

$$\textcircled{1} \begin{matrix} a+b \equiv 0 \pmod{8} \\ 21 \equiv -3 \pmod{8} \end{matrix} \rightarrow 3$$

$$\textcircled{2} 50+70=120 \rightarrow 70$$

$$\textcircled{3} 8 \text{ impairs} \rightarrow \text{gris}$$

$$1+3+5+\dots+15 = 16 \times 4 = \underline{64}$$

$$\textcircled{4} 10 \equiv 2 \pmod{4} \rightarrow 2$$

$$\textcircled{5} A \text{ ment} \Rightarrow M:V \Rightarrow \underline{\text{Alice}}$$

$$K:V, F:V \rightarrow \text{OK}$$

$$\textcircled{6} \cancel{3 \times (1+6)} + \cancel{3 \times 2} + 3 \times 5$$

(dés pas forcément identiques)

$$(1+7+5) + (6+5) + (14+5)$$

$$+ (7+5+4) = \cancel{58} \underline{59}$$

$$\textcircled{7} \begin{matrix} 2+15 \rightarrow 17 \\ +7+10 \rightarrow 34 \end{matrix}$$

$$\begin{matrix} 7+4+20+10 \rightarrow 41 \\ +2+15 \rightarrow 58 \end{matrix}$$

(solutions sans 3)

Avec 3: relié à 2 ou 15

$$\cancel{2+15} + 3 + \binom{4}{20} + \binom{7}{10}$$

$$\begin{matrix} 16, 19, 32, 35, \\ 29, 32, 45, 48 \end{matrix} \Bigg) 7 \text{ poss.}$$

$$7+4 \rightarrow \underline{11 \text{ possibilités}}$$

$$\textcircled{8} \text{ Pair} \rightarrow 11, 12, 15, 16, 19, 20$$

$$\rightarrow \underline{6}$$

$$\textcircled{9} \begin{matrix} 6000 \text{ cm}^2 \text{ de tissu} \\ 1200 \text{ cm}^2 \text{ de trous} \end{matrix}$$

$$7200/2 = 3600$$

$$6000 \rightarrow 3600 : -2400$$

$$2400/10 = \underline{240 \text{ lavages}}$$

$$\textcircled{10} \begin{matrix} \begin{matrix} \times \times & \times & \times \times \\ \times & \times \times & \times \\ & \times & \times \\ \times & \times \times & \times \end{matrix} \end{matrix} \Bigg) \text{ en premier}$$

$$3 \times 5 = 15?$$

$$\begin{matrix} \begin{matrix} \times \times \\ \times \times \end{matrix} & \begin{matrix} \times \times \\ \times & \times \\ & \times \times \end{matrix} & \begin{matrix} \times \times \\ \times \\ 0 \ 0 \end{matrix} \end{matrix}$$

$$\begin{matrix} \begin{matrix} \times \times & \times & \times \times \\ \times & & \times \times \\ & \times \times & \times \\ \times \times & \times & \times \times \end{matrix} \end{matrix} \rightarrow 16$$

$$\textcircled{11} a(2a) \cancel{b(2b)} \quad S = 3(a+b)$$

$$\cancel{100a} \times 12$$

$$12(100a+b) / (3(a+b))$$

$$a+b \mid 4(100a+b) \quad a \leq 4, b \leq 4$$

$$\rightarrow a+b = 2, 3, 4, 6, 8, \cancel{10}, \cancel{11}$$

$$7: 7 \mid 2a+b \text{ non}$$

$$\cancel{10: 5 \nmid 5}$$

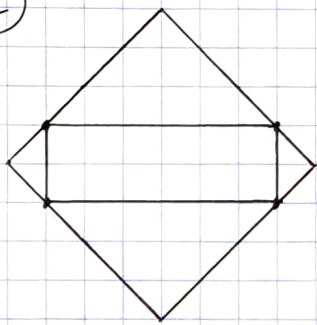
$$1212, 1224, 2412,$$

$$1236, 3612, \cancel{2424},$$

$$\cancel{2448}, 3636, 4824,$$

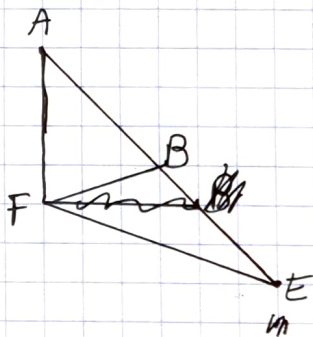
$$4848 \rightarrow \underline{10 \text{ sol}^\circ}$$

