

## Гипероператор-1, Сложение

$$2 + 2 = 4$$

## Гипероператор-2, Умножение

$$3 * 4 = 12$$

## ↑, Гипероператор-3, Возведение в степень

$$\boxed{3 \uparrow 3} \ominus 3 * 3 * 3 \ominus \boxed{3^3} \ominus 27$$

$$3 \uparrow 4 \ominus \underbrace{3 * 3 * 3 * 3}_{n_1=4} \ominus 3^4$$

$$3 \uparrow n_1 \ominus \underbrace{3 * 3 * 3 * \dots * 3}_{n_1} \ominus 3^{n_1} \ominus \text{«Перемножить } n_1 \text{ троек»} \ominus \text{«Возвести тройку в степень } n_1\text{»}$$

## ↑↑, Тетрация, Гипероператор-4

$$\boxed{3 \uparrow\uparrow 3} \ominus 3 \uparrow 3 \uparrow 3 \ominus 3 \uparrow (3 \uparrow 3) \ominus 3 \uparrow 3^3 \ominus \boxed{3^{3^3}} \ominus \boxed{3 \uparrow\uparrow 3} \ominus 3^{27} \approx 7.6 * 10^{12}$$

$$3 \uparrow\uparrow 4 \ominus \underbrace{3 \uparrow (3 \uparrow (3 \uparrow 3))}_{n_2=4} \ominus 3 \uparrow (3 \uparrow 3^3) \ominus 3 \uparrow 3^{3^3} \ominus 3^{3^{3^3}}$$

$$3 \uparrow\uparrow n_2 \ominus \underbrace{3 \uparrow 3 \uparrow 3 \uparrow \dots \uparrow 3}_{n_2} \ominus 3^{3^{3^{\dots^3}}} \} n_2 \ominus \text{«Степенная башня из } n_2 \text{ троек»}$$

Пентация, Гипероператор-5

$$3 \uparrow\uparrow\uparrow 3 \ominus 3 \uparrow\uparrow (3 \uparrow\uparrow 3) \ominus 3 \uparrow\uparrow \boxed{3 \uparrow\uparrow 3} \ominus \left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \boxed{3 \uparrow\uparrow 3} \ominus \left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \boxed{7.6 * 10^{12}}$$

$$3 \uparrow\uparrow\uparrow 4 \ominus 3 \uparrow\uparrow (3 \uparrow\uparrow (3 \uparrow\uparrow 3)) \ominus 3 \uparrow\uparrow (3 \uparrow\uparrow\uparrow 3) \ominus \underbrace{\left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \boxed{3 \uparrow\uparrow\uparrow 3}}_{\text{Башен} = 4} \ominus \underbrace{\left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \boxed{3 \uparrow\uparrow 3}_{\#1} \#2}_{\#3}}_{\text{Башен} = 4}$$

$$3 \uparrow\uparrow\uparrow 5 \ominus \underbrace{3 \uparrow\uparrow (3 \uparrow\uparrow (3 \uparrow\uparrow (3 \uparrow\uparrow 3)))}_{n_3=5} \ominus 3 \uparrow\uparrow (3 \uparrow\uparrow\uparrow 4) \ominus \underbrace{\left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \boxed{3 \uparrow\uparrow\uparrow 3}}_{\text{Башен} = 5}$$

$$3 \uparrow\uparrow\uparrow n_3 \ominus \underbrace{3 \uparrow\uparrow 3 \uparrow\uparrow 3 \uparrow\uparrow \dots \uparrow\uparrow 3}_{n_3} \ominus 3 \uparrow\uparrow (3 \uparrow\uparrow\uparrow 4) \ominus \underbrace{\left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \dots \left. 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \right\} n = \boxed{3 \uparrow\uparrow\uparrow 3}}_{\#4} \dots}_{\#(n_3-2)} \#(n_3-1)}_{\text{Башен} = n_3}$$

$3 \uparrow\uparrow\uparrow n_3 \ominus$  «Вложение из  $n_3$  башен»

$$3 \uparrow\uparrow\uparrow 3 \ominus 3 \uparrow\uparrow (3 \uparrow\uparrow 3) \ominus 3 \uparrow\uparrow \left\{ 3^{3^{3^3}} \right\} n = 3^{3^3} \ominus 3^{3^{3^3}} \left\{ n = 3^{3^{3^3}} \right\} n = \dots \left\{ n = 3^{3^{3^3}} \right\} n = 3^{3^{3^3}} \left\{ n = 3^{3^{3^3}} \right\} n = 7.6 * 10^{12}$$

