# Physics 5a: Week 2 Discussion

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August 28, 2018



## Problems

**Problem K&K 1.4 esque.**

**Problem K&K 1.5 esque.**

**Problem Law of Cosines Problem.**

Prove:

$$a \cdot b = \|a\|\|b\|cos\theta \tag{1}$$

Using the Law of Cosines...

$$\begin{aligned} |a|^2 \cdot |b|^2 - 2|a||b|cos\theta & \\ &= |\overrightarrow{a} - \overrightarrow{b}| \\ |a| \cdot |b| &= |a||b|cos\theta \end{aligned}$$

**Problem sin problems.**

**Definition:**

$$\begin{aligned} e^x &\implies x \text{ is dimension-less} \\ cos(x) &\implies x \text{ is dimension-less/radians} \\ log(x) &\implies x \text{ is dimension-less} \end{aligned}$$

**Problem 7.** Given:
a frequency: $[f] = \frac{1}{T}$,
a speed: $[v] = \frac{L}{T}$,
an L: $[h] = \frac{ML^2}{T}$,

define a standard set of units of length, time and mass in terms of f, v, h.

$$\begin{aligned} f &= 1/s \\ v &= m/s \\ h &= gm^2/s \end{aligned}$$

**Problem 8.** Find radius that you have to squeeze the earth into so that even light cannot escape. We have $M$, $c$, $G$ as our information.

$$\begin{aligned} L^1 &= M^\alpha + c^\beta + G^\gamma \\ &= m^\alpha + \frac{L}{T}^\beta + \left(\frac{L^3}{MT^2}\right)^\gamma \end{aligned}$$