12



$$12 / (4 \times 8) = 3/8 = \underline{0,375}$$

13



$$\text{Aire}(ABF) = \cancel{2} \times \text{Aire}(EBF)$$

$$\Rightarrow AB = BE = \frac{1}{2} AE = \frac{1}{2} AC$$

$$\rightarrow AB/AC = \underline{1/2}$$

14

$$A = \overline{20M} \quad B = \overline{M20} \quad M: k \text{ chiffres} \quad A = 2 \times 10^{k+1} + M$$

• Si $A/B = 2/5$:

$$B = 100M + 20$$

$$10^{k+2} + 5M = 200M + 40$$

$$195M = 10^{k+2} - 40$$

$$3 \times 13 \times M = 2 \times 10^{k+1} - 8$$

$$13 \mid 10^{k+1} - 4$$

$$10 \equiv -3 [13]$$

$$1: -3 \quad 2: 9 \quad 3: -1 \quad 4: 3 \quad 5: -9 \equiv 4 [13]$$

$$k+1=5 \quad 3 \times 13 \times M = 200000 - 8 = 199992$$

$$199992 / 13 = 15384 \quad 15384 / 3 = \underline{\underline{5128}}$$

• Si $B/A = 2/5$

$$500M + 100 = 4 \times 10^{k+1} + 2M$$

$$498M = 4 \times 10^{k+1} - 100$$

$$249M = 2 \times 10^{k+1} - 50$$

$$83 \mid 4 \times 10^{k+1} - 100$$

$$83 \mid 4 \times 10^{k-1} - 1$$

$$k=1: 4$$

$$k=2: 40$$

$$k=3: 400 \equiv -15$$

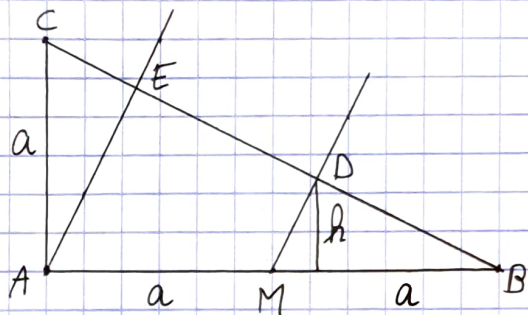
$$k=4: -150 \equiv 16$$

$$k=5: 160 \equiv -6$$

$$k=6: -60 \text{ imp.}$$

$$1 \text{ sol}^\circ: 5128$$

15



$$BC^2 = 5a^2$$

$$AB/BC = \frac{2}{\sqrt{5}}$$

$$AE = \frac{2}{\sqrt{5}} a$$

$$DM = \frac{1}{\sqrt{5}} a$$

$$h/DM = 2/\sqrt{5}$$

$$h = \frac{2}{5} a$$

$$8 \times \frac{a h}{2} = \frac{8}{5} a^2$$

$$\left(\frac{8}{5} a^2\right) / (2a)^2 = \frac{2}{5}$$

$$1 - \frac{2}{5} = \frac{3}{5} \rightarrow \underline{60\%}$$

16

$N = p^2 \times q \times r$ ou $p^2 \times q^3 \rightarrow \text{non}$ ou $p \times q^5 \rightarrow \text{non}$
 $\hookrightarrow$ si r grand: 1, p , p^2 , q , qp , qp^2 , r (7°)

