

Contest Duration: 2025-10-25(Sat) 23:00 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251025T2100&p1=248>) - 2025-10-26(Sun) 00:40 (<http://www.timeanddate.com/worldclock/fixedtime.html?iso=20251025T2240&p1=248>) (local time) (100 minutes)

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## G - Sum of Pow of Mod of Linear

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Time Limit: 4 sec / Memory Limit: 1024 MiB

Score : 625 points

### Problem Statement

You are given integers  $N, M, A, B, X, R$ .

Find the remainder when  $\sum_{k=0}^{N-1} X^{(Ak+B) \bmod M}$  is divided by  $R$ .

You are given  $T$  test cases, so find the answer for each of them.

### Constraints

- $1 \leq T \leq 100$
- $1 \leq N, M, R \leq 10^9$
- $0 \leq A, B < M$
- $1 \leq X < R$
- All input values are integers.

### Input

The input is given from Standard Input in the following format:

2026-01-02 (Fri)  
05:32:23 +11:00

$T$   
case<sub>1</sub>  
case<sub>2</sub>  
⋮  
case <sub>$T$</sub>

Each test case case <sub>$i$</sub>  is given in the following format:

$N \ M \ A \ B \ X \ R$

## Output

Print  $T$  lines.

On the  $i$ -th line, print the remainder when  $\sum_{k=0}^{N-1} X^{(Ak+B) \bmod M}$  is divided by  $R$  for the  $i$ -th test case.

## Sample Input 1

Copy

```
3
4 5 2 1 2 1000000000
777 429 33 58 1 1000000000
20251025 429429 777 1025 575757 998244353
```

Copy

## Sample Output 1

Copy

```
15
777
445271630
```

Copy

Consider the first test case.

- When  $k = 0$ :  $X^{(Ak+B) \bmod M} = 2^{(2 \times 0 + 1) \bmod 5} = 2^1 = 2$ .
- When  $k = 1$ :  $X^{(Ak+B) \bmod M} = 2^{(2 \times 1 + 1) \bmod 5} = 2^3 = 8$ .
- When  $k = 2$ :  $X^{(Ak+B) \bmod M} = 2^{(2 \times 2 + 1) \bmod 5} = 2^0 = 1$ .
- When  $k = 3$ :  $X^{(Ak+B) \bmod M} = 2^{(2 \times 3 + 1) \bmod 5} = 2^2 = 4$ .

From the above, the desired value is the remainder when  $2 + 8 + 1 + 4$  is divided by 1000000000, which is 15. Therefore, print 15 on the 1st line.

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