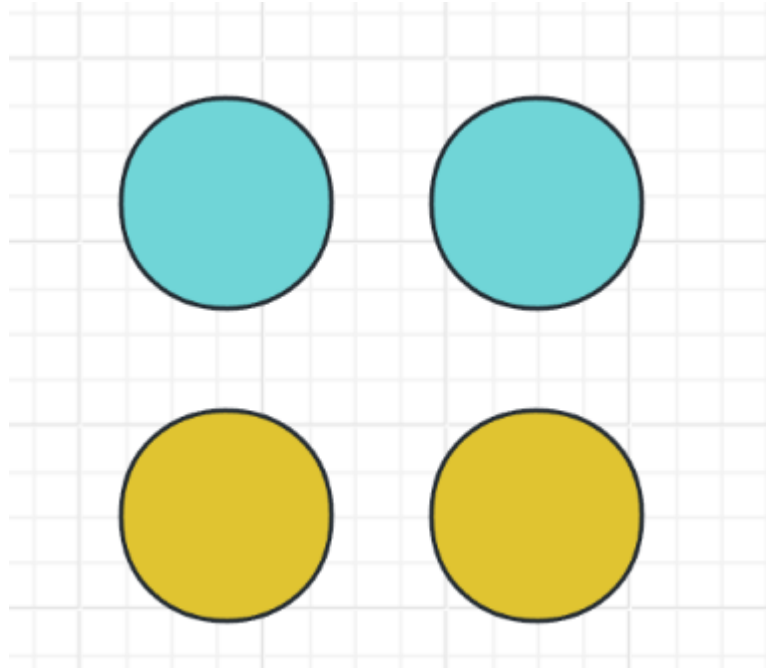


Answer: six (6)

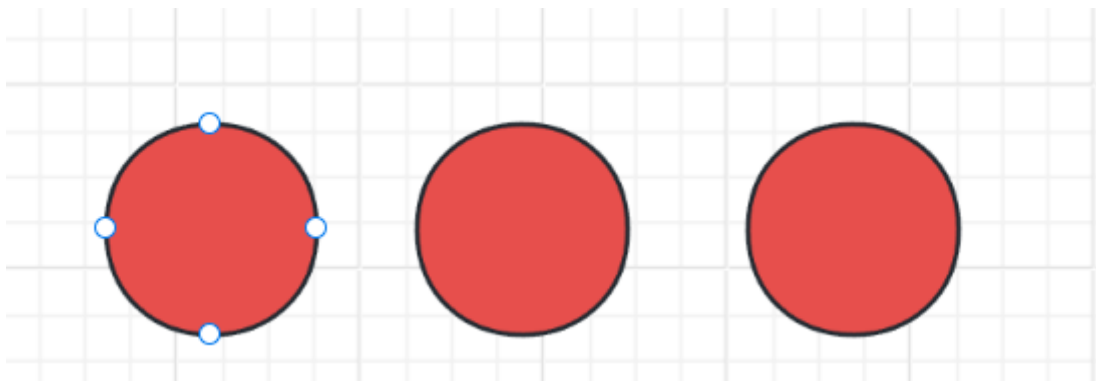
Reason:

Given the hint, we know that at least two logicians have dots of the same color.

1. On the first bell ring, four participants left. Imagine you are a logician and you see that there is one participant with a unique dot color. Given the condition that at least two participants have the same color, you can deduce that your dot is the same color as this participant's. Thus, the four participants who left in the first round each saw another participant with the same color dot, confirming their own dot color. This means there are exactly two participants for each of these two colors.

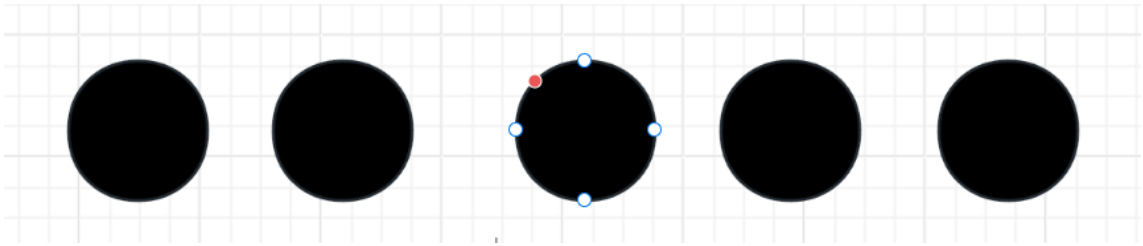


2. On the second bell ring, all participants with red dots left. If you are one of these participants, you observed two participants leaving in the first round. If you also see two other participants with red dots, you realize that these participants didn't leave in the first round because they saw another pair with the same color. Thus, you can deduce that your dot must also be red. Therefore, there were three participants with red dots.

