## the h-bar palladium Issue 5: 07/16/15 -*a math+science newsletter*



## Degrees vs. Radians

Imagine standing in one spot, holding a rope of length *r*. Your friend, pulling the other side, runs through an arc of distance *s* while you turn through an angle  $\theta$ . Any increase in the length of the rope, or the angle you turn, means your friend would have to run through a longer distance. The simplest way to describe this relationship is through the equation:



the angle to go all the way around is  $2\pi$ . Convert using  $360 \deg = 2\pi$ , or: How many radians are in a  $30 \deg ree angle$ ?

 $30 \deg \times \frac{\pi \text{ rad}}{180 \deg} = \frac{\pi}{6} \text{ rad}$ 

180 deg =  $\pi$  rad **Give it a try!** In degrees, what is  $\frac{5\pi}{4}$  rad?

 $s = r\theta$ 

distance around a

that equal to  $r\theta$  to find  $2\pi r = r\theta$ , or

circle is  $2\pi r$ . Set

You know the



Orbitals are the key to understanding the structure of the periodic table. Each block can be thought of in chemical terms or in mathematical terms.



## **Orbitals in Chemistry**

H-bar Academy students Nora and Nathan show off their creative take on p and d orbitals. This is a more accurate representation of electrons than the Rutherford model still taught in schools -- even though it has been over 100 years since Niels Bohr first conceived of the Shell Model! Bohr was Rutherford's student who only took 2 years to realize that spectral lines were best explained by quantizing electrons in units of h-bar.



**Biochemistry** students show that not only is candy made of molecules, but molecules can be made of candy too! Yummy! Students above are constructing lipid molecules.

## h-bar Summer Academy!

Summer Session 1 is off to a great start and we are looking forward to Session 2!

Our staff includes MIT and Caltech grads excited to offer original courses. Check out some of the offerings available for Session 2:

Artificial Intelligence	e Chem Lab
Robotics	Zoology
Geometry	<b>Musical Circuits</b>
Botany	Botany
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Botany Programming

mming Philosophies
Session 2:

July 27 - August 13 Monday - Thursday 9 am - 5 pm