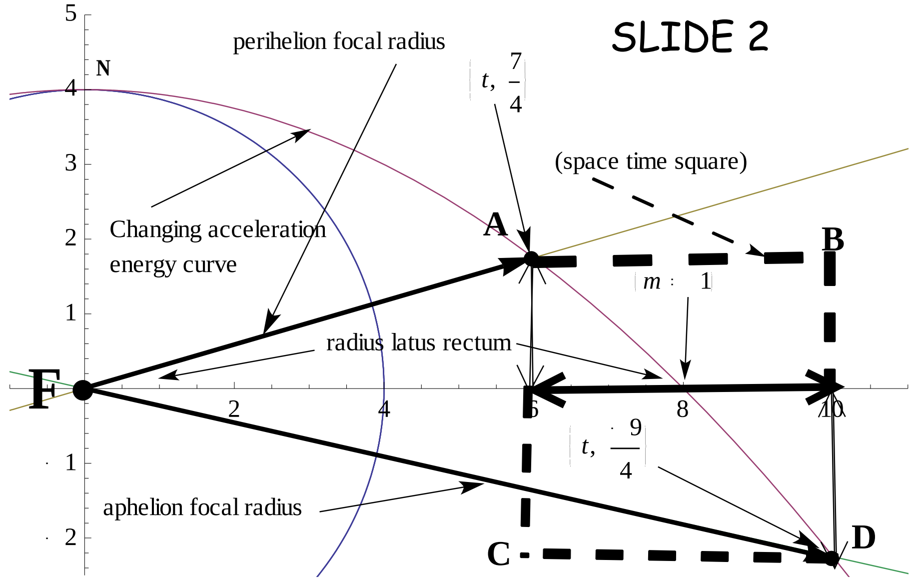
EXPLANATION OF SLIDE 2: **CSDA** PLANE GEOMETRY CONSTRUCTION OF CHANGING ACCELERATION SPACE AND TIME SQUARE.



RELATIVE TANGENTS as a FUNCTION of a UNIT CIRCLE

In Figure [8] we have a **CSDA** constructed with three fundamental plane geometry curves, one independent unit circle and two dependent unit parabolas built as **RELATIVE TANGENTS** of the unit circle**.** Joining these three plane geometry curves together, one circle and two parabolas, will allow utility of basic calculus needed to explore space curves as the dependent and independent field acceleration curves that they are. Unit parabola dependent changing acceleration curves will not be as abstract as gravity field independent surface (constant) acceleration curves permeating the solid earth upon which we walk. Constant acceleration space time squares are produced without need of unit parabola **RT**'s (see figure 4). In a completed constant acceleration time square, everything is linear including the traditional square space diagonal demonstrating free fall straight to central force **F**. Only the acceleration surface curvature produced by **F** is a member of curved space.

Dependent curves describe perpetual motion of stable orbits. To avoid falling to center, motion description concerning stable orbit time squares are composed with three one second magnitude vectors. One of these 1 second motion vectors is momentum $(mass \times velocity)$and manifests itself as constant velocity defining orbit momentum *around* the spin axis, strictly speaking a one-half second analysis of position within the space time cube being constructed on the dependent curve unit parabola: $((velocity\ at\ start\ of\ \ second + velocity\ at\ end\ of\ second)/2)$. The 2nd directed motion vector is toward [**F**] and this vector magnitude represents the changing acceleration that will alter the **Kinetic Energy** of orbit velocity, thus curving orbit momentum needed to produce the third vector definition of motion within an orbit space time cube, torsion. Two different time squares defining two differing accelerations, one constant and one changing, with two different Pythagorean diagonals.

