Amusement Park (Solution)

We consider the graph whose vertices are the attractions in JOIOI park, and edges are the paths. Since this graph is connected, we can take a spanning tree. Hence it is enough to solve the task if the graph is a tree.

Let us consider the following strategy to tell the integer X:

- We put an integer between 0 and 59, inclusive, to each vertex. The way to do it should be the same for JOI-kun and IOI-chan.
- To each vertex, JOI-kun writes the value of a bit of X. The position of the bit is the integer of that vertex.
- For each integer between 0 and 59, inclusive, IOI-chan visits a vertex corresponding to it. Then she can recover the value of X.

By the following method, we can put an integer between 0 and 59, inclusive, to each vertex so that the following condition is satisfied:

> for each vertex, there is a subtree containing it such that the subtree also contains exactly one vertex corresponding to each integer between 0 and 59, inclusive.

The method is as follows:

1. To any vertex r, we can assign a subtree T_0 of size 60 containing it. For example, this can be achieved by the depth-first search from the vertex r.
2. To each of the vertices of T_0, we put an integer between 0 and 59, inclusive. Different vertices of T_0 should have different integers. Moreover, to each of these vertices, we assign the subtree T_0.
3. Assume that u, v are adjacent vertices such that a subtree T is assigned to u, and v is not contained in T. If we did not yet put an integer to v, we can put an integer and assign a subtree to v by the following way:
   - Take a leaf w of T different from u.
   - Let T' be the subtree obtained from T by removing w and appending v.
   - Put an integer of w to v. Assign the subtree T' to v.
4. Repeat the procedure 3 until we put an integer to every vertex.

By the above method, we also assign a required subtree for each vertex.

IOI-chan performs the depth-first search for this subtree. She can visit all vertices of the subtree by at most $2(|T| - 1) = 118$ moves.

Therefore, we can read all of the 0–59h bits of X. We can recover X successfully, and get full score.