Question: 40 people are sitting around a table. Everyone noticed that one of the people sitting beside him is wearing a dress of the same colour as him, but the other one was wearing a dress of different colour. What is the number of different dress colours of those people?

Solution. Let us choose one of the people as the starting point (*"first* person*"*) and numerate the dress colours (**1**, **2**, etc.).
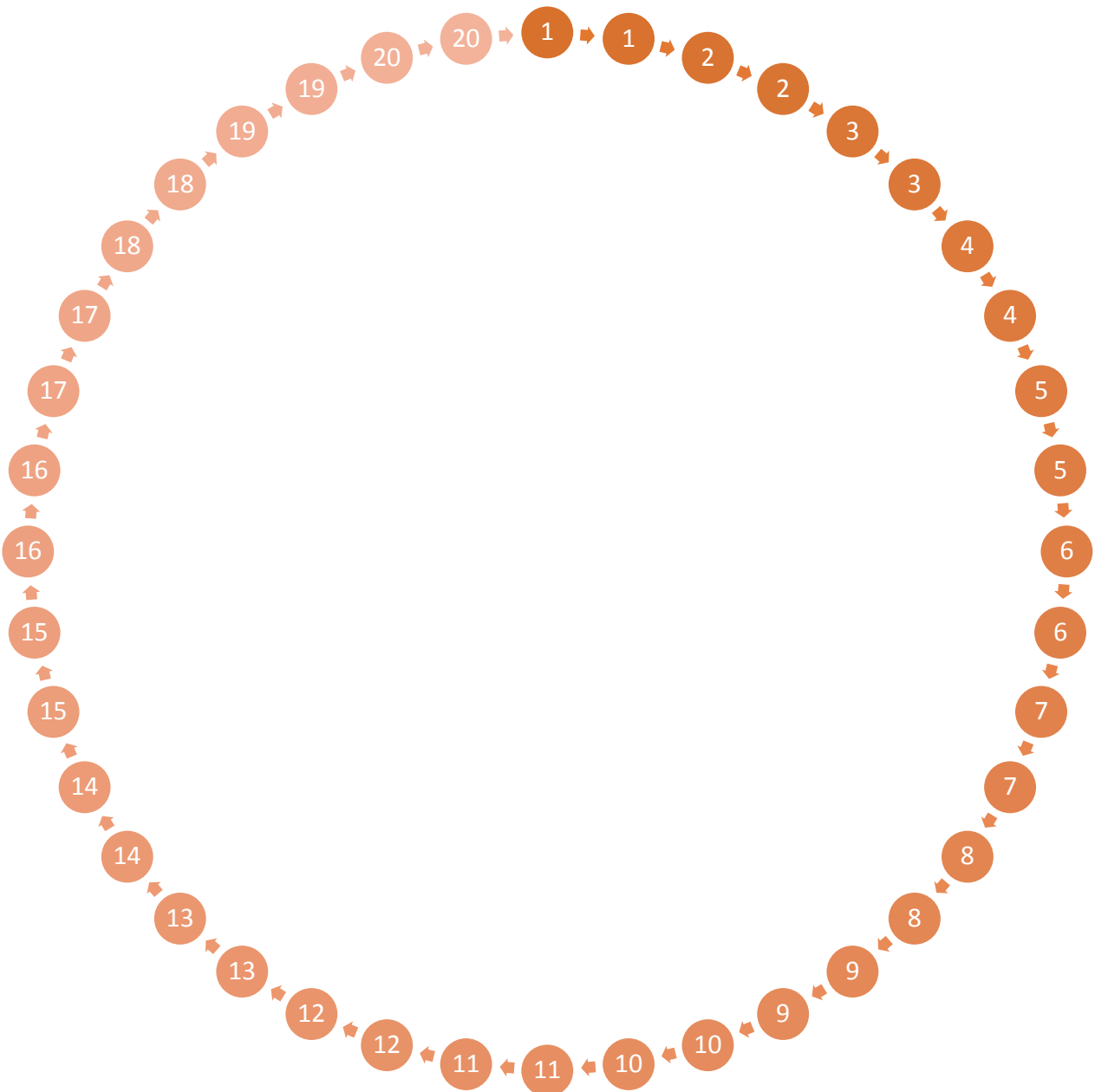
The *first* person should have a neighbour with similar dress colour; therefore, the *second* person will also be dressed in colour 1.

