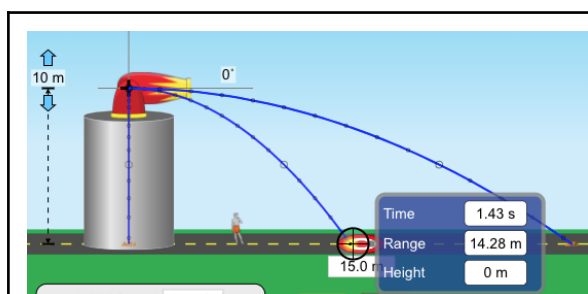


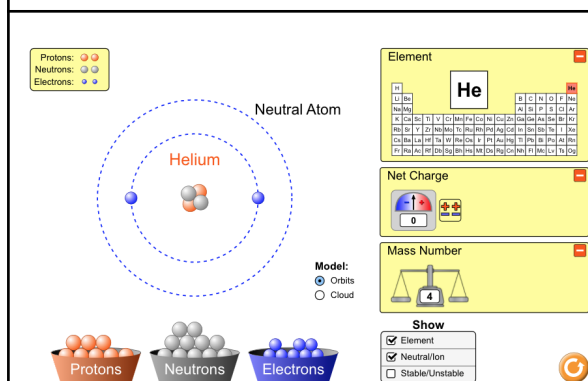
Students can engage in inquiry even in a whole-class discussion in which the instructor is the only person controlling the simulation. We call this kind of discussion "Whole-Class Inquiry" because the whole class may be engaged in the testing of cause-and-effect relationships, as if they were one large lab group. Some strategies that you can use to prompt a whole-class inquiry are:

- Start by attempting to reveal students' preconceptions by using **"What will happen if...?"** questions, inviting students to share the reasoning behind their answers. Some examples include:



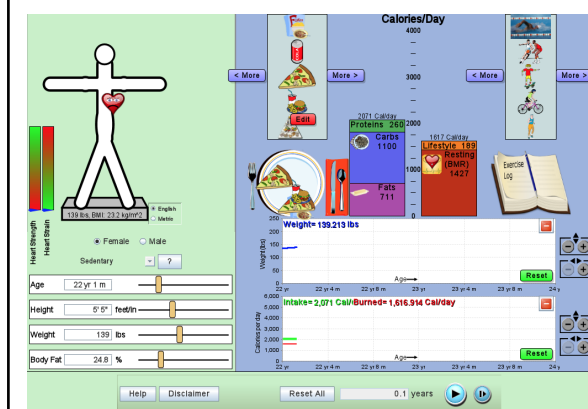
With [Projectile Motion](#)

- Which pumpkin is going to hit the ground first if they are fired from the cannon at the same time, but with different initial speeds (0 m/s, 10 m/s, and 20 m/s)? Explain your reasoning



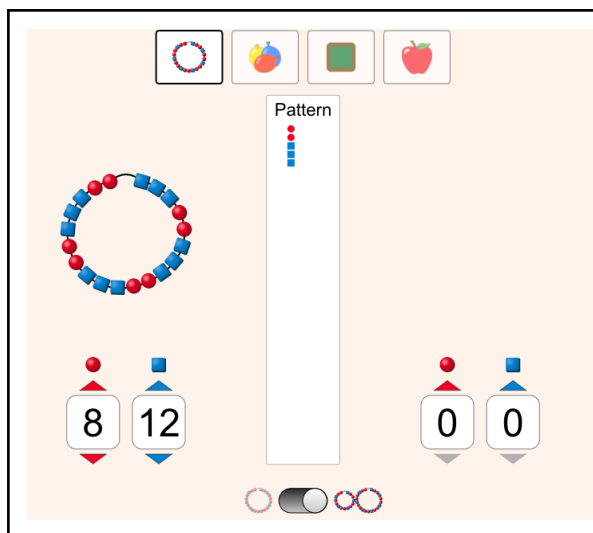
With [Build an Atom](#)

- What will happen if you add another proton to a neutral atom of helium? Mention all the properties of the atom that change and explain your reasoning.



