VIRUS ALERT IN STAYHOMPTON

Tips for printing

- Print all materials on **A4** paper.
- For the **city map,** tape the two sides together.
- If possible, use **thick paper** for printing the **white** and **yellow** chips.
- If you have **yellow paper,** use it for printing the yellow chips (last page) so that they are **yellow on both sides.** The paper should be of the same thickness as the paper for the white chips, so you cannot sense the color of the chips by touching.
- Cut out the **question cards, "no entry signs"** and **chips** along the dotted lines.

VIRUS ALERT IN STAYHOMPTON

Game Instructions

eduB

MAX-PLANCK-INSTITUT FÜR EVOLUTIONSBIOLOGIE

IST AUSTRIA
Institute of Science and Technology

www.ist.ac.at/virusalarm

Imprint

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The story of Stayhompton

It's a beautiful spring day in the town of Stayhompton, population 100. Two of the town's inhabitants have just returned from vacation---but there's something they don't yet know: while away, they were infected with the new YEAN (YEt ANother) virus! They still feel healthy, however they are symptom-free infected, so they go to town where they can infect other humans. Only after the three-day incubation period do they start feeling sick. At this time, they are taken to the Stayhompton Clinic for treatment and do not go to town anymore. But how many people did they unknowingly infect? Can a large virus outbreak still be prevented?

How to play

You will simulate a virus outbreak using a city map and chips to represent inhabitants. There are **two versions of the game:**

Simulation page 5

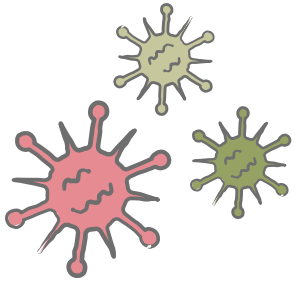
You are scientists investigating how fast the YEAN virus can spread in Stayhompton.

Challenge page 9

You are politicians who have to take measures to prevent an outbreak without completely paralyzing the city.

The two versions are played independently. If you want to try both, start with "Simulation".

The game is played in a team of two or three people. You can also play alone, but it will be more challenging. Your opponent is the YEAN virus.



Game materials

- 1 city map
- 2 x 100 chips representing inhabitants of two types
    - white (healthy) → detach from sheet
    - yellow (infected) → detach from sheet
- 8 “no entry” signs → detach from sheet
- 3 data sheets “Simulation“ with diagram template
- 3 data sheets “Challenge”
- 10 question cards
- 1 instruction booklet

You will also need pens in three different colors, a coin, a ruler, and three small bowls or cups.

You can download all game materials and additional data sheets to print out at home at **www.ist.ac.at/virusalarm.**

Game version “Simulation”

You are a team of scientists. Your task is to find out what could happen when two infected people come to your city. To do this, you will simulate a possible virus outbreak. Along the way, you will document your observations and draw conclusions.

Goal

- During gameplay, you will observe what happens when a virus spreads in a city without countermeasures. At the end, demonstrate your understanding of virus outbreaks by answering questions!

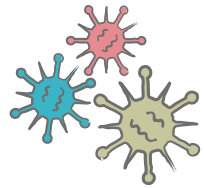
Preparation

- Place a coin on the arrow next to the timeline.
- Separate the inhabitant chips by color into two bowls.
- Place the bowl with the white chips to the left of the city map (“residential area”).
- Put the bowl with the yellow chips aside.
- Place the empty bowl on the city map on the Stayhompton Clinic.
- Take out a data sheet “Simulation” and the question cards.

ℹ The “no entry” signs are not required in the version “Simulation”.

Select a team member to be responsible for filling out the data sheet. Other team members will be responsible for the chips.

- Replace 2 white chips (healthy inhabitants) in the residential area bowl with 2 yellow chips (the two inhabitants infected while on vacation) and mix well. Put the two white chips aside.



Let's go!

