Space Wars 2.0

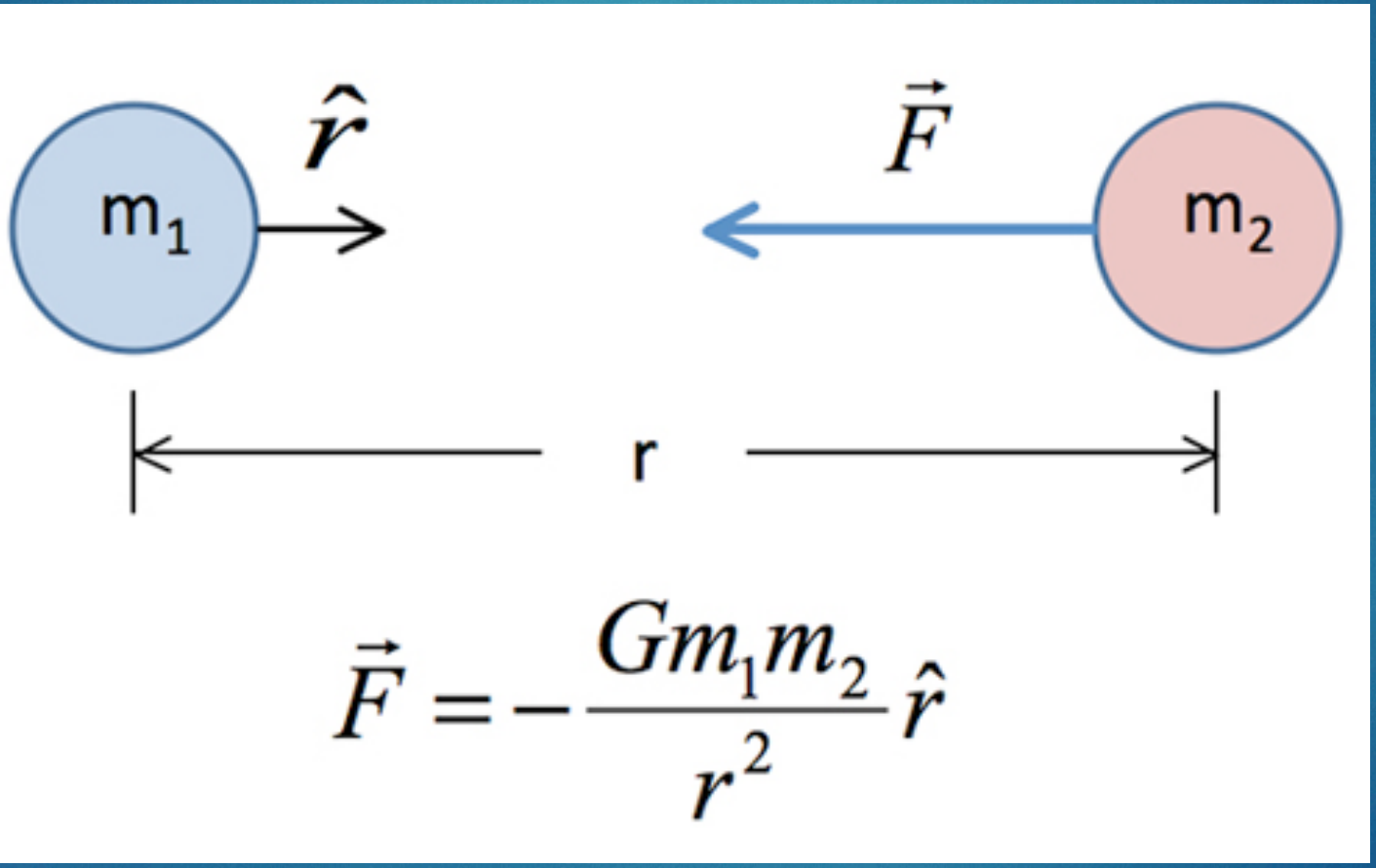
JACK COUTRE

ntroduction

- Created by Larry Rosenthal
- Released by Cinematronics in 1977
- Based on Spacewar!

http://www.arcade-museum.com/game_detail.php?
http://en.wikipedia.org/wiki/Spacewar_(video_gam

