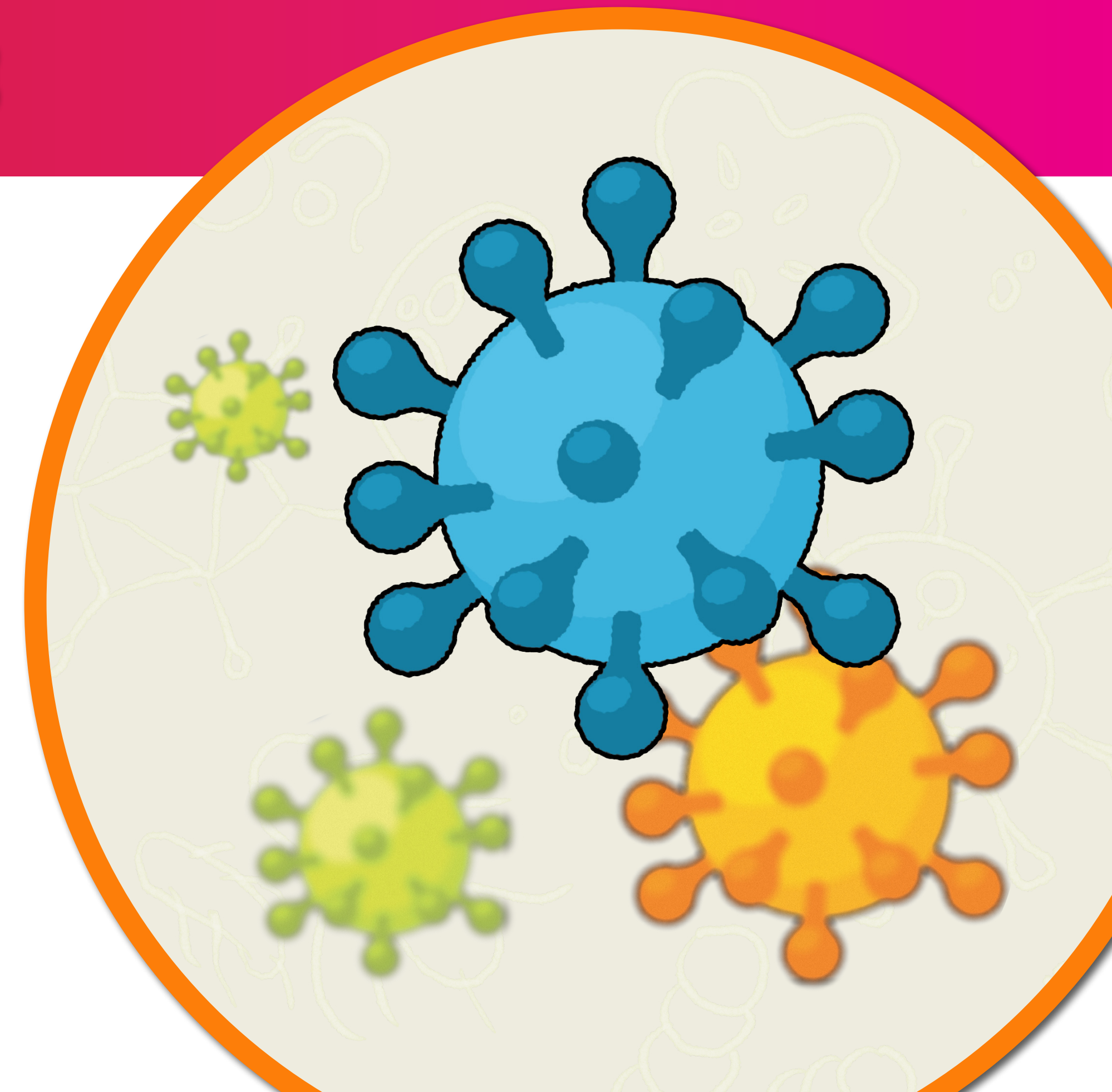
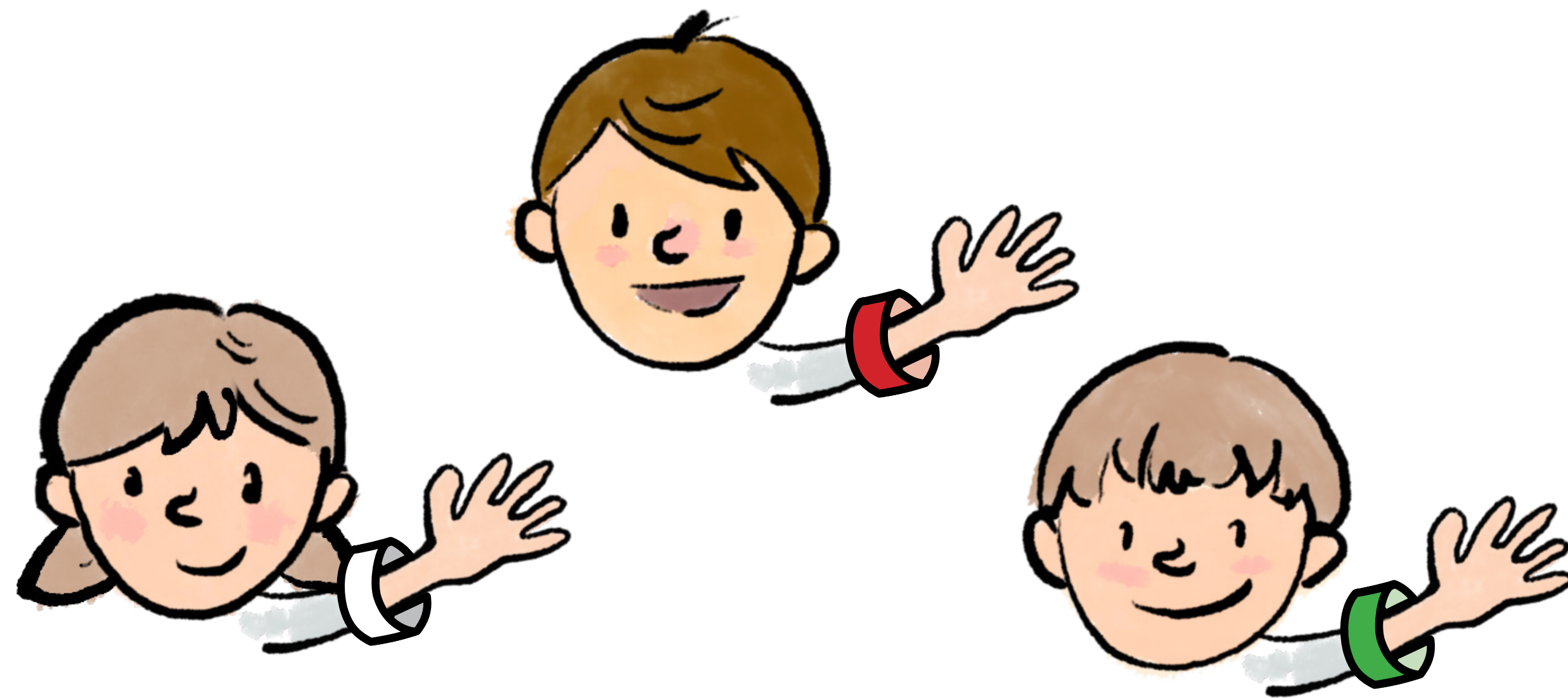


INDOOR GAME FOR CHILDREN: HOW DISEASES SPREAD

... AND WHY WE HAD TO STAY AT HOME



PREPARATIONS

This game is a useful addition to educational topics such as:

- Why do we get sick?
- What are viruses and microbes?
- How do they spread?
- How does a body fight against them?
- How can we protect ourselves against such diseases?

In order to play this game, you will need to do the following pre-steps and provide required props:

- Each player crafts three paper bracelets: one white, one red and one green
- Each player needs to be able to read and understand numbers on a six-sided dice
- Each player gets one dice or the entire group uses at least P number of dices (to make the game go faster)
- Prepare tokens that will be used by infected players for counting the game rounds (e.g. paper cut outs of flowers or stars)
- Describe to players how the numbers in each round will be visualized with histogram (explained in the appendix)

PREPARATIONS

During the game, the players will interchangeably wear three colored paper bracelets:



White bracelet
(identifies a healthy person
which is not immune)



Red bracelet
(identifies a sick/infected
person)



Green bracelet
(identifies a healthy
and immune person)

SETTING UP THE GAME PARAMETERS

This game is a simplified version of the SIR model of disease spread. The game has three parameters that control progression of the number of infected and the number of recovered players:

K = probability of a disease transmission

P = number of potentially infected people

N = duration of illness

SETTING UP THE GAME PARAMETERS

GAME A: This setup results in a fast growth of infected (uncontrolled epidemic spread).

Number of players in the game →

	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
K	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
P	3	3	3	4	4	4	4	5	5	5	6	6	6	7	7	7
N	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

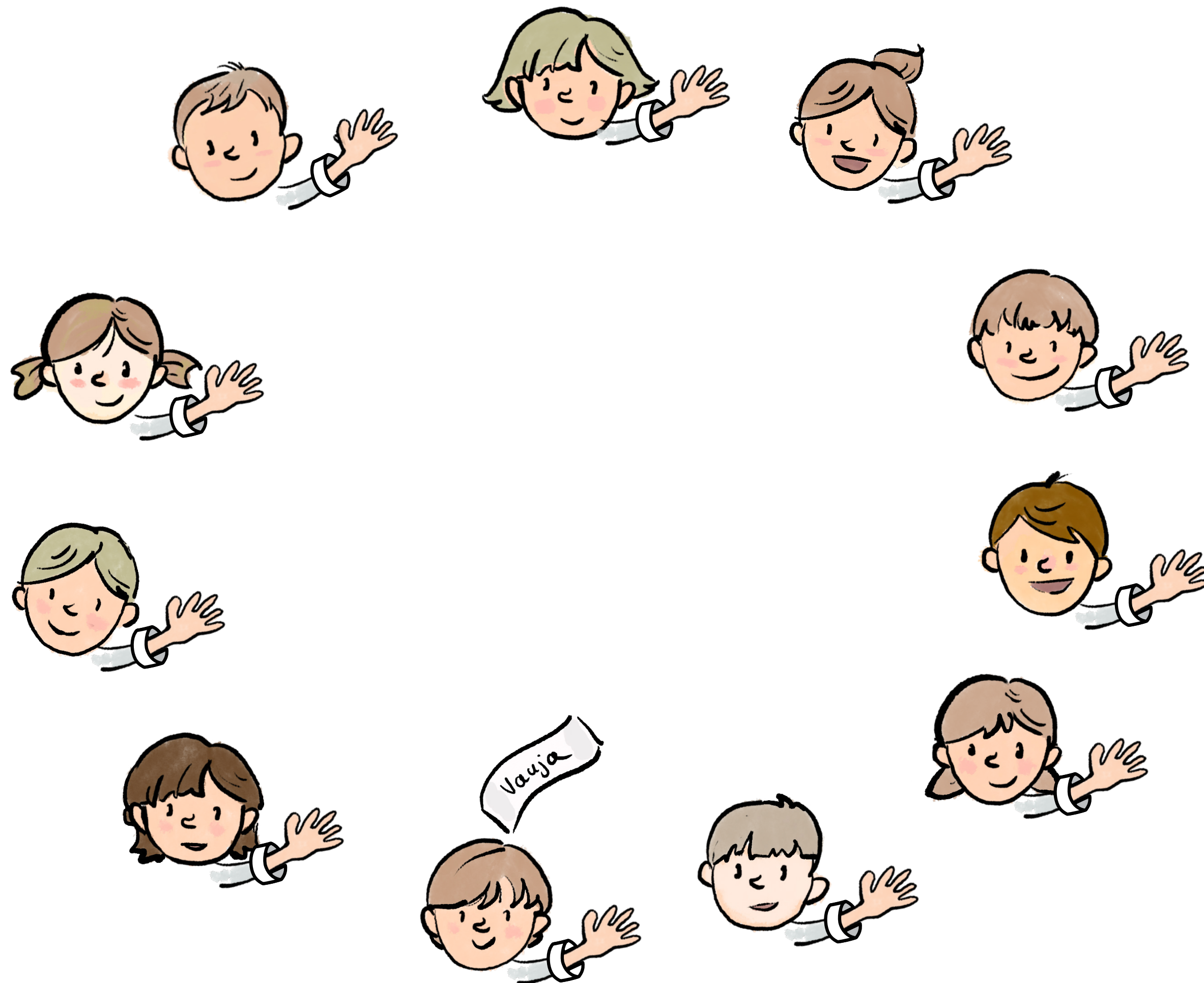
SETTING UP THE GAME PARAMETERS

GAME B: This setup slows down epidemic spread, resulting in a lower number of infected, but epidemic spread will last longer.

Number of players in the game →		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	K	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	P	1	1	1	1	2	2	2	2	3	3	3	3	3	4	4	4
	N	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4

GAME B shows why we had to stay at home: to reduce the number P, i.e. the number of people we come in contact with and thus potentially infect them. When we are not careful, we get in contact with a lot of people, making P larger (GAME A).

INTRODUCTORY STEP – PART ONE



All players form a circle.

Each player in the circle wears a white bracelet.

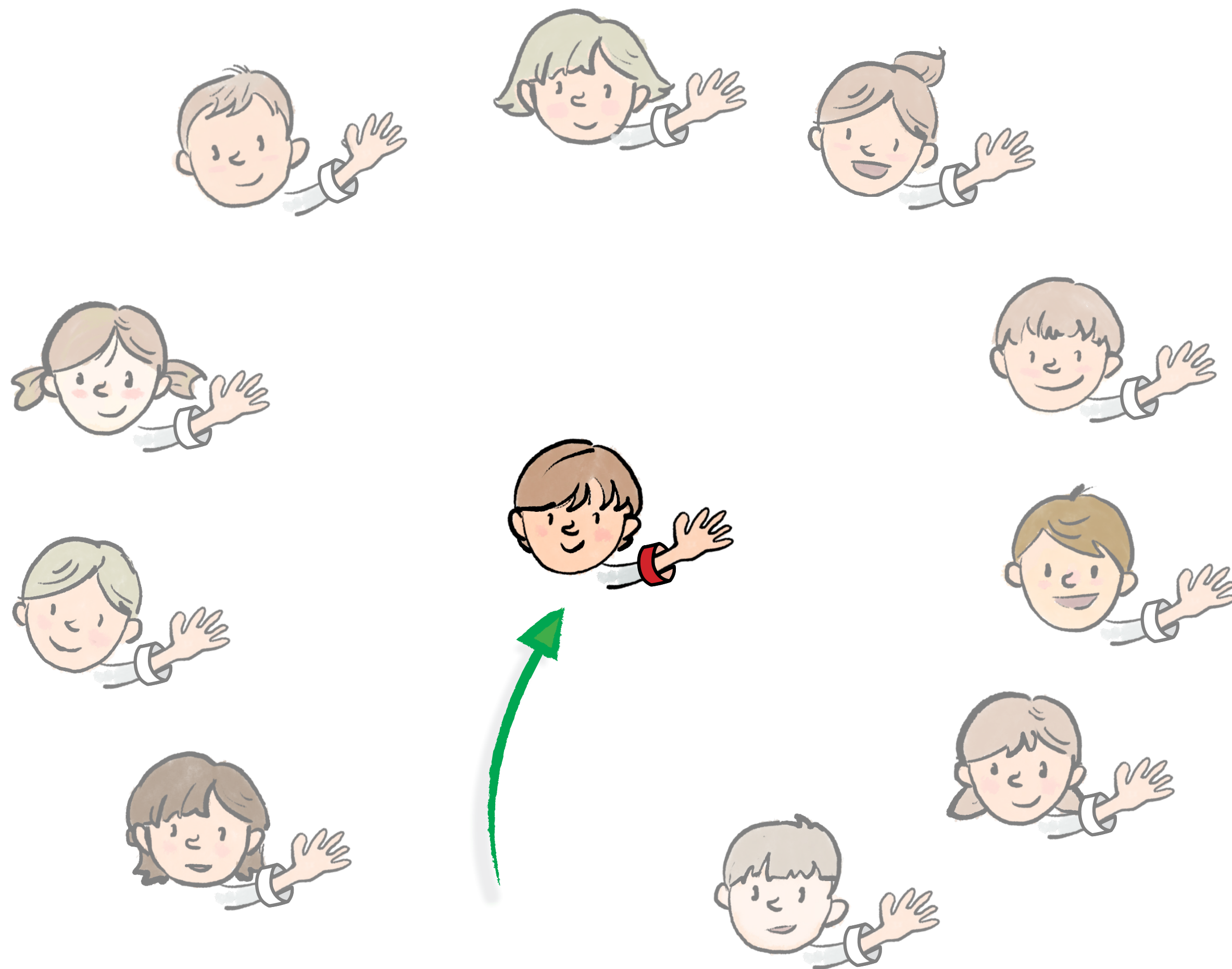
The game host has a bag with names of each player written on a piece of paper.

The host then draws a random piece of paper from the bag: this is the name of the first infected.



That piece of paper/name is then removed from the game - so it cannot be drawn again.

