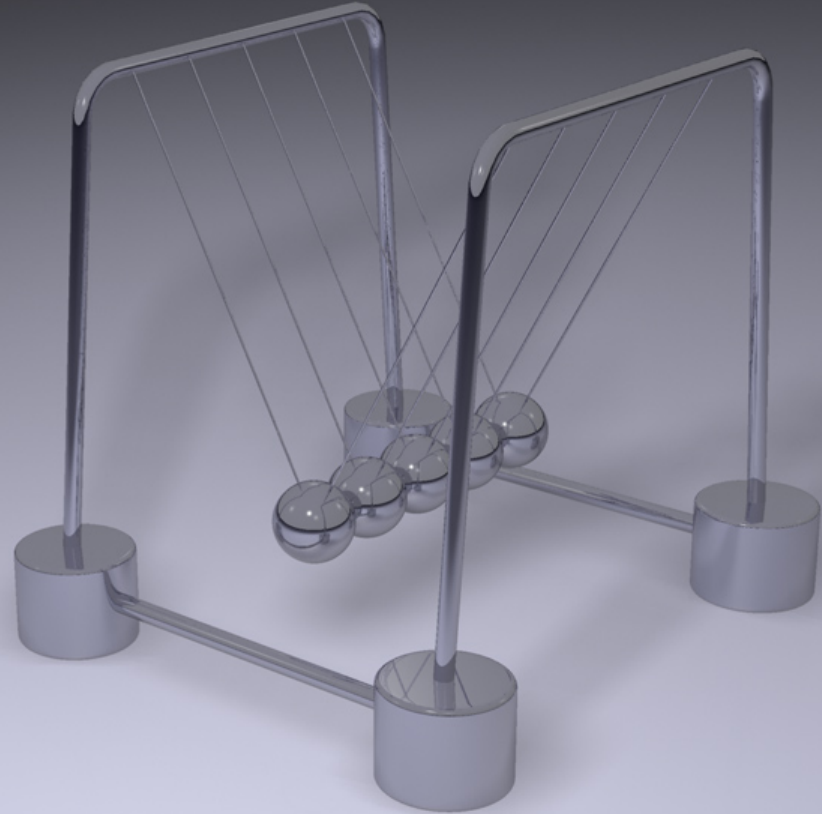


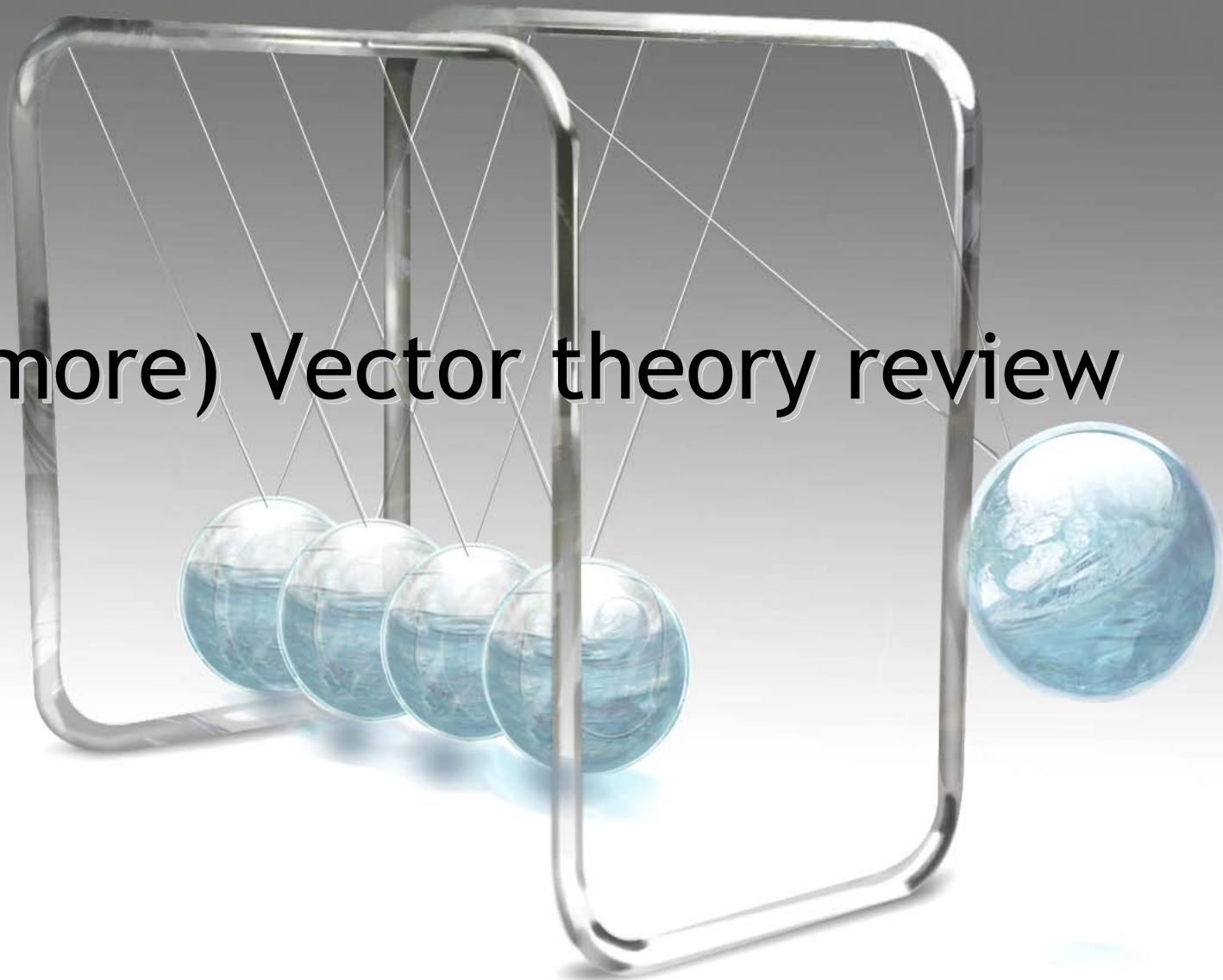
DM2212 Programming Physics



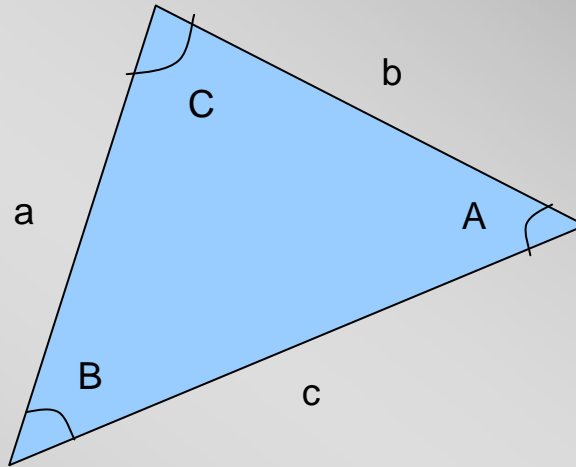
FALLING APPLE S
MINDPHASE

ML: Dioselin Gonzalez
