

## SP713 January 27, 2010 Summary

### Discussion

"Did you do a really cool experiment on Monday?"

Elizabeth "...connection to Galileo his observations and thoughts, through deep and growing sense of what we observe and understand and sense about what he is doing and thinking. ...a connection between understanding Galileo or a classmate or child.. Your classnotes are a start to document and observe each other's work"

-“she doesn’t always tell us the answer; she lets us discover the answer, let us explore! encouraging us to explore by ourselves!”

-“[after class] we remembered the thing that was important, and we spent hours exploring it.. geode: a metaphor for learning: outside, layer, thin layer, crystals and structure, empty space to learn more”

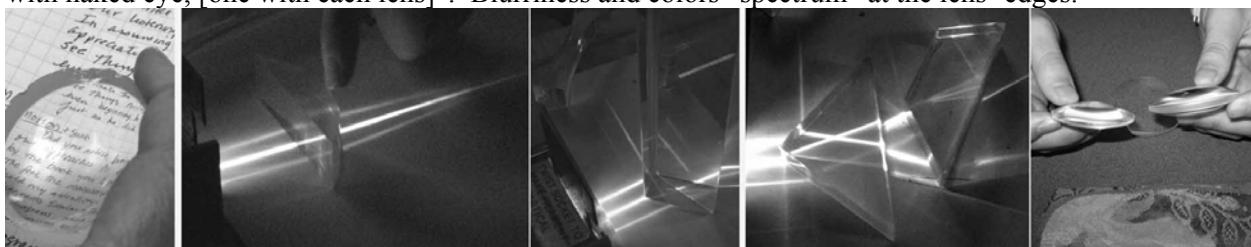
### Observing with Light

Print as seen through a concave lens (photo 1) and a pencil seen through a lens.

Light line source directed at a half-convex lens (photo 2). “The distance [lens] to converging point to where it bends, is not the same, when you flip it [lens] around.” “The convex lens they[light lines] all come to one point; this[concave] kind of expands it back out” “when you have double concave does it make it twice as big?”

A pair of prisms (photo 3), a triangle and a four-sided shape with many intriguing effects (photo 4). Reflection of the rainbow mirroring.

Two convex lenses; comparative views made at the same distance, different distances (photo 5) “I thought it interesting to see if [the image] really become sharper... the image is magnified differently: you can see three sizes of things, one with naked eye, [one with each lens]”. Blurriness and colors “spectrum” at the lens’ edges.



Holding two lenses up between the eye and an object:

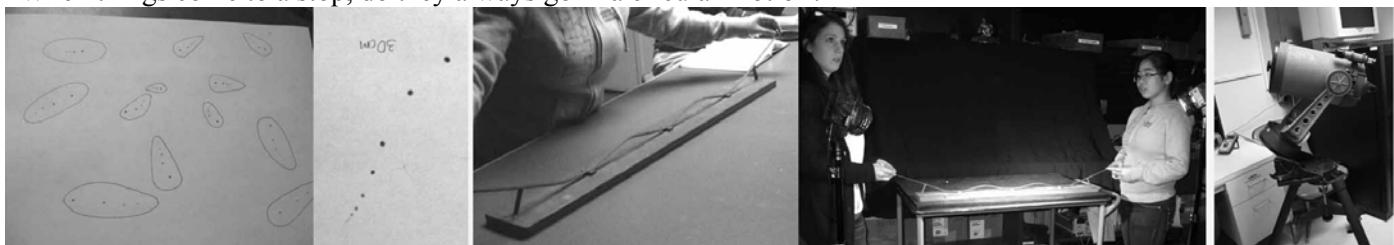
“concave to convex... I can only see three-quarters of the whole thing; convex to concave I see the whole thing. I didn’t expect that.” Measuring with the viewed image.

Viewing with convex lens: “I am trying to find out at what distance does it become to be upside down.”

### Motions

A marble is dropped from different heights above a sheet of carbon paper over a white paper; dots of different spacing appear on the paper beneath (photos 6,7). “Before the ball stopped, it vibrates, it is not the complete dot like the first one... I have a question about a ball going to stop.. maybe this one gives me some clues”

“When things come to a stop, do they always go in a circular motion?”



“They use this principle to build roller coasters.” A curved ramped track with three dips between the two outer ends (photos 7,8). A ball released from a top edge rolls back and forth, at first traversing all humps, eventually ending in a U dip where it goes back and forth. “The first time it landed in the far U and this time it was [another one]... I would have thought it would end in the same U” “but it almost never ends in the center ...”

“Shall we compete [two balls releasing them] from two points; let them go together. They will have a fight.”

Techniques for release: one ball on one end by one person, one on the other end released by a different person. Someone counts “one two three go.” A release of both balls by the same person where the balls meet in the middle and stop. Trials with balls of the same size/kind and of balls that differ in shape and weight. “Look how they chase each other” Dropping balls from above the track onto it. A judge watches the competition to see which ball “wins”. “We are getting better at these two [ball releases]” Rolling on the half round track is compared to rolling on the three U track. Recording the motions with Phantom High Speed Video camera: once a marble that leaves the track and falls, another time, marbles roll in dips of the track. One person releases a ball from each end of the track, and there is a marble[or more] at the middle U of the track.

### ***Third Floor Hallway at 4:50***

Watching for the Sun in the Hallway effect. The pink sunlight color extends partway down the hall, and recedes. Mirrors. Clouds.

### ***MIT Wallace Observatory Tour, Westford MA***

A clear moonlit night at the Observatory. Moondogs – big white circle- around the moon. In the control room, a 8” celestron telescope, like the one we borrowed (photo 9). Looking at the mirror of the 24” telescope in the dome (photo 10); the view into the mirror (photo 13). Inside the dome, looking out the opening to the sky, with the telescope (photo 11, 14). The dome in moonlight on the snow (photo 15). Glow in the sky from moon and cities. We see Orion and his belt and sword. Do these telescopes have lenses?



The image of the moon falls from the telescope eyepiece as a white bright spot on the observer’s eye (photo 16); catching it on a white paper placed below the 14 inch telescope eyepiece (photo 19), as an image (photo 20). The Orion Nebula, a brighter haze around 4 bright stars, and with 3 stars oriented toward it; reddish glow of Mars with vague shadows (photo 17). Light and dark features of the moon; change as observation continues (photo 18). Circles and rings on the moon. Perfect circles, many circles. A translucent gray like a pebble. ‘Rays’ going out from some circles; different shades of white and gray. Does the part of the moon outside of the sun’s light get light on it?



**THANKS SP 713 2010  
OUR CLASS!**

**GALILEO!**

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