

# Acceleration of Moon / g .

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To calculate acceleration  $a_M$  of MOON towards earth & to compare  $a_M$  with  $g = 9.8 \text{ m/sec}^2$

Need

$R_E = 6.37 \times 10^6 \text{ m}$  : Radius of EARTH

$R_{EM} = 3.84 \times 10^8 \text{ m}$  : EARTH-MOON Distance

$T_M = 27.3 \text{ days}$  : Period of Moon  
 $= 2.36 \times 10^6 \text{ sec}$  ( $= 27.3 \times 24 \times 3600$ )

[NOTE: MASS of MOON is NOT needed,

Since  $F_{GRAV}$  provides acceleration which is independent of mass (Galileo!)]

$$a_M = \frac{(v_M)^2}{R_{EM}} = \frac{(2\pi R_{EM})^2}{(T_M)^2} \frac{1}{R_{EM}} = \frac{4\pi^2 \cdot R_{EM}}{(2.36 \times 10^6)^2}$$
$$= 2.72 \times 10^{-3} \text{ m/sec}^2$$

$$\frac{g}{a_M} = \frac{10}{2.72 \times 10^{-3}} = 3.68 \times 10^3 \approx 3600$$
$$= \left(\frac{R_{EM}}{R_E}\right)^2 = (60)^2 = 3600.$$