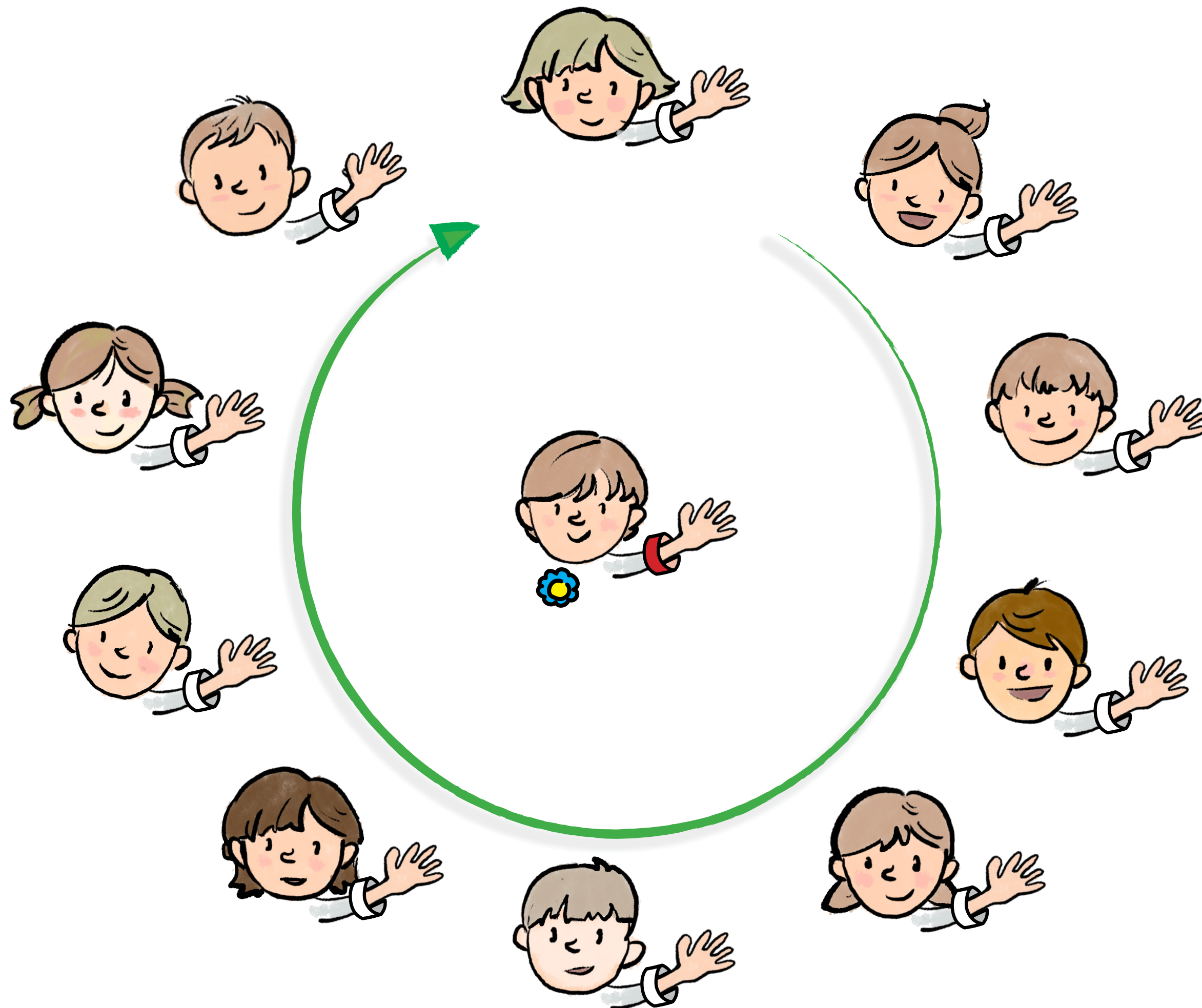
INTRODUCTORY STEP – PART TWO



The first infected player replaces their white bracelet with a red one and sits in the middle of the circle.

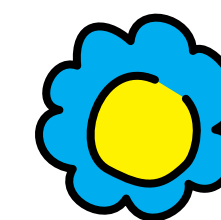
Each infected player waits for N game rounds in a recovery in order to become healthy again.

1ST STEP

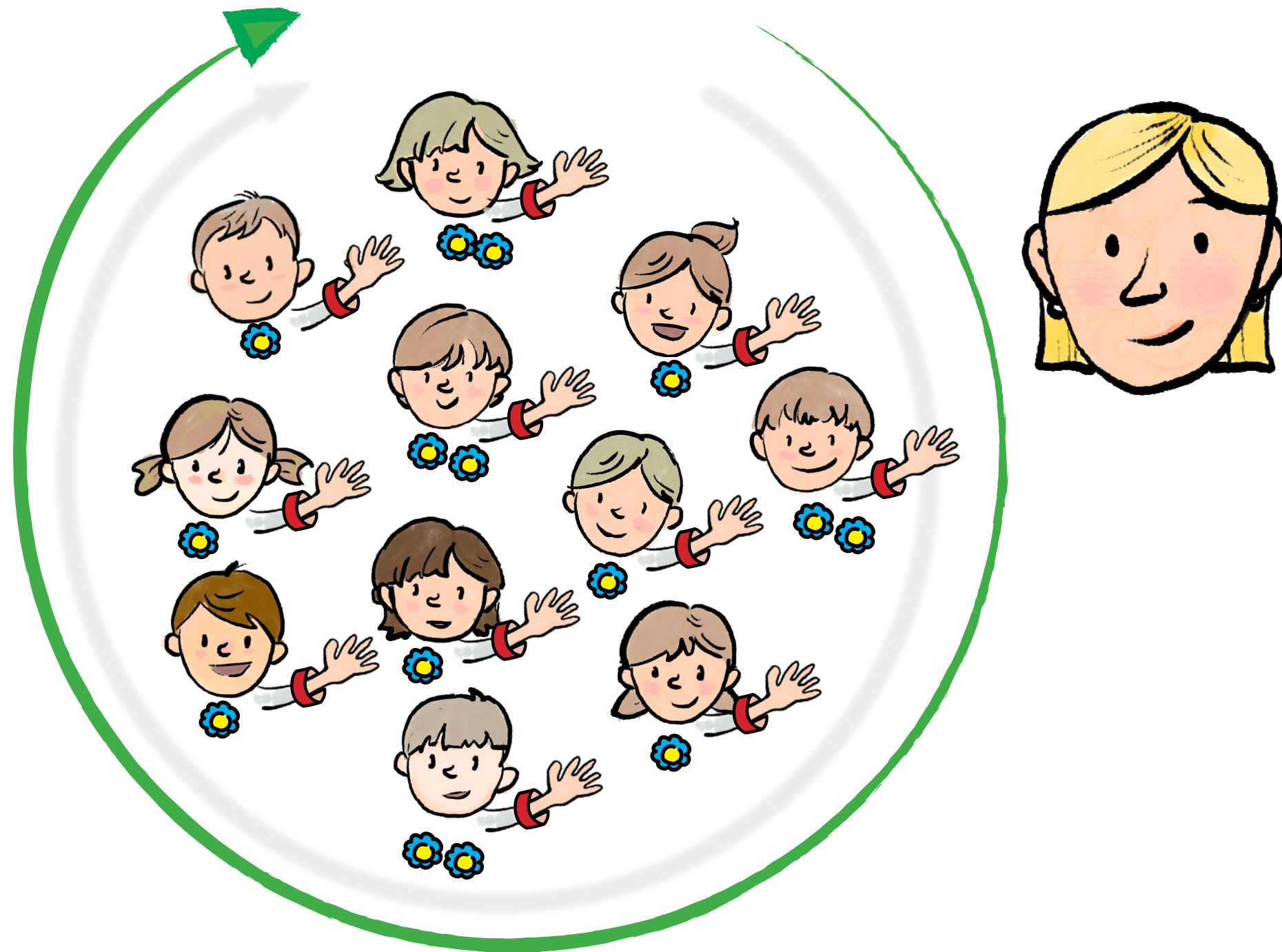


Players that are not wearing a red bracelet walk one full lap around the infected players sitting in the center. After that they stop and sit down.

Each infected player sitting inside the circle gets one token that marks a round they spent sitting in a recovery:



1ST STEP: NOTE 1

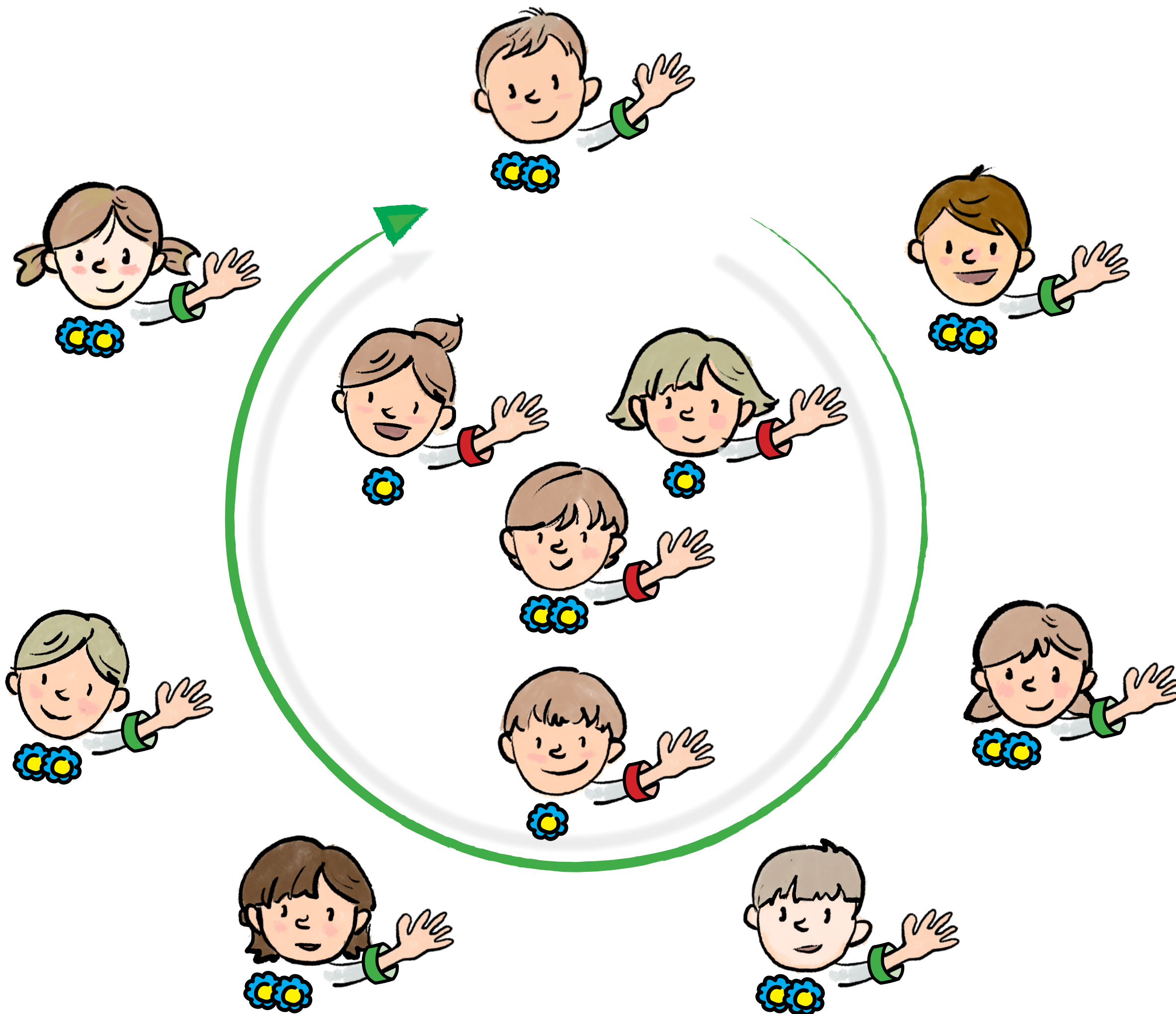


If every player in the game in an ongoing round is marked as infected (i.e. wearing a red bracelet), the game host then walks one lap around the group.

After that, each infected players gets one token that marks that round (a round they spent sitting in a recovery).

The game than skips to the fifth step.

1ST STEP: NOTE 2

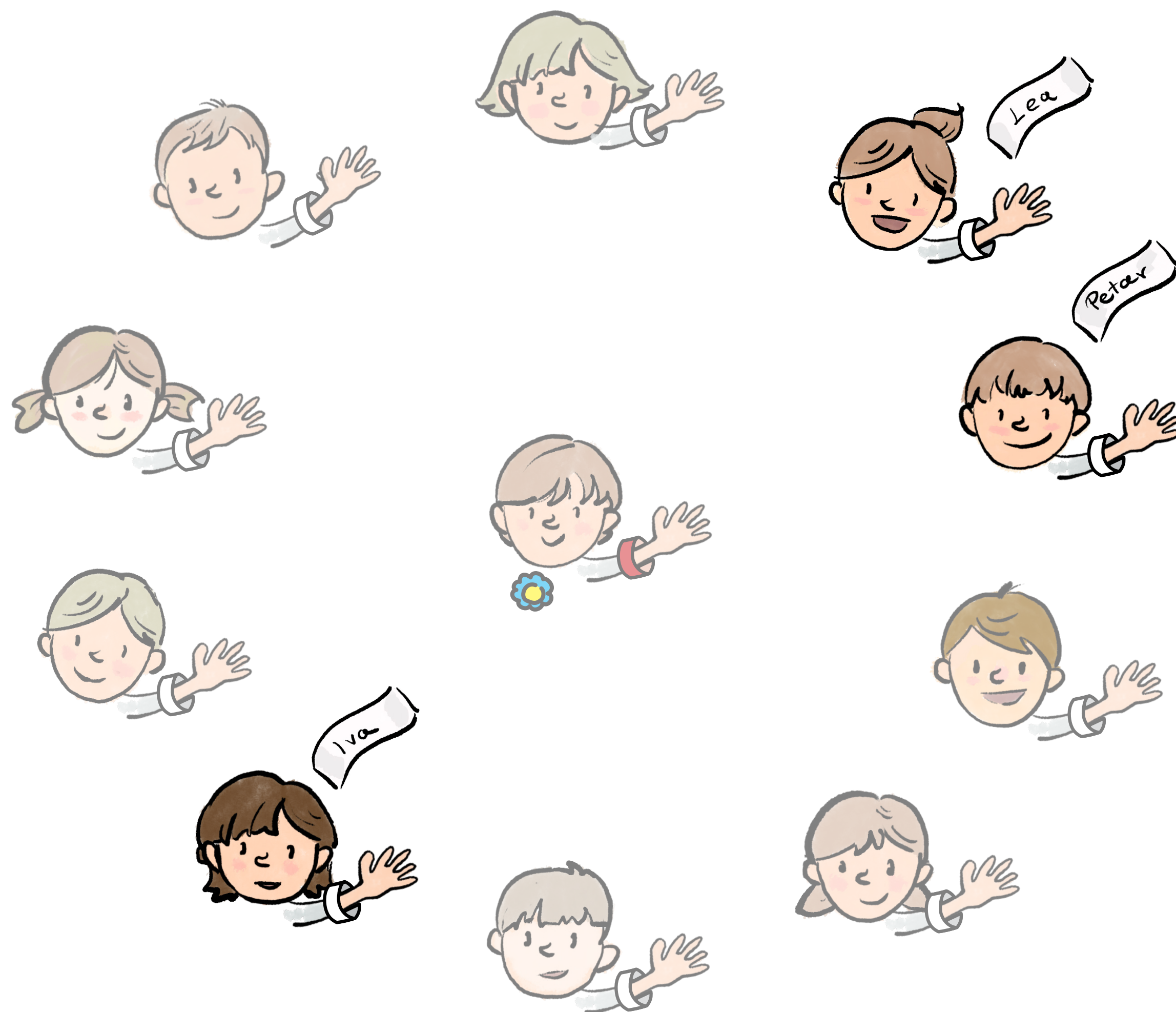


If there are no players wearing a white bracelet, then *all* players walk one lap.

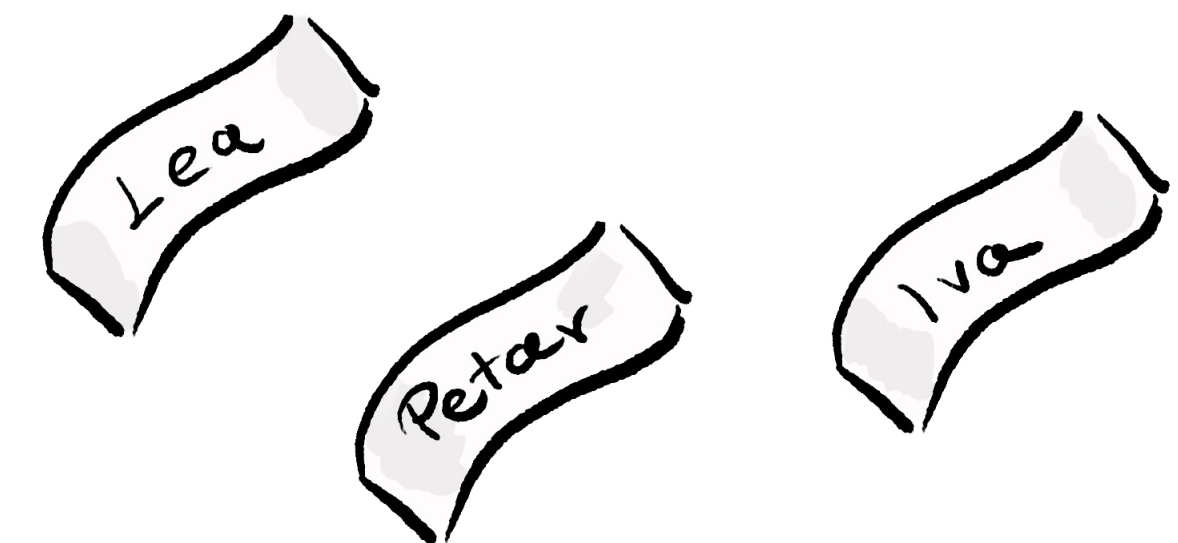
After that, each infected players gets one token that marks that round (a round they spent sitting in a recovery).

The game than skips to the fifth step.