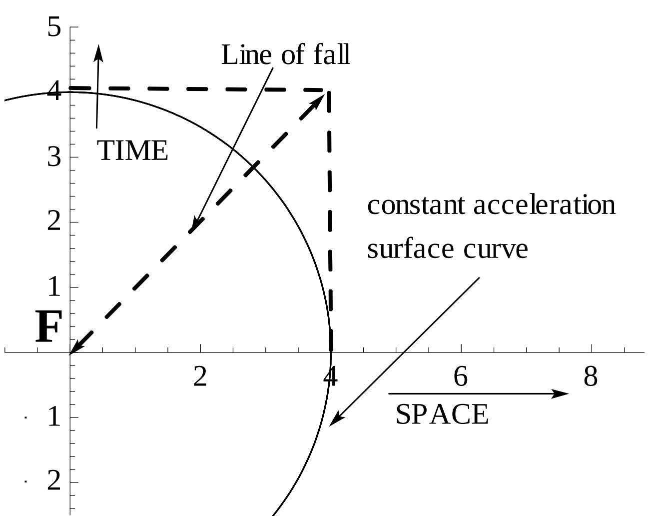


Figure 4: Constant Acceleration Space Time Square

In a constant acceleration time square, everything is linear. Unit time is straight line, unit space is straight line, and the Pythagorean hypotenuse is a straight line fall to center. Only acceleration is curved.

Methods to determine acceleration curvature of point mass [**F**] have been found to depend on the mass volume ratio surrounding [**F**] and inversing the magnitude of a one second free fall experiment.

RELATIVE TANGENTS are ENERGY CURVES.

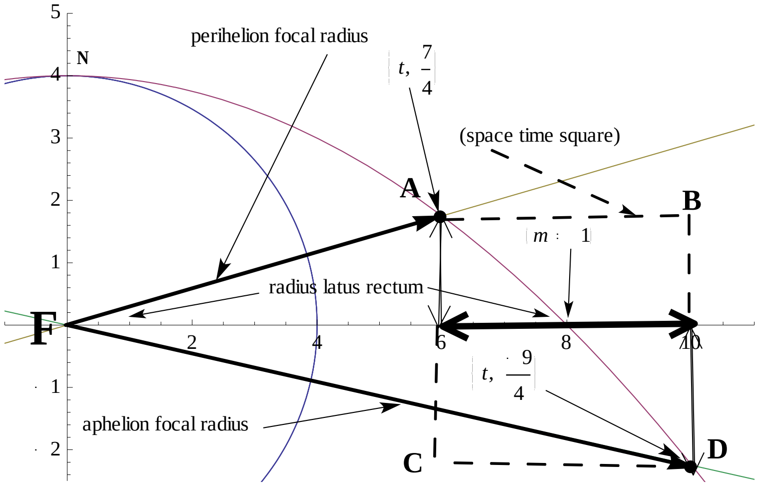


Figure 5 Curved space time cube having one second duration.

Changing acceleration space time squares have a curved time diagonal. The sides of the square actually profile a time cube. All sides, including the traditional (now curved) Pythagorean hypotenuse$(\overleftrightarrow{AD})$, have the same length of time. The energy sides $[\overleftrightarrow{CA} and \overleftrightarrow{DB}]$ are 1 second long. The motion sides $[\overleftrightarrow{AB} and \overleftrightarrow{CD}]$ are also 1 second long. The curved connecting energy diagonal of a time cube begins at point **D** curving across space for one second joining the opposite cubic congruent vertex **A**$'$ describing closed orbit period $[\widetilde{AD}]$ as a 1 second instantaneous assessment. Partial orbit assessment is the same for return motion progress measured from **A'** to next cubic congruent second **D"**. Average orbit motion is into the paper and is actually tangential velocity within the time cube constructing the primitive 3-space motion cube of curved space having one second duration. Mechanical phenomena of stable orbit are thus captured in the resultant two dimensional square space description of: (1) progress along the **RT** surface, (2) around the spin axis, and (3) toward central force **F**. In vector calculus these three vectors are known as three motion vectors of Frenet; (1) = torsion (changing energy of motion); (2) = tangential velocity (momentum); and (3) = acceleration.

Using Euclidean **RT**'s we can not only graph changing position of stable orbit candidates but the energy of motion needed by candidates for stable orbit period. **RT**'s carry a complete and precise mechanical history of time, energy, and changing curvature required for stable orbit motion. Tangent slope of orbit position is relative with the average curvature of the orbital and will be used to determine end point velocities required for stable orbit composition of $\mathbf{M_1}$ and $\mathbf{M_2}$.