We now focus on the *second* person. He or she already has a neighbour with similar dress colour (*first* person); therefore, his or her other neighbour (*third* person) should not be dressed in colour **1**.

Denote the dress colour of the *third* person as **2**.

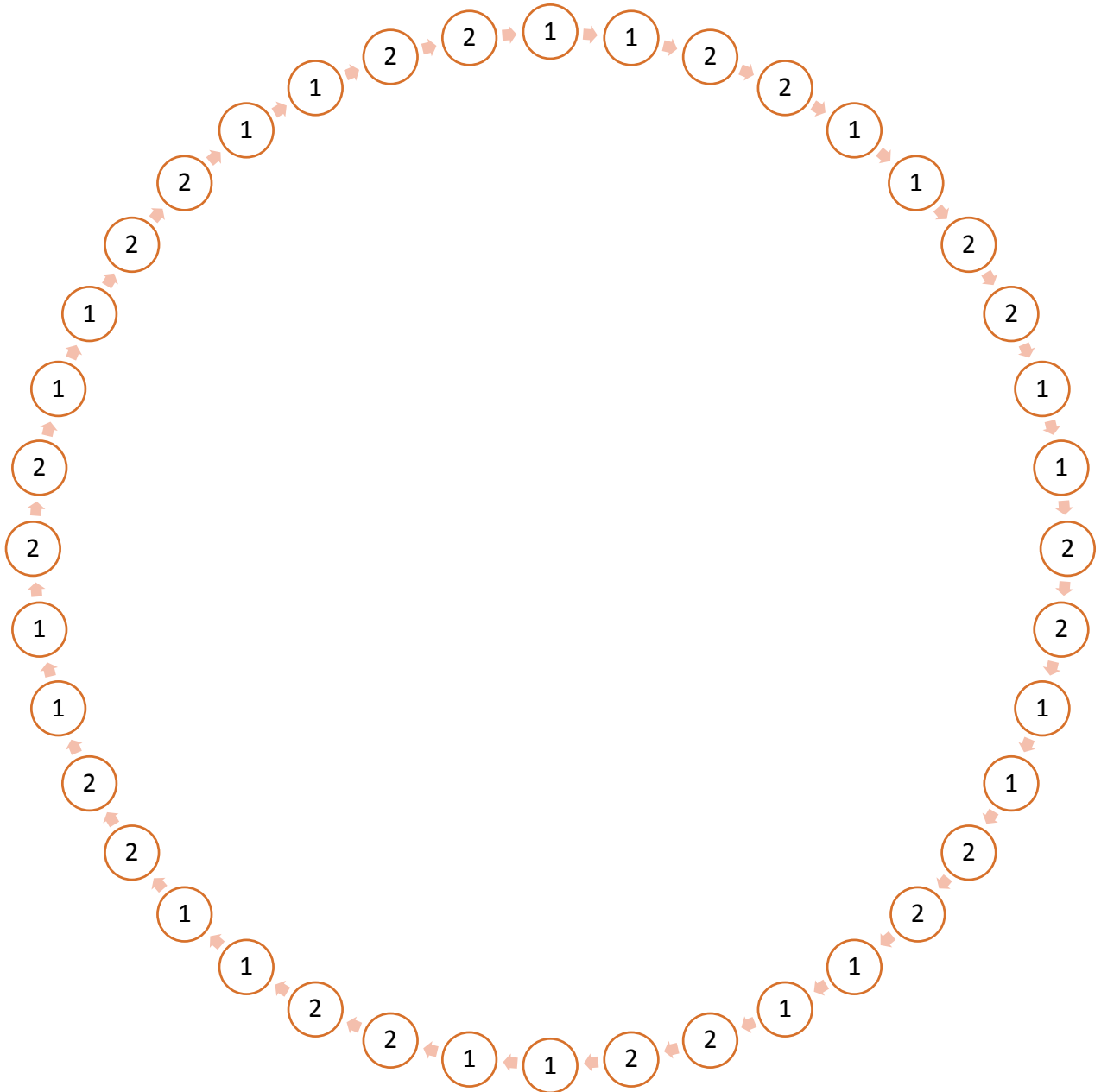Applying the same logic, we obtain that the *fourth* person should be dressed in colour **2**.