2ND STEP

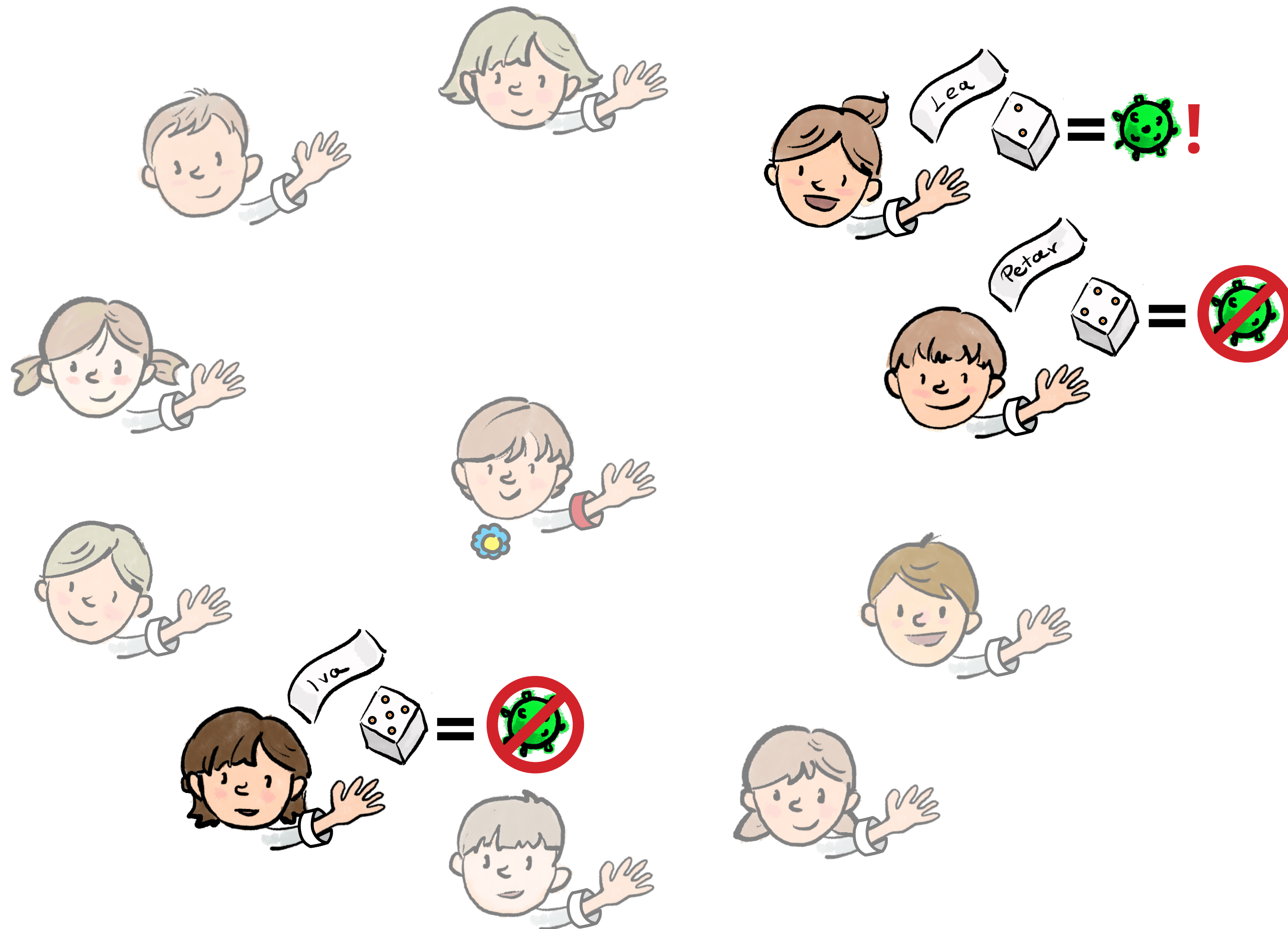


The game host randomly draws P names from the bag.



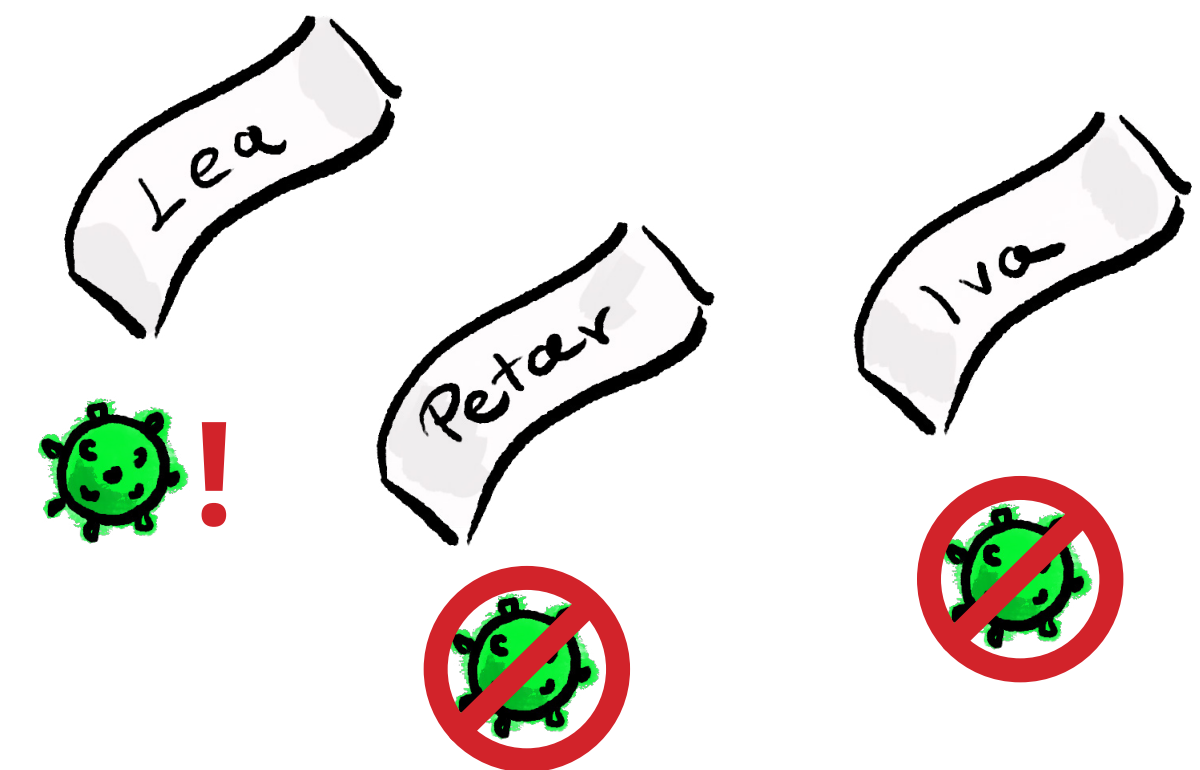
If there are *less* than P players wearing a white bracelet in the game, then all players wearing a white bracelet are selected for the next step.

3RD STEP

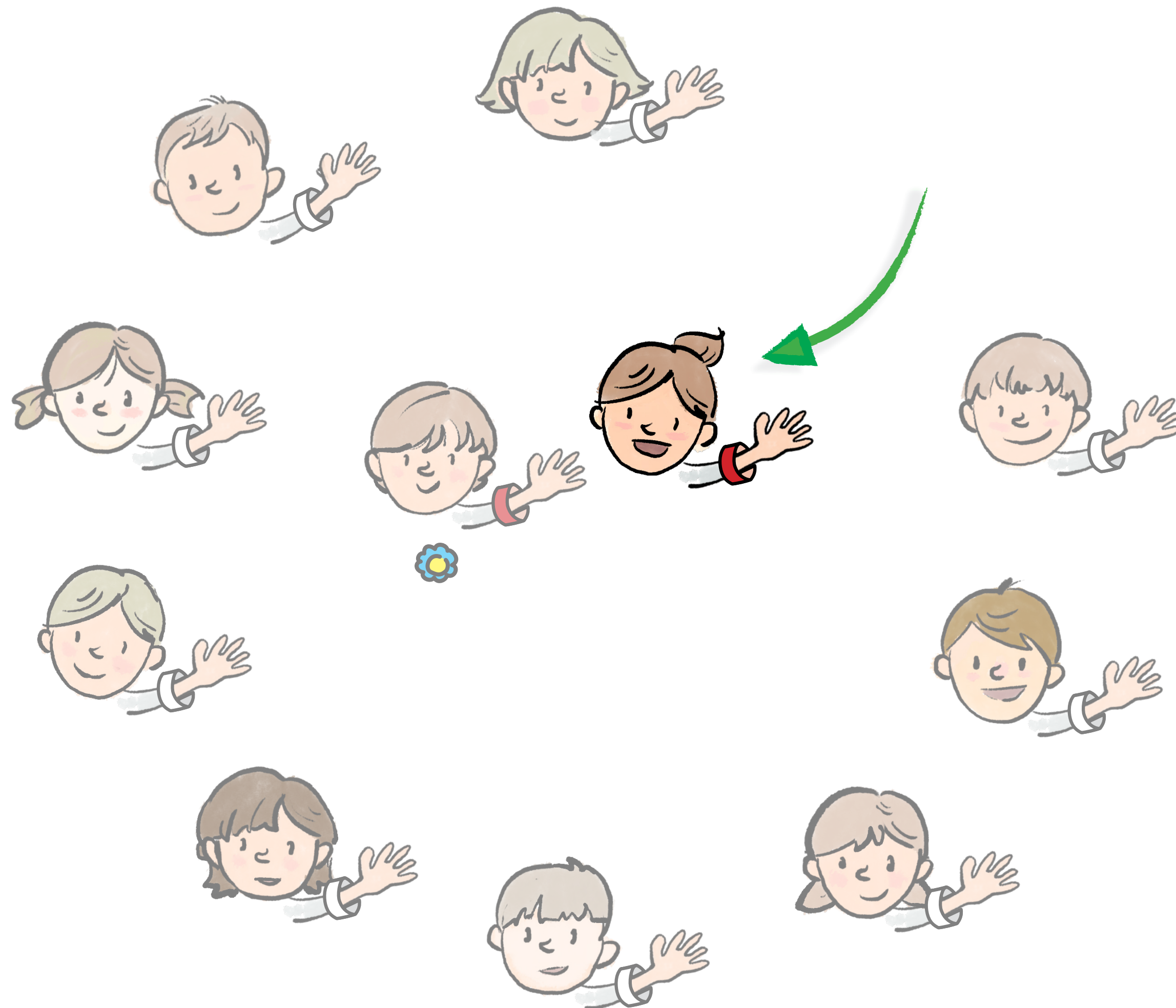


Each of P selected players rolls a dice.
Rolled value will determine whether the player is infected or not.

If a rolled value is *less than or equal to* K ,
then the player is marked as infected.



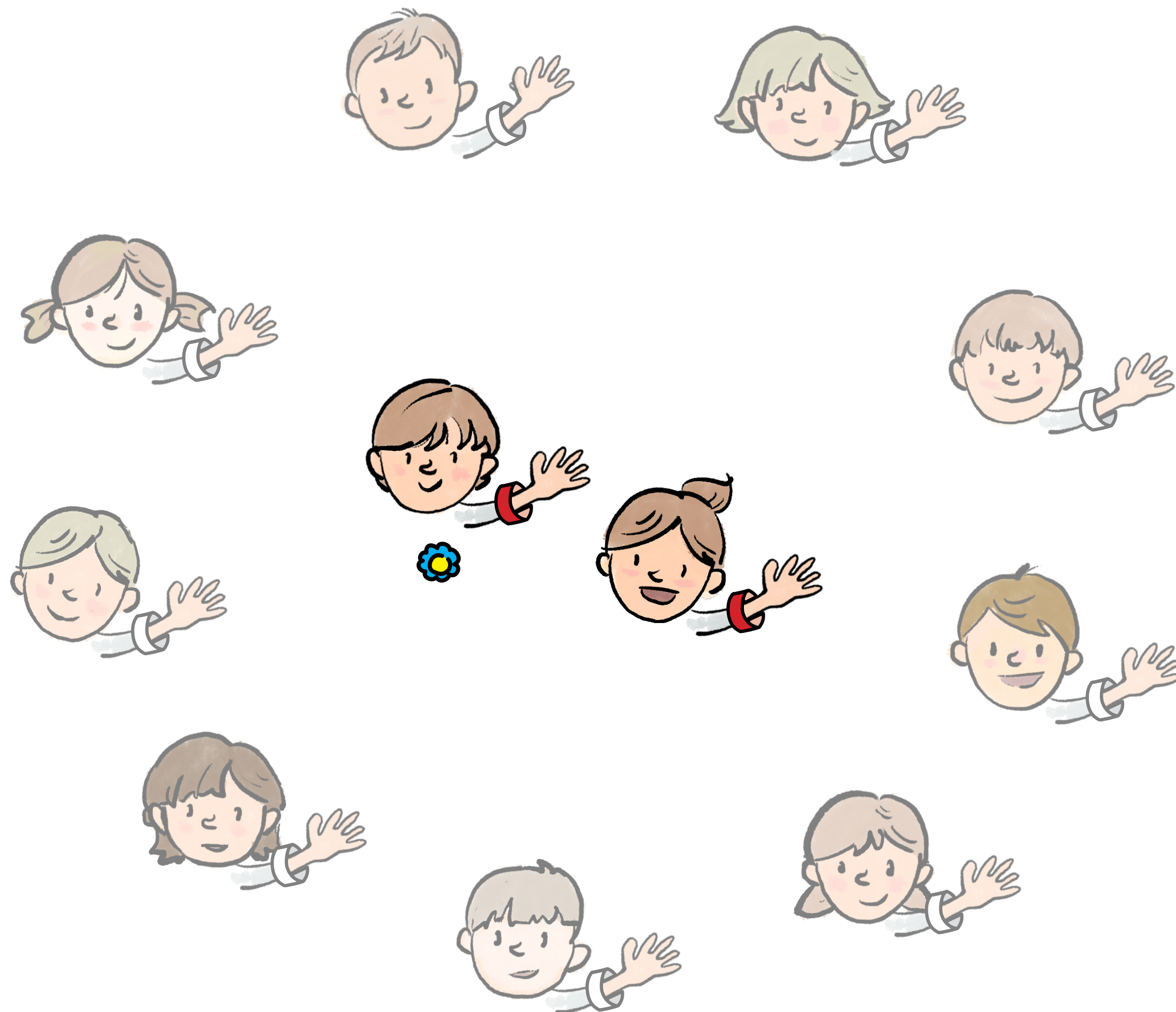
4TH STEP



Each newly infected player puts on a red bracelet and sits in the middle of the circle.

The papers with names of newly infected players are removed from the game, while the papers with names of players that avoided the infection are put back into the bag.

5TH STEP

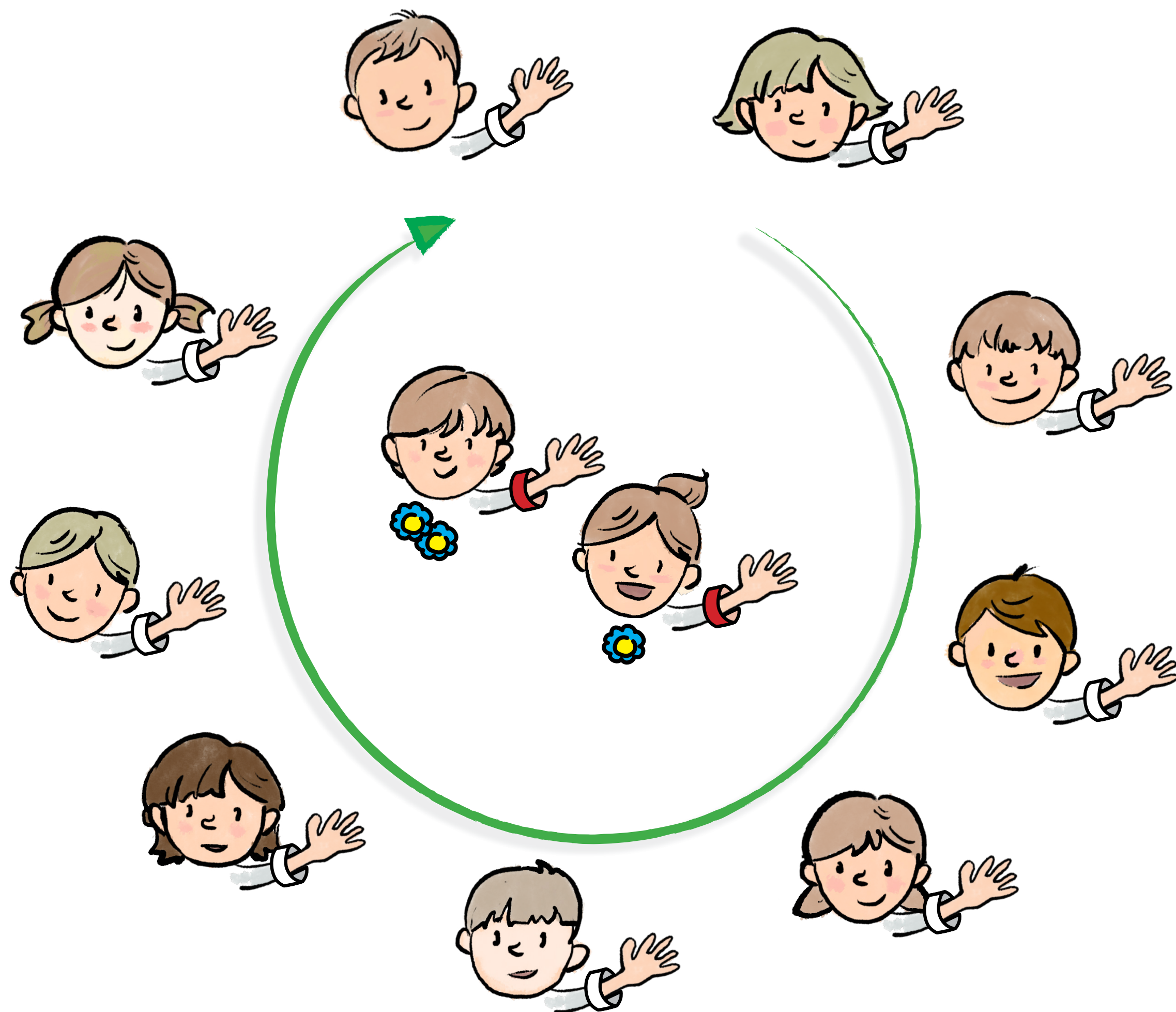


The game host checks if there are any infected players with N tokens sitting in the middle of the circle.

