What are the dimensions?

Goal: Help students develop their critical thinking by challenging them with questions about the fourth dimension.

Materials:

* Some sort of line (toothpicks)
* Some sort of point (gum drops) (it’s helpful if they can put points and lines together, but not necessary)
* <https://www.youtube.com/watch?v=NeNvSCTbVVs> (king of pointland)
* <https://www.youtube.com/watch?v=76lUZR6z3OQ&t> (king of lineland)
* Worksheet

Starter:

Have students answer the following questions:

1. Give an example of:
	1. Zero dimensions
	2. One dimension
	3. Two dimensions
	4. Three dimensions
2. What could a creature in each of these dimensions “see”?
3. What directional words make sense in each dimension?

Help students with the answers to each of these questions and then help students see how to “flip” a line (take it out of 1-D into 2-D and then flip and return). Talk about how that would change the line’s “life”. Have them think through and do the rest of the worksheet.

Pitfalls:

 Before moving on to what happens in the 3rd or even higher dimensions have students really think about how they could affect a two dimensional world. Have them think about how 2-D would preform surgery vs how they could on 2-D. About distances (fold two points). I also like to point out that everything we can see can be placed on a sheet of paper… a 4-D creature could place everything they can see in a cube.