We can continue in the same manner and receive the following:

Note that the solution above is possible due to the fact that 40 is divisible by 2, and so the *fortieth* person is not dressed in the same colour as the *first*.
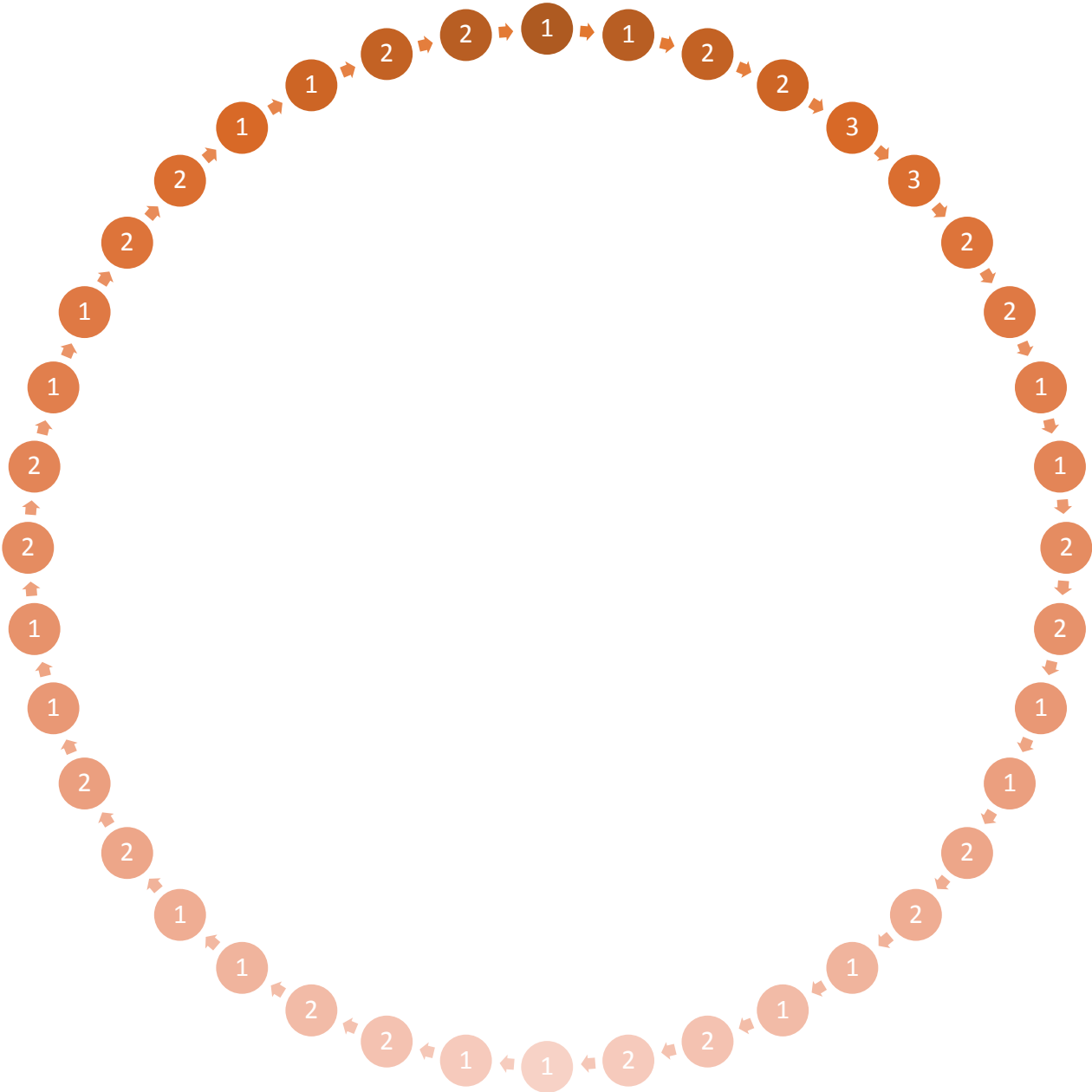
We have thus shown that the people in our question can be dressed in **20 different colours**.

However, this is not the only solution: we can repeat the initial steps, but instead of dressing the *fifth* person in colour **3**, dress him or her in colour **1** again, and so on:

Thus, another possible answer to this question is **2 different colours**.

Finally, we note that for every pair of neighbours dressed in the same colour, we can replace this colour with a new one without violating the rules, e.g. take the previous solution and only change the dress colour of the *fifth* and *sixth* person:

We see that **3** is also a possible answer to this problem.

In this manner, we can dress the people in any number of different colours between 2 and 20.

Answer. The 40 people can be dressed in any number of different colours between 2 and 20, inclusive ($2 \leq x \leq 20$, where x is the number of different colours).