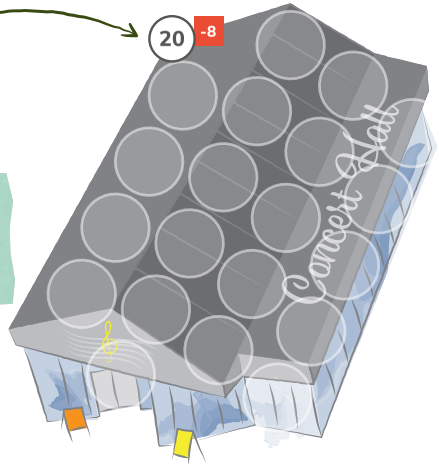
Each day is divided into three phases.

Phase 1: The day begins

The inhabitants of Stayhompton leave the residential area and visit buildings in the city.

- Slide the coin one day forward on the timeline.
- Without looking, take chips from the well-mixed residential bowl into your hand.
- Stack the chips, and use them fill the buildings of Stayhompton in clockwise order, starting with the concert hall. Start at the concert hall. Notice how many people fit into each building. If you need more chips, take more from the bowl

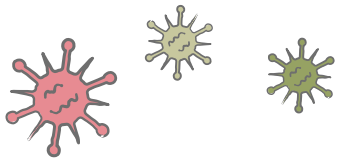
(20) This number tells you the number of outlined circles, or chips (people) that fit into the building.



The Stayhompton Clinic is not filled with chips.

Phase 2: The virus spreads

- Check all buildings. Is there an infected person (yellow chip) inside? If so, they will infect all other people in the same building.



- Count how many white chips are in buildings with yellow chips. This is the number of "newly infected" people.
- Enter the value in the counting table, in the row "Newly infected".
- Replace these chips with yellow ones and put the white chips aside.

White chips that remained in the residential area bowl remain white.

Counting table

Day	1	2	3
Newly infected	15		
Infected 1 day ago	2		
Infected 2 days ago		2	
Newly sick			2

Phase 3: The day ends

The inhabitants of Stayhompton go back home.

- Return all chips on the city map to the residential area bowl.

Complete the counting table:

- From day 2 onwards: Fill in the remaining orange and red fields in the counting table by transferring the numbers from yesterday along the arrows.

People who were infected three days ago develop symptoms. They get sick and are brought to the Stayhompton Clinic for isolation. There they can no longer infect anybody.

- From day 3 onwards: Patients that fell sick today (line "Newly sick" in the counting table) are moved to the hospital. Take the same number of yellow chips as newly sick from the residential bowl and move them to the bowl at the Stayhompton Clinic.

Track the events in the diagram:

- Count (or calculate) how many healthy, infected, and sick individuals there are in total. Enter the values in the diagram table and mark the values as points on the diagram graph. Connect the days with lines, using a different color for each type of inhabitant (healthy, infected, sick).

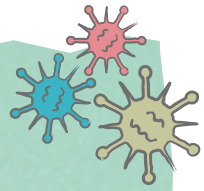
Stayhompton goes to sleep. The next day starts again with phase 1!

End of the simulation

- Play until either ten days have passed or all the residents are sick.
- If there are not enough resident chips left in the residential area to fill all open buildings, fill the open buildings clockwise, starting with the concert hall.

Look at the finished diagram and discuss what happened.
Draw three question cards and discuss possible answers together!

If you have ideas how to stop the virus outbreak, try the game variant "Challenge". If you would like to see how the virus spreads under different conditions, download more scenarios to play at **www.ist.ac.at/virusalarm.**



Did you know that ...

... real scientists make **mathematical models** and – similar to this game – **simulations** to understand how epidemics develop? Such models use many numbers, called **parameters,** that describe e.g. how easily a virus is transmitted between people. Some parameters are difficult to measure, but scientists can estimate them from data and use them to make so-called **quantitative predictions** about the course of an epidemic. Using math and hard numbers is important, because our intuition is often wrong about epidemics.

Politicians can consult with scientists and use their models to estimate the effects of various possible measures. In this way, science can help politicians make better decisions.

Game version "Challenge"

As the government of Stayhompton, you are responsible for the well-being of the town's inhabitants. According to newspaper reports a new virus is spreading in nearby places.*

You can close buildings in your city to reduce the risk of infection. However, closing down buildings has unpleasant consequences ... Can you find a good strategy to prevent a major virus outbreak?