Башен =  $3^{3^{3^3}} \left\{ n = 7.6 * 10^{12} \right\}$

$$3 \uparrow\uparrow\uparrow 4 \ominus 3 \uparrow\uparrow (3 \uparrow\uparrow (3 \uparrow\uparrow 3)) \ominus 3 \uparrow\uparrow \left\{ 3^{3^{3^3}} \right\} n = 3^{3^{3^3}} \left\{ n = 3^{3^{3^3}} \right\} n = \dots \left\{ n = 3^{3^{3^3}} \right\} n = 3 \uparrow\uparrow 3_{\#3}$$

Башен =  $3 \uparrow\uparrow\uparrow 3$  #4

$$3 \uparrow\uparrow\uparrow 5 \ominus \underbrace{3 \uparrow\uparrow (3 \uparrow\uparrow (3 \uparrow\uparrow (3 \uparrow\uparrow 3)))}_{n_4=5} \ominus 3 \uparrow\uparrow (3 \uparrow\uparrow\uparrow 4) \ominus 3^{3^{3^3}} \left\{ n = 3^{3^{3^3}} \right\} n = \dots \left\{ n = 3^{3^{3^3}} \right\} n = 3 \uparrow\uparrow 3_{\#3}$$

Башен =  $3^{3^{3^3}} \left\{ n = 3^{3^{3^3}} \right\} n = \dots \left\{ n = 3^{3^{3^3}} \right\} n = 3 \uparrow\uparrow\uparrow 3$

Башен =  $3 \uparrow\uparrow\uparrow 3$  #5 #4

$$3 \uparrow\uparrow\uparrow n_4 \ominus \underbrace{3 \uparrow\uparrow 3 \uparrow\uparrow 3 \uparrow\uparrow \dots \uparrow\uparrow 3}_{n_4} \ominus 3^{3^{3^3}} \left\{ n = 3^{3^{3^3}} \right\} n = \dots \left\{ n = 3^{3^{3^3}} \right\} n = 3 \uparrow\uparrow 3_{\#3}$$

Башен =  $3^{3^{3^3}} \left\{ n = 3^{3^{3^3}} \right\} n = \dots \left\{ n = 3^{3^{3^3}} \right\} n = 3 \uparrow\uparrow\uparrow 3$

Башен =  $3 \uparrow\uparrow\uparrow 3$

Башен =  $3^{3^{3^3}} \left\{ n = \dots \left\{ n = 3^{3^{3^3}} \right\} n = 3 \uparrow\uparrow\uparrow 3 \right\}$  #n<sub>4</sub> #5

#4 Вложений = n<sub>4</sub>

⊖ «Кассета из n<sub>4</sub> вложений»

Гипероператор-7

$3 \uparrow\uparrow\uparrow\uparrow 3 \ominus 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = \dots \} n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3 \uparrow\uparrow\uparrow 3$

Башен =  $3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = \dots \} n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3 \uparrow\uparrow\uparrow 3$

Башен =  $3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = \dots \} n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3 \uparrow\uparrow\uparrow 3$

Башен =  $3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = \dots \} n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3 \uparrow\uparrow\uparrow 3$

Вложений =  $3 \uparrow\uparrow\uparrow 3$

$3 \uparrow\uparrow\uparrow\uparrow 4 \ominus 3 \uparrow\uparrow\uparrow (3 \uparrow\uparrow\uparrow (3 \uparrow\uparrow\uparrow 3)) \ominus 3 \uparrow\uparrow\uparrow 3 \uparrow\uparrow\uparrow\uparrow 3 \ominus 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = \dots \} n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3 \uparrow\uparrow\uparrow 3$

Башен =  $3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = \dots \} n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3 \uparrow\uparrow\uparrow 3$

Башен =  $3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = \dots \} n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3 \uparrow\uparrow\uparrow 3$

Башен =  $3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = \dots \} n = 3^{3^{3^{3^{\cdot^{\cdot^{\cdot}}}}}n = 3 \uparrow\uparrow\uparrow 3$

