

5

x x x x x x  
 o o o x x x x  
 o o x o o x x  
 o o o o o o

→ 3

6

2: 493827    4: 24    6: 16 non  
 3: 21        8: 12345679

→ 8

7

0: 1 à n  
 1: n+1 à 2n  
 2: 2n+1 à 3n  
 3: 3n+1 à 4n  
 4: 4n+1 à 5n

4n+1 ≤ 49 ≤ 5n

→ n = 10 ou 11 ou 12

→ voisins = 9 ou 10 ou 11

8

3x3: 2  
 4x4: 2  
 5x5: 1

[1,2]: 2+2

[2,2]: 1

[1,3]: 2+2

[2,3]: 1+1

[1,4]: 1+1

→ 18

9

P(n) =

~~n^3~~ n^3 (20-n)^2

~~P'(n) = 2n^3(n-20) + 3n^2(20-n)^2~~  
~~= n^2(n-20)(2n+3(n-20))~~

5n - 60 = 0    n = 12

12^3 x 8^2 = 4096 x 27 = 110592

11^3 x 9^2 = 1331 x 81 =

106480  
 1331

~~13^3 x 7^2~~

169  
 x 13  
 2197  
 169  
 x 49

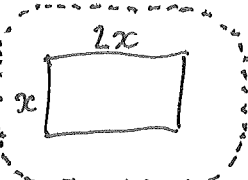
107653

~~110592~~

576 x 3 = 1728  
 x 8  
 13824  
 x 8  
 110592

(10)

111  
111  
111



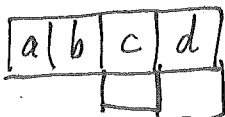
$$6398 = 6x + 2\pi \times 700 = 4400$$

$$x = \frac{1998}{6} = 333$$

$$S = 2 \times 333^2$$

$$N = \frac{S}{18} = 111^2 = \boxed{12321}$$

(11)



$$b + c + d = a + b + c + 1$$
$$d = a + 1$$

a b c a+1 b+1 c+1 a+2 b+2 c+2 a+3 b+3

a+b+c min.

$$a=1 \rightarrow b, c \geq 5$$

- ~~1, 5, 9~~
- ~~1, 8, 5~~
- ~~8, 1, 5~~
- 4, 8, 1
- 8, 4, 1

2 solutions:

- 4 8 1 5 9 2 6 10 3 7 11
- 8 4 1 9 5 2 10 6 3 11 7

(15)

$$\sigma(12) = 2 \times 3 = 6 \quad 6/2 \rightarrow 3$$

$$12 = 1 \times 12$$
$$= 2 \times 6$$
$$= 3 \times 4$$
$$= 2 \times 2 \times 3$$

$$\sigma(N) = 11 \text{ ou } 12$$

↑  
imp.

$$N = p^{11} \text{ ou } p \cdot q^5 \text{ ou } p^2 q^3 \text{ ou } p^4 q r^2$$

↑  
imp.

$$p q^5 r \rightarrow q=2 \rightarrow 32p \rightarrow 96 \text{ ou } 160$$

$$p^2 q^3 r \rightarrow 4 \times 27 = 108$$

~~4 \times 5^3~~

$$9 \times 8 = 72$$

- $p q r^2 \rightarrow 2 \times 3 \times 25$
- $2 \times 5 \times 9$
- $2 \times 7 \times 9$
- $2 \times 11 \times 9$
- $3 \times 5 \times 4$
- $3 \times 7 \times 4$
- $3 \times 11 \times 4$
- $3 \times 13 \times 4$

$$5 \times 7 \times 4$$

- 96
- 160
- 108
- 72
- 150
- ~~18 \times \{5, 7, 11\}~~
- 12 \times \{5, 7, 11, 13\}
- 140
- $\rightarrow 13 \text{ sol}^{\circ}$

(13)

$F, T_1, T_2, T_3$   
 $\downarrow$                        $\downarrow$   
 $14P/am$                  $4\sigma/am \ (x3)$

$$M^2 + F^2 + 3T^2 = 1997$$

$$M^2 + 14F + 12T + 1 = 23 \times 71 = ~~1639~~ 2059$$

$$M^2 + 14F + 12T = 2058$$

$$F(14 - F) + 3T(4 - T) = 61$$

$$T=1 \rightarrow F(14-F) = 52 = 4 \times 13$$

$$T=2 \rightarrow \quad \quad \quad = 49 = 7 \times 7$$

$$T=3 \rightarrow \quad \quad \quad = 52$$

$$T=2, F=7 \rightarrow M^2 = 1997 - 49 - 12 = 1936$$

$$\rightarrow \boxed{M = 44}$$

$$\begin{array}{r}
 4 \\
 \hline
 84 \\
 \times 4 \\
 \hline
 336
 \end{array}$$

$$\begin{array}{r}
 176 \\
 176 \\
 \hline
 \end{array}$$

(14)