2007 S1

(more) Vector theory review

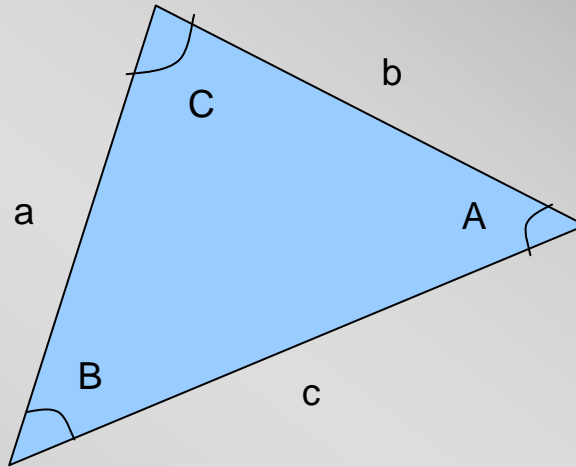


Law of sines



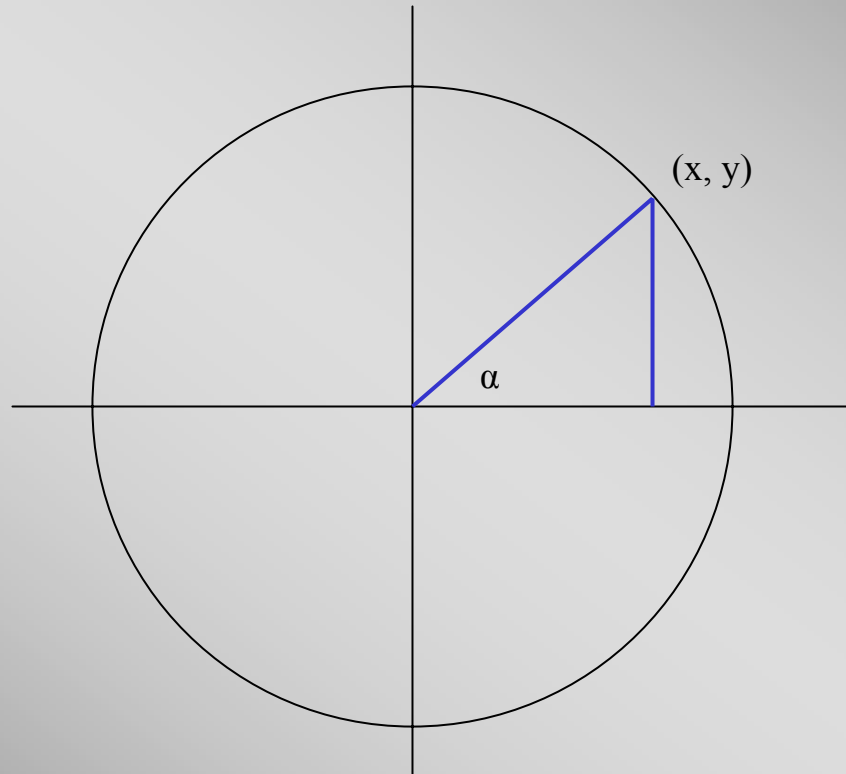
$$\frac{a}{\sin(A)} = \frac{b}{\sin(B)} = \frac{c}{\sin(C)}$$