Goal

Every day you can decide which buildings to close down and which to leave open. You lose points for each closed building, but on the other hand, you gain points for each healthy inhabitant. Set a new point record and become a pandemic professional!

Preparation

- Place a coin on the arrow next to the timeline.
- Separate the inhabitant chips by color into two bowls.
- Place the bowl with the white chips to the left of the city map ("residential area").
- Put the bowl with the yellow chips aside.
- Place the empty bowl on the city map on the Stayhompton Clinic.
- Take out a data sheet "Challenge" and the "no entry" signs.

The question cards are not required in the "Challenge" version.

Select a team member to be responsible for filling out the data sheet. Other team members will be responsible for the chips.

- Replace two white chips (healthy inhabitants) in the residential area bowl with two yellow chips (the two inhabitants infected while on vacation) and mix well. Put the two white chips aside.

* In the game, you have an advantage over a real city government: at any time, you know how many inhabitants are infected! In reality, this is difficult to know, though it could be learned, for instanced, by measuring virus concentration in sewage.

Let's go!

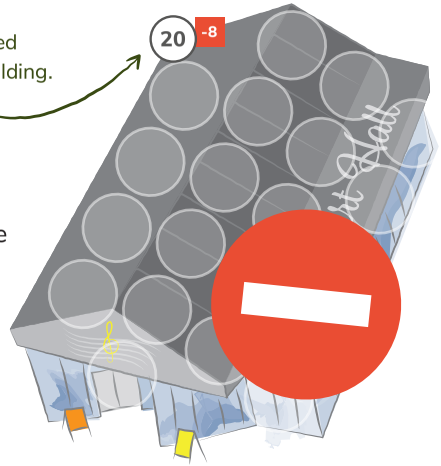
Each day consists of four game phases.

Phase 0: Deciding on closures

Decide which buildings you want to keep closed today, if any. On the city map, you can see how many penalty points it costs to close each building. For comparison: At the end of the day, you receive 1 point for each healthy inhabitant.

(20) This number tells you the number of outlined circles, or chips (people) that fit into the building.

-8 This number tells you how many penalty points it would cost to close this building.



- Mark buildings that you decide to close with a "no entry" sign.
- Mark your penalty points in the upper part of the data sheet by circling them.
- Calculate how many penalty points you receive that day in total.

Penalty points for building closures

Using circles, mark the buildings you close in the column of the day. Sum up the circled points to calculate your daily total per

Day	1	2	3	4	5	6	7	8	9
Pharmacy	−20	−20	−20	−20	−20	−20	−20	−20	−20
Bakery	−12	−12	−12	−12	−12	−12	−12	−12	−12
Shopping center	−8	−8	−8	−8	−8	−8	−8	−8	−8
Concert hall	−8	−8	−8	−8	−8	−8	−8	−8	−8
Supermarket	−20	−20	−20	−20	−20	−20	−20	−20	−20
Restaurant	−10	−10	−10	−10	−10	−10	−10	−10	−10
School	−16	−16	−16	−16	−16	−16	−16	−16	−16
Gym	−6	−6	−6	−6	−6	−6	−6	−6	−6
Total penalty points	-30								

Phase 1: The day begins

The inhabitants of Stayhompton leave their apartments and go to town.

- Slide the coin one day forward on the timeline.
- Without looking, take chips from the well-mixed residential bowl into your hand.
- Stack the chips, and use them fill the buildings of Stayhompton in clockwise order, starting with the concert hall. Notice how many people fit into each building. If you need more chips, take more from the bowl.

ℹ Closed buildings and the Stayhompton Clinic are not filled with chips.

Phase 2: The virus spreads

Check all buildings with people in them. Is there an infected person (yellow chip) among them? If so, they will infect all other people in the same building.

- Count how many white chips are in buildings with yellow chips. This is the number of "newly infected" people.
- Enter the value in the counting table, in the row "Newly infected".
- Replace these chips with yellow ones and put the white chips aside.

