

①  $7 \times 9 = 63 \rightarrow \underline{\underline{21:25}}$



③ 
$$\begin{array}{r} 2022 \times x \quad 60 \\ x 2022 \times \quad 3 \times 9 = 27 \\ x \times 2022 \quad 24 \\ \hline \underline{\underline{111}} \end{array}$$

④  $2: 11 + 10 + 5 = 26$   
 $0: 12 + 12 + 8 + 4 + 2 = 38$   
 $3 \times 26 + 38 = 78 + 38 = \underline{\underline{116}}$

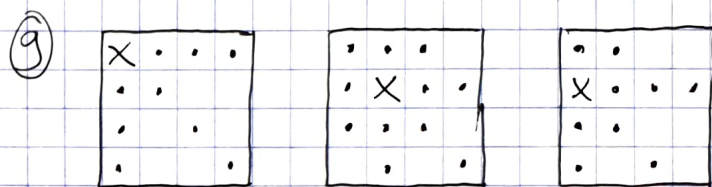
⑤  $(x, 9, 22) \quad x \geq 14 \quad x \leq 30$   
 $30 - 13 = \underline{\underline{17}}$

⑥  $hc^2/3 = 24$   
 $hc^2 = 2^3 \times 3^2$   
 $C_{max} = 2 \times 3 \rightarrow h = 2$   
 $C_{min} = 1 \rightarrow h = 72$

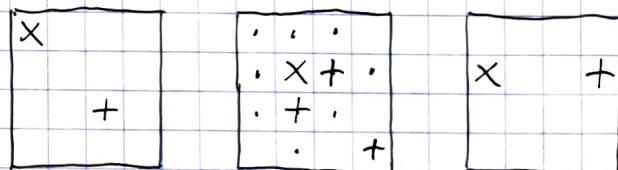
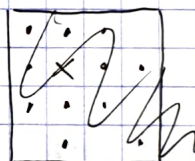
⑦  $D = 1 \quad \# = 8 \text{ ou } 9$   
 $2U + I \rightarrow \text{retenu} = 1 \text{ ou } 2$   
 $\rightarrow E = 7 \text{ ou } 8$   
 $I \text{ pair} \rightarrow X + E + I = 22$   
 $(X, E, I) = (3, 7, 6)$   
 $\rightarrow 2U + I = 20 \rightarrow U = 7 \text{ OK}$   
 $7 \text{ imp.}$

$I \text{ impair} \rightarrow X + E + I = 12$   
 $(X, E, I) = (4, 7, 1)$   
 $(3, 8, 1)$   
 $(2, 7, 3) \rightarrow 2U + I = 21$   
 $\rightarrow U = 9 \text{ OK}$

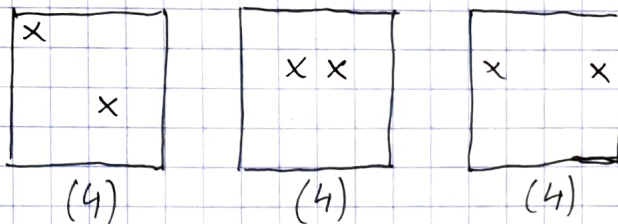
⑧  $\cancel{3+3} (3-1) + (3-1) + 2$   
 $2 + 1 + 3$   
 $2 + 1 + 1 + 2$   
 $1 + 2 + 3$   
 $1 + 2 + 1 + 2$   
 $1 + 1 + 2 + 2$   
 $1 + 1 + 1 + 3$   
 $1 + 1 + 1 + 1 + 2 \rightarrow \underline{\underline{8}}$



$\rightarrow$  ~~3 nécessaires~~ 2 nécessaires



3 classes:



$\rightarrow \underline{\underline{2, 12}}$

$\rightarrow \underline{\underline{IDEE = 3177}}$

$$\textcircled{10} \quad f(n+1) = 2f(n) + 1$$

$n \quad f(n)$

1

1

2

3

3

7

4

15

$$2^7 - 1 = \underline{\underline{127}}$$

$\textcircled{11}$  Le + rapide (1) ramène la torche.