Gravitational Force

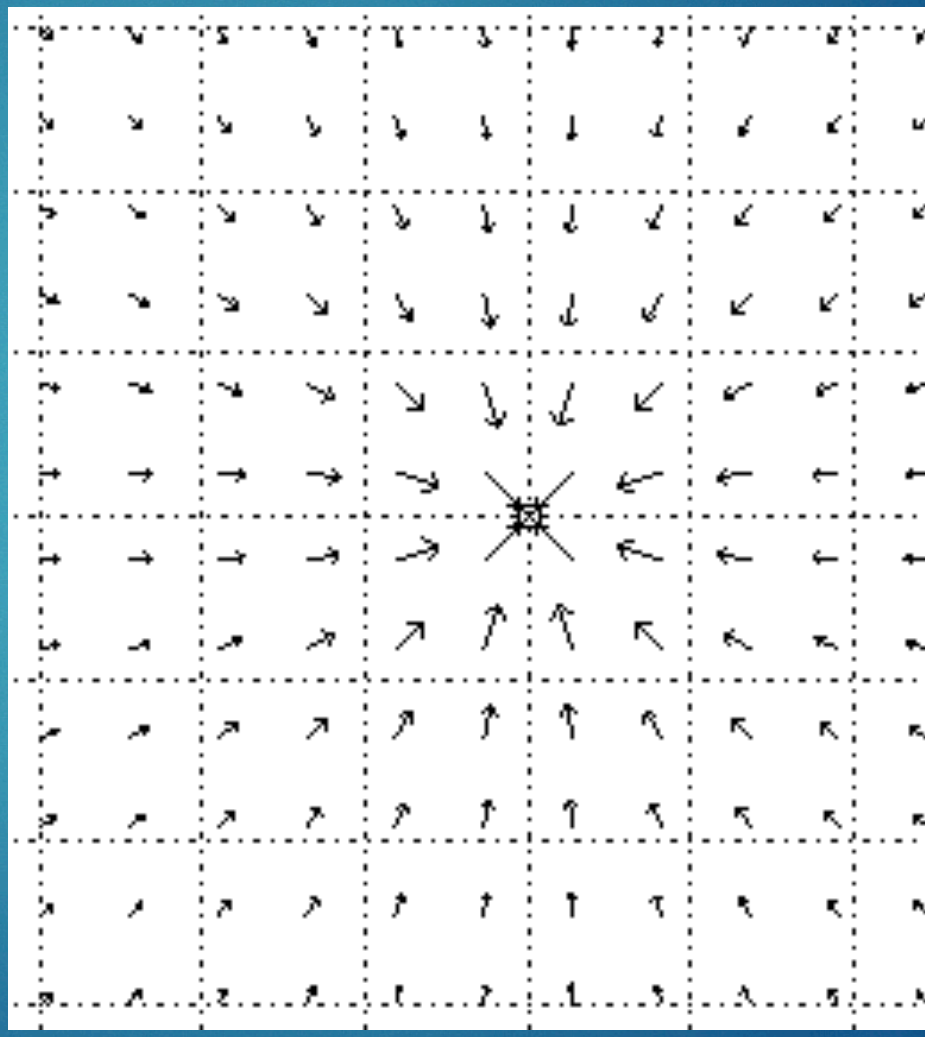


http://www.learner.org/courses/physics/unit/text.html?unit=3&secNum=3

Gravitational Field

$$\vec{g} = -\frac{GM}{r^2}\hat{r}$$

$$\vec{F} = m\vec{g}$$



http://math.oregonstate.edu/home/programs/undergrad/CalculusQuestStudyGuides

osition, Velocity, and Acceleration

$$= x\hat{i} + y\hat{j} + z\hat{k}$$

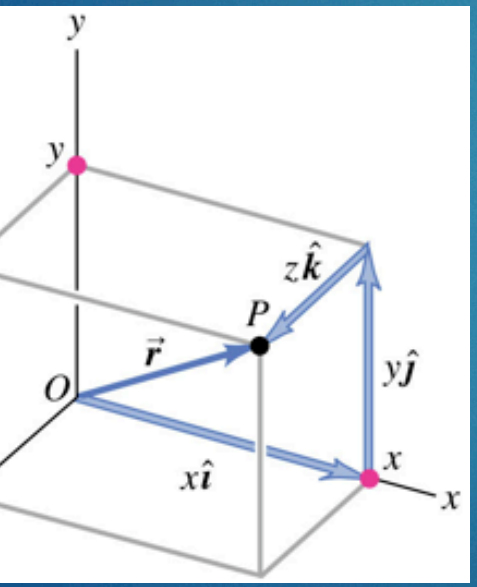
$$\vec{v}_{av} = \frac{\vec{r}_2 - \vec{r}_1}{t_2 - t_1} = \frac{\Delta\vec{r}}{\Delta t}$$