ℹ White chips that remained in the residential area bowl remain white.

Phase 3: The day ends

The inhabitants go home again.

- Return all chips on the city map to the residential area bowl.

Complete the table:

- From day 2 onwards: Fill in the remaining orange and red fields of today's column by transferring yesterday's numbers along the arrows.
- Count (or calculate) how many healthy people there are in total at the end of the day.

Calculate your daily score:

- Number of healthy inhabitants – penalty points = daily score

People who were infected three days ago develop symptoms. They get sick and are brought to the Stayhompton Clinic for isolation. There they can no longer infect anybody.

- From day 3 onwards: Patients that fell sick today (line "Newly sick" in the counting table) are moved to the hospital. Take the same number of yellow chips as newly sick from the residential bowl and move them to the bowl at the Stayhompton Clinic.

Stayhompton goes to sleep. The next day starts again with phase 0!

End of the Challenge

- Play until ten days have passed.
- If there are not enough inhabitants left in the residential area to fill all open buildings, fill the open buildings clockwise, starting with the concert hall.
- If at any time all inhabitants are sick, simply enter a daily score of −50 for each remaining day.

Calculate your total score by adding up all the points of all 10 days and compare your results with other teams or the table below:

from 601 points:	Pandemic pro
301–600 points:	Aspiring health politicians
101–300 points:	Not bad! Can you get more points next time?
0–100 points:	You can do better, want to try again?
less than 0 points:	That didn't go so well, try again!

Do you have any ideas how to improve your results? Play again, and optimize your tactics!

Share your results!

Send us your score with a photo of your data sheets to **science.education@ist.ac.at**, on facebook to **@istaustria** or share it on Instagram with the hashtag **#ISTAustria** and tell us about your findings! A winner of a small surprise will be drawn from all entries once a month until February 2021.

Small glossary

Incubation period: The amount of time it takes for symptoms to appear after infection by a virus.

Isolation: The strict separation of sick people from the rest of the population so they cannot infect anyone. If the people are only suspected of being infectious, this separation is called quarantine.

Symptoms: Noticeable signs of illness, such as coughing or fever.

Symptom-free infected people: People who have been infected by a virus and may already be able to infect others, but do not show any symptoms.

For parents and teachers

“Virus alert in Stayhompton” is a game for young people age 12 and up. By simulating the spread of a fictitious virus in a small town, the players learn how the spread of viruses can be contained by limiting contact to others (“social/physical distancing”).

The players dive into the role of **scientists,** who simulate an extreme scenario (game version “Simulation”), or into the role of **politicians,** who have to weigh the advantages and disadvantages of restrictions on public life (game version “Challenge”). Players become familiar with phenomena such as incubation time, super-spreading or infection by a- or pre-symptomatic carriers (“symptom-free infected people”). In addition, players practice working with data and diagrams as well as their “what if” thinking skills.

Players also gain an understanding of the measures that serve to contain the **coronavirus pandemic** and learn to argue for their views. It is important to note that the parameters of the game do not correspond 1-to-1 to the reality of the coronavirus pandemic. For example, it is rarely ever the case that all people in a building are infected by the new coronavirus as soon as an infected person enters the building. Discuss this with the children, also to avoid emerging fears, such as fear of going to school.

Playing with chips and a city map is more time-consuming than online simulations or computer games, but has the advantage of giving players time to internalize observations while they place and count chips.

The **question cards** promote understanding of basic epidemiological mechanisms, and address differences between the game and reality as well as the role of chance in the spread of a virus. Background information on the questions and possible answers can be found at www.ist.ac.at/virusalarm.