ON RELATIVE TANGENTS OF THE UNIT CIRCLE.

Let's define two types of tangency for the unit circle. Traditional tangency of straight lines and relative tangents of curved lines. Un-like two straight line tangents constructed on the "spin" diameter of a circle where parallel properties of such tangents forbid intersection, **Relative Tangents** of a unit circle spin diameter will intersect.

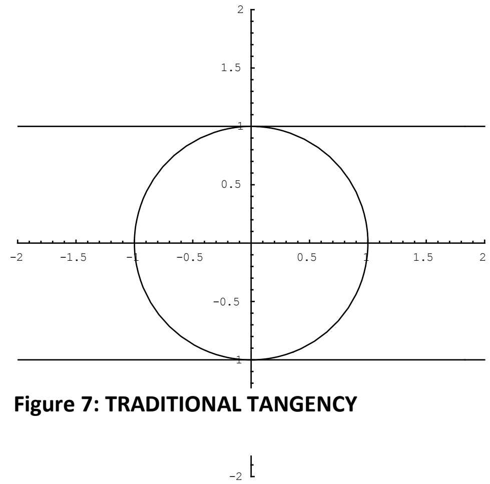


Figure 7: TRADITIONAL TANGENCY

Traditional Euclidean tangents at North and South polar spin axis of a spherical field.

These types of tangents are straight lines through space and being parallel with each other never intersect**.**

This is what happens to Euclidean tangents when they are subjected to phenomena of mass/volume ratio imbued to a unit sphere in the real world of space, time, and gravity.

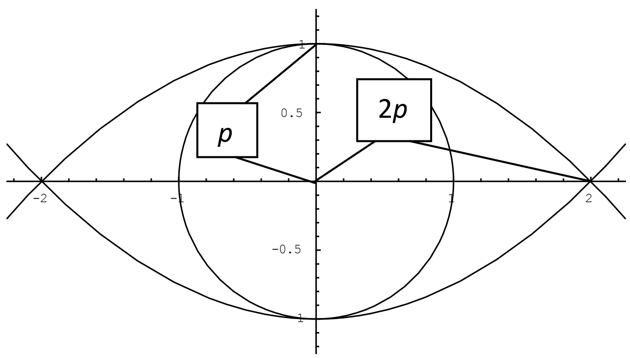


Figure 8: **RELATIVE TANGENTS**

They become **RELATIVE TANGENTS** with respect to unit sphere center, home to all central force phenomena. Most important is the proportional linear relativity the builder [*p*] will bring to changing spherical radii of a gravity field orbital.

Relative Tangent: Let two Euclidean tangents on the north and south vertex of a two-space **ASI** spin diameter be constructed. When the concept of mass is imbued to the two-space **ASI**, the tangents change from a straight line first degree locus to loci of a second degree generator curve without altering the meter or measure of our two-space experience. The locus of a relative tangent defines the 2-space profile curvature of the gravity field three space orbital. <u>Radius vectors of **F** to the tangent locus are field focal radii</u>. Nature would have two tangents for the field; only the north tangent is used in these writings for our planet group approach perihelion from a south to north relative motion on the ecliptic with respect to the solar spin axis.

Methods to determine, graph, and construct changing energy, motion, and slope on a **RT** will be demonstrated with the Earth-Moon system. Primary activity of method requires finding the principal **ASI** to determine g-field co-operators (**r**) and (**p**) as well as energy limits of the orbit (**π**) perihelion and (**α**) aphelion to build their relative average curvature and radius of curvature that is the g-field orbital diameter latus rectum (**r-aorb**).

GIVEN LUNAR DATA: (m is orbital slope where average orbit curvature has (m = 1)):
Construct a gravity field orbital.
Object identification:

- π = perihelion parameters.
- α = aphelion parameters.
- *m* = orbital position slope.
- Radii observed will have g-field central properties.
- Focal radii will have system composed g-field position/energy properties.

