

Project Euler #1: Multiples of 3 and 5



This problem is a programming version of [Problem 1](#) from [projecteuler.net](#)

If we list all the natural numbers below **10** that are multiples of **3** or **5**, we get **3, 5, 6** and **9**. The sum of these multiples is **23**.

Find the sum of all the multiples of **3** or **5** below N .

Input Format

First line contains T that denotes the number of test cases. This is followed by T lines, each containing an integer, N .

Constraints

- $1 \leq T \leq 10^5$
- $1 \leq N \leq 10^9$

Output Format

For each test case, print an integer that denotes the sum of all the multiples of **3** or **5** below N .

Sample Input 0

```
2
10
100
```

Sample Output 0

```
23
2318
```

Explanation 0

For $N = 10$, if we list all the natural numbers below **10** that are multiples of **3** or **5**, we get **3, 5, 6** and **9**. The sum of these multiples is **23**.

Similarly for $N = 100$, we get **2318**.

* Solution :

- Multiples of 3 in $[1, n]$ interval:

$$\begin{aligned} & 3 + 6 + 9 + \dots + 3 \cdot (n//3) \\ &= 3 \cdot 1 + 3 \cdot 2 + 3 \cdot 3 + \dots + 3 \cdot (n//3) \\ &= 3 \cdot (1 + 2 + 3 + \dots + n//3) \\ &= 3 \cdot \frac{n//3}{2} \cdot (1 + n//3) \end{aligned}$$

- Sum of consecutive numbers:

$$1 + 2 + 3 + \dots + N = \frac{N \cdot (N+1)}{2}$$

- (Sum of Multiples) of 3 and 5 ~~is~~ $= S(3) + S(5) - S(15)$
 $\rightarrow (S)$