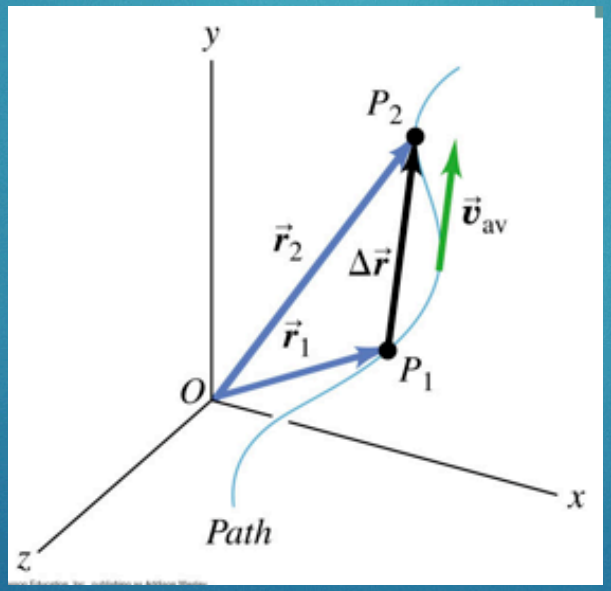
$$\vec{v} = \frac{d\vec{r}}{dt} = \frac{dx}{dt}\hat{i} + \frac{dy}{dt}\hat{j} + \frac{dz}{dt}\hat{k}$$