DIRECTED RADIUS OF ORBITAL	r-aorb	π	α	*m* (π)	*m* (α)	ASI
Radius observed	**384403**	**363299**	**405506**	**.946608**	**1.0564**	**192202**
Focal radius	**384403**	**363880**	**406086**			
velocity	**1.0176** $\frac{\text{km}}{\text{sec}}$	**1.0751** $\frac{\text{km}}{\text{sec}}$	**.9632** $\frac{\text{km}}{\text{sec}}$			
F **(t) ⟶ΔKE**	reference energy level of system (m=1)	**20524 relative energy level**	**-21682 relative energy level**			

The unit circle will be the independent curve and the unit parabola will be the dependent curve for the earth/moon gravity field orbital. The latus rectum is the average orbit diameter, divide by 4 to find (*r*) of the unit circle. The average radius is under the column **r-aorb** (note focal radius and inverse square radius/central radius equivalence) and the latus rectum average energy diameter will be:

The average diameter (768806km) divided by 4 will give radius of the field principal **ASI** and builder (*p*) of the latus rectum of dependent curvature.

$$\left(\frac{768806}{4} = 192202\right)$$

Once the radius of the principal **ASI** is known, we can construct the profile of a g-field orbital. Components for parametric definition are; where *p* = *r* as **ASI** radius:

$$\left\{t, \frac{t^2}{-4p} + r \right\} \Rightarrow \left\{t, \frac{t^2}{-4(192201.5)} + 192201.5 \right\}$$

To find position slope on the orbital we need parametric description of the *focal radius* magnitude, not the central property radius magnitude of an **ASI.** All focal radii magnitudes have an identity with respect to the $\left(\frac{\pi}{2}\right)$ parabola spin vertex radius of curvature which will always equal 2 (*p*).

$$\left[orbitalvertexradiusofcurvature - \left(f(t)\right)\right] = focalradius$$

If (t) is the position radius then *f* (t) will be energy component of a parametric orbital description $\left\{t, \frac{t^2}{-4p} + r \right\}$. To find *f* (radius π) substitute the central property radius for (*t*) and ask *Mathematica* to compute the solution term.

$$\left(\frac{(t)^2}{-4(192201.5)} + 192201.5\right) /.\, t \rightarrow 363299 = 20524.7$$

Using the focal radius identity we can compute focal radius magnitude to position (π) on the orbital. Radius of curvature of any orbital vertex is twice the principal unit **ASI** radius (2p = 2r).

$$\left((2 * 192202) - (20524) = 363880\right)$$

Note the difference in magnitude between the focal radius (363880) and acting inverse square radius (363299).

To evaluate position slope for position radius (π) on the orbital, use the first derivative of the unit parabola where (p and r = 1):

$$\left[\partial_t \left(\frac{t^2}{-4p} + r\right) = \frac{-t}{2p} \;\; and \;\; \left|\frac{-363880}{2 * (192202)}\right| \longrightarrow m = 0.946608\right]$$

Now to determine the focal radius and position slope of orbit limit (**α**).

To find position slope on the orbital we need parametric description of the *focal radius* magnitude, not the central property radius magnitude of an **ASI.** All focal radii magnitudes have an identity with respect to the $\left(\frac{\pi}{2}\right)$ parabola spin vertex radius of curvature which will always equal 2 (*p*).

$$\left[orbitalvertexradiusofcurvature - \left(f(t)\right)\right] = focalradius$$

If (t) is the position radius then *f* (t) will be energy component of a parametric orbital description $\left\{t, \frac{t^2}{-4p} + r\right\}$. To find *f* (radius π) substitute the central property radius for (*t*) and ask *Mathematica* to compute the solution term.

$$\left(\frac{t^2}{-4(192201.5)} + 192201.5\right) /.\, t \rightarrow 405506 = -21682.3$$

Using the focal radius identity we can compute focal radius magnitude to position (π) on the orbital. Radius of curvature of any orbital vertex is twice the principal unit **ASI** radius (2p = 2r).

$$\left((2 * 192202) - (-21682.3)\right) = 406086$$

Note the difference in magnitude between the focal radius (406086) and acting inverse square radius (405506).

