Gravity

pp352–359

Law of universal gravitation

- Bigger objects: greater attraction
- Closer objects: greater attraction
- No limit on distance (UNIVERSAL)
- Can be measured
- Why would we want to measure gravity?

formula

$$F = G\frac{m_1 m_2}{r^2}$$

$$G = (6.67428 \pm 0.00067) \times 10^{-11}\ \mathrm{m^3\ kg^{-1}\ s^{-2}}$$

- G is a constant that is good EVERYWHERE
- G is *different* from g
- F is a *force*
- Obeys F=ma
- How would this be used in Astronomy?

Gravity on earth

- The mass of Earth biggest influence on gravity to us
- Same everywhere near Earth's surface
- Free fall = no air resistance
- F=ma –> a_g = g = 9.8m/s^2
- Causes weight
- What else influences gravitation on Earth's surface?

Air resistance

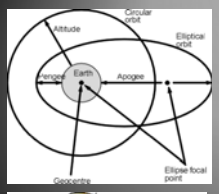
- Makes gravity hard to measure, hard to observe
- It's everywhere
- Causes phenomenon of "terminal velocity"

Terminal velocity

Terminal velocity

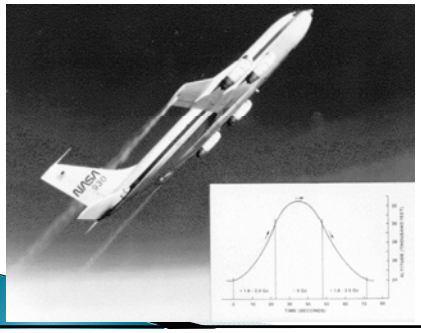
- How can we observe gravity without terminal velocity?

orbit



- Orbit is caused by gravity
- Objects in orbit are in free fall
- Floating/weightlessnes s
- What is path 1? 2? 3? 4?
- Why elliptical/ why circular orbits?

Vomit comet

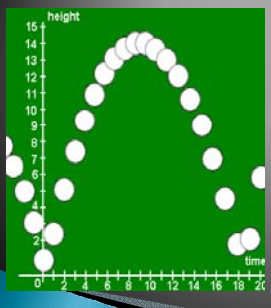


How?

Vomit comet

Why?

Projectile motion



- Very important!
- Why?
- Constant Velocity AND Constant Acceleration
- CV and CA are independent
- Can be treated independently and solved independently