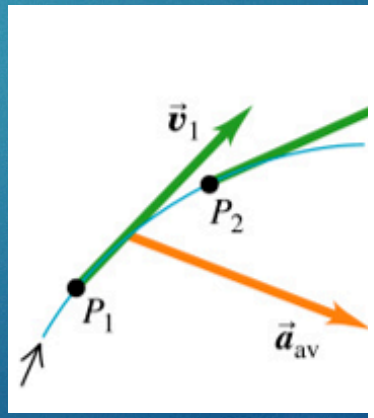
$$\vec{a}_{av} =$$

$$\vec{a} = \frac{dv_x}{dt}\hat{i}$$

$$\vec{a} = \frac{d^2x}{dt^2}\hat{i}$$







physics.wku.edu/~womble/phys250/ch3

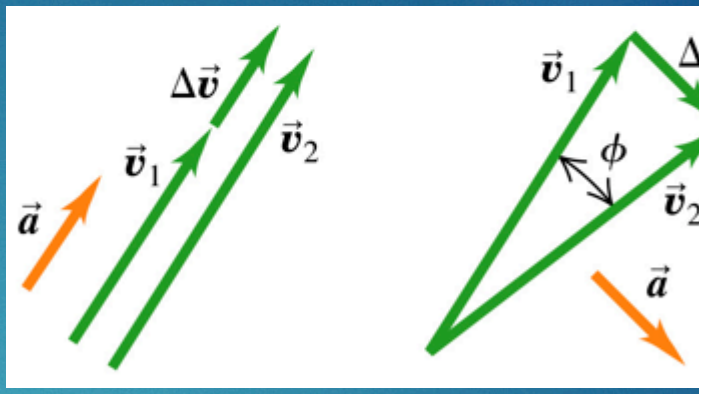
D Motion

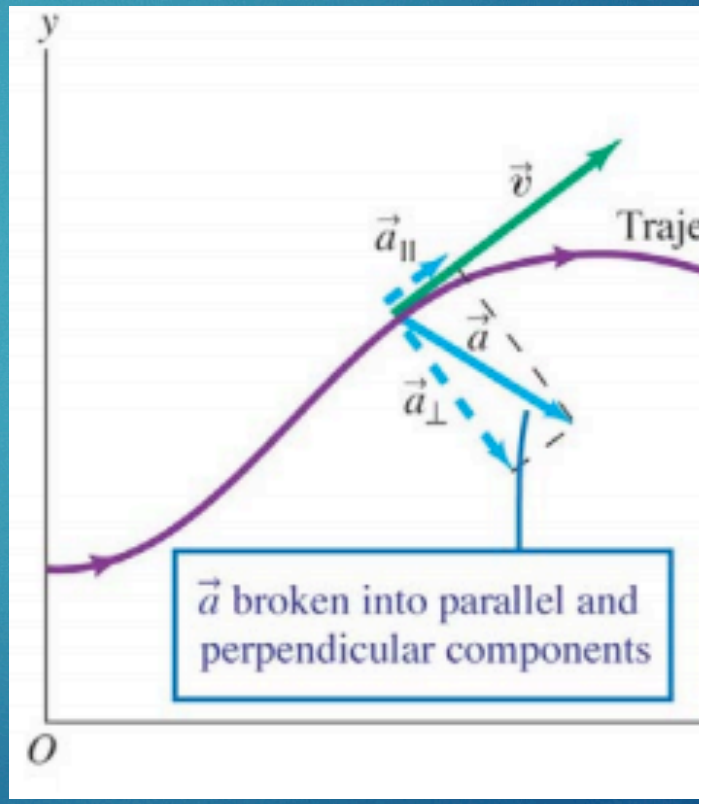
rallel acceleration changes the magnitude velocity and is given by the projection of ration on the velocity

$$\vec{a}_{\parallel} = -\frac{(\vec{a}\cdot\vec{v})}{v^2}\vec{v}$$

rpendicular acceleration changes the direction velocity

$$\vec{a}_{\perp} = \vec{a} - \vec{a}_{\parallel}$$





http://homepages.spa.umn.edu/~zudov/1201/Ch
physics.wku.edu/~womble/phys250/ch3.ppt

