

Monday, January 27, 2025

Speed of light:  $c = 3.00 \times 10^8 \text{ m/s}$

1 year  $\approx \pi \times 10^7 \text{ s}$

Light year =  $c \times 1 \text{ year}$

$$\approx \left( 3.00 \times 10^8 \text{ m/s} \right) \times \left( \pi \times 10^7 \text{ s} \right)$$

$$\approx 9.45 \times 10^{15} \text{ m}$$

$$\approx 9.45 \times 10^{12} \text{ km} \approx 5.9 \text{ trillion miles}$$

note: 1 mile = 1.6 km

## Review of Exponents

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

$$= \underbrace{5.3 \times 1.98}_{10.494} \times 10^{7+3}$$

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

Significant figures) =  $10.5 \times 10^{10}$  or  $10 \times 10^{10} = 1.0 \times 10^{11}$

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

$$= 2.6767 \times 10^4$$

(significant figures) =  $2.7 \times 10^4$

Addition :  $5.34 \times 10^7 + 3.1 \times 10^6$   
Subtraction

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

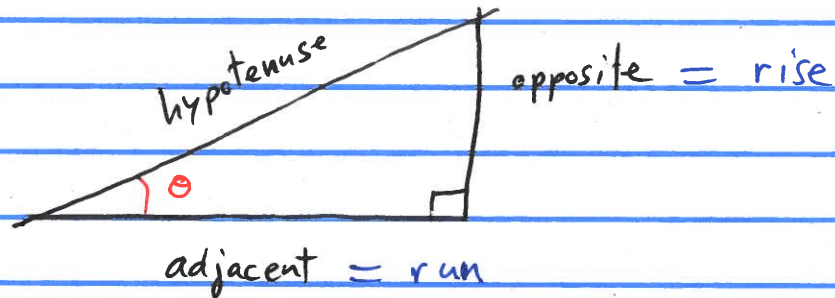
$$= (5.34 + 0.31) \times 10^7$$

$$= 5.65 \times 10^7$$

$$5.03 \times 10^7$$

Powers :  $(7 \times 10^3)^2 = 7^2 \times (10^3)^2$   
 $= 49 \times 10^{3 \times 2}$   
 $= 49 \times 10^6$

## TRIGONOMETRY REVIEW

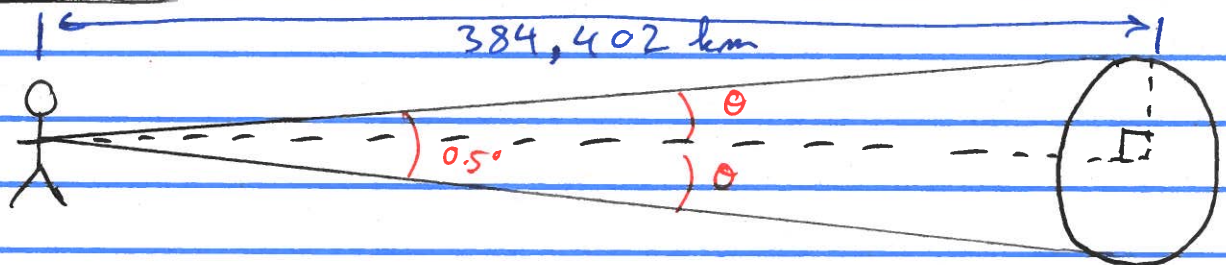


$$\sin \theta = \frac{\text{opposite}}{\text{hypotenuse}}$$

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

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

Example: Diameter of the Moon



$$2\theta = 0.5^\circ \Rightarrow \theta = 0.25^\circ$$

$$\tan \theta = \frac{\text{rise}}{\text{run}} \Rightarrow \text{rise} = \text{run} \times \tan \theta = \text{radius}$$

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

$$\Rightarrow \text{diameter} = 2 \times \text{radius} = 2 \times (384,402) \times (0.004363) = 3353 \text{ km}$$