The game is particularly suitable for use in the **classroom.** In order to have time for discussion, it is advisable to schedule two lessons. The class is divided into small groups of 2 or 3 players. In the first lesson, the teams play either the same or different scenarios of the version “Simulation” and compare results. In the second lesson, the teams compete against each other in the game version “Challenge”. For more scenaria of the game version “Simulation”, please visit **www.ist.ac.at/virusalarm.**

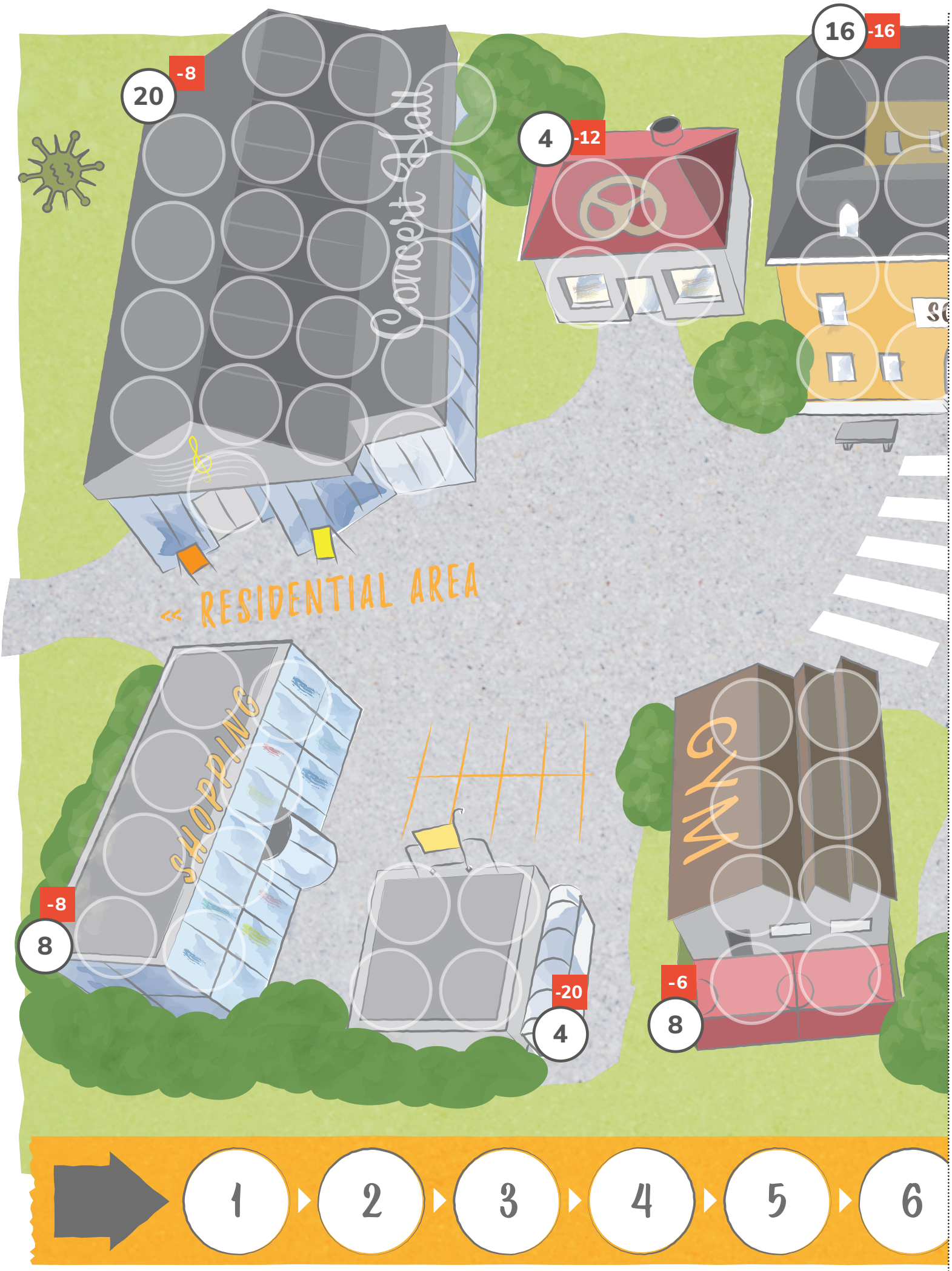
For **younger children,** filling in the counting table may be a challenge. Help them out, for instance by making stacks of ten for easier counting! Though the math might prove challenging, the principles of the game are usually well-understood by school-age children. If an adult or older child manages the counting table, the game can also be played with children age 7 and up.