If there are, then each of those players replaces their red bracelet with a green one and returns into the circle with healthy players.

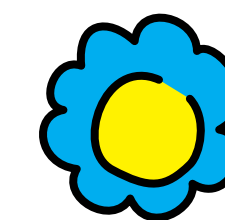
After this step one round is completed and the game goes back to the 1st step.

1ST STEP (ROUND 2)

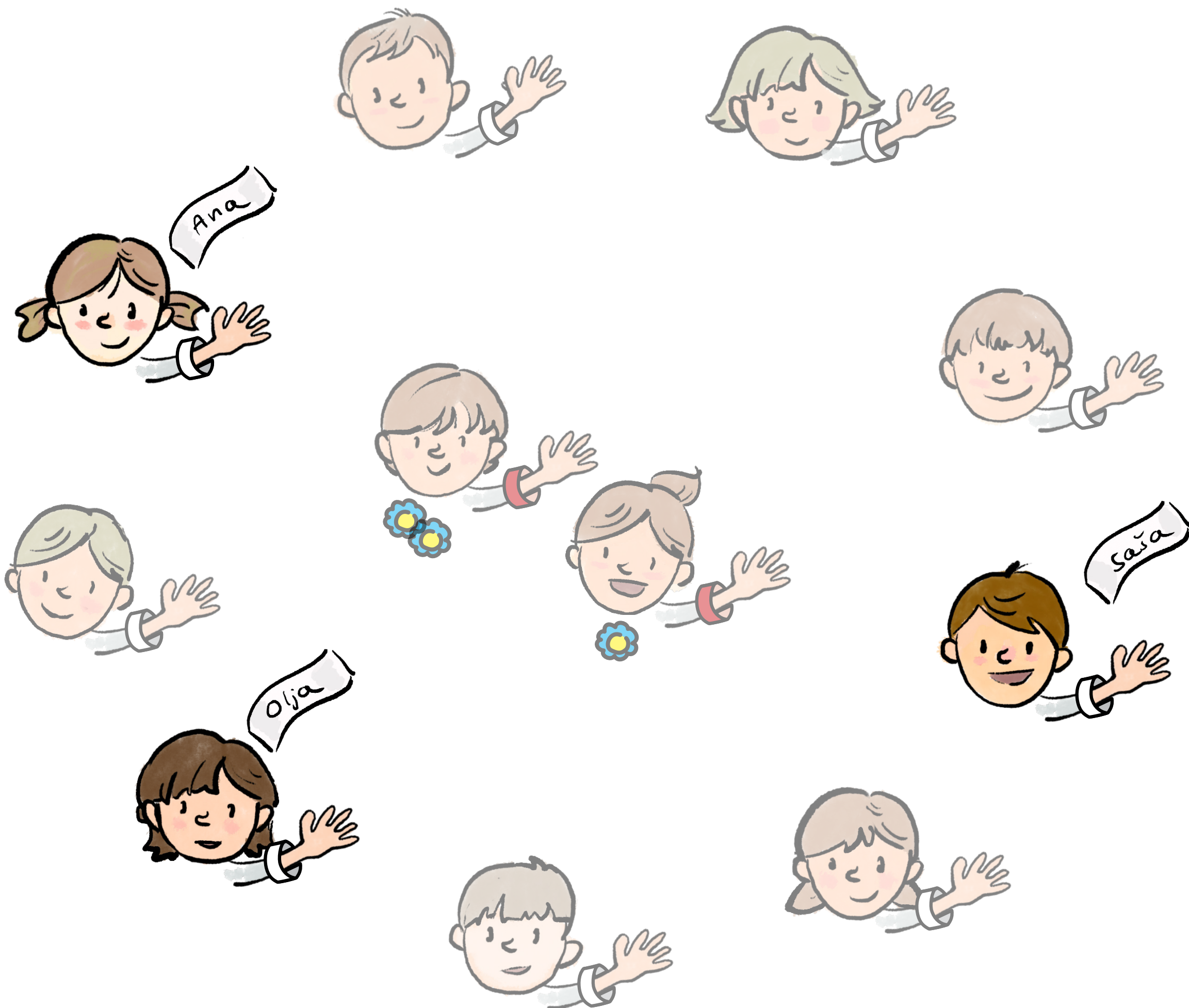


Players that are not wearing a red bracelet walk one lap around the infected players sitting in the center. After that they stop and sit down where they found themselves at that moment.

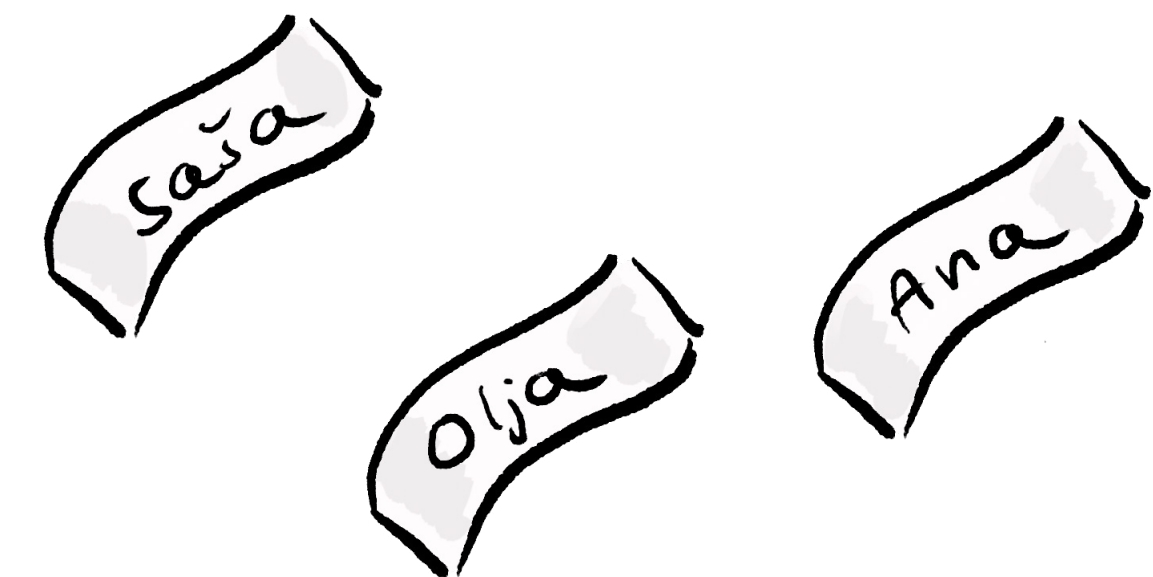
Each infected player sitting inside the circle gets one token that marks a round they spent sitting in a recovery:



2ND STEP (ROUND 2)

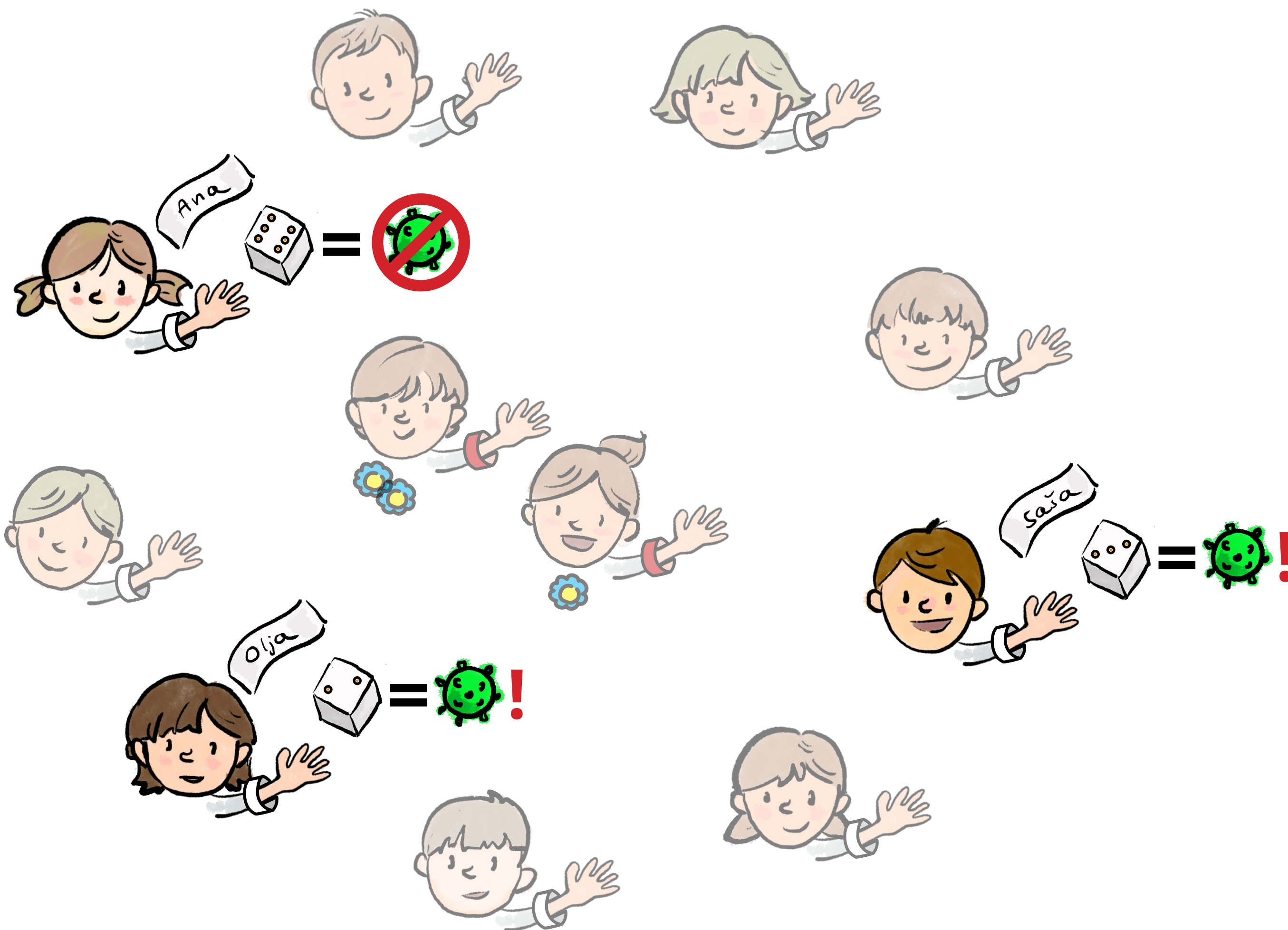


The game host randomly draws P names from the bag.



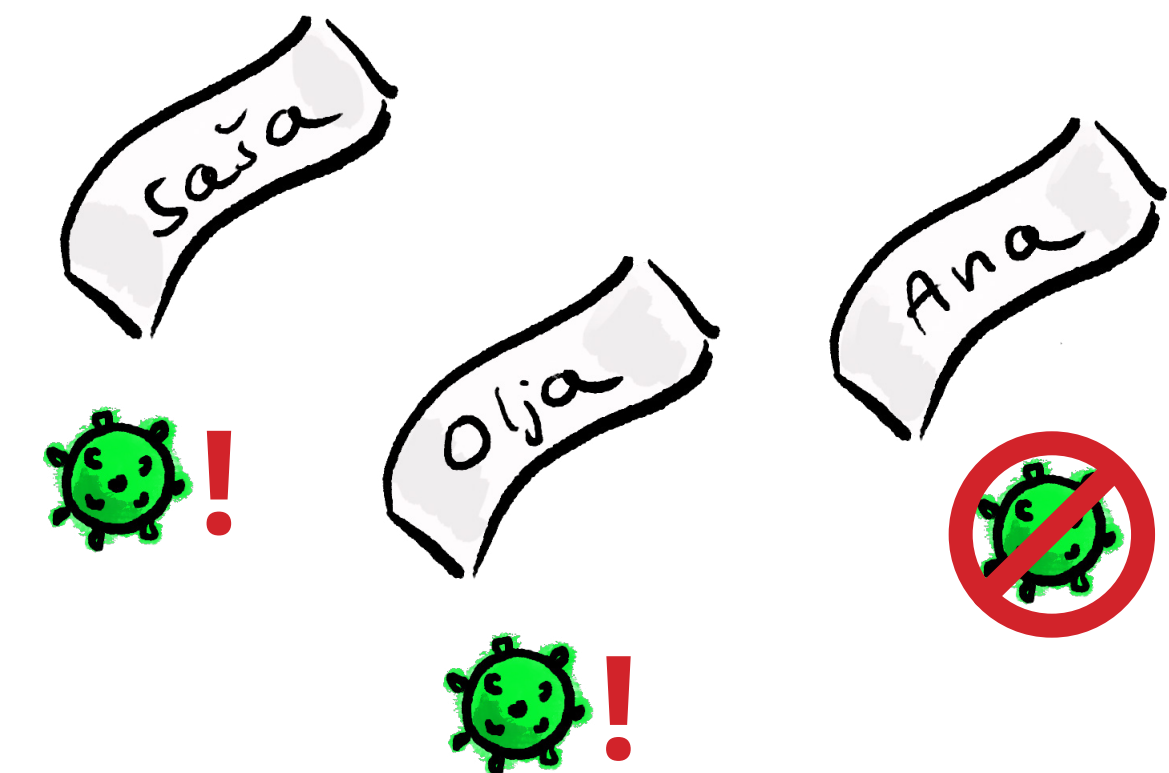
If there are *less* than P players wearing a white bracelet in the game, then all players wearing a white bracelet are selected for the next step.

3RD STEP (ROUND 2)

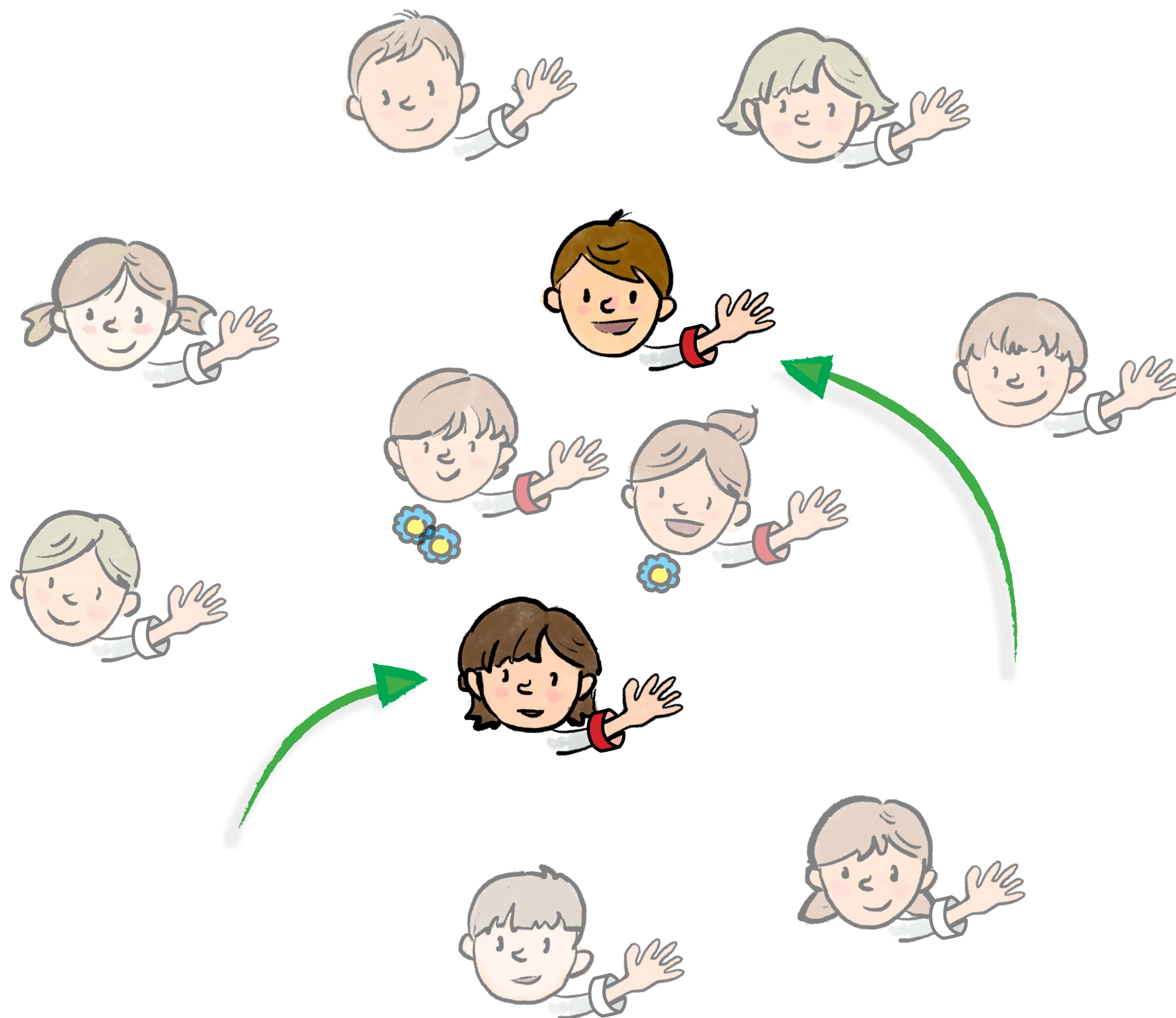


Each of P selected players rolls a dice.
Rolled value will determine whether the player is infected or not.

