VanCleave Science Experiments

Extra tips, explanations and questions from Doc Brown!

Cycle 2, Weeks 1-6

Welcome everyone! This is for all my CC family out there who would like to add a little Doc Brown to their VanCleave science experiments for Classical Conversations Cycle 2, Weeks 1-6. Please follow the wisdom of your Director and Tutors and allow me to add to what they are already having you do! Lets get going…

Cycle 2, Week 3

VanCleave #024: See Through

Only one experiment this week folks and it is part science and part arts and crafts! We are going to make a device that will fool your eyes into thinking something is solid when it is not! If you can prep some of the materials before community day, it would be helpful and you will want any extra moms to help with this one! A couple of notes on the experimental set-up:

1. Using a push-pin works just as well as a straight pin and might be easier.
2. Make sure the pin is pushed tightly into the pencil eraser so the slips of paper do no move.
3. It works just as well with copy paper as it does poster board and might be easier to push into the pencil eraser.
4. You do not need to glue the papers together if you push the pin in tightly, again this is why a push pin might be easier.

(I just did all the modifications I just mentioned above. It took less than two minutes and worked beautifully)

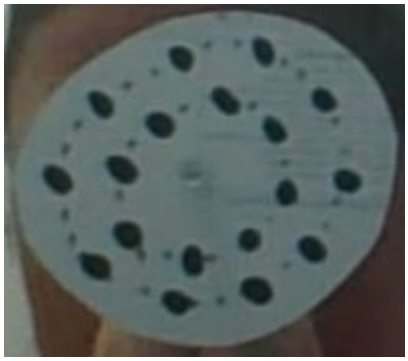
This experiment is to demonstrate how Saturn's ring "look" solid but are also see-through. Saturn's rings are made up of many smaller pieces of rocks and ice, from dust sized particles to larger chunks the size of a house. These particles are often clumped together and at the same time bumping and colliding with each other. They form one clump, bounce around and form a different clump. This is happening

quickly, all the time. Gravity forces from Saturn and its many moons keep the particles around Saturn and cause the gaps in the rings. The particles also reflect around 80% of the light that reaches them so the reflections can blend together making a more solid look.[1,2].

When we spin the papers blades with lines, our eyes cannot keep tract of how fast they spin. Our brain fills in the gaps and we see solid white and black "rings." This experiment takes it to another level because there are "see-through" gaps between the paper blades. If you try this with a solid circle that has dots you will miss the see-through effect. In the book she does a good job of illustrating the solid black lines but there should be another graphic like this…

Here I am spinning my paper blades in front of my face. You will see something similar when you spin yours and look down at it. Notice that the blades do in fact make solid lines. But what's that…in the red circle…its…its…my finger! I hope you can see my finger through the "white" top and bottom sections and even through the "black" line. Pretty cool!!

For comparison (I am not an artist!) here is a solid circle with dots and then the same circle spinning. Notice in the spinning picture you can see solid white and black "rings" but you cannot see my finger or my face through the rings. So make sure you look down at the paper bladed and look through them to see your hands!

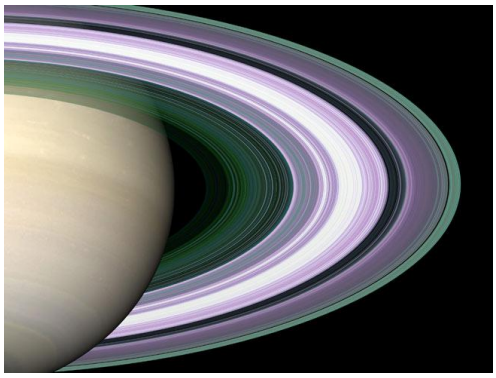


Solid circle with dots (little ones did not work very well, everyone makes mistakes!)

Lines are not as clear in this example, but you cannot see me behind it.

Now for some questions:

1. What are the steps of the Scientific Method?
2. Why kind of hypothesis do we want to use (ex. a yes/no question or IF/THEN statement)?
3. What are the materials?
4. What is the procedure?
5. This experiment is part optical illusion, similar to a flip book or basic animation, what are some other ways our eyes get fooled?
6. Why do we keep studying science? When Galileo first saw Saturn's rings in 1610 (during the Renaissance) they looked like handles on the side of the planet. Over 500 years later we can see Saturn's rings like this, thanks to the Cassini space craft. What if we accepted Galileo's discovery and never looked again? This image is amazing!!



Credit: NASA/JPL

7. Saturn was named for the Roman God *Saturn*. What day of the week has the root word Saturn? Or for the littles…What day of the week sounds like Saturn?

These websites seems to be a good site for info during the week, I couldn't find much info newer than 2014, which seems odd.
http://www.nasa.gov/audience/forstudents/postsecondary/features/F_Saturn_Rings.html
http://www.space.com/48-saturn-the-solar-systems-major-ring-bearer.html
http://www.space.com/17754-cassini-huygens.html

Speaking of Saturn, it is the farthest planet we can see with our own eyes. This past week (August 8-12 it was in a neat triangle next to the moon with Mars and Antares) It may be visible for a few more nights! (August 14, 2016)
http://earthsky.org/tonight/moon-and-saturn-on-august-12

References:

1. http://www.nasa.gov/audience/forstudents/postsecondary/features/F_Saturn_Rings.html
2. http://www.space.com/48-saturn-the-solar-systems-major-ring-bearer.html

Next week's post will be VanCleave Wk4 by MomBrown