1. $h^2 \leq 36206 < (h+1)^2$

Вычисления в целых числах

Номер шага	1	2	3	4	5
h	36206	18103	9052	4527	2267
b	18103	9052	4527	2267	1141

6	7	8	9	10	11
1141	586	323	217	191	190
586	323	217	191	190	190

Ответ: $h = 190$

2. $c = 2002$

метод простых делителей

$2002/2 = 1001$; $1001/3$; $1001/5$; $1001/7 = 143$

$143/7$; $143/11 = 13$

Ответ: $2002 = 2 \cdot 7 \cdot 11 \cdot 13$

метод Ферма:

$2002/2 = 1001$;

N шага	1	2	3	4	5	6	7	8
h	1001	501	251	127	67	40	32	31
b	501	251	127	67	40	32	31	31

$h = 31$; $x = h = 31$; $y = 0$

Numar	R_{xy}	R_x	R_y
0	-40	63	1
1	23	65	1
2	22	65	3
3	19	65	5
4	14	65	7
5	7	65	9
6	-2	65	11
7	63	67	11
8	52	67	13
9	39	67	15
10	24	67	17
11	7	67	19
12	-12	67	21
13	55	69	21
14	34	69	23
15	11	69	25
16	-14	69	27
17	55	71	27
18	28	71	29

19	-1	71	131
20	70	73	31
21	39	73	33
22	6	73	35
23	-29	73	37
24	44	75	37
25	7	75	39
26	-32	75	41
27	43	77	41
28	2	77	43
29	-41	77	45
30	36	79	45
31	-9	79	47
32	70	81	47
33	23	81	49
34	-26	81	51
35	55	83	51
36	4	83	53
37	-49	83	55
38	34	85	55
39	-21	85	57
40	64	87	57
41	7	87	59
42	-52	87	61
43	35	89	61
44	-26	89	63
45	63	91	63
46	0	91	65

$$1001 = \left(\frac{91-65}{2}\right)\left(\frac{91+65}{2}-1\right) = \left(\frac{R_x - R_y}{2}\right)\left(\frac{R_x + R_y}{2}-1\right) =$$

$$= 13 \cdot 77$$

N	1	2	3	4	5	6
h	77	39	20	11	9	8
b	39	20	11	9	8	8

h=8; x=h=8; y=∞

N	Rxy	Rx	Ry
0	-13	17	1
1	4	19	1
2	3	19	3
3	0	19	5

$$77 = \left(\frac{Rx - Ry}{2}\right)\left(\frac{Rx + Ry}{2} - 1\right) = 7 \cdot 11$$

Ответ: $2002 = 2 \cdot 13 \cdot 7 \cdot 11$

3. $59x + 30y = 2002$

$59 = 30 \cdot 1 + 29$

$30 = 29 \cdot 1 + 1$

$29 = 1 \cdot 29$

$\gcd(59, 30) = 1 ; 2002 \vdots 2$

$59x_0 + 30y_0 = 1$

$x_0 = 1$

$y_0 = 2$

$59x_1 + 30y_1 = 2002$

$x_1 = -2002$

$y_1 = 4004$

$x = -2002 + 30k ; k \in \mathbb{Z}$

$y = 4004 - 59k ; k \in \mathbb{Z}$

Проверка:

$k = 0 : 59 \cdot (-2002) + 30 \cdot 4004 = -118118 + 120120 = 2002$

$k = 1 : 59 \cdot (-2002 + 30) + 30 \cdot (4004 - 59) = -116348 + 118350 = 2002$

Ответ: $\begin{cases} x = -2002 + 30k \\ y = 4004 - 59k \end{cases} ; k \in \mathbb{Z}$

4.2 $3x + 112_7 = 346_7$

I $3x = 234_7$

$x = 56_7 = 41_{10}$

$346 - 112 = 234$

$234_7 : 3 = 56$ (21 : 3 = 7, 24 : 3 = 5, 24 : 24 = 1, 0)

II $112_7 = 49 + 7 + 2 = 58_{10}$

$346_7 = 3 \cdot 49 + 4 \cdot 7 + 6 = 181_{10}$

$3x = 181_{10} - 58_{10}$

$3x = 123_{10}$

$x = 41_{10}$

Onlam: $56_7 = 41_{10}$