If a rolled value is *less than or equal to* K ,
then the player is marked as infected.



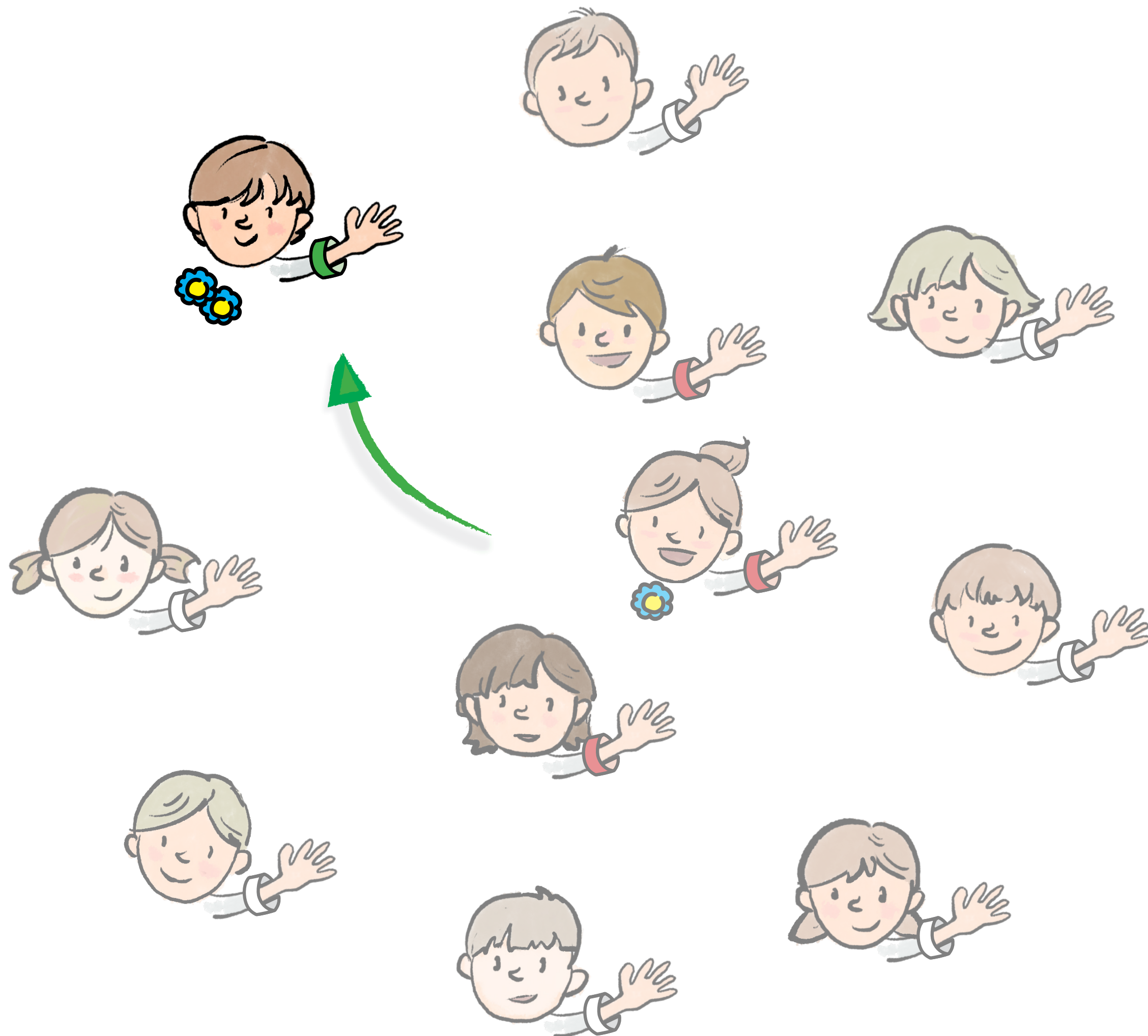
4TH STEP (ROUND 2)



Each newly infected player puts on a red bracelet and sits in the middle of the circle.

Papers with names of newly infected players are removed from the game, while the papers with names of players that avoided the infection are put back into the bag.

5TH STEP (ROUND 2)

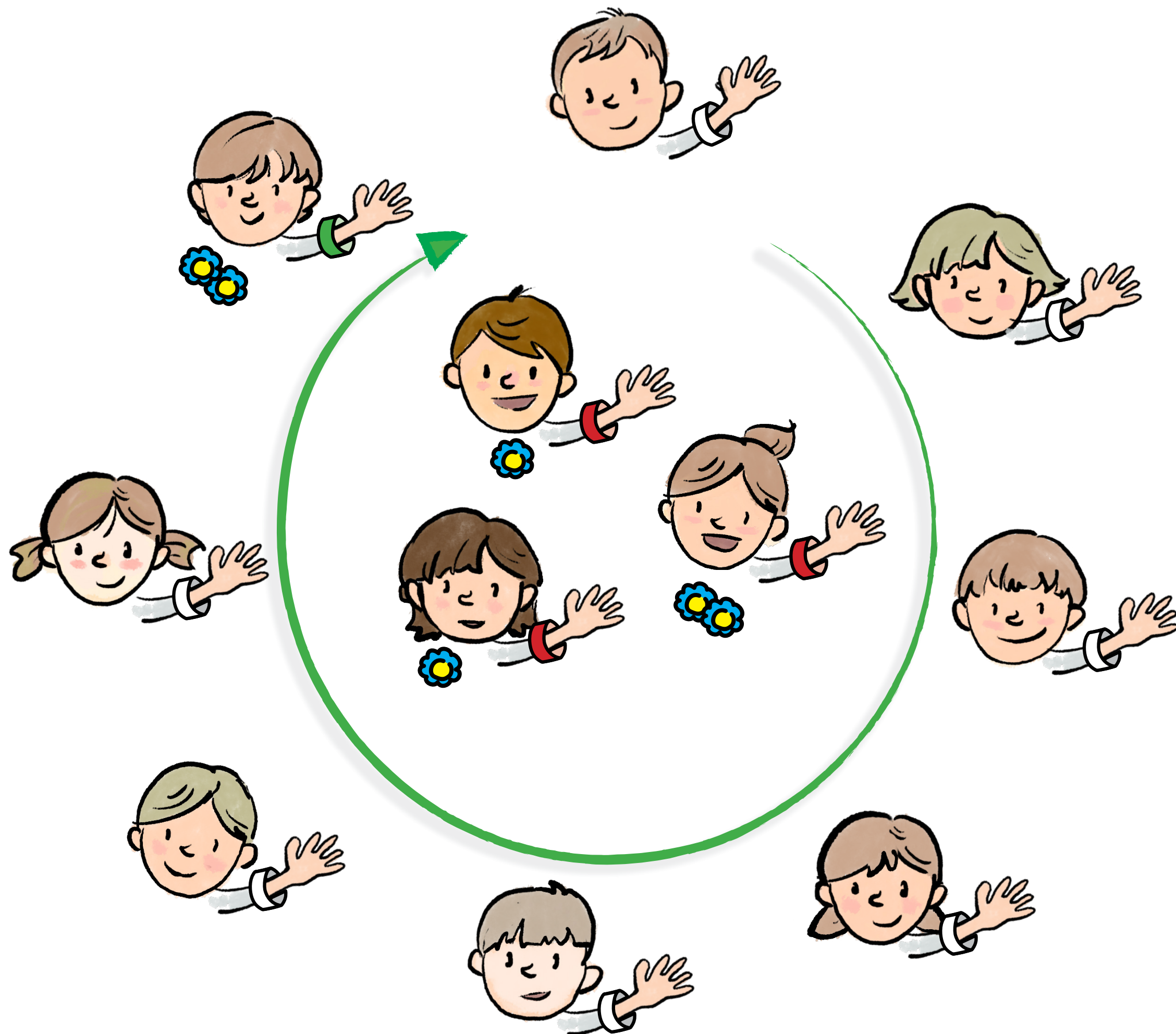


The game host checks if there are any infected players with N tokens sitting in the middle of the circle.

If there are, then each of those players replaces their red bracelet with a green one and returns into the circle with healthy players.

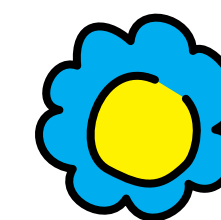
After this step one round is completed and the game goes back to the 1st step.

1ST STEP (ROUND 3)

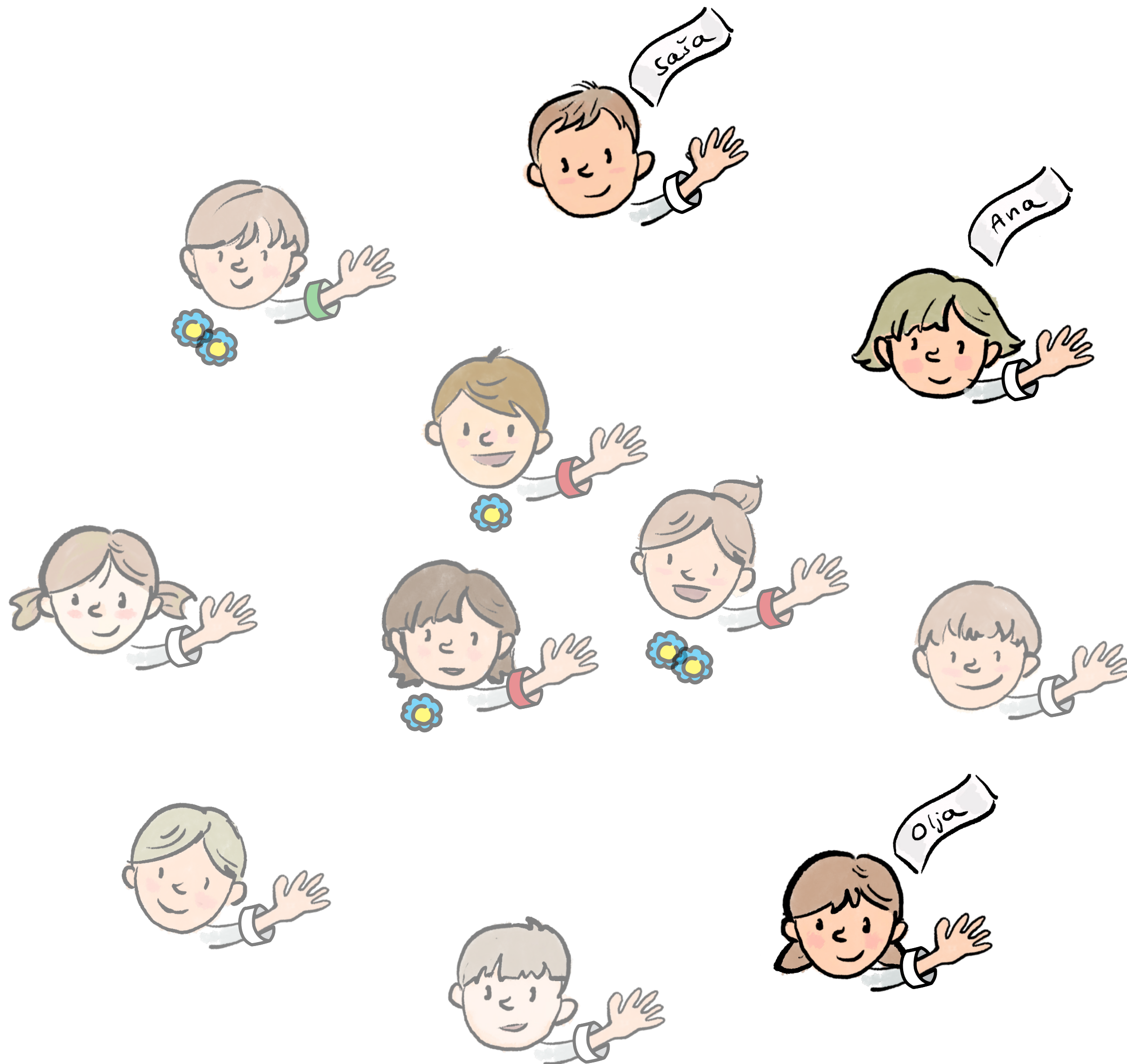


Players that are not wearing a red bracelet walk one lap around the infected players sitting in the center. After that they stop and sit down where they found themselves at that moment.

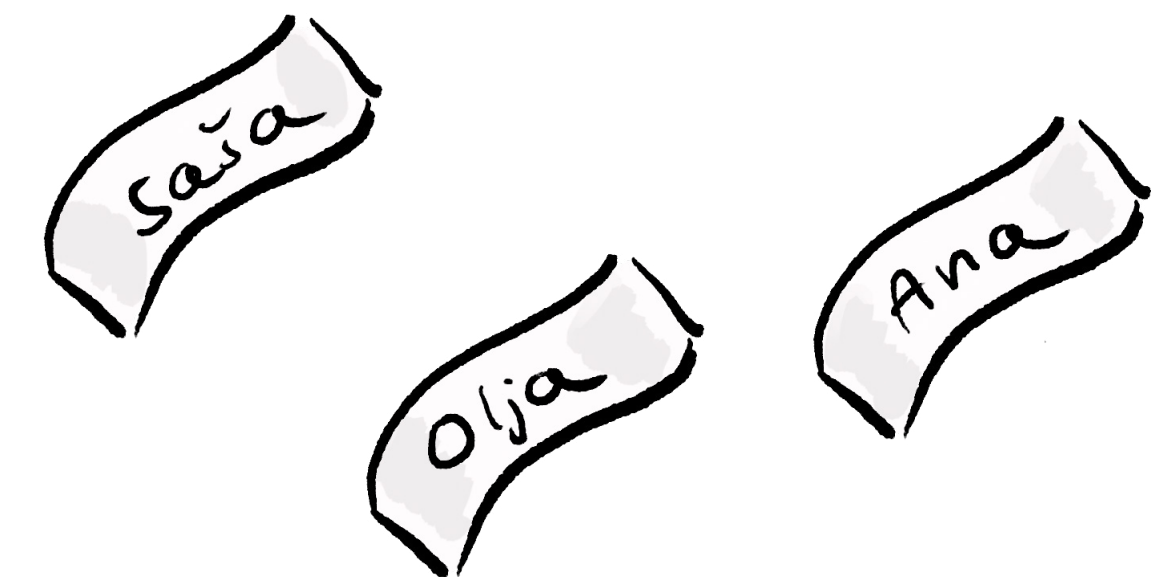
Each infected player sitting inside the circle gets one token that marks a round they spent sitting in a recovery:



2ND STEP (ROUND 3)

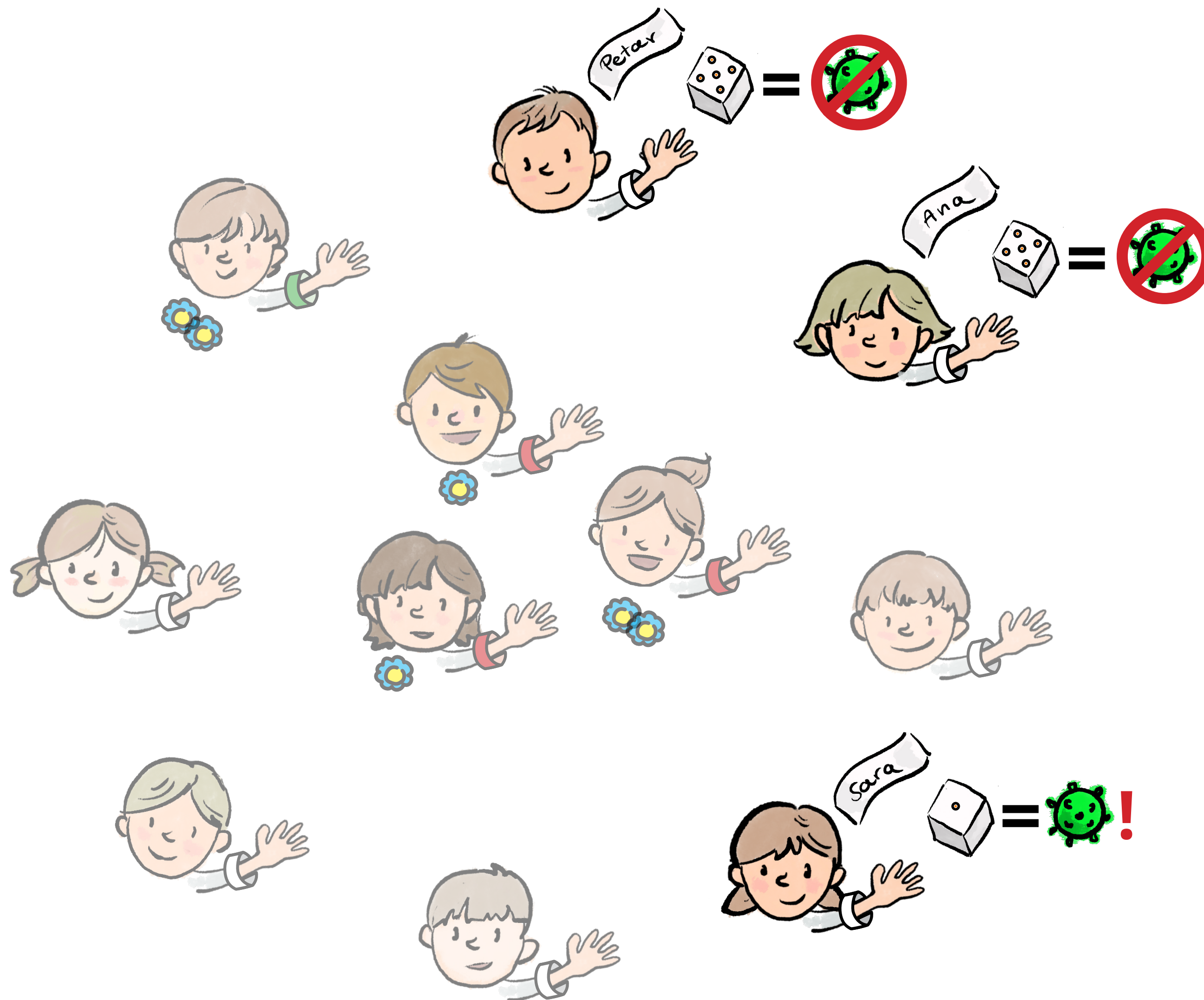


The game host randomly draws P names from the bag.



