Floorlandia: Setting up a Computational Model

1. Form pairs.
2. Receive from teacher:
    a. **Grid of Floorlandia Elevations** or laminated **11x13 Floorlandia**
    b. **Lesson 3 – Activity 3 – Student Pages**
    c. 2 water bead marbles
    d. pen or pencil.

The **Grid of Floorlandia Elevations** is a 2D representation of a landscape that can be used to simulate surface water flow in the real world. The landscape is broken into 8 x 8 = 64 small cells. Remember the ideas discussed about discretization in Activity 2.

3. **Part 1 - Lay of the land.** Examine the topography of the model, find the key features and then complete Part 1 in the Student Pages worksheet.
    a. Highest point(s)
    b. Lowest points(s)
    c. General Lay of the land

4. **Part 2 - Setting rules for water movement.** Discuss what the basic rules of the model should be and then record the rules in Part 2 in the Student Pages worksheet.
    a. In which direction does the water move from cell to cell?
    b. Is diagonal movement allowed?
    c. What about ties?
    d. What happens to water droplets at the boundary of the model?

5. Practice using the model based on these rules. Place a bead on any cell in the model you choose (preferably, a high elevation cell), then move the bead through the model following the established set of rules. Once you have completed one pathway, select one or two more starting cells and repeat the procedure. Discuss any changes you want to make to the rules and record these in the Student Pages worksheet Part 2 and then complete the rest of Part 2 (reflecting on your rationale for the rules).

6. **Part 3 - Modeling flow paths of water droplets.** Use the blue marker to draw arrows from cell to cell along the pathway a water droplet would travel from each starting location, following the rules you established. Continue until each cell has a pathway of arrows leading to one of the low points on the model. Divvy up the grid if that makes it easier to find flow directions for every cell. You are modeling how water moves over surfaces in the real world. Complete Part 3 of the Student Pages (Question 3).

7. **Part 4 - Delineating watershed(s).** Delineate the watershed boundary or boundaries on your grid. Use a black dry erase marker to draw a boundary between the cells where water does NOT flow between. You should end up with a continuous boundary around a large watershed that takes up much of the grid, and several smaller ones surrounding this one.

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8. When you have covered your model in arrows and delineated the watershed boundaries, share your models with the rest of the class and compare these with the "Expert" results from Comp Hydro hydrologists. Have a brief discussion about why groups might have different results from each other and from the scientists. Then complete Part 4 of the Students Pages.

9. **Part 5 - About the watershed**. Work with your partner to complete Part 5 of the Student Pages, Questions 7, 8 and 9. Use the "Expert" version of flow paths and watershed boundaries from the Comp Hydro hydrologists.