

Partnering with teachers  
Joel Scheingross at McKinley Middle School  
6<sup>th</sup> grade science teacher Marcus Williams  
Academic year 2010/2011

I've done two lessons so far for Marcus' 6th grade class (supposed to do another one next week).

The first lesson was on reading topographic maps. I first gave a mini lecture on topographic maps and talked about how to identify valleys and ridge lines. I then gave a short demonstration (provided by Caltech Classroom connection) of a 3D surface that I flooded with water so students could trace the water lines and see the contours develop.

After I was confident the students understood the basic principles I gave the students a 5 m (LiDAR) derived contour map of Eaton Canyon, as well as a shaded relief map. I slightly modified the attached contour map and hand wrote in elevations of 4-5 contour lines. I then asked students to work in pairs to do some simple exercises (calculating the elevation difference between points as well as the horizontal distance between points). Students generally did well, except for when I asked students to compute the elevation difference between two points on opposite sides of a valley.

If I was to do this activity again, I would modify the hand out sheet to ask students to list the actual elevation at different points (rather than the elevation difference between points). But overall, it went fairly well.

The second lesson I did was on why the Earth has seasons. I planned to run an exercise the teacher had with a light bulb, light meter, and sphere where we could tilt the sphere to different angles and see the different solar insolation for winter vs. summer. When I got to the classroom the light meter didn't work so we had to improvise on the fly. We still had the light meter and a globe, so I had a student volunteer hold the globe and circle the light bulb to demonstrate that the northern hemisphere gets more direct light in summer than in winter, and that's why we have seasons. I also gave the students a mini-lecture telling them the earth sun distance at aphelion and perihelion, and we performed a simple back of the envelope calculation to determine how long it takes light from the sun to reach the Earth (which was a question from a student). If I had to do this again, I might spend more time to describe the Milankovitch Cycles (we touched on this briefly at the end, and the students were interested), and also how seasons on other planets aren't the same as Earth's. The exercise I planned to do with the students is attached.

As a general rule, I've found that for this 50 minute 6th grade class, a short

lecture (15 minutes or less), followed by a hands on activity (25 minutes), and a 10 minute review/synthesis works quite well. Also, the students really enjoy when you give them the opportunity to volunteer for activities/demonstrations.