \quad \text{or} \quad 3F = 2G$$

$$F-2 = \frac{3}{10}(F+G)$$

$$\frac{5}{2}F = \frac{10}{3}(F-2)$$

$$3F = 4(F-2)$$

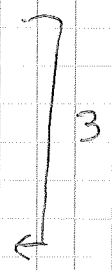
$$F = 8 \quad G = 12$$

~~120~~

$$F-2 = \underline{6}$$

10

99	100	101
100	101	98
101	98	99
98	99	100



3	4	5
4	5	2
5	2	3
2	3	4
3	4	1
4	1	2
1	2	3
2	3	0



$3 \times 98 + 1 = \underline{295}$

11

$\frac{1}{4}C + \frac{1}{6}L$

N: de 2 à ?

3 amies = $C + \frac{4}{6}L < C + L$

4 amies = $\frac{5}{4}C + \frac{5}{6}L < C + L$ si $L > C$

5 " = $\frac{6}{4}C + L > C + L$

3 sol^{ns}: 2, 3, 4

12

$$x, 3x, 15$$

$$x + 3x > 15 \rightarrow x > 4$$

$$4 \quad 12 \quad 15$$

$$5 \quad 15 \quad 15$$

$$6 \quad 18 \quad 15$$

$$7 \quad 21 \quad 15$$

$$(7 + 15 > 21)$$

$$x + 15 > 3x$$

$$2x < 15$$

$$x < 7.5$$

$$\rightarrow 7 + 21 + 15 = \underline{43}$$

13

$$\text{gd } m + l = \frac{x}{2} : m = 100$$

$$m' = 3m$$

$$l' = 3l$$

$$\text{gd } m' + l' = \frac{3x}{2} : l' - l = 150$$

$$m + l = \frac{x}{2} \quad m = 100$$

$$100 + l = \frac{x}{2}$$

$$(300 + 3l = \frac{3x}{2})$$

$$2l = 150$$

$$l = 75$$

$$x = 200 + 2l = \underline{350}$$

(14) $(1+2+\dots+9) \times 2$

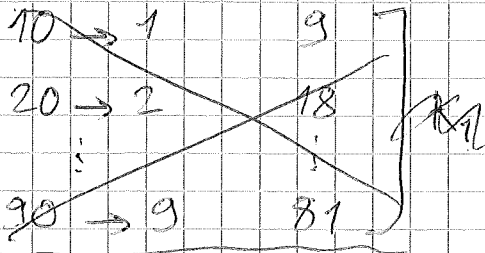
$11+12+\dots+19$

$21+\dots+29$

\vdots

$91+\dots+99$

$1+2+\dots+999 - K$



$a00 \rightarrow a \quad 99a$

$a0b \rightarrow ab \quad 90a \text{ pour } 1 \leq b \leq 9$

$ab0 \rightarrow ab \quad 9\overline{ab} \text{ pour } "$

$0 \leq a \leq 9$

$1+2+\dots+9 = 45$

$K = 99 \times 45 + 9 \times 90 \times 45$

$+ 9 (1+2+\dots+9 + 11+12+\dots+19 + \dots + 91+\dots+99)$

$9 \times (99 \times 50 - 450)$

$= 99 \times 45 + 99 \times 450 + 9 \times 80 \times 45$

$= 45 \times (99 + 990 + 720) = 45 \times 1809$

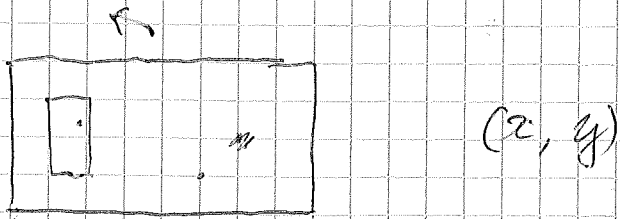
~~999~~ $N = 999 \times 500 - 45 \times 1809$

$9 \times 1809 = 16281$

$= \frac{1}{2} (999000 - 162810)$

$= \frac{1}{2} (836190) = \underline{\underline{418095}}$

15



$$\begin{aligned}
 (x, y) &\rightarrow (x-c, y-c) \\
 &\rightarrow \left(\frac{1}{4}(x-c), \frac{1}{4}(y-c)\right) \\
 &\rightarrow \left(-\frac{1}{4}(y-c), \frac{1}{4}(x-c)\right) \\
 &\rightarrow \left(c - \frac{1}{4}(y-c), c + \frac{1}{4}(x-c)\right) \\
 &= \left(\frac{3}{4}c - \frac{1}{4}y, \frac{3}{4}c + \frac{1}{4}x\right)
 \end{aligned}$$

$$(0, 0) \rightarrow (2, 1)$$

$$(8, 0) \rightarrow (2, 3)$$

$$(0, 4) \rightarrow (1, 1)$$

$$(x, y) \rightarrow \left(2 - \frac{y}{4}, 1 + \frac{x}{4}\right)$$

$$\begin{cases}
 x = 2 - y/4 \\
 y = 1 + x/4
 \end{cases}$$

$$\begin{aligned}
 4x &= 8 - y \\
 4y &= 4 + x
 \end{aligned}$$

$$\begin{aligned}
 16x &= 32 - 4y \\
 &= 28 - 4x \\
 20x &= 28 \\
 x &= 28/20
 \end{aligned}$$

$$y = 1 + 0,35 = 1,35$$

$$x = 28/17$$

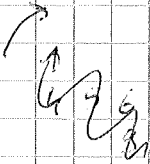
$$y = 1 + 7/17 = 24/17$$

$$\text{Er dm: } \left. \begin{aligned}
 x &= 28 \text{ dm} \\
 y &= 24 \text{ dm}
 \end{aligned} \right\}$$

