

**(a) Class Discussion on the Harvard Science Center and Houghton Library Visit**

- The lighting and the layout of the room give the three-dimensional effects.
- We are very excited because we can touch the historical scientific books.
- Although we cannot understand the texts on the books, we look at the diagrams and illustrations on the books. LJ has drew a similar perspective which can find in the Kepler's book before she look at it.
- How many things has he observed before Galileo can describe the moon? How sensitive as an observer Galileo was.
- Someone will regard that he/she can learn better by reading, but there are also s group of people realize that they can learn better by doing the things. Although different people has different opinion on the learning skills, everyone can take more on hand learner even for a book learner.
- What are the little things have Galileo observed in his life? Galileo can explain many things in a scientific ways which he has see in his life, such as the projectile motion, the fall of an object, the rolling object and the swinging pendulum.
- What else happened in Galileo's days which trigger his thoughts?
- How can a person teach science in a context of times? How difficult was to create a lens?
- People learn from the wrong assumptions and modified the assumptions once they found the correct one, e.g. the earth surface is flat.
- From our perspective, we always thought that there is no relationship between the technical skills own by the craftsmen, glass blowers and gardeners and the science.
- Starts to pay more attention to the things around us even something that look normal for us.
- May be we always take things for granted, we cannot be a very sensitive observer in our real life.

**(b) Experiment (Motion – Incline Plane)**

I have set up an experiment to study the rolling motion of different types of objects down to the plane. The objects included a solid sphere ball, a spherical shell, a solid cylinder and a cylindrical shell. All objects have approximately equal diameter. The setting up and the procedures are written on my journal which I will scan and attach to another submission for reference. The distance traveled by all objects are the same.

From this experiment, the solid sphere rolls faster than the spherical shell. Likewise, the solid cylinder rolls faster than the cylindrical shell. This imply that the motion of both solid sphere and solid cylinder are faster. Why isn't so? Why does a spherical shell and a cylindrical shell take longer times to arrive at the bottom of the plane? Isn't because of the different in mass? If yes, what is the relationship between the mass of an object and the velocity of an object? The velocity is defined as the total distance traveled by the object divided by the time taken. Mass of an object is not a variable in this definition. Obviously, the velocity is independent from the mass. The other variable in this experiment which I can think of is the center of mass of the object. These objects have different center of mass, therefore these objects have different moment of inertia. If I consider the work-energy theorem in this case, the total kinetic energy must be equal to the total energy done by the object. Assuming that the object rolls without slipping:

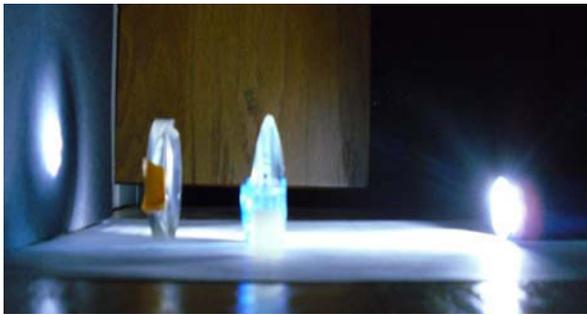
$$KE_{TOT} = W_{TOT} \quad \frac{1}{2} mv^2 + \frac{1}{2} I\omega^2 = mgh$$

(I have found the reason behind this experiment! Please refer to my calculations on my journal.)

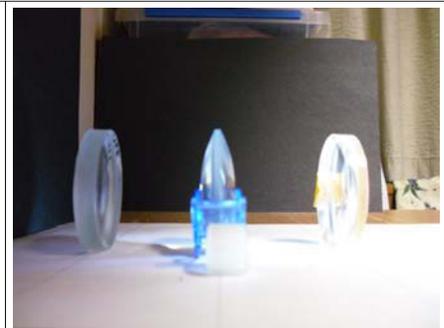
**(c) Experiment (Lenses and Lights)**

Today, I still want to explore the lenses and the lights. Therefore, I have set up another experiment which is different from what I have done on January 11, 2010. Just to quick refresh with what I have done on January 11, I have explored the lenses and the lights by stacking the lenses in a vertical direction. Today, I will repeat this experiment again but the arrangement of the lenses is different. The lenses are now placed vertical on the table at equal spacing (e.g. 5cm, 10cm and 15cm) and the torch light is placed at approximately 7cm from the 15cm horizontal line on the white paper. Please refer to the scan document for the setting up and procedures.

Interested to find out what I have noticed in this experiment? Look on my journal and you will be surprised. I have taken some photographs when I conduct this experiment but the resolution of the photographs might not be good due to the reflection of the light on the lenses.



**Photo 1(a): Side View**  
Negative meniscus and biconvex lenses (from left to right)



**Photo 2(c): Side View**  
Biconcave, biconvex and negative meniscus lenses (from left to right)



**Photo 1(b): Front View**



**Photo 1(c): Closer View**



**Photo 2(b): Front View**

MIT OpenCourseWare  
<http://ocw.mit.edu>

EC.050 Recreate Experiments from History: Inform the Future from the Past: Galileo  
January IAP 2010

For information about citing these materials or our Terms of Use, visit: <http://ocw.mit.edu/terms>.