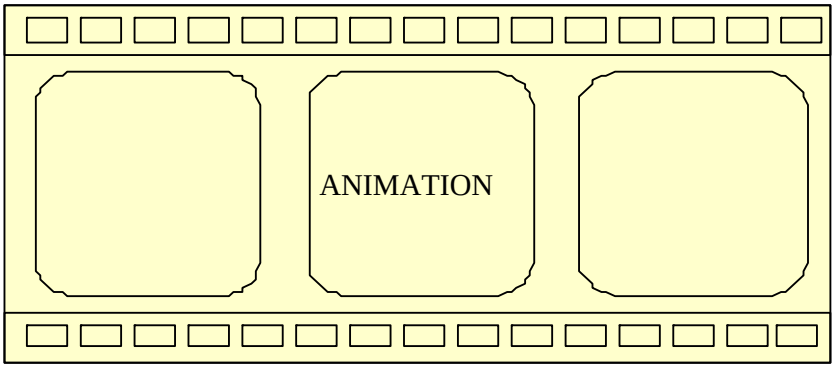

Objective:
The students will demonstrate the concept of persistence of vision used in animation.

Materials:
3”X5” index cards
Plastic straws
Scissors
Black marker

Introduction:
Animation is predominant in the lives of students today. Animation is used on television, the Internet, some cell phones, and movies. It is what makes movies like *Toy Story* exciting. Around 340 B.C., Aristotle wrote about the after effects of light and motion. Later, in 130 A.D., Greek astronomer, Ptolemy, developed a theory called persistence of vision.

Studies continued about light and human eye anatomy. In the 1820s, a motion toy called a thaumatrope was invented that demonstrated the principle of persistence of vision, early animation. The toy consisted of a disc with pictures on both sides, tied to two pieces of string. When spun, the pictures seem to blend into one image. The inventor is in question. Three people have been credited with the discovery: Peter Roget, Dr. John Ayrton of Paris, and Dr. Fitton of London.

The retina captures an image and the eye and brain remember the first picture for a fraction of a second and blend it with the second picture. The number of frames per second (FPS), correlates with the smoothness of the image movement. If the frame rate is slow, the image appears jerky and if faster, it will appear smooth.

Activity:
1. After a unit on human eye anatomy and behavior, students will investigate completed animation cards. Ask the following questions:
    - What do you notice about the two images? (very similar)
    - What about the rolling of the straw? (the faster you roll it, the smoother the movement)
    - How do you think animation is linked to human eye anatomy and behavior? (retina captures and holds image a fraction of a second and blends it with the second image)
2. Have students construct an animation card with the materials provided. Students cut a 3”X5” index card in half and draw a similar object on each one. Then, have them glue the two cards back to back with the images facing out. Each student now cuts a plastic

drinking straw about an inch vertically on one end (both sides of straw). Slide the two glued index pieces in the slit you created on the straw.

3. Now, have the students predict what they think will happen when they roll the straw between their palms.
4. Have the students hold the straw between both palms and roll it back and forth to see the animation. Now, have them write their observations about what happened.
5. Have the students do research on persistence of vision on the Internet and use some of the websites listed below.
6. With all the information, the students can now construct another animation card to see if they can make it work better.

Internet resources/references

History of Animation

http://www.privatelessons.net/2d/sample/m01_02.html

Thaumatrope

http://www.randommotion.com/html/thauma.html

http://www.eggplant.org/ideas/visual/animation/thaumatrope.html

http://www.vam.ac.uk/moc/kids/things_to_make/thaumatrope/index.html

Persistence of Vision

http://www.privatelessons.net/2d/sample/m01_03.html

http://www.geocities.com/Hollywood/Makeup/9472/sfx.htm

http://www.exploratorium.edu/snacks/persistence_of_vision.html