Slope of position for inverse square radius (**α**) on the orbital is the first derivative of the unit parabola where (p = 1):

$$\left[\partial_t\left(\frac{t^2}{-4p} + r\right) = \frac{-t}{2p}\ and\ \frac{406086.0}{2 * (192202)} \longrightarrow m = 1.0564\right]$$

A Euclidean Plane Geometry Sketch of Focal and Inverse Square Composition of the Earth/Moon G-field Orbital:

$$\text{ParametricPlot}[\{\{192202\text{Cos}[t],192202\text{Sin}[t]\},\{t,\frac{t^2}{(-4(192202))}+192202\},$$

$$\{t,20524\},\{t,-21682\},\{t,192202\},\{192202,t\},\{363880,t\},$$

$$\left\{t,363880+\frac{(-t(363299))}{2*(192202)}\right\},\{406086,t\},\{384403,t\},$$

$$\{t,t\frac{(20524)}{363299}\},\{t,t\frac{(-21682)}{405506}\},\{t,406086+\frac{(-t(405506))}{2*192202}\}\}$$

$$,\{t,-200000,450000\},$$

$$\text{PlotRange}\rightarrow\{\{-50000,430000\},\{-50000,200000\}\}]$$

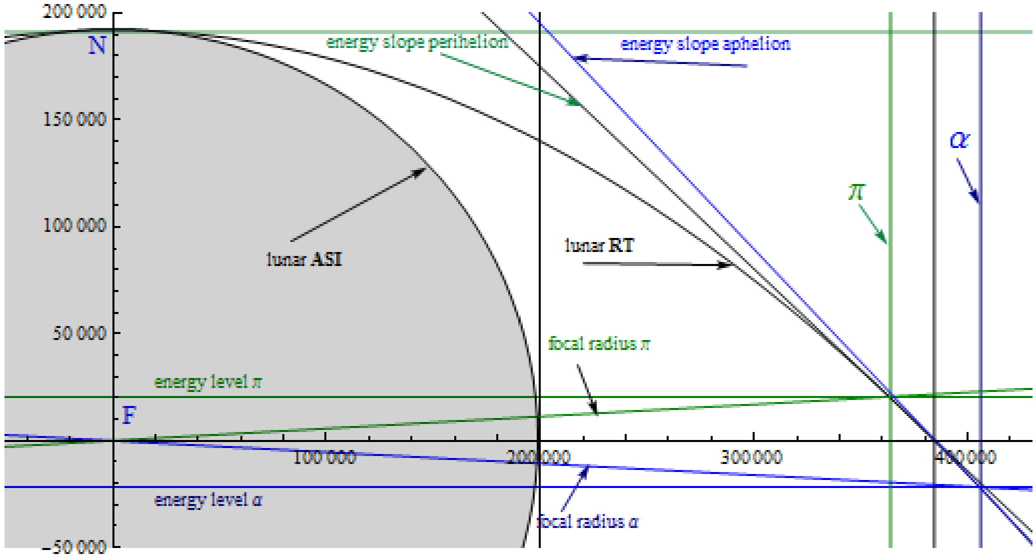


Figure: EARTH/MOON SPACE TIME SQUARE ORBITAL

In the above g-field construction of earth/moon system energy curves, immediate questions arise. If [**F**] is the point mass acceleration curvature of earth, does the **ASI** belong to earth or the moon? Since the **RT** is specific to lunar motion I say the independent curve **ASI** is properly called a lunar **ASI** as its sole purpose of description defines the degree and energy limits for stable lunar orbit motion. It is also that place in space where meshing of two g-field forces happen joining together both influence of each point mass that is the earth and the moon enabling action-reaction of such homogenized blending of two distinct accelerating phenomena on the average plane of curvature and energy that is the Euclidean Apollonian Latus Rectum.

OBJECT IDENTIFICATION:

$\{\mathbf{192202Cos}[\boldsymbol{t}], \mathbf{192202Sin}[\boldsymbol{t}]\} \xrightarrow{\boldsymbol{yields}}$ Acceleration spherical influence of planet earth.

$\left\{t, \frac{t^2}{-4(192202)} + 192202\right\} \xrightarrow{yields}$ Curvature of a g-field orbital (**RT**) about planet earth.

