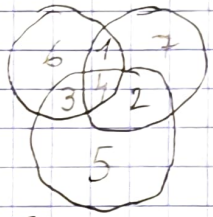
① $1+5\times4=21$

② $\min(5,5,4)=4$

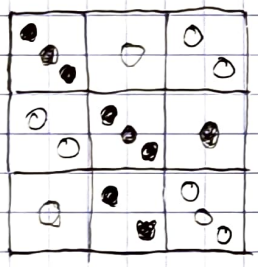
③



$1+2+\ldots+\ldots=14$

$\ldots+\ldots=11$

④



⑤ $p=3+a$

$i=3+b$

3 pairs et 5 impairs

⑥ $A\times B$

$ABCB$, $ACAB$

$\rightarrow 3\times2\times2=12$

⑦ (+1) à tous les chiffres

→ autre sol°

→ $D=5$

• Si $E=3$: $M=8$, $A=5$

imp.

• Si $E=2$: $M=7$, $A=4$

$A\neq D$ $A=D+1$

$E\geq6$ $D=E+2$

$E=6$ $D=8$ $A=9$ $M=1$

$$\begin{array}{r} 8316 \\ -\,6831 \\ \hline 2025 \end{array} \leftarrow$$

⑧ $S=45$ → retirer 20

$20=9+8+3=9+7+4$

$=8+4$

$20=1+2+8+9=1+3+7+9$

$=1+4+6+9=1+4+7+8$

$=1+6+6=2+3+6+9$

$=2+3+7+8=2+4+6+8$

$=3+4+6+7$ → 10

⑨ $\frac{2k}{3k}$ $k\geq13$ $k\leq16$

$\frac{26}{39}$ $\frac{28}{42}$ $\frac{30}{45}$ $\frac{32}{48}$ 4 sol°

⑩ $1+k+(k+r)+(k+2r)+\ldots+(k+(n-1)r)=625$

$k\geq5$ $r\geq3$

$2k+r=24$ r est pair.

$nk+\frac{n(n-1)}{2}r=624$

$n\left(k+(n-1)\frac{r}{2}\right)=624$

• Si $k=5$, $r=14$: $n(5+7(n-1))=624$

$n(7n-2)=624$

$7n^2-2n-624=0$

$\Delta'=1+7\times624=$

$624\simeq 7n^2$ $624/7=89,\ldots$

$<$

imp.

• Si $k=6$, $r=12$: $n(6+6(n-1))=624$

$6n^2=624$ $n^2=104$ imp.

• Si $k=7$, $r=10$: $n(7+5(n-1))=624$

$n(5n+2)=624$ $624/5\simeq125$

imp.

• Si $k=8$, $r=8$: $n(8+4(n-1))=624$

$n(4n+4)=624$ $n(n+1)=156$

$12\times13=156$ OK $n=12$

• Si $k=9$, $r=6$: $n(9+3(n-1))=624$

$n(3n+6)=624$ $n(n+2)=208=m^2-1$

imp.

• Si $k=10$, $r=4$: $n(10+2(n-1))=624$

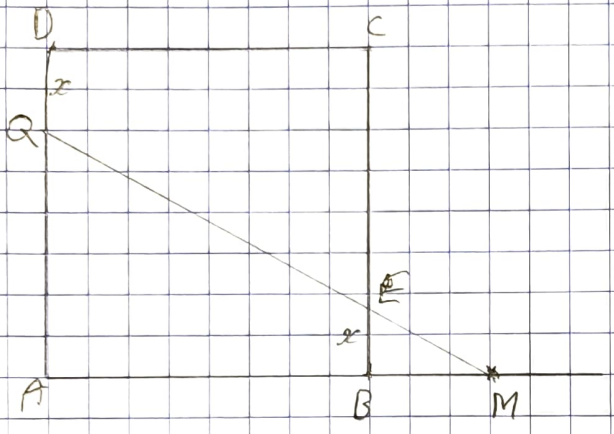
$n(2n+8)=624$ $n(n+4)=312$

$16\times20=320$ imp.

(11) Somme des angles: $180(n-2) = 180 \times 7$

Moy: $180 \times 7 / 9 = 7 \times 20 = 140$

(12)



~~74/13~~

$(74+13)/13 = (74-x)/x$

$87x = 13(74-x)$

$(87+13)x = 13 \times 74 = 962$

$BE = x = 9,62$

(13) $A(100-A) = B(B-1)$ $\quad 900 \leq A(100-A) \leq 2500$

A pair $\rightarrow 4 \mid A(100-A)$ $\quad \rightarrow B \geq 31$

$A = 2a$ $\quad 4 \mid B(B-1)$ $\quad a(50-a) = B(B-1)/4$

$B = 32 \Rightarrow A = 62$ imp.

