

$$1. \quad h^2 \leq 36214 < (h+1)^2$$

$$h = \frac{\left(36214 + \frac{36214}{36214}\right)}{2} = \frac{36214+1}{2} = 18107;$$

$$h = \frac{\left(18107 + \frac{36214}{18107}\right)}{2} = \frac{18107+2}{2} = 9054;$$

$$h = \frac{\left(9054 + \frac{36214}{9054}\right)}{2} = \frac{9054+3}{2} = 4528;$$

$$h = \frac{\left(4528 + \frac{36214}{4528}\right)}{2} = \frac{4528+7}{2} = 2267;$$

$$h = \frac{\left(2267 + \frac{36214}{2267}\right)}{2} = \frac{2267+15}{2} = 1141;$$

$$h = \frac{\left(1141 + \frac{36214}{1141}\right)}{2} = \frac{1141+31}{2} = 586;$$

$$h = \frac{\left(586 + \frac{36214}{586}\right)}{2} = \frac{586+61}{2} = 323;$$

$$h = \frac{\left(323 + \frac{36214}{323}\right)}{2} = \frac{323+112}{2} = 217;$$

$$h = \frac{\left(217 + \frac{36214}{217}\right)}{2} = \frac{217+166}{2} = 191;$$

$$h = \frac{\left(191 + \frac{36214}{191}\right)}{2} = \frac{191+189}{2} = 190;$$

$$h = \frac{\left(190 + \frac{36214}{190}\right)}{2} = \frac{190+190}{2} = 190.$$

Ответ: $h = 190$.

$$2. \quad \text{Факторизовать } c = 2002$$

$$\sqrt{c} \approx 44;$$

$$2002 = 2 \cdot 1001;$$

$$2002 = 3 \cdot 667 + 1;$$

$$2002 = 5 \cdot 400 + 2;$$

$$2002 = 7 \cdot 286;$$

$$2002 = 11 \cdot 182;$$

$$2002 = 13 \cdot 154;$$

$$2002 = 17 \cdot 117 + 13;$$

$$2002 = 19 \cdot 105 + 7;$$

$$2002 = 23 \cdot 87 + 1;$$

$$2002 = 29 \cdot 69 + 1;$$

$$2002 = 31 \cdot 64 + 18;$$

$$2002 = 37 \cdot 54 + 4;$$

$$2002 = 41 \cdot 48 + 34;$$

$$2002 = 43 \cdot 46 + 24.$$

Число делится нацело на 2, 7, 11, 13.

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

3. 1) $\text{НОД}(59, 30) = 1$

2) $59x_0 + 30y_0 = 1$

$x_0 = -1$

$y_0 = 2$

3) $59x_1 + 30y_1 = 2002$

$x_1 = x_0 \cdot \frac{c}{d} = -1 \cdot 2002 = -2002$

$y_1 = y_0 \cdot \frac{c}{d} = 2 \cdot 2002 = 4004$

4) Общий вид: $\begin{cases} x = x_1 + \frac{b}{d}k = -2002 + 30k \\ y = y_1 - \frac{a}{d}k = 4004 - 59k \end{cases}, k \in \mathbb{Z}$

4. Решить уравнение $3x + 344 = 1133$ в 5-ичной СС.

1) $3x + 344_5 = 1133_5$

$3x = 1133_5 - 344_5$

$3x = 234_5$

$x = 43_5$

Ответ: $x = 43_5$

2) $3x + 344_5 = 1133_5$

$3_5 = 3$

$344_5 = 3 \cdot 25 + 4 \cdot 5 + 4 = 99$

$1133_5 = 125 + 25 + 3 \cdot 5 + 3 = 168$

$3x + 99 = 168$

$3x = 168 - 99$

$3x = 69$

$x = 23 = 43_5$