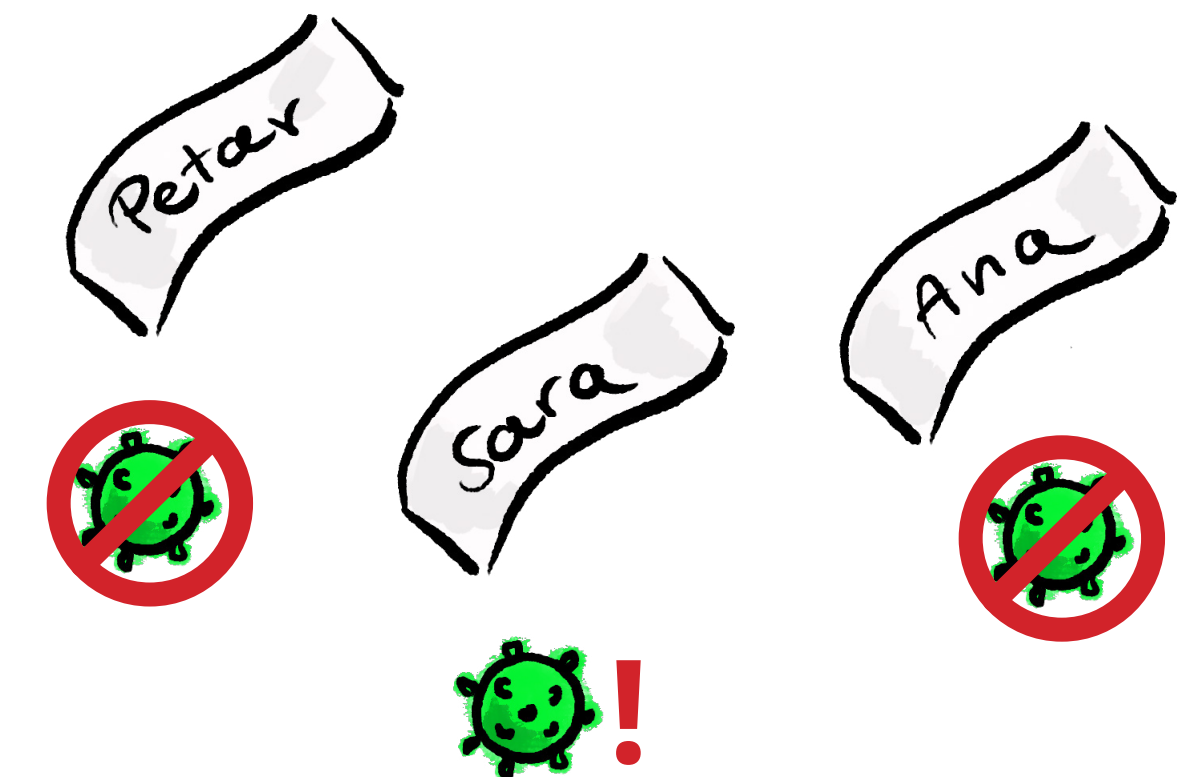
If there are *less* than P players wearing a white bracelet in the game, then all players wearing a white bracelet are selected for the next step.

3RD STEP (ROUND 3)

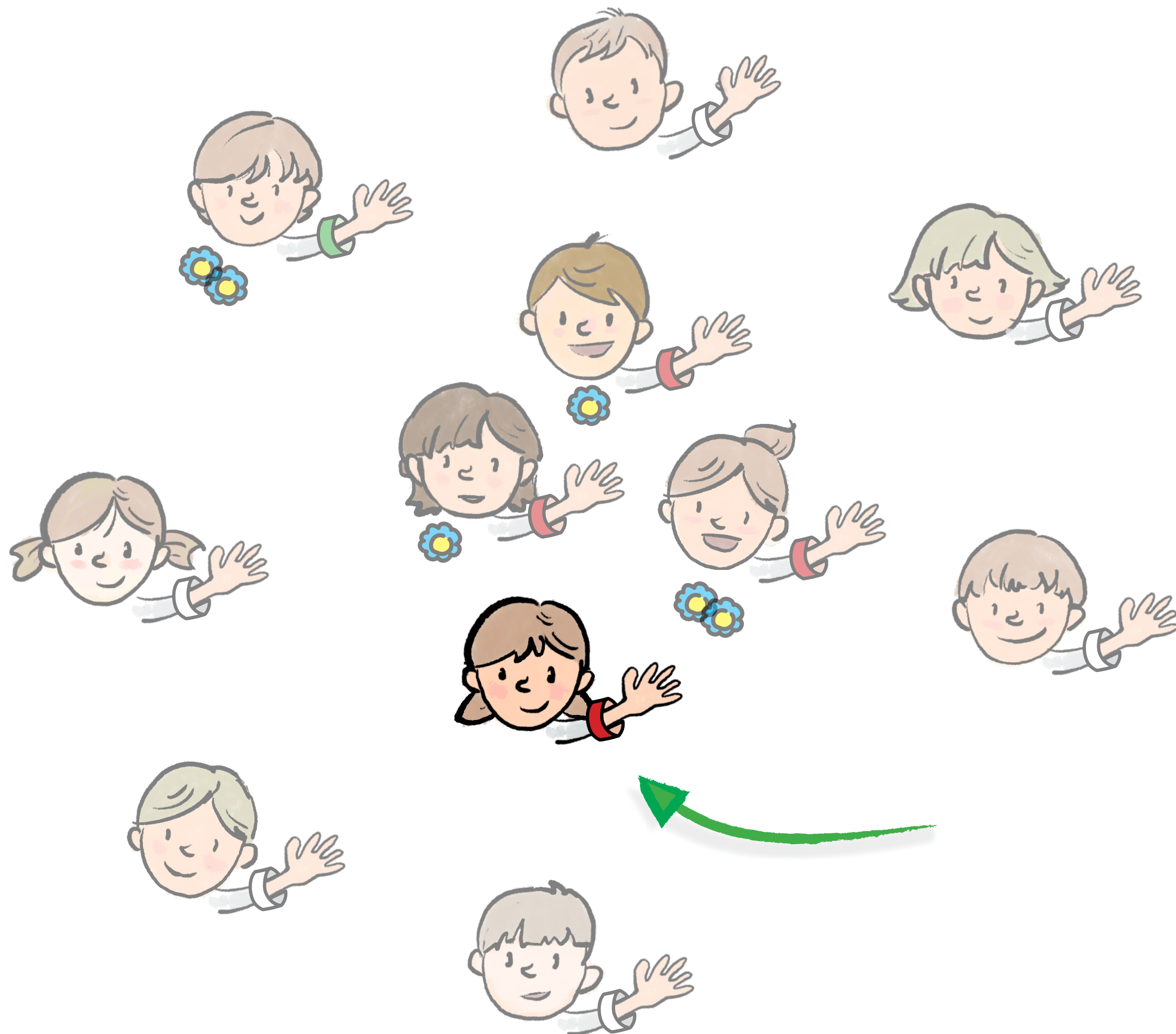


Each of P selected players rolls a dice. Rolled value will determine whether the player is infected or not.

If a rolled value is *less than or equal to* K , then the player is marked as infected.



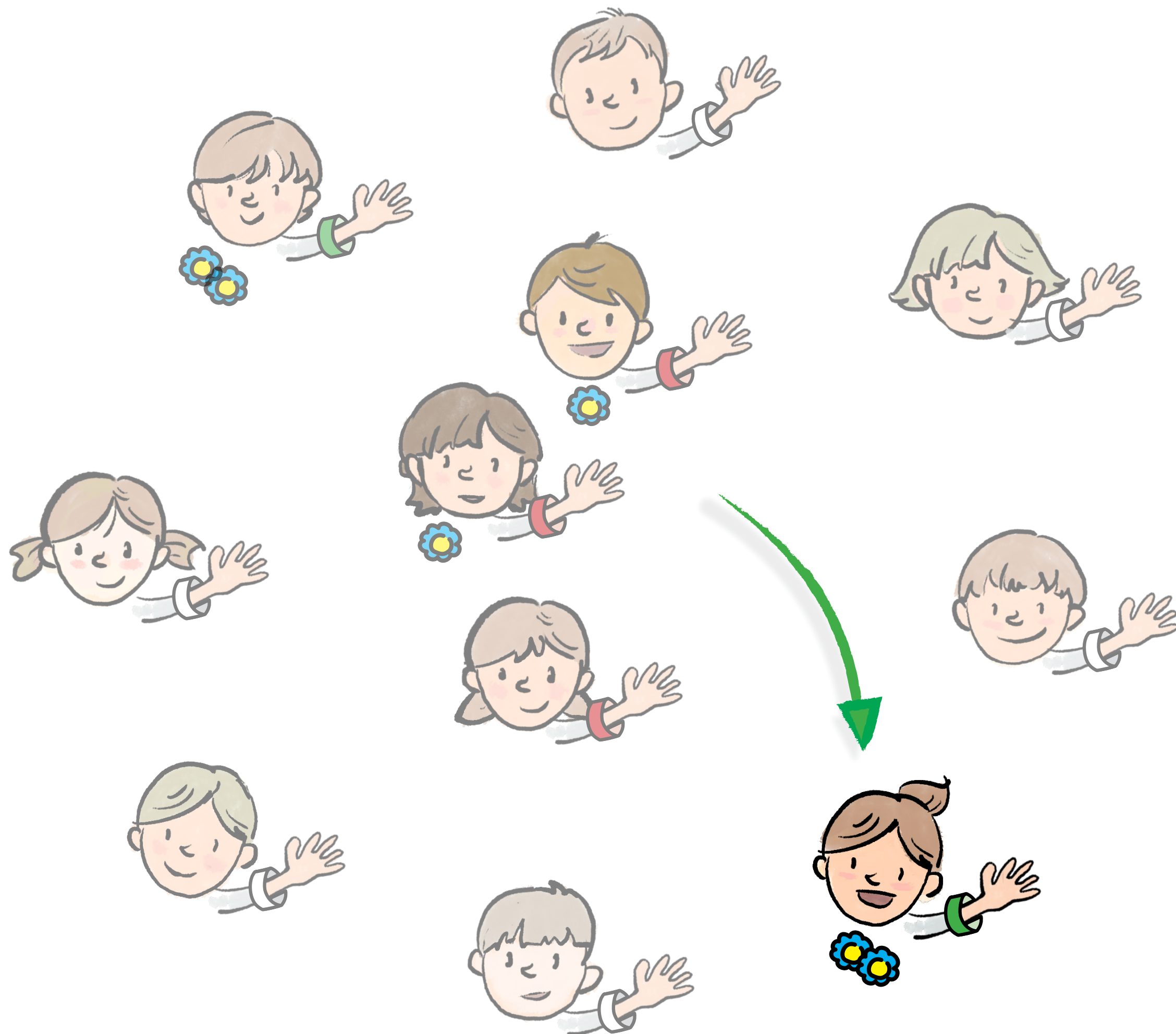
4TH STEP (ROUND 3)



Each newly infected player puts on a red bracelet and sits in the middle of the circle.

Papers with names of newly infected players are removed from the game, while the papers with names of players that avoided the infection are put back into the bag.

5TH STEP (ROUND 3)

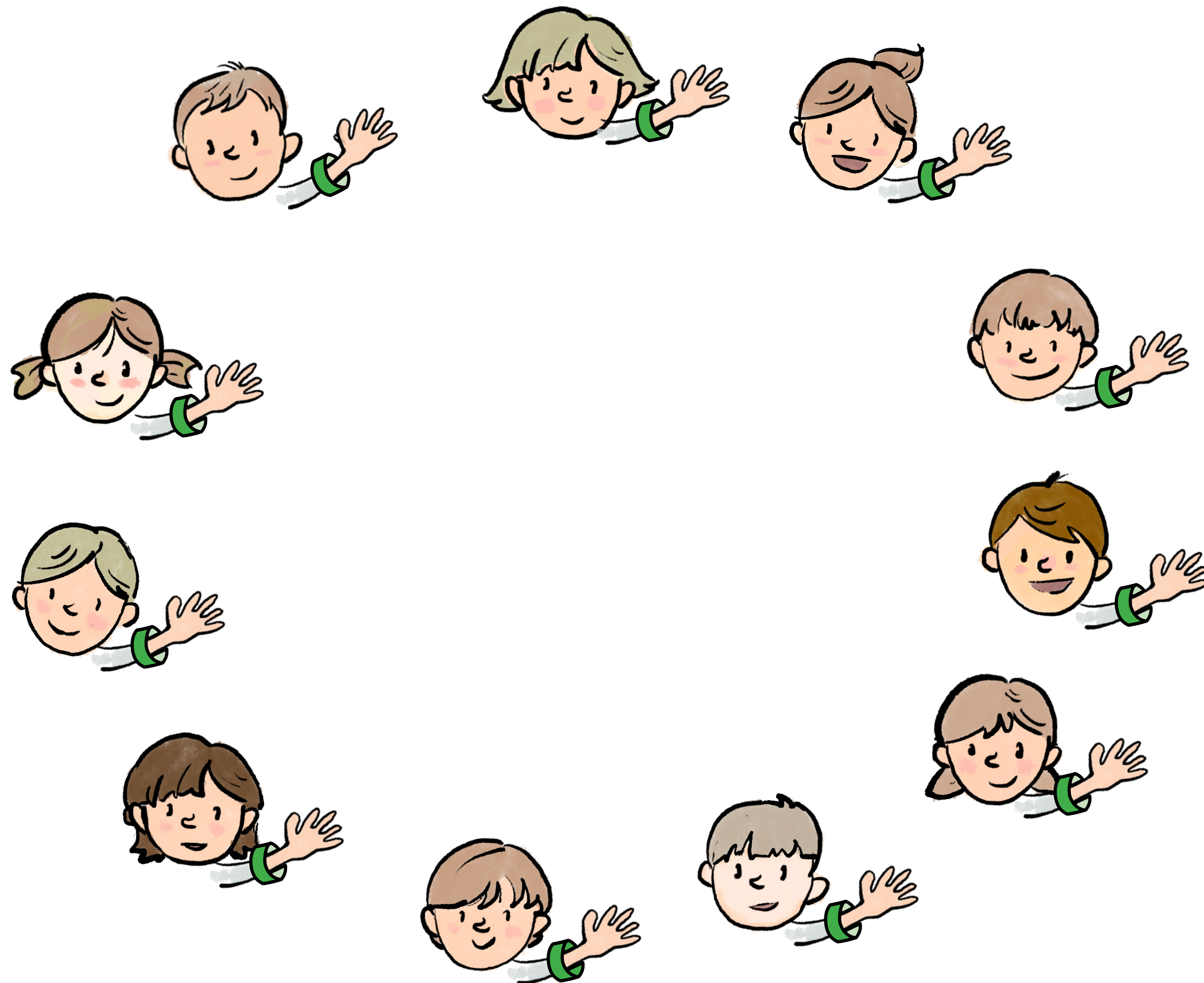


The game host checks if there are any infected players with N tokens sitting in the middle of the circle.

If there are, then each of those players replaces their red bracelet with a green one and returns into the circle with healthy players.

After this step one round is completed and the game goes back to the 1st step.

