Friday, August 21, 2020

Review of Exponents

multiplication: $(5.3 \times 10^7) \times (1.98 \times 10^3)$

$= 5.3 \times 1.98 \times 10^{7+3}$

$= 10.494 \times 10^{10} \simeq 10^{11}$

(sig figs) $= 10.5 \times 10^{10}$ or $10 \times 10^{10} = 1.0 \times 10^{11}$

Division: $\dfrac{5.3 \times 10^7}{1.98 \times 10^3} = \dfrac{5.3}{1.98} \times 10^{7-3}$

$= 2.6767 \times 10^4$

sig figs $= 2.7 \times 10^4$

Addition / subtraction: $5.34 \times 10^7 \pm 3.1 \times 10^6$

$= 5.34 \times 10^7 \pm 0.31 \times 10^7$

$= (5.34 \pm 0.31) \times 10^7$

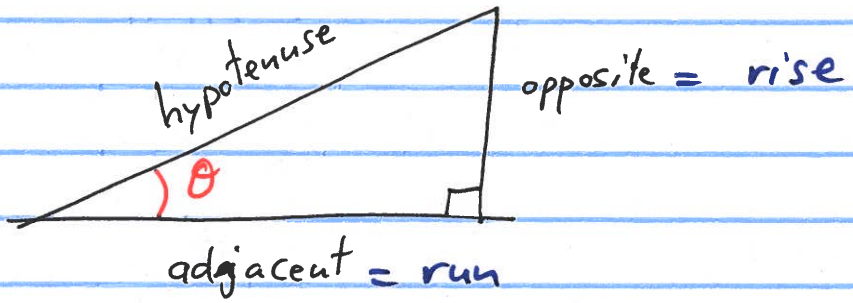
$= 5.65 \times 10^7$ $\quad 5.03 \times 10^7$

Powers: $(7 \times 10^3)^2 = 7^2 \times (10^3)^2$

$= 49 \times 10^{3 \times 2}$

$= 49 \times 10^6$

TRIGONOMETRY REVIEW

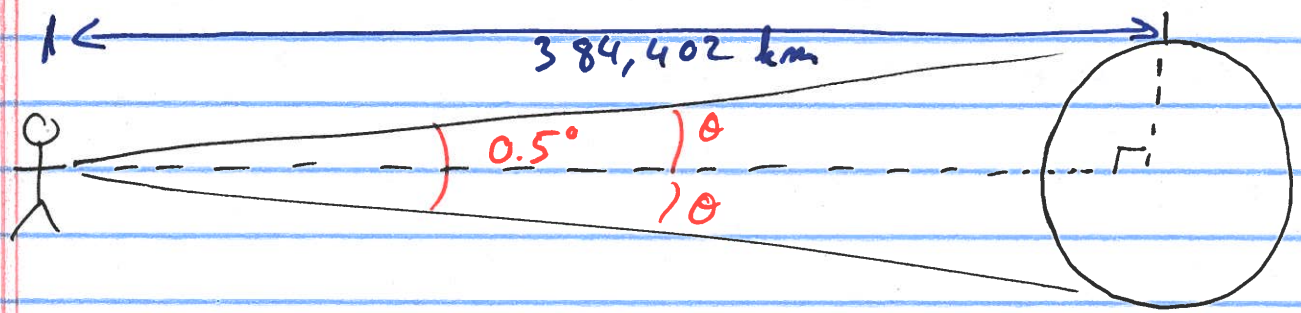


$$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

$$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$$

$$\tan\theta = \frac{\text{opposite}}{\text{adjacent}} = \frac{\sin\theta}{\cos\theta} = \frac{\text{rise}}{\text{run}}$$

Example: Diameter of the Moon



$2\theta = 0.5^\circ$ and $\tan\theta = \frac{\text{rise}}{\text{run}} \iff \text{rise} = \text{run} \cdot \tan\theta$

$\tan(0.25^\circ) = 0.004363$

$\Rightarrow$ diameter $= 2\,\text{run} \times \tan\theta = 2(384{,}402)(0.004363)$

$= \underline{3355 \text{ km}}$ < CA-VA distance