EDCP 552-26 Week 2: Multisensory math activities sheet

This week there are two batches of activities: (a) for people who are reading the Kepler reading (activities that connect with the text), and (b) for people who are reading the other two readings (activities that connect with the viewings). Feel free to do extra activities if you feel like it and have the time -- but be sure to do at least the activities according to your reading!
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Activities (a) (connected with the Kepler Six-Cornered Snowflake text). It's best to do these activities *before* reading the piece by Kepler if you can! And if you can share the activity with family, friends or students, so much the better <3

1. If possible, please get yourself the following 'mathematical foods' that Kepler refers to: a pomegranate, an apple, maybe some other fruit like an orange or a persimmon and maybe veggies (red cabbage is a good one, but zucchini, other squash, tomatoes, etc. are all interesting. Try to get hold of some actual honeycomb (you can sometimes buy a jar of honey with the honeycomb included), or look at some photos of honeycomb.

   •Slice the apple in half **horizontally** (not vertically). What patterns do you notice? Can you see the remnants of the apple blossom on the base of your apple (or look up a photo of an individual apple blossom). How does the pattern of the blossom connect with that of the apple? Are all apples like this?

   • Slice the pomegranate **horizontally** as well. What patterns do you see overall, and what patterns with the individual seeds? Take a moment to speculate why these patterns might form.

   • Try the same with some other fruits and vegetables. What patterns are you noticing? Conjecture why these plants might grow in these patterns.

   • Look at the honeycomb (or photos of it). Can you tell what shape the cells in the beehive are, and how they connect together? Why do you think bees make their hives and honeycombs this way? Is there any practical advantage in this for the bees?

2. If it happens to be snowing or frosty where you are (like the Vancouver area today, on a Snow Day!), go outside and catch some snowflakes on your mitten or scarf...and take a close look at frost on a windowpane. What shapes do you notice, in 2D and 3D? What might possibly explain them? If it's not snowing or icy, you can check out some photos.

3. Make yourself 3D (paper) models of the following polyhedra from the cut-and-tape templates linked here, or the origami models linked here. These are the only five regular polyhedra (ie: 3D objects with all faces exactly the same size and shape) -- known as the Platonic Solids (yes, that Plato!)

   • tetrahedron (triangular-based pyramid)

- hexahedron (cube)
- octahedron (diamond shape -- two square-based pyramids stuck together at their bases)
- dodecahedron (12 pentagonal faces)
- icosahedron (20 equilateral triangle faces)

Have these at hand as you read Kepler -- they should be helpful!

Reflection questions: What difference (if any) did it make to actually cut up and observe fruits and vegetables, to observe a honeycomb or a snowflake, and to have an octahedron and an icosahedron, etc. that you made as you were reading the text? What difference might it make to kids to learn from real 3D living things and/or objects with shape, texture, smell, taste, etc., as opposed to 2D printed images? What difference do you think it might it make for students with sensory impairment (low vision, auditory impairment, etc.)?

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Activities (b), for those reading the other two texts:

1. If possible, get some candies (Rockets, or other) or some other interesting snack food kids like. Inspired by Vi Hart's Smarties video, what data analysis activities can you design with the candies? What geometric learning activities can you design?

2. Use the template linked here (or the larger one linked here) and cut out and make a hexaflexagon as in Vi Hart's videos. You can play with decorating the three surfaces with colours, patterns, words, numbers, poetry, etc. Play around with your hexaflexagons so that you become good at 'folding and flipping' them to reveal their three surfaces (which is a little tricky at first!)

3. If you are able to, try making (and eating!) a Flex Mex hexaflexagon burrito, as in Vi Hart's video! How does it feel and taste to eat this mathematical shape?

4. If possible, get a bagel (or three) and try cutting it into a Mathematically Correct Breakfast of two interlocking rings as in George Hart's video. How does it change your experience of the geometry -- and the bagel? Now, if you are ready for a challenge, see if you can cut a bagel into a Möbius strip and document your tries and method!

Reflection questions: What difference (if any) did it make to actually experiment hands-on with mathematical activities that you watched on the videos? What difference might it make to kids to learn from real 3D living things and/or objects with shape, texture, smell, taste, etc., as opposed to 2D printed images? What difference do you think it might it make for students with sensory impairment (low vision, auditory impairment, etc.)?