$$2 + 1 + 3 + 1 + 4 + 1 + \dots + 2021 + 1 + 2022$$

$$= \frac{2022 \times 2023}{2} - 1 + 2020$$

$$\begin{array}{r} 2023 \\ \times 1011 \\ \hline \end{array}$$

$$\begin{array}{r} 2023 \\ 2023 \\ 2023 \\ \hline \end{array}$$

$$\begin{array}{r} 2045253 \\ + 2020 \\ \hline \end{array}$$

$$2047273 - 1 = 2047272$$

$$\textcircled{12} \quad \frac{63 \times 64}{2} = 63 \times 32 = 2016$$

$$1 + 2 + \dots + 64 = 2080 \rightarrow -58 \text{ non}$$

$$\dots + 65 \rightarrow -123 \text{ non}$$

$$n + (n+1) + \dots + (n+k-1) = kn + \frac{k(k-1)}{2} = 2022$$

$$k\left(n + \frac{k-1}{2}\right) = 2022 = 2 \times 3 \times \cancel{337}$$

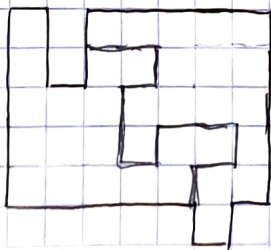
Si  $k = 337$ ,  $\rightarrow$  imp.

$$k(2n + k - 1) = 2^2 \times 3 \times 337$$

$$k = 12 \quad 2n + k - 1 = 337 \quad \rightarrow \quad n = \frac{326}{2} = \underline{\underline{163}}$$

Verif:  $1630 + 326 + 66 = 2022$

$\textcircled{13}$



$$2 \times 17$$

$$41,14 / 34 = 1,21 = c^2 \rightarrow c = 1,1$$

$$13 \times 1,1 = 14,3 \text{ m}$$



14)  $1, 1, 3 \rightarrow 7$        $1, 2, 7 \rightarrow 11$   
 ~~$1, 2, 3$~~        $(1, 2, 6 \rightarrow 10)$   
 $1, 3, 8 \rightarrow \underline{\underline{12}}$   
 $(1, 3, 7 \rightarrow 11)$

15) 0?

16) 4 9 25 49 121 169 289 361 529 841 961

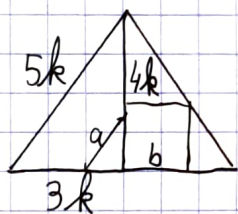
$37^2 = 1369$      $41^2 = 1681$      $43^2 = 1849$

2022 pair  $\rightarrow = 4 + X + Y$        $X + Y = 2018$

$9 + 9 = 2018$        $A + B = 200$

$16 + 184 \rightarrow 2, 13, 43$

17)



$3k = \frac{5}{4}a + \frac{3}{5}a = \frac{37}{20}a$

$a = 35 \text{ mm} \rightarrow k = \frac{37 \times 5 \times 7}{3 \times 4 \times 5} = \frac{7 \times 37}{3 \times 4}$

$3k = b + \frac{3}{4}b = \frac{7}{4}b \rightarrow b = \frac{3 \times 4}{7} \times \frac{7 \times 37}{3 \times 4} = \underline{\underline{37}}$

18) N joueurs: Entre eux:  $\frac{n(n-1)}{2} \times [1/2, 1]$  pts.

$n = N - 10$

Contre les 10 derniers:  $[0, 10n]$  pts.

$10n \geq \frac{n(n-1)}{4}$

~~10n~~  $n-1 \leq 40$      $n \leq 41$

~~21~~ joueurs:  $10v + 10n$ .

31 joueurs:  $10v + 20n$ .

$\Rightarrow$

19

$$\text{rapport} = x$$

$$3a + r^2 x = x$$

Cercle: ~~π~~ π (rayon 1)

$$\text{Hauteur trig: } \frac{2}{3} h = 1 \rightarrow h = 3/2$$

$$h = \text{base} \frac{\sqrt{3}}{2} \rightarrow \text{base} = \sqrt{3}$$

$$\text{Aire (trig)} = \frac{3\sqrt{3}}{4}$$

$$\text{rayon (petit cercle)} = \frac{h}{3} = \frac{1}{2}$$

$$\left(\pi - \frac{3\sqrt{3}}{4}\right) + \frac{1}{4}\pi x = \pi x$$

$$\frac{3}{4}\pi x = \pi - \frac{3\sqrt{3}}{4}$$

$$x = \frac{4}{3} - \frac{\sqrt{3}}{\pi} = \frac{4}{3} - \frac{473}{273} \times \frac{7}{22}$$

$$473 = 11 \times 43$$

$$273 = 7 \times 39$$

$$= \frac{4}{3} - \frac{43}{2 \times 39} = \frac{26 \times 4 - 43}{78}$$

$$= \frac{104 - 43}{78} = \frac{61}{78}$$