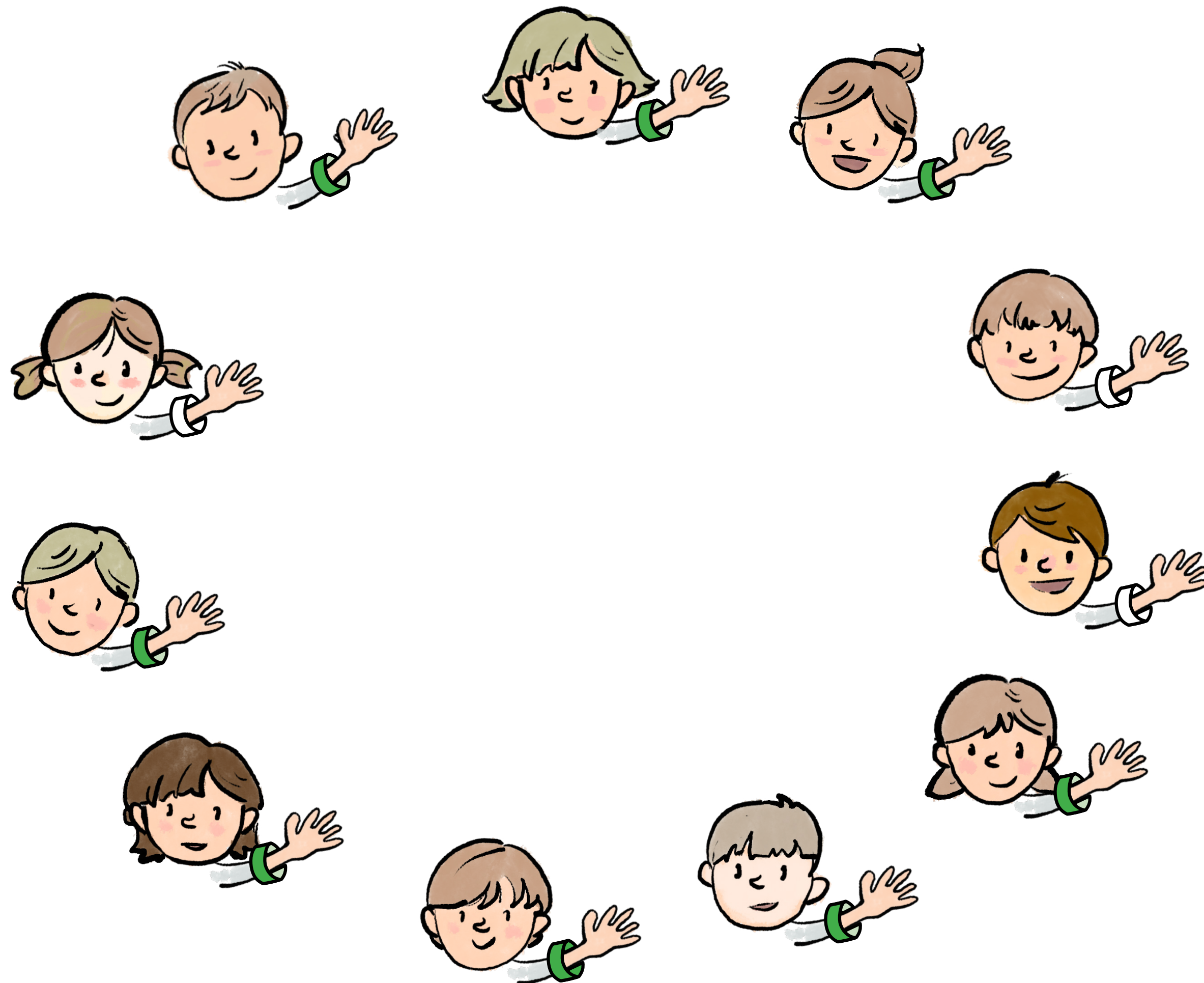
ENDGAME CONDITION: NOTE 1



Game session ends when the number of infected gets to zero.

This illustration shows a situation when all the players are healthy and immune (i.e. wearing green bracelets).

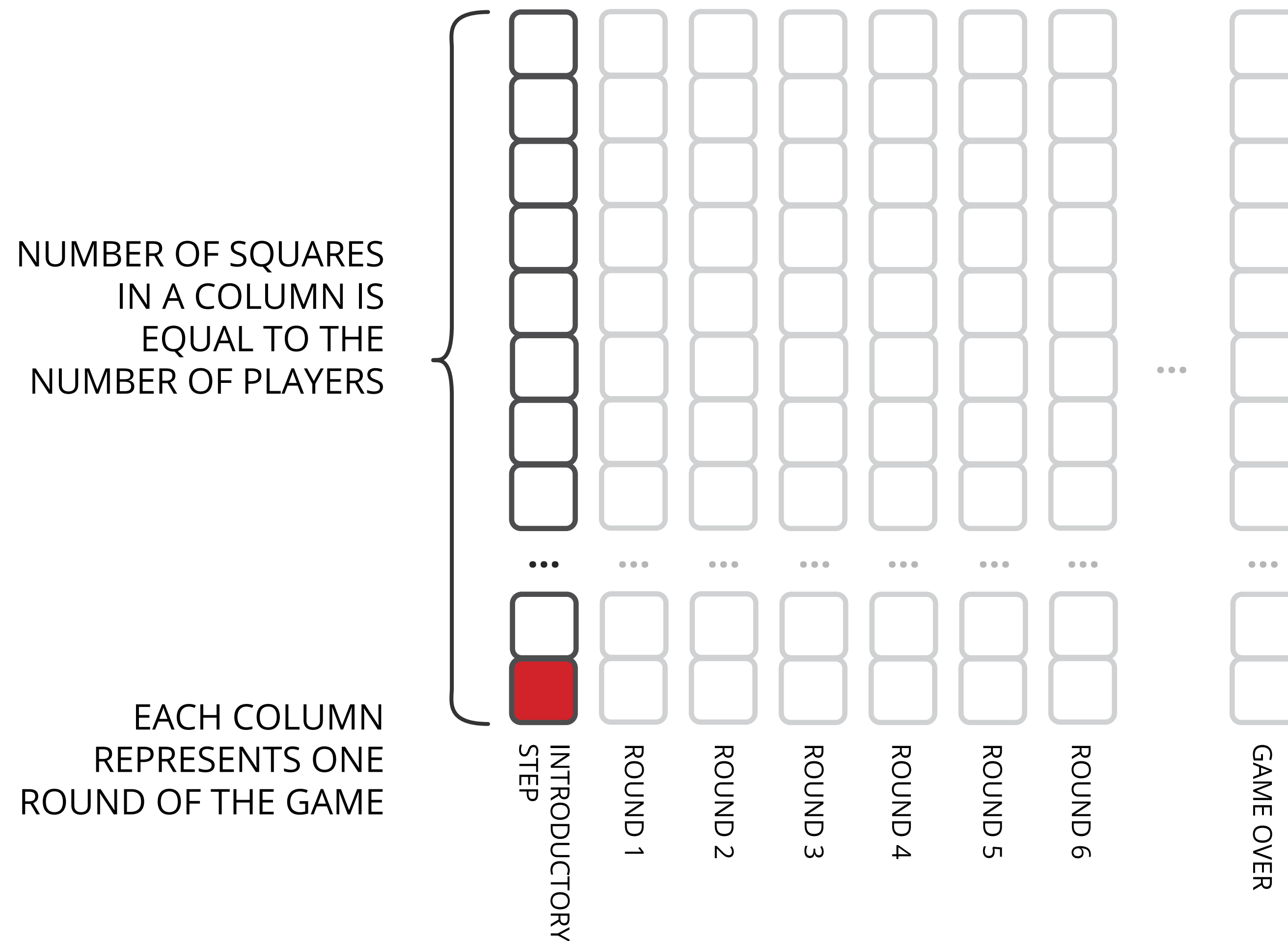
ENDGAME CONDITION: NOTE 2



Game session ends when the number of infected gets to zero.

This illustration shows a situation when some players are healthy and immune (i.e. wearing green bracelets), but the others are healthy and not immune (i.e. wearing white bracelets) because they have avoided getting infected.

APPENDIX: HISTOGRAM



If an additional goal of a game is to teach about numbers, keeping a tab on numbers of infected and healthy players is a great exercise.

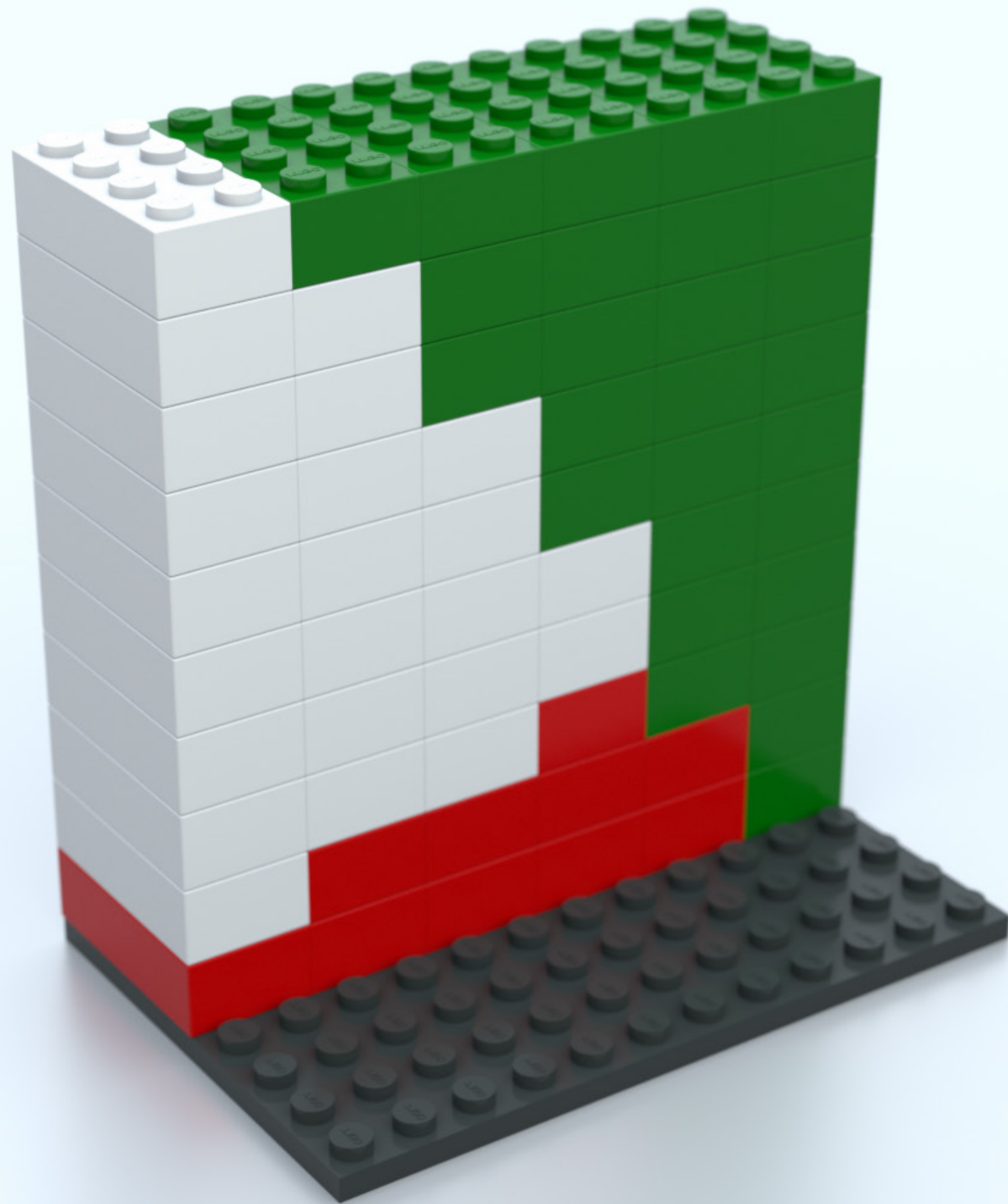
For this purpose we suggest you use a histogram, where each column has as many squares as there are players in the game.

Columns represent game rounds. The color of a square matches the bracelet color of a corresponding player.

The nice way to construct a histogram is to use Lego bricks or similar toys.

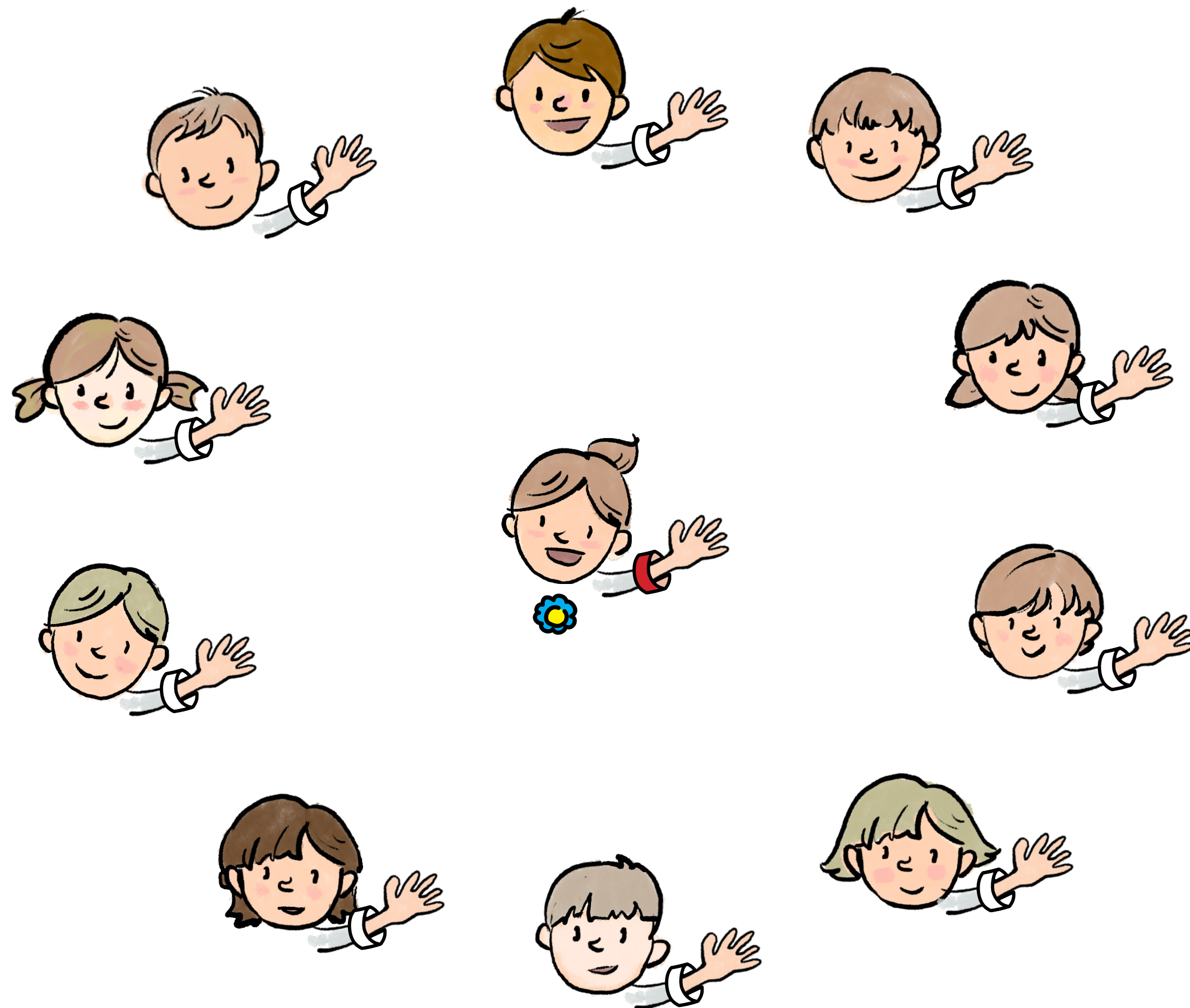
The colors of squares are filled in at the end of each round!

APPENDIX: HISTOGRAM

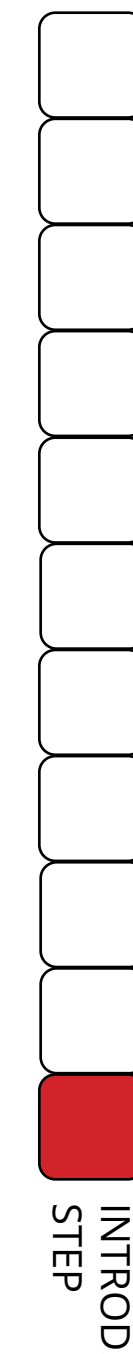


An example of a histogram constructed out of Lego bricks.

INTRODUCTORY STEP: HISTOGRAM

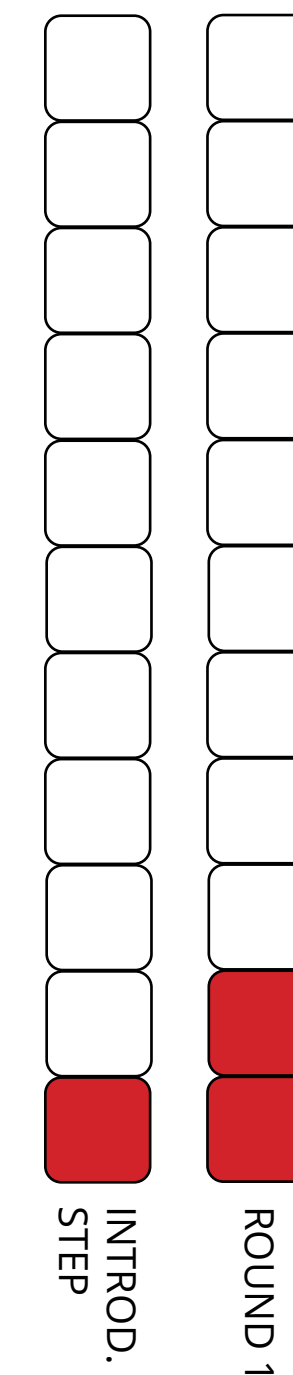
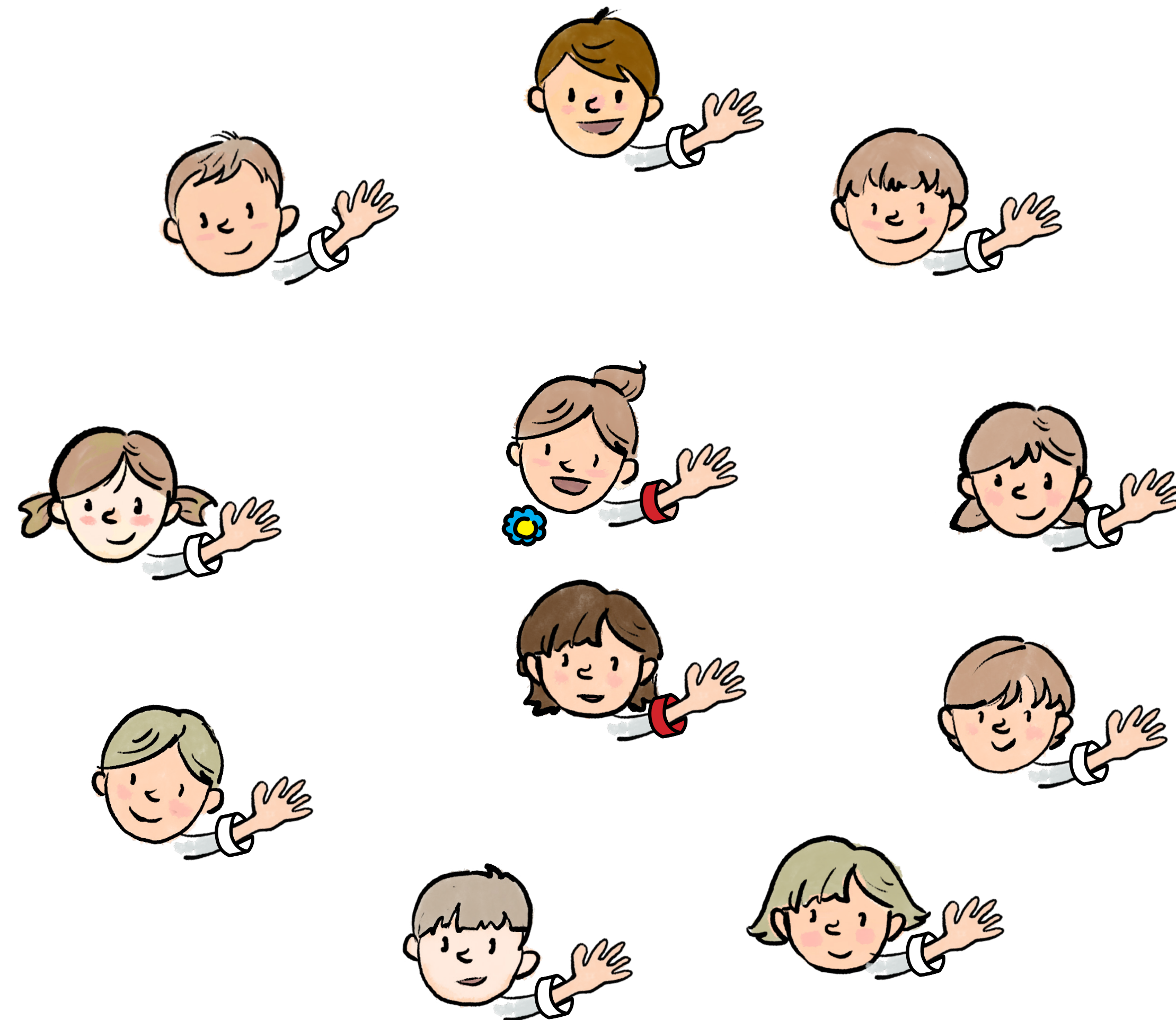


At the end of the introductory step we always have the following game state: one red square - representing infected player. All other squares are white.

