

21 Elves on Strike

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Challenge

It's December and there's way too much to do in Santa's gift factory ... The working conditions of the ten elves working for him are even more terrible than during the rest of the year. So they get together and promptly decide to go on strike. Just as one of the elves, Alexis, agrees to work out the schedule for the strike until tomorrow morning, Santa Claus bursts in, puts two and two together and immediately knows what the elves are up to. Anxious to avoid a strike so close to Christmas at all costs, Santa announces that starting tomorrow, all the elves will have to work individually in their offices and will no longer be allowed to talk to each other. He then leave—pleased with himself and believing that he has prevented the planned strike—the gift factory.

But the elves sit together for a while, thinking back and forth about how they can still share the yet-to-be-developed strike schedule tomorrow. That's when Alexis says, "I have a plan! We're all being sent to the copy room over and over again. Santa will make sure that there are never more than one of us in there and that we don't leave any messages for each other. However, there is a secret locker in the wall for which we all have a key! Tomorrow morning before 6 am, I will put the strike schedule into the locker and lock it afterwards. Every time I find the locker unlocked, I will lock it again. Now, we just have to figure out a strategy to make sure that I know all of you have read the schedule. Because as soon as I know that, I'm going to call for an immediate strike over the speakers."

How should Alexis instruct *the other nine elves* to unlock / lock the locker in the copy room so that Alexis at some point knows with absolute certainty that all nine elves have seen the strike schedule, even though they have *no* influence on the order in which they are sent to the copy room?

Possible answers:

1. Every time they are sent to the copy room, they unlock the locker if it is locked. Otherwise, they do nothing.
2. Every time they are sent to the copy room, they lock the locker if it is unlocked. Otherwise, they do nothing.
3. Every time they are sent to the copy room, they unlock the locker if it is locked, and lock it if it is unlocked.
4. The first time they are sent to the copy room, they unlock the locker and then lock it again. Otherwise, they do nothing.
5. Every odd time they are sent to the copy room, they unlock the locker if it is locked. Otherwise, they do nothing.
6. Every even time they are sent to the copy room, they unlock the locker if it is locked. Otherwise, they do nothing.
7. Every odd time they are sent to the copy room, they lock the locker if it is unlocked. Otherwise, they do nothing.
8. The first time they find the locker locked, they unlock it. Otherwise, they do nothing.
9. The first time they find the locker unlocked, they lock it. Otherwise, they do nothing.
10. The first time they find the locker locked, they unlock it. And the first time they find it unlocked, they lock it. Otherwise, they do nothing.