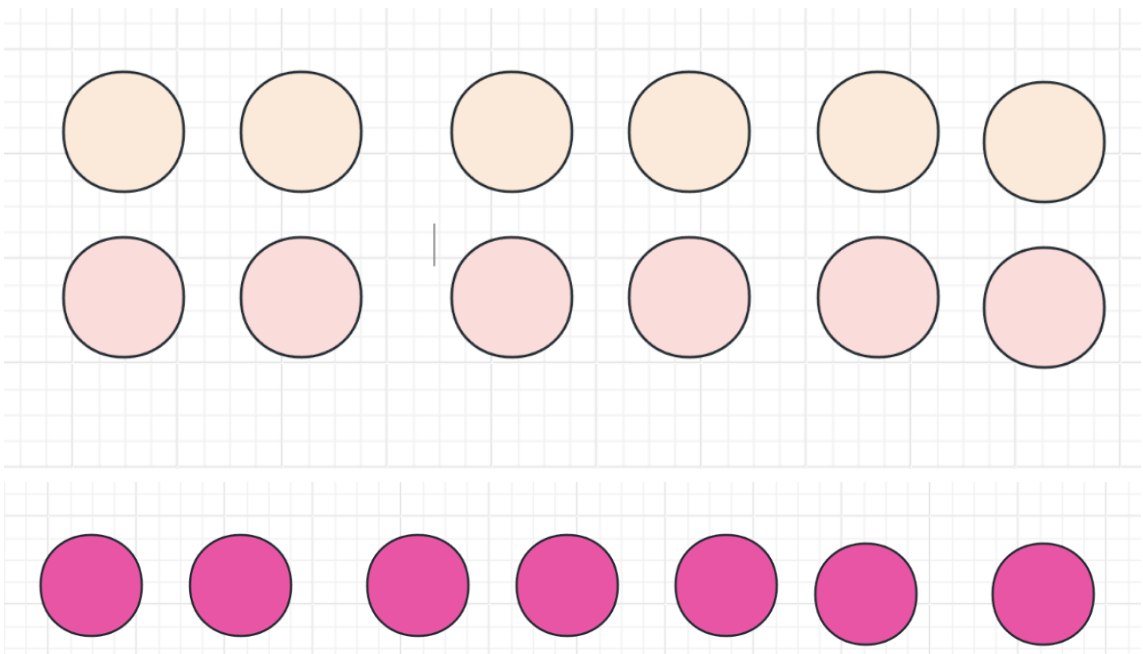


3. On the third bell ring, no one left, indicating that there are no four participants with the same color. If there were, those participants would have been able to deduce their dot color and left. For example, if you saw three participants with the same color and they didn't leave in the previous round, it would mean that those participants saw another triplet with the same color. So no one left in this round because there wasn't a group of four.

4. On the fourth bell ring, at least one participant left. This suggests that there is a group of participants, at least five, with the same color. If you were part of this group, you saw four participants with the same color. Since they didn't leave previously, they must have seen another set of four participants with the same color. Therefore, on the fourth bell ring, at least one participant left, indicating that at least five participants had the same color. If we assume there is only one such color, then five participants left.



5. On the fifth bell ring, at least six participants with the same color left. According to the problem statement, the participant who asked the initial question, his sister, and some other participants left. Since he and his sister had different colors, at least 12 participants left in this round. Now, there are 7 participants remaining, which means they all have same colors and will leave together on the next bell ring, confirming the assumption.



So, a total of six bell rings were needed.

Summary:

1. **First bell ring:** Four participants left, indicating there are two colors, each with two participants.
2. **Second bell ring:** All participants with red dots left, totaling three participants.
3. **Third bell ring:** No one left, indicating there are no four participants with the same color.
4. **Fourth bell ring:** At least one participant left, indicating there are at least five participants with the same color. If we assume there is only one such color, then five participants left.

5. **Fifth bell ring:** At least six participants with the same color left, including the participant who asked the initial question, his sister, and some other participants. Since the questioner and his sister had different colors, at least 12 participants left.

Now, there are 7 participants remaining, and they all have the same color. On the next bell ring, these participants will leave together.

Therefore, the total number of bell rings is six.