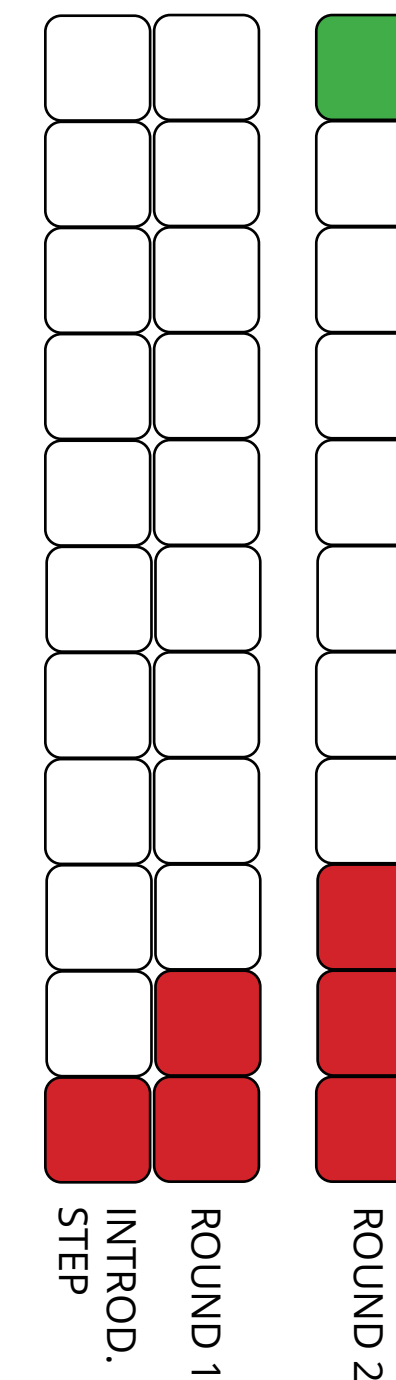
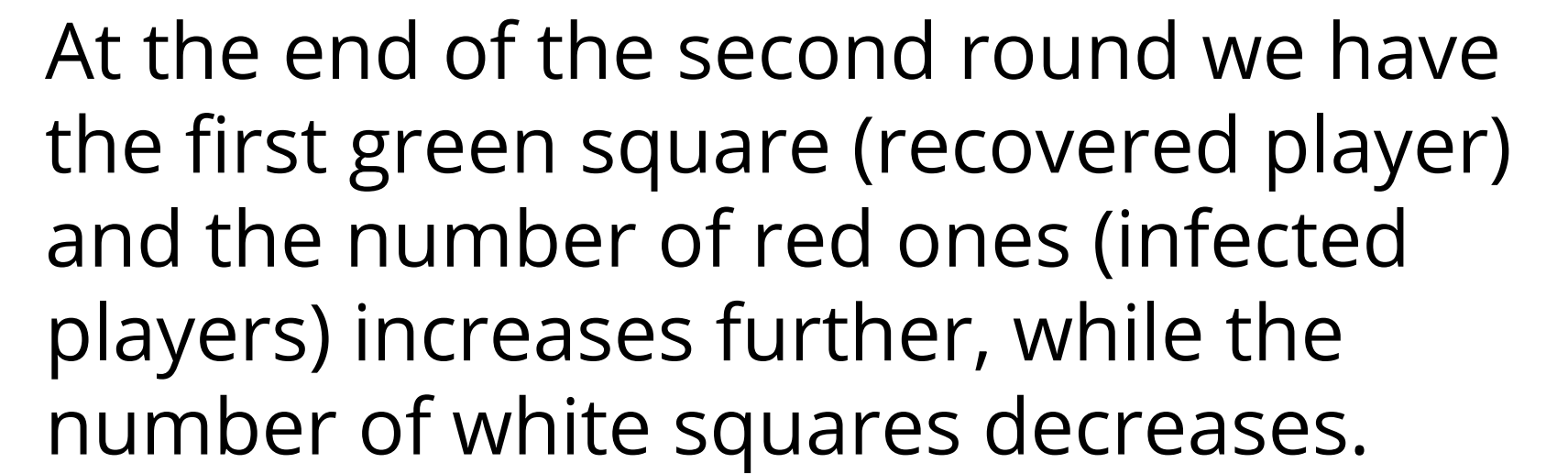


1ST ROUND: HISTOGRAM

At the end of the first round the number of red squares (infected players) increases.

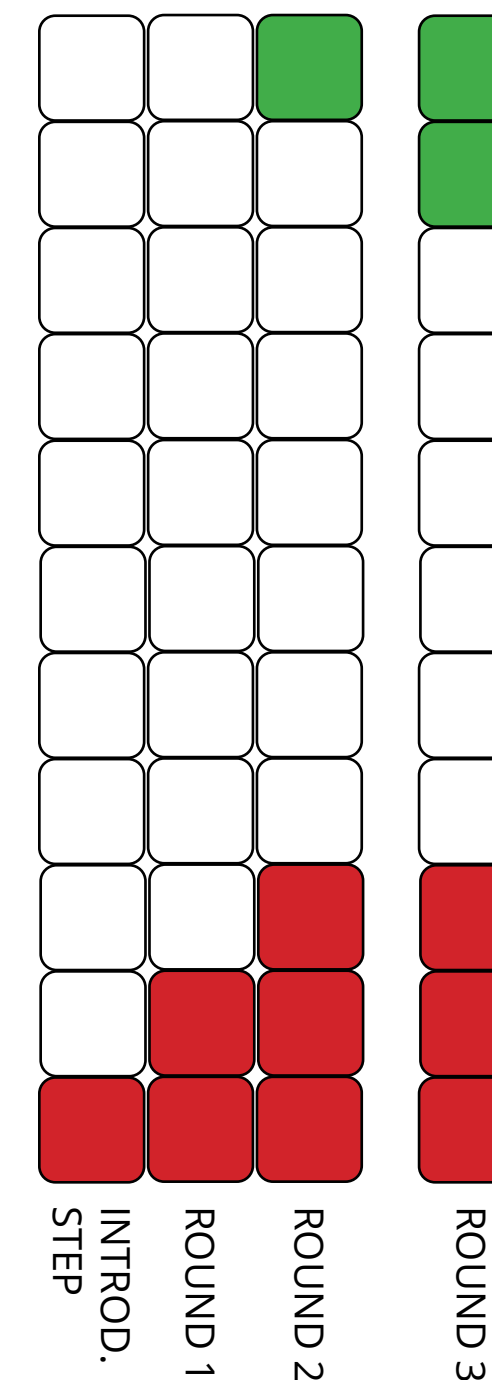


A collection of stylized, hand-drawn illustrations of various microorganisms, including bacteria, viruses, and fungi, in a light blue color. The organisms are scattered across the page, with some showing internal structures like nuclei or flagella.

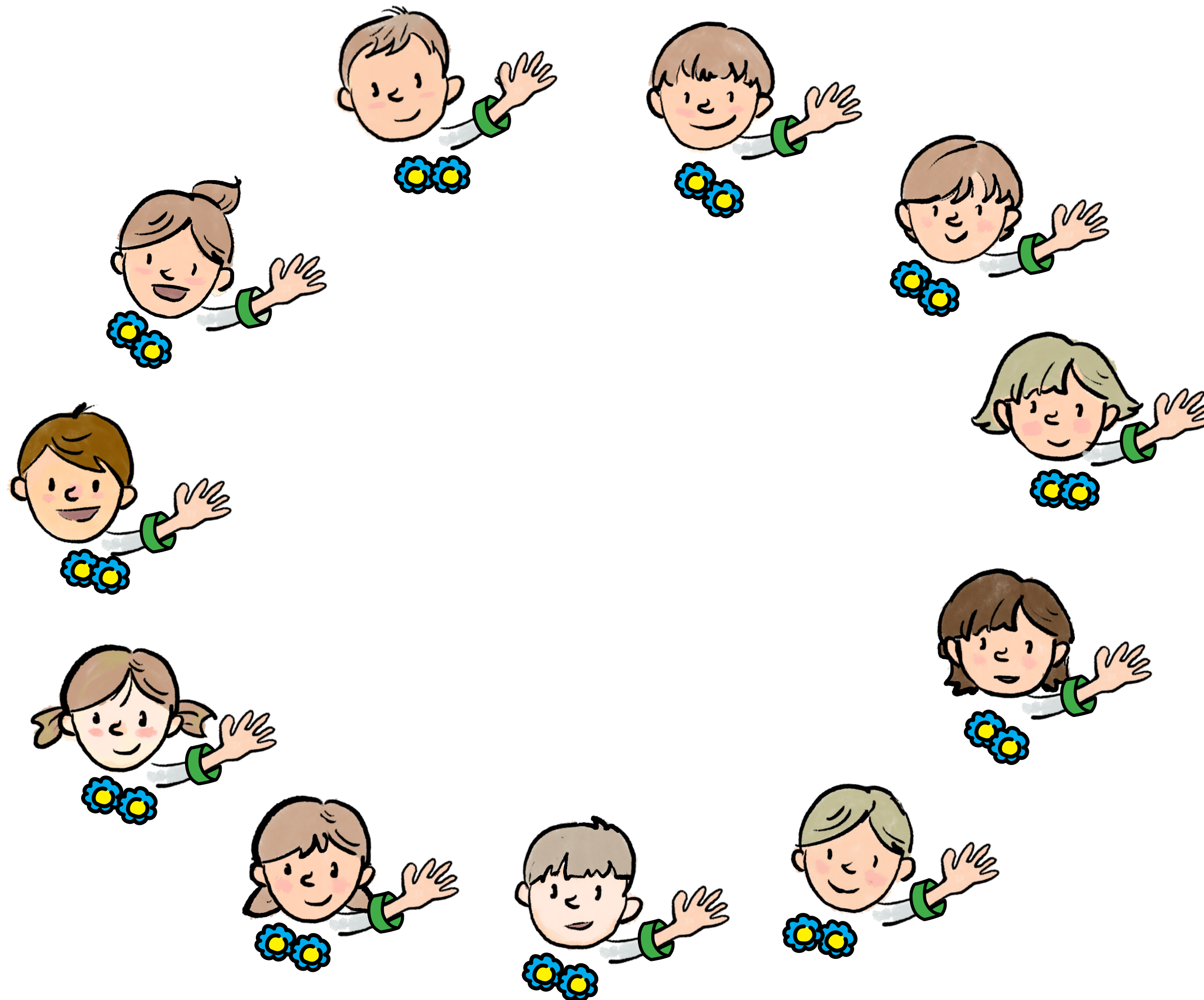


3RD ROUND: HISTOGRAM

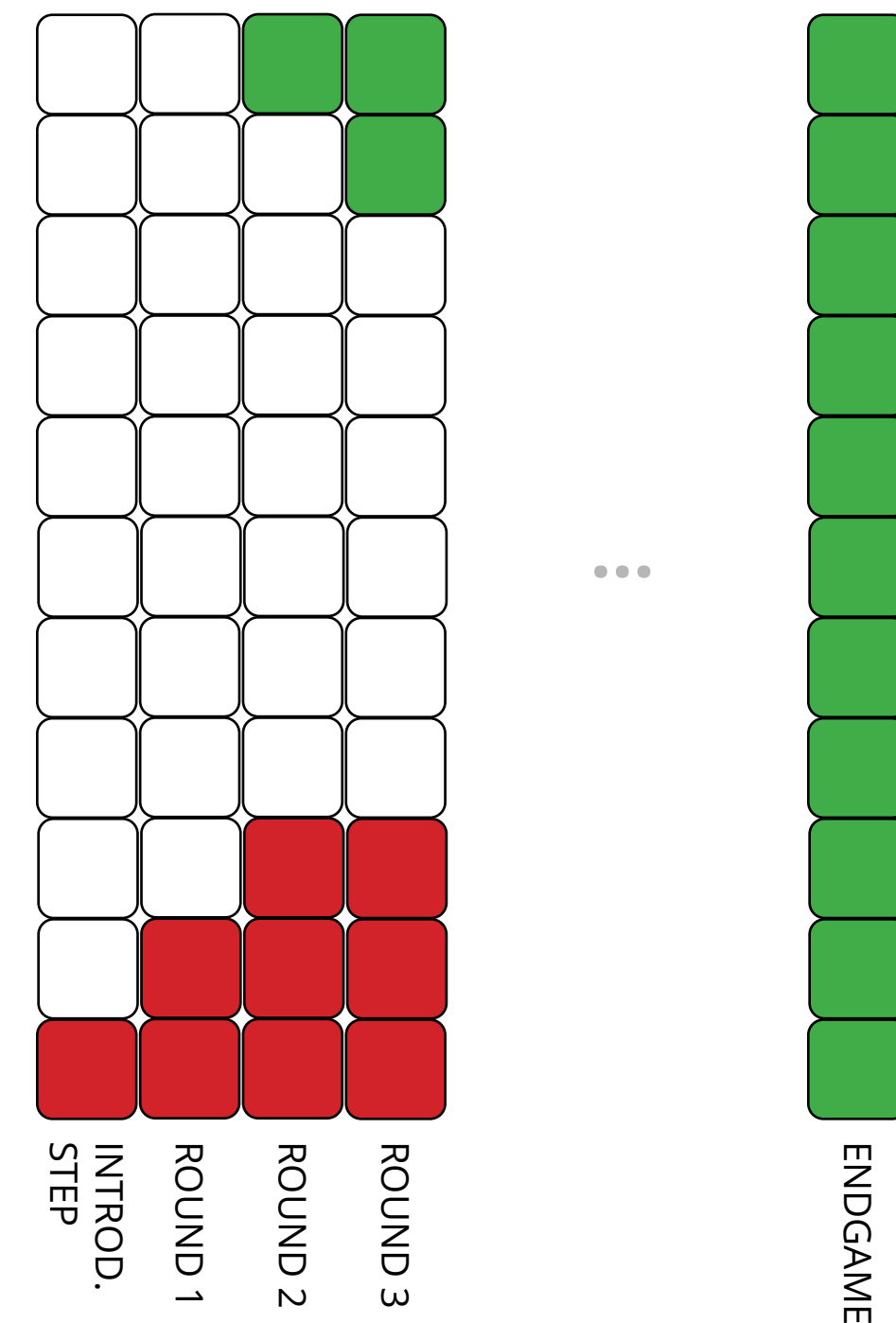
At the end of this round the number of green squares (recovered players) increases even more.



THE FINAL ROUND (ENDGAME): HISTOGRAM



At the end of the game, either all squares are green (each player is recovered) or the number of red squares (infected players) is zero.



WHAT DID WE LEARN?

If you have played only one session of game A:

The importance of the number of contacts: the disease spread quickly and infected many children because the number of contacts was large (number P). This is why during the pandemic we had to stay at home so as not to spread the infection to others.

Kindergartens and schools are places where children come into many contacts with other children (number P) and therefore infection can spread quickly in those places.

The importance of hygiene and masks: when we come in contact with an infected person, we want to protect ourselves by reducing the likelihood of transmitting the infection (number K).

The importance of the vaccine: vaccinated children would be given green bracelets at the beginning of the game and could not get infected, which would reduce both the total number of infected and slow the spread of the infection.

If you have additionally played one session of game B:

“Curve smoothing”: we want to avoid everyone getting sick at once because then hospitals cannot help all patients. That is why it is important to stay at home and reduce the number contacts P . Then the infected can transmit the disease only to a small number of other people, which reduces the number of infected, but the epidemic lasts longer.

If you have played either game A and/or game B multiple times:

The role of chance: the number of infected is not necessarily the same from game to game (easier to see when playing game B).



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