Problem 3   Cable Thieves[1]

The Siruseri Telecom Corporation has set up a 26th generation hyperfast fibre optic network to connect the N cities in Siruseri. The Corporation, ever so systematic, first laid a network of underground tunnels, each connecting a pair of cities. The set of tunnels were built in such a way that there is exactly one path from any city in Siruseri to another through these tunnels. Following this, $\binom{N}{2}$ fibre optic cables were laid, each connecting one pair of cities through the tunnels along the unique path connecting them.

Daku Gabbar Singh would like to dig a hole into one of these tunnels and pull out all the cables that pass through this tunnel. The price at which a cable of length ℓ can be sold in the black market is ℓ^d, for some prespecified value d. Amazingly, all the tunnels have the same length and so length can be calculated in terms of the number of tunnels. Gabbar has asked his secretary Kalia to prepare a list containing the amount of money he can make for every choice of tunnel.

Kalia, ever the lazy one, attempted to have this project scrapped pointing out that these numbers may be very large. Gabbar has now instructed him to report all the numbers modulo 100000. Your task is to write a program to help Kalia in this task. Here is an example with 5 cities and 4 tunnels.
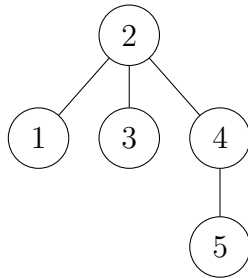
Digging into the tunnel connecting cities 1 and 2 will allow him to steal the four cables that connect 1 to the other four cities. You can check that this will give him cables of length $1, 2, 2$ and 3 and thus if $d = 1$ the total amount of money he will make from this tunnel is 8. With $d = 2$ the total amount of money would be $1+4+4+9 = 18$. On the other hand, if he chooses to dig into

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[1]Problem formulated by Nadeem

the tunnel connecting 2 to 4 he can pull out the cables connecting the pairs $\{(1,4),(2,4),(3,4),(1,5),(2,5),(3,5)\}$ with lengths $2,1,2,3,2,3$ respectively. Hence, with $d = 1$ the amount of money he can make is 13.

Input format

The first line of input contains two integers N and d. This is followed by $N - 1$ lines, each listing a pair of cities connected by a tunnel.

Output format

Your output should contain $N - 1$ lines, giving the amount of money that can be made from each of the $N - 1$ tunnels, listed in the same order as the tunnels are listed in the input.

Test Data

You may assume that $1 \leq N \leq 100000$ and $0 \leq d \leq 5$. You may further assume that in inputs worth at least 40% marks, $d \leq 1$.

Sample input 1	Sample output 1
5 1	8
1 2	8
2 3	13
2 4	9
4 5	

Sample input 2	Sample output 2
6 3	170
1 2	71
3 2	170
2 4	127
4 5	127
1 6	

Time and memory limits

The time limit for this task is 2 seconds. The memory limit is 76 MB (actual limit 64 MB, plus 12 MB buffer for 64-bit compilation).