While playing, children may come up with ideas for how to make the simulation more realistic, or they may question some of the game rules. Use these ideas as a basis for discussion or expand the game to include such self-imagined rules!

Have fun playing and discussing!

The authors of “Virus alert in Stayhompton” and
the IST Austria Science Education Team

P.S.: Have a fun new rule or a question about gameplay or virus outbreaks? Is there a story you’d like to share? We want to hear from you! Send us your feedback to **science.education@ist.ac.at**!



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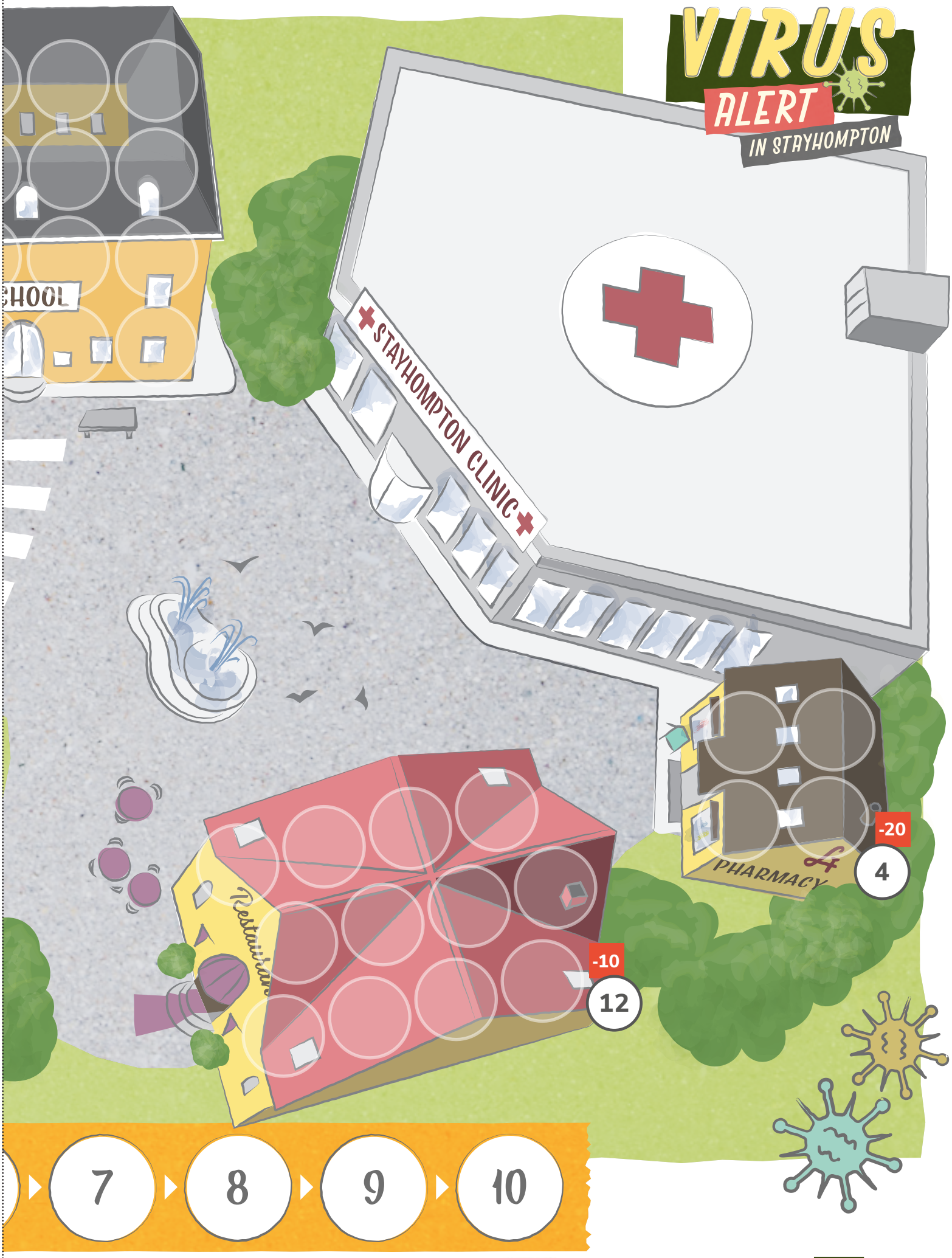