With [Eating and Exercise](#)

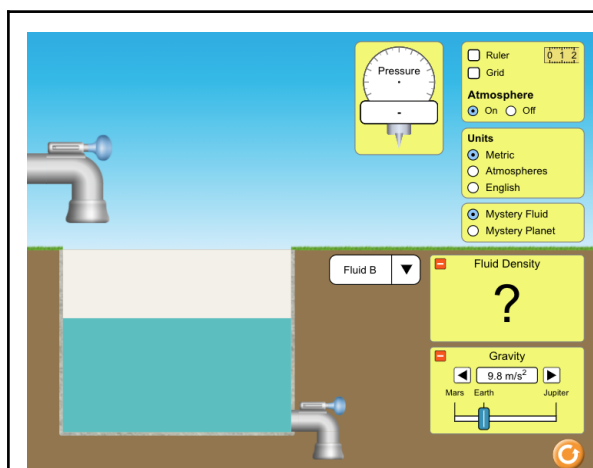
- What will happen to a person if their caloric intake is larger than the amount of calories that is burnt per day? Predict their weight graph.



With [Proportion Playground](#)

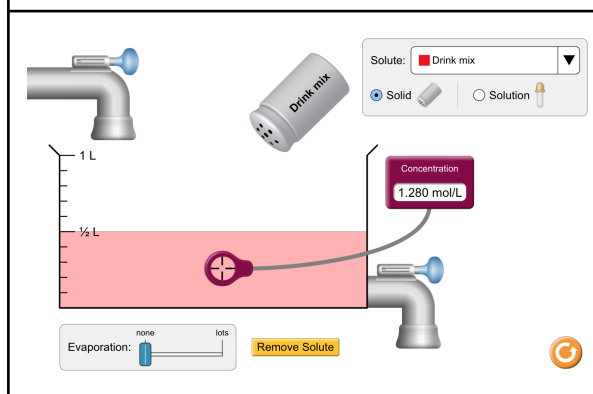
- What will happen with the pattern if I change the red bean's number to 10? Explain how you know it.

- You can also **encourage students to propose new questions and experiments** by asking them “**what should we change in order to...?**” and then testing their ideas with the sim. The more you use the simulations, the more students will become comfortable asking spontaneous “what-if” questions, and you will have more student-driven discussions in which they suggest what to do with the sim. Depending on how your class is structured, you can ask some students to volunteer to use the simulation in front of the class to test their ideas.



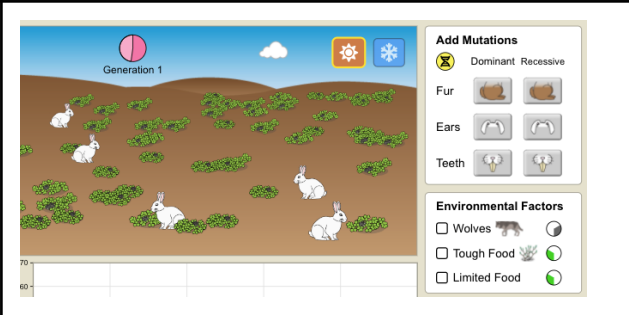
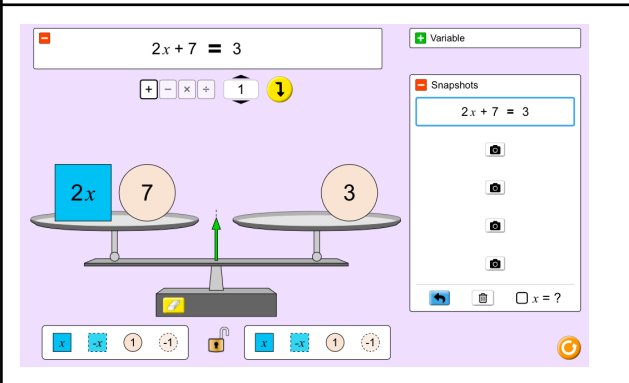
With [Under Pressure](#)

- How could we use the sim to discover the density of the unknown fluid?

