

Name \_\_\_\_\_

## Practice Calculations Test Problems

**Do-overs Allowed - only 3 significant figures in answers needed.**

In the following formulas, use  $G=6.67\times 10^{-11}\frac{\text{N}\cdot\text{m}^2}{\text{kg}^2}$  and  $c=3.00\times 10^8\text{ m/s}$  .

1. Calculate the gravitational force in newtons using the formula  $F=G\frac{m_1m_2}{d^2}$  where,  
 $m_1=5.3\times 10^{23}\text{ kg}$  ,  $m_2=64.9\text{ kg}$  and  $d=8.3\times 10^8\text{ m}$  .

2. Calculate the dimensionless relativistic factor  $\gamma=\frac{1}{\sqrt{1-\frac{v^2}{c^2}}}$  where  $v=2.8\times 10^8\text{ m/s}$  .

3. Using  $E=mc^2$  , calculate the energy in joules released when  $3.7\times 10^{-3}\text{ kg}$  is converted to energy.

4. Using  $\lambda=\frac{c}{f}$  , calculate the wavelength in meters of a photon that has a frequency of  $5\times 10^{15}\text{ Hz}$  .