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Data sheet “Simulation”

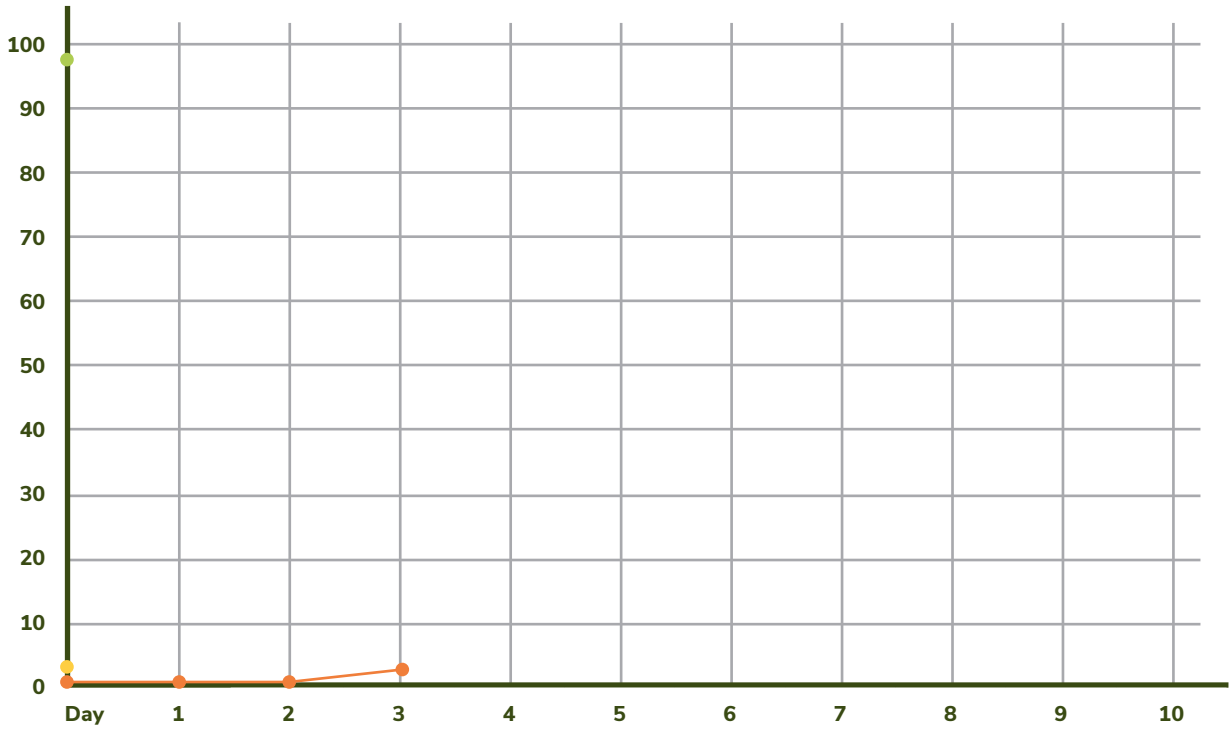
VIRUS ALERT IN STRYHOMPTON

Counting table

Day	1	2	3	4	5	6	7	8	9	10
Newly infected										
Infected 1 day ago	2									
Infected 2 days ago		2								
Newly sick			2							

Diagram

Day	1	2	3	4	5	6	7	8	9	10
Total infected										
Total sick										
Healthy										



Download data sheets: **www.ist.ac.at/virusalarm**

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Data sheet “Challenge”

VIRUS ALERT IN STRYHOMPTON

Penalty points for building closures

Using circles, mark the buildings you close in the column of the day. Sum up the circled points to calculate your daily total penalty points.

