

Soul Link

Input file: **standard input**
Output file: **standard output**
Time limit: 2 seconds
Memory limit: 256 megabytes

You are playing an adventure game. As a mage, you need to use magic to deal with several enemies in front of you. Each enemy has a level, which is an integer between 1 and n . An enemy of level i has 2^{i-1} health points.

You can use two kinds of spells:

- Soul Link: consumes m mana and applies the "Soul Link" effect to one enemy. This effect lasts until that enemy dies.
- Attack: consumes 1 mana and deals 1 damage to all enemies with the Soul Link effect, i.e. decreases their health by 1. Once an enemy's health drops to 0, that enemy dies, and you gain m mana as a reward.

Among the enemies in front of you, there are a_i enemies of level i . You may use the two spells any number of times, but at any time your mana cannot be less than 0. What is the minimum initial mana you need in order to defeat all enemies?

Input

The first line contains an integer T ($1 \leq T \leq 500$), denoting the number of test cases.

For each test case, the first line contains two integers n, m ($1 \leq n \leq 30, 1 \leq m \leq 10^{18}$), representing the maximum enemy level and the mana cost of Soul Link, respectively.

The second line contains n positive integers. The i -th integer a_i denotes the number of enemies of level i .

For each test case, it is guaranteed that $0 \leq a_i \leq 10^9$ and $\sum_{i=1}^n a_i > 0$.

Output

For each test case, output one line containing an integer, denoting the minimum initial mana required to defeat all enemies.

Example

standard input	standard output
2	34
5 7	48
5 2 4 1 2	
6 4	
1 1 4 5 1 4	

Note

Explanation for the first test case:

Initially, there are 14 enemies, with health values 1, 1, 1, 1, 1, 2, 2, 4, 4, 4, 4, 8, 16, 16.

With 34 mana initially, first apply Soul Link to the enemies with health 1, 1, 1, 1, leaving 6 mana.

Attack once, and the enemies' health becomes 0, 0, 0, 0, 1, 2, 2, 4, 4, 4, 4, 8, 16, 16. Four enemies die, leaving 33 mana.

Apply Soul Link to the enemies with health 1, 2, 2, 4, leaving 5 mana.

Attack once, and the enemies' health becomes 0, 1, 1, 3, 4, 4, 4, 8, 16, 16. One enemy dies, leaving 11 mana.
Apply Soul Link to the enemy with health 4, leaving 4 mana.

Attack once, and the enemies' health becomes 0, 0, 2, 3, 4, 4, 8, 16, 16. Two enemies die, leaving 17 mana.
Apply Soul Link to the enemies with health 4, 16, leaving 3 mana.

Attack twice, and the enemies' health becomes 0, 1, 2, 4, 8, 14, 16. One enemy dies, leaving 8 mana.
Apply Soul Link to the enemy with health 8, leaving 1 mana.

Attack once, and the enemies' health becomes 0, 1, 4, 7, 13, 16. One enemy dies, leaving 7 mana.

Attack once, and the enemies' health becomes 0, 4, 6, 12, 16. One enemy dies, leaving 13 mana.
Apply Soul Link to the enemy with health 4, leaving 6 mana.

Attack four times, and the enemies' health becomes 0, 2, 8, 16. One enemy dies, leaving 9 mana.
Apply Soul Link to the enemy with health 16, leaving 2 mana.

Attack twice, and the enemies' health becomes 0, 6, 14. One enemy dies, leaving 7 mana.

Attack six times, and the enemies' health becomes 0, 8. One enemy dies, leaving 8 mana.

Attack eight times, and all enemies die, leaving 0 mana.