Medulla

2.5 second, 128 megabytes
By PakinDioxide

Finally, Toda just figured how to do modulo operations. Toda is a normal student in grade 20. Each day, her teacher, Demo, will always give homework. The homework has t questions, the each question is to find the value of $f(x)$ mod $20,011$. While $f(x)$ has an equation shown below.

$$f(x) = \begin{cases} x^3 & x \leq 2 \\ f(x-3)^3 + f(x-2) \times f(x-1) & \text{otherwise} \end{cases}$$

Input

First line An integer t: The number of questions $(1 \leq t \leq 7,500,000)$
Next t lines An integer x $(0 \leq x \leq 7,500,000)$.

Output

For each question Output the value of $f(x)$ mod $20,011$ with a new line.

Input and Output Example

Input Example	Output Example
3 2 3 4	8 8 65
5 7 9 10 3 2	11080 7908 11254 8 8