Day	1	2	3	4	5	6	7	8	9	10
Pharmacy	−20	−20	−20	−20	−20	−20	−20	−20	−20	−20
Bakery	−12	−12	−12	−12	−12	−12	−12	−12	−12	−12
Shopping center	−8	−8	−8	−8	−8	−8	−8	−8	−8	−8
Concert hall	−8	−8	−8	−8	−8	−8	−8	−8	−8	−8
Supermarket	−20	−20	−20	−20	−20	−20	−20	−20	−20	−20
Restaurant	−10	−10	−10	−10	−10	−10	−10	−10	−10	−10
School	−16	−16	−16	−16	−16	−16	−16	−16	−16	−16
Gym	−6	−6	−6	−6	−6	−6	−6	−6	−6	−6
Total penalty points										

Counting table

Day	1	2	3	4	5	6	7	8	9	10
Newly infected										
Infected 1 day ago	2									
Infected 2 days ago		2								
Newly sick			2							
Healthy										

Daily score

Calculate your daily score as the number of today‘s healthy people minus the total daily penalty points. Your total score is the sum of all daily scores.

Day	1	2	3	4	5	6	7	8	9	10	Total score
Daily score											

Question cards

VIRUS ALERT IN STRYHOMPTON

? What would happen if sick people continued to go to town instead of being isolated in the hospital?	? What methods could be used to slow down the spread of a virus?
? Why are large buildings often the first to close during virus outbreaks?	? How would an outbreak develop, if the incubation time was just 1 and not 3 days? How could you simulate that in the game?
? Why is a virus particularly difficult to control when there are infected people who do not have symptoms?	? On which day would the inhabitants notice that they have a virus problem in their town?
? How does the spread of the YEAN virus in this game differ from the spread of the new coronavirus in the real world? What else is different or missing in the game simulation?	? If you replayed the same simulation, do you think you would get exactly the same numbers again? Why or why not?
? In reality, people very close to an infected person are more likely to get infected than people further away in the same building. How could you simulate that in the game?	? How would the outbreak develop if half of all people were vaccinated? How could you simulate that in the game?

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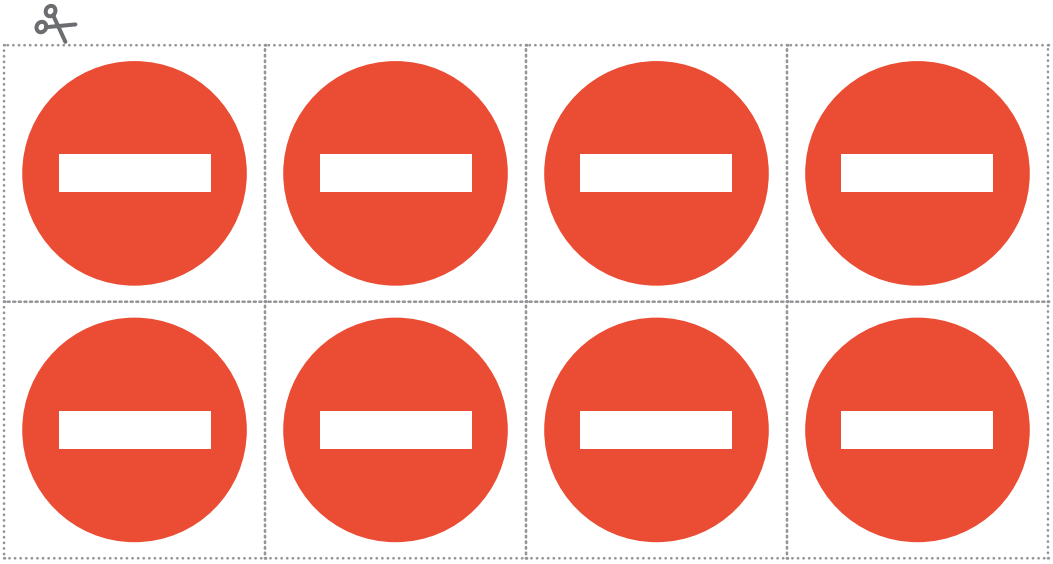

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