16

15

~~437~~
~~456~~



~~456~~

8 7
4 5 6

~~456~~
9

15 =

/

4 3 2
3 5 7
8 1 6

4 3 8
9 5 1
2 7 6

4
5
6



2 9 4
7 5 3
6 1 8

~~2 9 4~~
~~7 5 3~~
~~6 1 8~~



B I D
G E C
F A H

17

1 2 7

1 1 1

1 1 2

⋮

1 1 7

1 2 2

1 1 1

1

1/1

1 1 2

~~1~~ (1+2+4) / 2 = 7/2

1 2 2

2 2 2

~~1 2 3~~

(6+10+9) = 25/3

1 1 3

1 2 3

1 3 3

2 2 3

2 3 3

3 3 3

4: 10 + 2x3 + 3x7 + 4x4 = 65 65/4

5: 15 + 2x14 + 3x12 + 4x9 + 5x5 = 140 140/5

6: 21 + 2x20 + 3x18 + 4x15 + 5x11 + 6x6 = 266 266/6

7: 28 + 2x27 + 3x25 + 4x22 + 5x18 + 6x13 + 7x7 = 462 462/7

1 + 7/2 + 25/3 + 65/4 + 28 + 266/6 + 66 = 1/12 (12 + 42 + 100 + 195 + 336 + 532 + 792)

28x12
336
66x12
792

= 1/12 (2009) = 2009/12

1	7	25	65	140	266	462
6	18	40	75	126	196	
12	22	35	51	70		
	10	13	16	19		

18 Nb prem: 2, 3, 7, 11, 13, 17, 19 → Face B,
~~8 = 1/12 21 × 22~~

Face 6: 1, 3, 6, 8, 10, 12 = 40

" 5: 2 + 5 + 7 + 9 + 11 = 34

" 4: 4 + . + . + .

4, 5 et 6: 15 nb

1 + 2 + 3 + ... + 15 = 15 × 8 = 3 × 40

17 + 19 + 23 > 40

S > 41

3, 4, 5 et 6:

1 + 2 + ... + 18 = 18 × 9 = 171

~~171~~ 171 / 4 > 168 / 4 = 42 S > 43

2 à 6:

1 + 2 + 3 + ... + 20 = 210 210 / 5 = 42 < 43

S = 43?

Face 3: C { 3, 7, 11, 13, 17, 19, 23, 29, 31 }

31 + 12 non

- ~~23 + 17 + 3~~ 29 + 11 + 3
- 23 + 17 + 3
- 23 + 13 + 7
- 19 + 17 + 7
- 19 + 13 + 11

18) suite

6: $3 \times 6 = 171 = \cancel{168} 43 \times 4 - 1$
 \uparrow
 $1+2+\dots+18 \rightarrow \text{N.P.}$

\Rightarrow Face 3 =
 $7+17+19$ ou $11+13+19$

Face 2 = $20+23$

$4 \times 43 = 1+2+3+4+\dots+17+19$

\Rightarrow Face 6:
 $1+3+6+8+10+15$
 $1+3+6+8+11+14$
 $1+3+6+9+11+13$

\Rightarrow Face 5:
 $2+5+7$

Face 4: $43-4 = 39$
 $\cancel{4} 4+11+13+15$ non
 $4+10+12+17$ non
 $4+10+13+16$ OK?
 $4+9+12+18$
 $4+9+13+17$ non
 $4+9+14+16$
 $4+8+13+18$ non
 $4+8+14+17$ non
 $4+7+14+18$
 $4+7+15+17$ non
 $\cancel{4+6+15+18}$

$2+5+10+12+14$ non

Face 5:
 • $2+5+7+.$
 $3: 11+13+19$
 $6: 1+3+6+8+10+15$
 $4: \cancel{4+9+12+18}$
 ou $4+9+14+16$
 $2+5+7+12+17 \rightarrow \text{OK}$
 • $2+5+8+.$
 $6: 1+3+6+9+11+13$
 $3: 7+17+19$
 $4: \text{non}$
 • $2+5+9+$
 $6: 1+3+6+8+10+15$
 $4: 4+7+14+18$
 $3: 11+13+19$ $5: 2+5+9+12+15$
 $6: 1+3+6+8+11+14$
 $4: 7+17+19$
 $4: 4+10+13+16$
 $5: 2+5+9+12+15$

Vincent LEFÈVRE (HC, 713)

PROBLÈME 11. (Café au lait)

Les solutions 2 et 3 s'obtiennent
à partir de la solution 4 en considérant
le café et le lait restant (pris en compte
dans le total).

→ 3 solutions : 2, 3, 4. OK