Вложений =  $3 \uparrow\uparrow\uparrow\uparrow 3$

$$3 \uparrow\uparrow\uparrow\uparrow 5 \ominus 3 \uparrow\uparrow\uparrow (3 \uparrow\uparrow\uparrow\uparrow 4) \ominus 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \boxed{3 \uparrow\uparrow\uparrow 3}$$

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \boxed{3 \uparrow\uparrow\uparrow 3}$

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \boxed{3 \uparrow\uparrow\uparrow 3}$

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \boxed{3 \uparrow\uparrow\uparrow 3}$

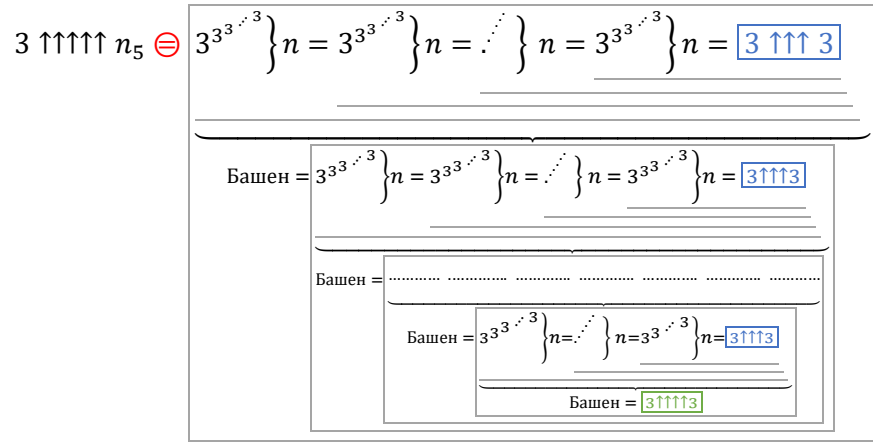
Вложений =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \boxed{3 \uparrow\uparrow\uparrow 3}$

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \boxed{3 \uparrow\uparrow\uparrow 3}$

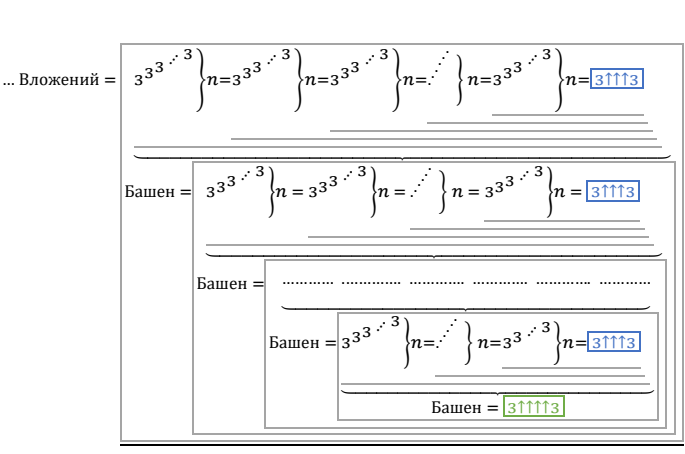
Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \boxed{3 \uparrow\uparrow\uparrow 3}$

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \boxed{3 \uparrow\uparrow\uparrow 3}$

Вложений =  $\boxed{3 \uparrow\uparrow\uparrow\uparrow 3}$



Вложений = ...



Вложений =  $\boxed{3 \uparrow \uparrow \uparrow 3}$

Кассет =  $n_5$

$3 \uparrow \uparrow \uparrow \uparrow n_5 \ominus$  **Батарея** из  $n_5$  кассет

$$3 \uparrow\uparrow\uparrow\uparrow\uparrow 3 \ominus$$

$$3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3 \uparrow\uparrow\uparrow 3$$


---

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3 \uparrow\uparrow\uparrow 3$

---

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3 \uparrow\uparrow\uparrow 3$

---

Башен =  $3 \uparrow\uparrow\uparrow 3$

Вложений = ...



... Вложений =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3 \uparrow\uparrow\uparrow 3$

---

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3 \uparrow\uparrow\uparrow 3$

---

Башен =  $3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = \dots \} n = 3^{3^{3^{\cdot^{\cdot^{\cdot^3}}}}} \} n = 3 \uparrow\uparrow\uparrow 3$

---

Башен =  $3 \uparrow\uparrow\uparrow 3$

Вложений =  $3 \uparrow\uparrow\uparrow 3$

Кассет =  $3 \uparrow\uparrow\uparrow\uparrow\uparrow 3$