D Projectile Motion

$$\vec{F} = m\vec{a}$$

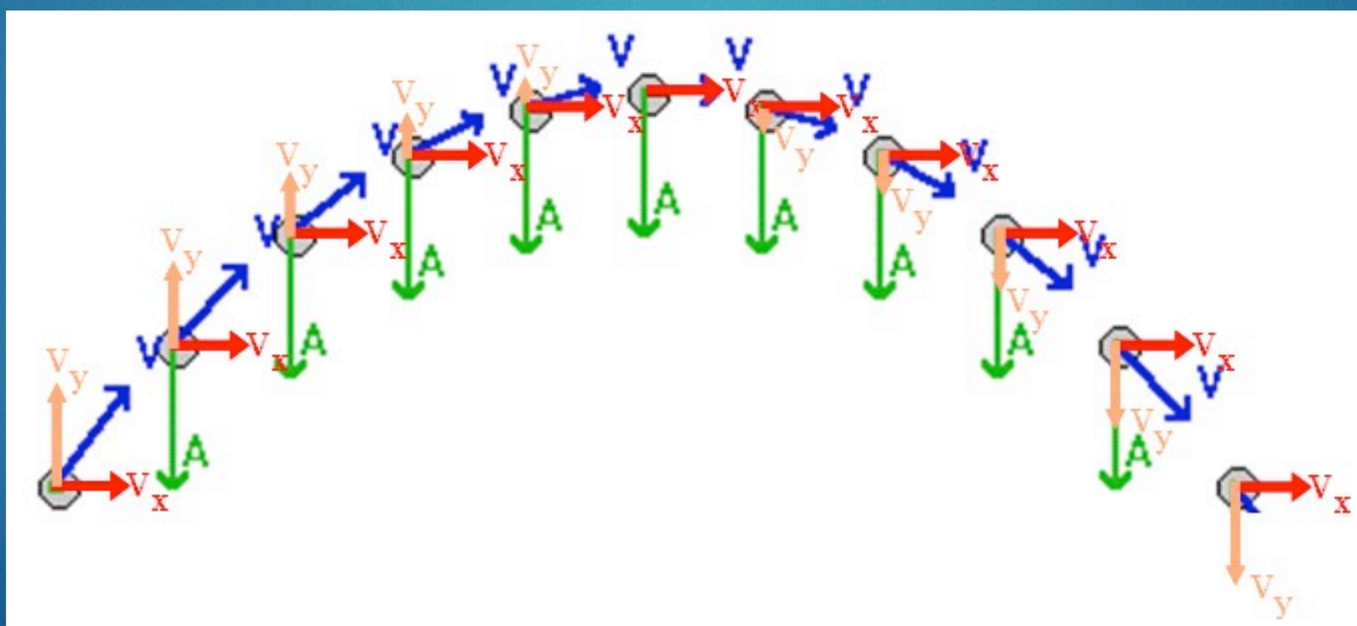
$$v = at + v_0 \quad [1]$$

$$r = r_0 + v_0 t + \frac{at^2}{2} \quad [2]$$

$$r = r_0 + \left(\frac{v + v_0}{2}\right) t \quad [3]$$

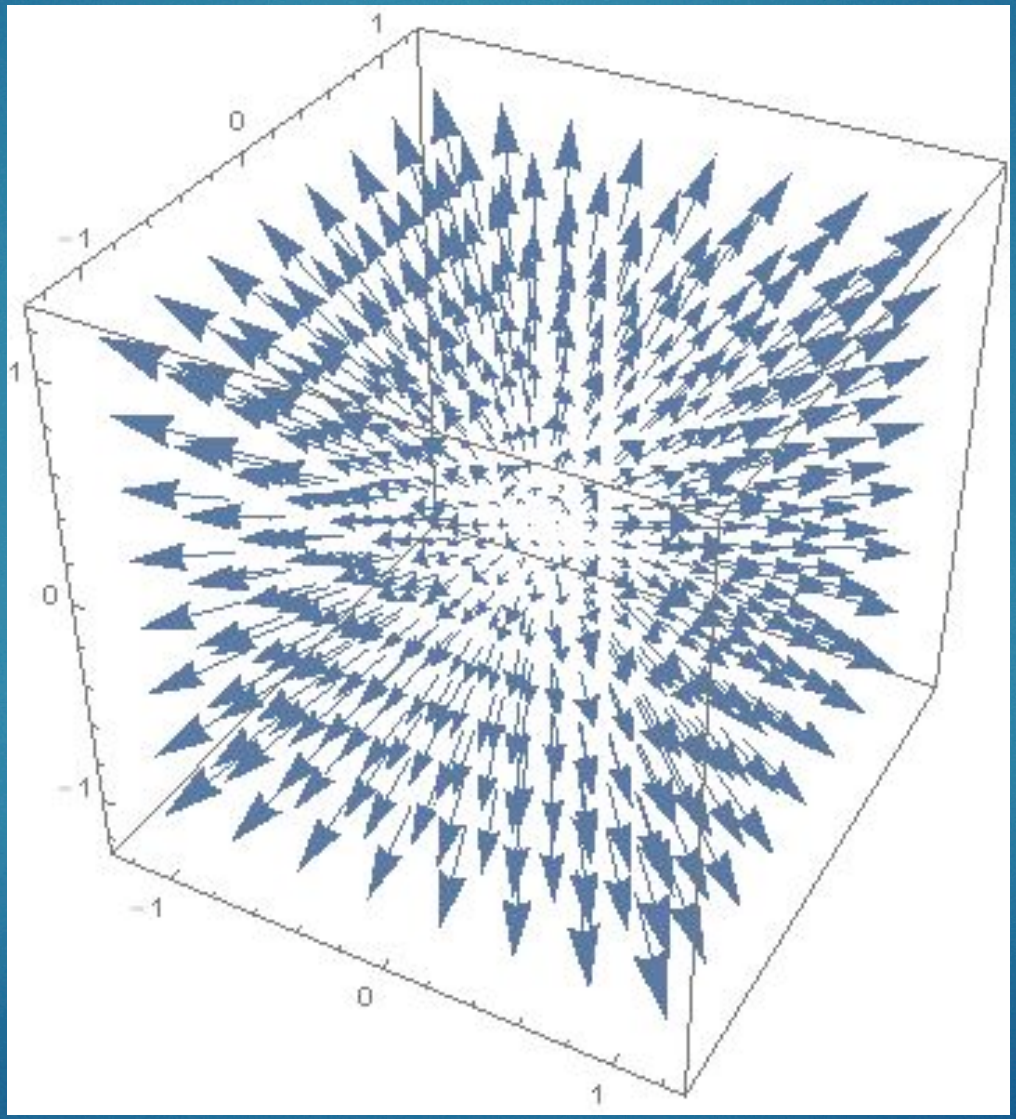
$$v^2 = v_0^2 + 2a\,(r - r_0) \quad [4]$$

$$r = r_0 + vt - \frac{at^2}{2} \quad [5]$$



http://home.comcast.net/~steve_tech01/Qtr1Files/prmo.htm

Visualizing 3D



http://mathematica.stackexchange.com/questions/61083/plotting-3d-vector-field-in-one-plane