Hour Glass Guided Discovery Modeling Activity

Your task for this assignment is to program a simulation of an hour glass. Start with a simple simulation, then we can build in complexity as we go.

Consider the following video: [https://youtu.be/CltD7aXr2fw](https://youtu.be/CltD7aXr2fw)

Also, take a look at my basic simulation: [https://youtu.be/NKRNvw9aCkI](https://youtu.be/NKRNvw9aCkI)

**Activity:** Now you will be working in pairs to make your simulations. One computer per pair, find your partner based on whoever has a card that is the same color and number as yours. Consider the following video as you work together and share who is using the mouse/keyboard and who is giving instructions.

Pair programming video: [https://youtu.be/vgkahOzFH2Q](https://youtu.be/vgkahOzFH2Q)

You should be able to complete this basic task with the skills you learned in Frogger but adding complexity takes using new code. Start simple, then make it more realistic and complicated once you have it working.

If you finish your basic simulation early, consider the following:

- Does the sand in your simulation flow realistically?
- How steep does the sand stack up?
  - Should it be steeper or more shallow?
  - How could you change this?
- Try making new worlds with different shaped hour glasses and different reservoirs that flow into different basins. Could you model a dam or a something with multiple basins?

If they have done simulation properties before

- Try adding a random element to how the sand falls, can you make this adjustable with a simulation property
- How would it be different if you were modeling sand instead of water? Give it a try with a simulation property where 1=sand and 0=water.
  - If you are done with that, how could you model something more viscous, like lava
- What if there is a tendency for the sand to fall in one direction, try adding an adjustable wind factor?
- Should the sand/water always fall straight down, what if you add a random chance that it will not fall down, even if there is nothing below it
Discussion: discuss strategies, meta-reflection on this task

- How did you get the sand to move?
- What problems did you encounter? What was easier for you to solve?
- Which extension activities did you pursue?
- What suggestions would you have for this activity if you were to use it in your classroom?
  - What scaffolds would you use?
  - How much time would you have them spend offline/unplugged?
  - Would you limit them to just sand or would you give more control over the theme of the simulation, beyond just “something falling”

- What did you find useful about this model of learning? Did you learn new ways to use the code? Did you have the opportunity to genuinely problem solve?

- What was frustrating about this type of activity? Did it take longer than if I just told you what to do? What would have been the downside of me teaching by explaining rather than by guiding?

Scaffolds when students need some more support:

- What agents do you need?
- Sketch out the program first
- What behaviors do each agent need?
- Try using the agent design sheets