1/27/2009

GRAVITY - long history

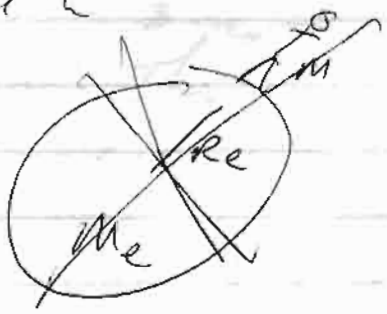
Newton (1642 - 1727)

look at 2 laws

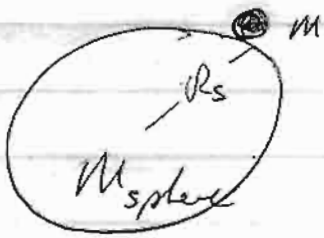
1) $F = mg$ say, you on Earth
m = mass (like your mass)
g = acceleration of gravity
$\approx 9.8\ m/s^2$

2) $F = \frac{G M_1 M_2}{r^2}$ $\quad G = 6.670 \times 10^{-11}\ m^3/kg\ s^2$

look at you on Earth



$$F = \frac{G M_s m}{R_{sphere}^2}$$



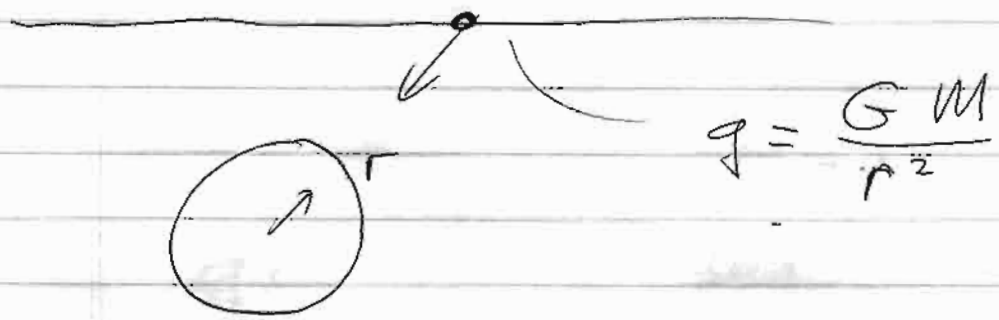
Set equal

$$F = mg = \frac{G M_s m}{R_{sphere}^2}$$

$$g = \frac{G M_e}{R_{sphere}^2} \quad \frac{G M_e}{R_s^2}$$

$g = \frac{G M_s}{R_s^2}$ is attraction of a solid sphere

More hairy it:



STANDS TO REASON That, as mass distribution in the sub surface changes, the gravity @ the surface changes.

? What archaeological applications can you come up with?

Tomb

Trenches

- Problems
  1) changes with latitude ($d_0 / d\phi$)
  2) changes with elevation

——————— M.S.L.

go above sea level

$-.3086 \frac{\text{mgals}}{\text{meter}}$ ——— (F.A.C.)

M-Ssocals — ~ 1,000 meters
~ 308 mgals

Gal = CM/s^2

1000 mgals = Gal

Archaeological anoms (< 1 mgal)

Need
- good elevation control
- sensitive instrument

Field work:

1) ~ 5 minutes / observation

2) how many observations?

— The fundamental question —

Model