Law of cosines



$$c^2 = a^2 + b^2 - 2ab\cos(C)$$

Unit circle



$$x^2 + y^2 = 1$$

$$\sin \alpha = y$$

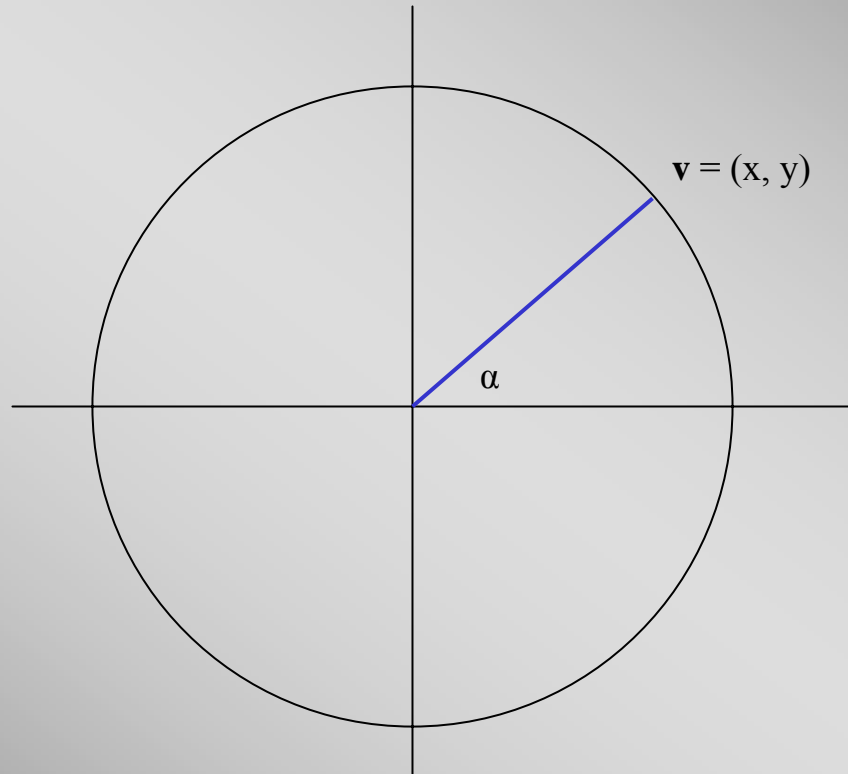
$$\cos \alpha = x$$

Let us proof...

1. $\mathbf{u} \cdot \mathbf{v} = |\mathbf{u}| |\mathbf{v}| \cos\varphi$
2. If $\mathbf{u} \neq \mathbf{0}$, then \mathbf{u} and \mathbf{v} are parallel if and only if $\mathbf{v} = k\mathbf{u}$ for a constant $k \neq 0$
3. If \mathbf{u} and \mathbf{v} are different than zero, then \mathbf{u} and \mathbf{v} are orthogonal iif $\mathbf{u} \cdot \mathbf{v} = 0$

4. $|\mathbf{u} \times \mathbf{v}| = |\mathbf{u}| |\mathbf{v}| \sin \varphi$
5. $\mathbf{u} \cdot (\mathbf{u} \times \mathbf{v}) = \mathbf{v} \cdot (\mathbf{u} \times \mathbf{v}) = 0$

Polar coordinates



$$\mathbf{v} = |\mathbf{v}| @ \alpha$$

Lab

- Extend you vector library to:
 - Convert radians to degrees and vice versa
 - Convert to/from Cartesian coordinates to/from Polar coordinates

References