Problems : Discussion Questions

Q1.1. 1 correct experiment to disprove a theory. (assuming that experiment is meticulously crafted).

Likewise, 1 correct experiment to prove a theory.

Depends on the theory and how well decomposed the theory is. In practice, many iterations are needed to "get" to the "correct" singular experiment to prove or disprove a theory.

Q1.2. No. By definition, the "tangent" is a straight line that "just" touches the curve at a particular point. "5.00" meters is too ~~vague~~ vague; for there is no mention of a θ or another length to allow for the computation of a tangent value. (because 2 variables are needed, when only 1 was provided).

Q1.3 My height is 172 cm.

My weight is $w = mg$

$= (73.70 kg)(9.80665 m/s^2)$

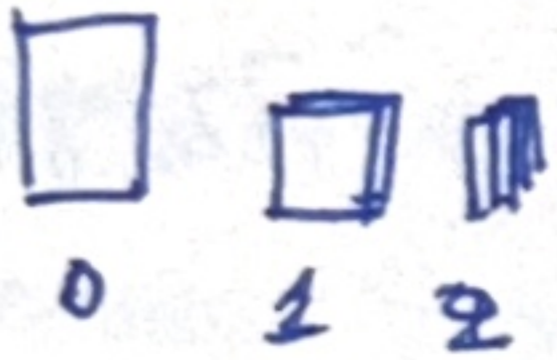
$= 722.750105 \ kg \cdot m/s^2$

$\approx 722.6 \ \underline{\underline{N}}$

Q1.4 Yes. These "standard" kilograms serve as the basis for the entire world's unit measurement. If these masses are changing over time, studies and empirical results reliant on these figures need to account for these deltas, especially since many results and theories can trace their origins to the past (which can span several to many decades).

Q1.5. The shadows left by a sun's lightrays.

Q1.6. Because a sheet of paper is too thin by its lonesome for ruler-based measurement, I could fold it multiple times (in equal divisions), count the number of folds (n)



in the form of 2^n, then ruler- ~~divide the folded~~ measure the folded paper and arithmetically divide the measured thickness by 2^n. If necessary, I can repeat this after unfolding the paper ~~and~~ and refolding it to get a better approximation. (Or, ~~we~~ ~~ruler~~ use the ruler to help fold and cut the paper into it's divisible slices to get more accurate results)

Q1.7. Dimensionless ~~numbers~~ quantities:

e: Euler's Number

ϕ: Golden Ratio

Q1.8. Cubic meter (m^3).

By definition, the volume of a cylinder is $\pi r^2 h$, where πr^2 = area of circle and h = "instances of circle".

$\pi r^3 h$ brings us to the realm of spheres, where h could be $\frac{4}{3}$, and hence the formula becomes $\frac{4}{3} \pi r^3$.

Q1.9 Joe: 10cm offset

Moe: 1cm from a point 20cm from center

Flo: 1cm from center..

Joe: ~~precise, not accurate~~ Not precise, accurate. ~~(high precision, low acc)~~

Moe: precise, not accurate

Flo: accurate, precise

Q1.10 $(\hat{i} + \hat{j} + \hat{k})$ is a unit vector, assuming

$A_x, A_y, A_z = 1, 1, 1.$

$\vec{v} = 3.0\hat{i} - 2.0\hat{j}$

$|\vec{v}| = \sqrt{(3)^2 + (-2)^2 + (0)^2}$

$= \sqrt{(9 + 4)}$

$= \sqrt{13}$

$\vec{v}$ is NOT a unit vector, because $|\vec{v}| \neq 1$.

By definition unit vectors have a magnitude of 1.