Understanding Systems with Computational Models: Using, Assessing, and Modifying a Computational Model

A system is a group of things which affect each other, such as plants and animals in a food web or parts of a machine. Models and simulations represent relationships and processes of systems with interrelated parts. Models can be computational or non-computational.

Computational models represent mathematical relationships between parts of a system, and are created using a computer. In this activity, you will use a computational model to collect data about a scientific phenomenon and then assess how accurate the computational model predicts phenomena in the real world.

1 Part 1: Exploring a Computational Model

Explore the computational model. Consider:

- What real-world phenomenon is this model based on?
- What settings can you change?
- What happens if you set them to one extreme or the other?

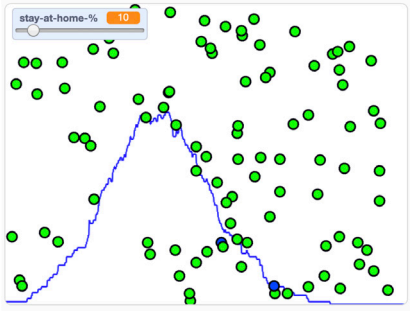
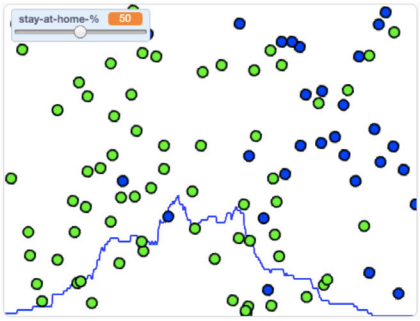
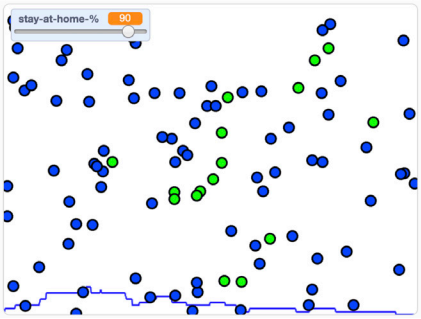
2 Part 2: Developing a Question/Connecting to the Real World

- How does this phenomenon relate to your life and/or community?
- What do you wonder about this phenomenon?
- How can this model help you to better understand this phenomenon?

3 Part 3: Using a Computational Model to Answer a Driving Question

Link to computational model: https://scratch.mit.edu/projects/376656449/

Question: How does staying at home (social distancing) affect how many people are infected with coronavirus?

Scenario 1	Scenario 2	Scenario 3
Settings: 10% stay at home	**Settings: 50% stay at home**	**Settings: 90% stay at home**
Results: 	**Results:** 	**Results:** 

Compare/contrast your results. What did you learn about your question?

If at least 50% of people stay at home, then about half of the people become infected with coronavirus. If 90% of people stay at home, a much lower percent of the population gets coronavirus.

What questions do you have about your results?

How long do people have to engage in social distancing for the disease to stop spreading?

4 Part 4: Assessing Your Computational Model

1. How is this real-world phenomenon different from the model? Identify at least two factors that are not represented in the model.

   - Other preventative measures for disease transmission: In the real world, there are other ways to prevent yourself from getting the virus besides staying at home. You could wash your hands, stay six feet apart, or wear a face mask.
   - Transmission rate: It is uncertain how likely someone is to contract the virus if exposed. Because so many people are asymptomatic, it is likely not 100%.

2. Did the creator make any assumptions about the system when they created the model? If so, how are those assumptions affecting the model?

Yes, the model assumes that the same number of people in the community remains constant. In reality, people travel between communities, which can affect the disease transmission rate.

5 Part 5 (Optional): Modify the Computational Model

What changes can you make to this model to make it more similar to the real world or better inform your question?

Are you able to see the code used to create this model? If so, look inside! Modify the code to reflect the change you identified.