$B = 33 \Rightarrow 8 \times 3 \times 11$ $\quad a = 44$ $\quad 100A + B = 8833$

$B = 36 \Rightarrow 5 \times 7 \times 9$ ~~15 x 35~~ imp $(5 \mid a)$

~~B = 37~~

$B = 40 \rightarrow 3 \times 13 \times 2 \times 5$ $\quad 5 \mid a$ imp.

$B = 44 \rightarrow 43 \times \_\_$

$B = 45 \rightarrow 11 \times 5 \times 9$ $\quad 5 \mid a$ imp.

$B = 48 \rightarrow 47$

$B = 49 \rightarrow$ imp (7^2)

$B = 52 \rightarrow 3 \times 17 \times 13$

$B = 56 \rightarrow 5 \times 11$ trop grand $\rightarrow$ 1 sol°

(14) ~~32~~^{2} = 1024) 65
1089
1156
1225
1296

impass- $x^2 = \ldots 2$

1225 ? ↳ imp

$39^2 = 1600 - 79 = 1521$

45^2 = 2025) 91
2116
2209

50^2 = 2500 imp-

55^2 = 3025) 111
3136
3249

1296?

65..

80^2 = 6400
6561

96^2 = 9216

65..

55..

~~7373~~

74^2 = 5476
5625

95..

~~8811~~ $97^2 = 9409$

$98^2 = 9604$

1296 ← OK
2025
9216
6561

9216 — OK
2025
1296
6561

~~14~~ ~~$32^2 = 1024$~~

15) $m = 5n + 31$

$mn = m + n + 2249$

$n(5n + 31) = 6n + 2280$

$5n^2 + 25n - 2280 = 0$

$n^2 + 5n - 456 = 0$

$\Delta = 25 + 1824 = 1849$

~~14~~ $43^2 = 1849$

$n = \frac{43 - 5}{2} = 19$

$m = 95 + 31 = 126$

$\rightarrow (126, 19)$

Verif: $19 \times 126 = 2520 - 126 = 2394$

$145 + 2249 = 2394$

17) $b(4) = b(1) + b(2)$

~~$n = 53$ ou $n = 49$ $49 + 13$~~

$n = 53 \rightarrow 53 + 8 + 7$

$n = 52 \rightarrow 52 + 7 + \_\_$

$n = 51 \rightarrow 51 + 6 + 12$

$n = 50 \rightarrow 50 + 5 + 10$

$n = 49 \rightarrow 49 + 13 + \_\_$

$48 + 12 + \_\_$

$47 + 11 + \_\_$

$46 + 10 + 11$

$45 + 9 + 9$

$44 + 8 + 7$

$43 + 7 + 5$

$42 + 6 + 12$

$39 + 12 + 6$

$38 + 11 + 13$

(16) $a,\ a+r,\ a+2r$

$a(a+2r)^2 = (a+r)^3 + 11r^3$

$a^3 + 4a^2r + 4ar^2 = a^3 + 3a^2r + 3ar^2 + 12r^3$

$a^2r + ar^2 = 12r^3$

$a^2 + ar = 12r^2$

Si $r = 1$: $a^2 + a - 12 = 0$

$\rightarrow a = \frac{-1+7}{2} = 3 \rightarrow a = 3r$

3, 4, 5 aire : $3 \times 4/2 = 6 \rightarrow 30, 40, 50$

$\rightarrow BC = 50$

(18) $s^2 = p(p-a)(p-b)(p-c)$ $p = \frac{a+b+c}{2}$

$a-1,\ a,\ a+1$ $p = 3a/2$ a pair

$2x-1,\ 2x,\ 2x+1$ $p = 3x$

$s^2 = 3x \cdot x(x^2-1)$ $3(x^2-1) = s^2$ $3 \mid s$

$x^2 - 1 = 3t^2$ $2p = 6x$

$x^2 - 3t^2 = 1$ (1,0) (2,1) (7,4) $\hookrightarrow 42$

(26,15)

$\hookrightarrow 6 \times 26 = 156$

$3 \times 144 = 432$

$3 \times 169 = 507$

$3 \times 196 = 588$

$3 \times 225 = 675$

$26^2 = 676$

$\times 4 \rightarrow \leq 624$ 3 sol°