2 4 6 8

~~10 12 14 16~~

9 11 13 15

10 12 14 16

1 3 5 7

7<sup>4</sup> x 9<sup>4</sup>

~~8 → 15~~

~~10~~ 8 → 15

6 → 13

4 → 11

2 → 9

16 ← 7

14 ← 5

12 ← 3

10 ← 1

8	→	1
10	→	3
12	→	5
14	→	7
16	→	9
6		11
4		13
2		15

7<sup>5</sup>

⇒ 9 11 13 15 1 3 5 7

(12)

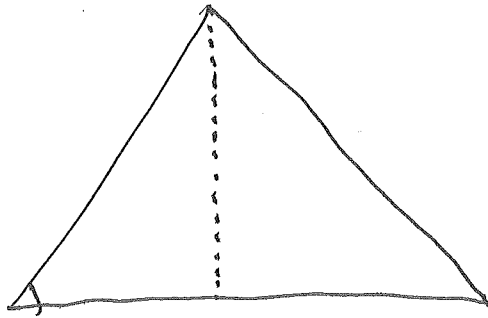
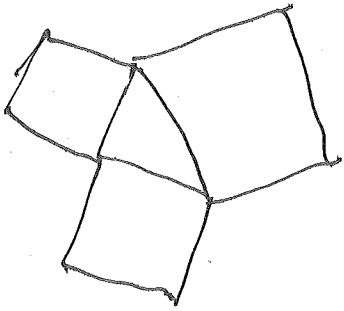
$4^2 + 7^2 = 65 \approx 64$

$500 \times \frac{28}{40} = 50 \times 7 = 350$   
*mm*

28 at 12

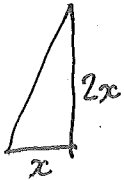
↑

56  $\sqrt{10 \times 3 \times 11 \times 5}$



$$\begin{aligned} \tan \theta &= 1 \rightarrow 45^\circ \\ \tan \theta &= 2 \rightarrow > 60^\circ \end{aligned}$$

$$\tan \theta = -1 \rightarrow (180 - 45)^\circ = 135^\circ$$



$$\tan(a+b) = \frac{\tan a + \tan b}{1 - \tan a \tan b}$$

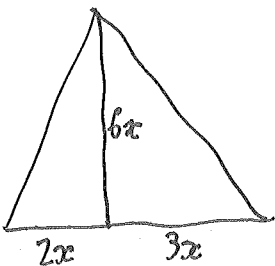
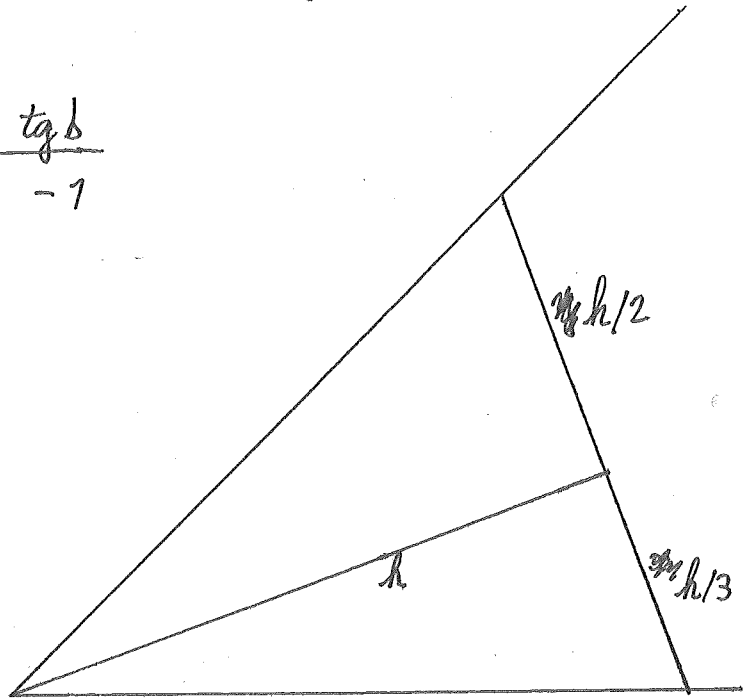
~~Angle > 90°~~  
~~Angle > 90°~~

$$\tan(180^\circ - x) = -\tan x$$

$$\tan c = -\tan(a+b) = \frac{\tan a + \tan b}{\tan a \tan b - 1}$$

$$C = \frac{A + B}{AB - 1}$$

$$A=1, B=2 \rightarrow C=3$$



~~15x²~~

$$\begin{aligned} 25x^2 \\ 40x^2 \rightarrow 400^2 \\ 45x^2 \end{aligned}$$

$$\begin{aligned} 5x^2 \\ 8x^2 \\ 9x^2 \end{aligned}$$

(16) suite

$$110 x^2$$

$$x^2 = \frac{400^2}{40} = 4000$$

$$\text{Ma } 440\ 000\ \text{m}^2 \rightarrow \boxed{44}$$