

# 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 5

### VanCleave #013: Expanding

This is a visual experiment to help us understand how the majority of the scientific community believes the universe is expanding. This ties into the Big Bang Theory so you may want to talk with your Director about how that fits (or not) with Creation. *It Couldn't Just Happen* by Lawrence O. Richards is a Challenge resource that could be helpful. Knowing what non-believers may think as truth can help us present the Gospel in a way that relates to them. OK, back to the experiment...

I do not have much to add, its pretty self explanatory. The idea is that the balloon is the "sphere" of the entire universe and each dot is a "galaxy." The instructions suggest to blow up the balloon to the size of an apple first, but I find it works just as well if you draw big dots on the balloon first. It can be awkward to try to draw on and try to keep the air in the balloon. Also I believe the mirror is just as good as the kiddos watch you or each other. As you (or partner up the older kiddos) blow more air into the balloon they should be able to see the dots getting farther apart. They should see some dots moving faster, this again models how most scientists think the universe behaves.

There are a lot of complicated theories that make up this part of Astronomy and I think those are left better for high school or college. Perhaps this would be a good time to talk about the difference between fact and theory. I have a theory that we

will have pizza for dinner, but will it turn out to be true? Has it happened before? Will it happen again? Will it happen every Monday? Will theory turn into fact?

Don't forget our standard 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. Did you see the "galaxies" move?
6. What does God say about the galaxies? Some good verses are Psalm 19:1, Jeremiah 10:12, Genesis 1:6-7, Isaiah 40:22. Sorry if I missed your favorite!!

## VanCleave #014: Balancing Point

This experiment is a bit out there...get it...out there, where the moon is...ha ha ha! But seriously this experiment is about the Earth's *barycenter*. The what?? OK, before we get to what the barycenter is lets review mass and gravity. Everything that has mass (including us) produces a gravitational field, ie we all have a little bit of gravity! The Earth is attracted to the gravitational field produced by the Sun's mass and thus we orbit the sun (or do we, the Sun has a barycenter and so does the solar system, keep reading). The center of mass (which we some times call the center of gravity here on Earth) is where the barycenter is. One thing, like the Earth or the moon, has a center of mass or barycenter. But put two or more masses together that are attracted to each other (Sun, Earth or Earth, Moon) and you have a system barycenter, dependent on both masses and the attraction between them. The Earth has mass, but so does the Moon. The Earth and the Moon are attracted to each other not just the Moon attracted to the Earth. So this means the Moon pulls on the Earth and they orbit around the center of mass, or barycenter, of BOTH bodies, which happens to be about 2,720 miles beneath the surface of the Earth.

You can calculate the barycenter of various heavenly bodies but that's a lot of math, better left for home! Jancie VanCleave herself explains and has a cool animation here:

<http://scienceprojectideasforkids.com/2010/barycenter-of-the-earth-moon-system/>

Basically nothing, including the sun, is independent of the other bodies around it. The barycenter of the solar system is usually inside the sun but not in the very center, so technically we orbit around the barycenter (not the *very*-center, get it bary-very...ha ha ha) of the solar system.

As for the experiment itself, just do the best you can, keep working on the "Moon" by adding a little bit of clay (or removing, if you add too much) and it will balance at some point. Every time I've done this the "Earth" and "Moon" are always different sizes!! LOL!!

Now for some questions:

1. What are the steps of the Scientific Method?
2. What 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. Define all the terms for this one: mass, gravity, orbit, attraction, barycenter, etc.
6. This experiment is not so much a "cause-and-effect" type as more of a project. How has this been different from previous science experiments?

Next week's post will be VanCleave Wk5 by MomBrown