$$N = 12r$$

$$2028 = 507 \times 4 = 169 \times 12$$

$$\rightarrow 173 \times 12 = \underline{\underline{2076}}$$

$$N = 20r$$

$$20 \times 103 = \underline{\underline{2060}}$$

$$N = 28r$$

$$2100 / 28 = 75$$

$$28 \times 73 = 2100 - 56 = \underline{\underline{2044}}$$

$$N = 44r$$

$$2024 / 44 = 506 / 11 = 46 \text{ non}$$

$$44 \times 47 = 2024 + 44 = \underline{\underline{2068}}$$

$$(44 < 47)$$

$$N = 18r$$

$$2034 / 18 = 113 \rightarrow \underline{\underline{2034}}$$

$$N = 45r$$

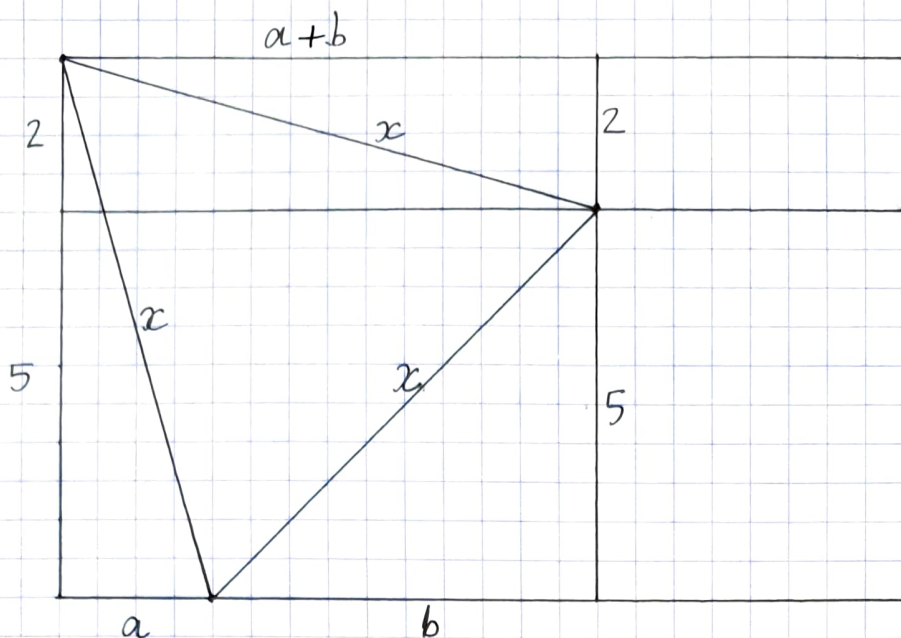
$$2025 / 45 = 405 / 9 = 45 \rightarrow \text{non}$$

$$N = 50r$$

$$\rightarrow \text{non}$$

$\rightarrow 5 \text{ sol}^{\circ}$

(17)



$$24^2 = 576$$

$$33^2 = 1089$$

$$1089$$

$$1665$$

$$1665/5$$

$$= 333$$

$$= 3 \times 111$$

$$= 9 \times 37$$

$$a^2 + 49 = x^2$$

$$b^2 + 25 = x^2$$

$$b^2 - a^2 = 49 - 25 = 24$$

$$(a+b)^2 + 4 = x^2$$

$$a^2 + b^2 + 2ab + 4 = a^2 + 49$$

$$= b^2 + 25$$

$$\rightarrow a^2 + 2ab = 21$$

$$b = \frac{21 - a^2}{2a}$$

$$4ab + 18 = 49 + 25 = 74$$

$$2ab = 33$$

$$b = 33/(2a)$$

$$33^2/(4a^2) - a^2 = 24$$

$$33^2/(4A) = A + 24$$

$$4A^2 + 96A - 33^2 = 0$$

$$A = a^2$$

$$\Delta' = 48^2 + 4 \times 33^2$$

$$= 4(24^2 + 33^2)$$

$$\left(\frac{21 - a^2}{2a}\right)^2 = a^2 + 24$$

$$A = a^2$$

$$(21 - A)^2 = 4A^2 + 96A$$

$$A^2 - 42A + 21^2 = 4A^2 + 96A$$

$$3A^2 + 138A - 441 = 0$$

$$\Delta = 4 \times 9 \times (529 + 147)$$

$$= (2 \times 3 \times 26)^2 = 156^2$$

$$138^2 = 18244$$

$$3 \times 441 = 1323$$

$$1323 \times 1323$$

$$138 = 2 \times 3 \times 23 \quad 23^2 = 529$$

$$529 + 147 = 676 = 4 \times 169$$

$$= 26^2$$

17 suite

$$A = \frac{\cancel{1138} - 138 + 156}{6} = \frac{18}{6} = 3$$

$$a = \sqrt{3}$$

$$x^2 = A + 49 = 52 = 4 \times 13$$

$$\cancel{x} \quad x = 2\sqrt{13} \simeq 2 \times 3,6056 = 7,2112 \text{ km}$$

$$\rightarrow \simeq 7211 \text{ m}$$