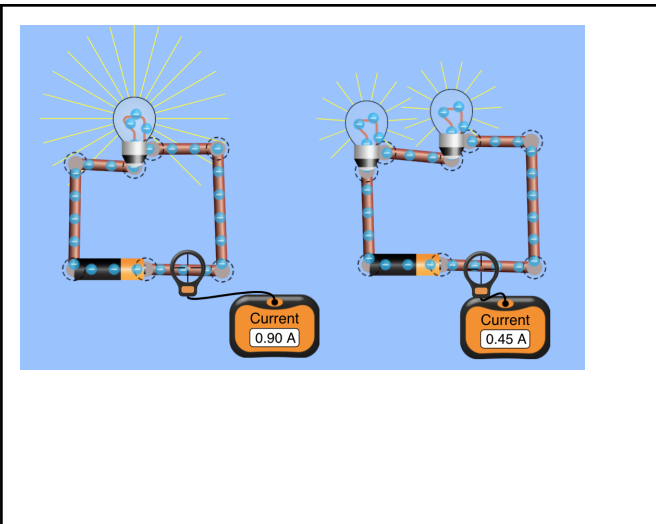


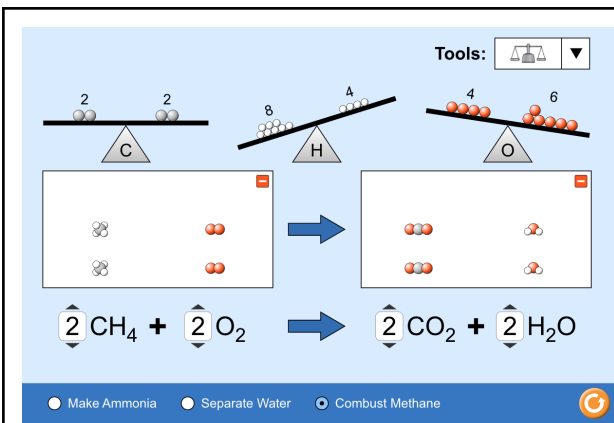
With [Concentration](#)

- What are all the different ways to increase the concentration of the drink mixture solution?

	With Natural Selection What do we need to do in the sim to produce a larger population of brown bunnies?
	With Equality Explorer What do we need to do in the sim to solve this equation for x?

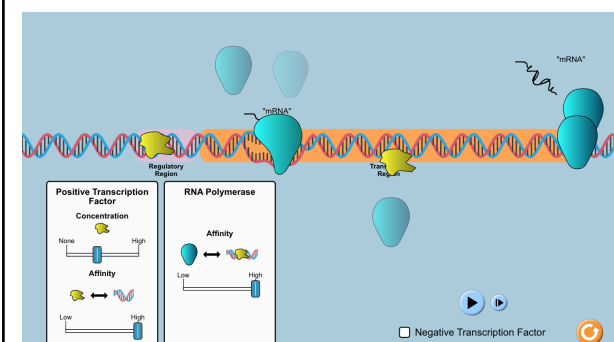
- Allow **students to explain** what happens within the simulation and to **interpret** the different visual outputs. Ask questions like:
 - What does ... represent?
 - What happens when we change ...?
 - What is the difference between ...?
 - Why ...?

	With Circuit Construction Kit: DC - What do the blue dots represent? - What happens to the brightness of the first light bulb after the second light bulb has been connected to the circuit? - What are the differences between the circuit with one light bulb and the circuit with two light bulbs? - Why is there less current flowing through the two-light-bulb circuit than the one-light-bulb circuit?
---	---



With [Balancing Chemical Equations](#)

- What do the red, white, and grey balls represent?
- What happens when we add an extra molecule of oxygen?
- What is the difference between balancing the methane combustion process and the separation of water?
- Why is this chemical reaction not balanced?
- Which part of the simulation is showing you that the equation is not balanced?



With [Gene Expression Essentials](#)

- What does the black curved squiggle represent?
- What happens when the affinity between the biomolecule and the gene is increased?
- What difference is there between modifying the affinity of the RNA polymerase and the positive transcription factor?
- Why might RNA polymerase not get transcribed even when the affinity is high?

Total: 52 cents

My Collection: 6 brown coins

$3 \text{ red} + 2 \text{ grey} + 1 \text{ yellow}$

$1 \text{ red} + 2 \text{ red} + 1 \text{ grey} + 1 \text{ grey} + 1 \text{ yellow}$

☐ Coin Values ☐ All Coefficients

With [Expression Exchange](#)

- What does the **3** to the left of the brown coin represent?
- What happens with the first expression if we add another grey coin?
- What is the difference between the first expression and the second one?
- What is the same in both expressions?
- Why does "My Collection" indicate that we have 6 brown coins? Where are they?