## the h-bar palladium $\frac{\text { Issue } 5: 07 / 1615}{\text { vindluriluoringeom }}$ - math+science nexsletter



## 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:

$$
s=r \theta
$$

How many radians are in a 30 degree angle?
$30 \mathrm{deg} \times \frac{\pi \mathrm{rad}}{180 \mathrm{deg}}=\frac{\pi}{6} \mathrm{rad}$
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You know the distance around a circle is $2 \pi r$. Set that equal to $r \theta$ to find $2 \pi r=r \theta$, or the angle to go all the way around is $2 \pi$. Convert using 360 deg $=2 \pi$, or:
$180 \mathrm{deg}=\pi \mathrm{rad}$
Give it a try! In degrees, what is $\frac{5 \pi}{4} \mathrm{rad}$ ?


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
Chem Lab
Robotics
Zoology
Geometry Musical Circuits
Botany
Botany
Programming Philosophies

## Session 2:

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


Throop Unitarian Universalist Church 300 S Los Robles Ave, Pasadena, CA