$\{\mathrm{t}, 20524\} \xrightarrow{\text{yields}} f(\text{perihelion})$, energy level of focal radius for position π.

$\{\mathrm{t}, -21682\} \xrightarrow{\text{yields}} f(\text{aphelion})$, energy level of focal radius for position α.

$\{\mathrm{t}, 192202\} \xrightarrow{\text{yields}}$ Spin axis limit of radius **ASI**.

$\{192202, \mathrm{t}\} \xrightarrow{\text{yields}}$ Rotation plane limit of radius ASI.

$\{363880, \mathrm{t}\} \xrightarrow{\text{yields}}$ Position component (abscissa) of focal radius perihelion (π).

$\left\{t, 363880 + \left(\frac{-t(363299)}{2*(192202)}\right)\right\} \xrightarrow{yields}$ Tangent slope to focal radius perihelion (π).

$\{406086, \mathrm{t}\} \xrightarrow{\text{yields}}$ Position component (abscissa) of focal radius aphelion (α).

$\{384403, \mathrm{t}\} \xrightarrow{\text{yields}}$ Focal radius latus rectum (**r-aorb**).

$\{t, \frac{20524t}{363299}\} \xrightarrow{yields}$ Focal radius π.

$\{t, -\frac{10841t}{202753}\} \xrightarrow{yields}$ Focal radius α.

$\{t, 406086 + (\frac{-t(405506)}{2*(192202)})\} \xrightarrow{\text{yields}}$ Tangent slope at aphelion.

PROPORTIONAL RATIOS OF INVERSE SQUARE ENERGY OF MOTION AND CHANGING ORBITAL SLOPE OF POSITION TO DETERMINE PLANET VELOCITY.

The construction on page 8 is that of a g-field orbital with orbit limits pressed upon the relative tangent. Reference numbers for comparative ratios will be built around the g-field "seam", that place in space where the rotational plane of **F**, the **SPR**, holds the measure of the semi-major axis between the relative tangents of the producing **ASI** spin axis. It is here that the slope of the orbital is (1) with respect to velocity and spin axis displacement. Since all proportions will be built upon the planets semi-major diameter, a postulate concerning orbital hierarchy of position with the spin axis of F is presented.

Postulate on Exclusive Occupation Rule: One and only one central property diameter can claim the disk latus rectum of the orbital **Relative Tangent** as exclusive residence. This diameter is the semi-major diameter of a planets orbit.

Elliptical semi-major diameters of planetary orbits are the average radius of orbit limits. Every average radius of all orbit period will take position on the latus rectum of the **RT**. Here, the average diameter on the **SPR** of **F** intersects the orbital surface at slope 1. Focal radii of curved space have congruence with central radii of familiar Euclidean space at orbital slope 1. This congruence enables ratios of curved space energy with that of central curvature position, to predict planetary velocity for any position/slope between the defined period pressed on the orbital.

The postulate of equivalent magnitude: Central and focal radius vectors of F have equivalent magnitude twice and only twice in a field reference frame. This occurs along the producing ASI spin diameter where (r) = (p), and again on the plane of the SPR as the focal radius of the relative tangent (RT) is equivalent with central force rotational curvature $(2p)^{-1}$.

PROPORTIONAL SLOPE AS ENERGY RATIO TO DETERMINE VELOCITY OF ORBITAL LIMITS ON THE FIELD (RT):

An aside: SLOPE AND INVERSE SQUARE RATIOS:

Traditional methods to determine slope use the first derivative directly. To structure field velocity ratios in this way returns opposite observations. Calculations return velocity of perihelion for aphelion and velocity of aphelion for perihelion. To correct results I found it necessary to use the inverse of the first derivative. I attribute this peculiarity to the fact that we are working with energy curvature and not position radii.

I will be using the first derivative of the **RT** to determine slope (-t/2p), where –t is not the traditional central force (*t*) but the focal radius magnitude of real time position on an operating inverse square energy curve. (2p) is the radius of curvature of the **RT** vertex and twice the radius of the producing **ASI.** Ratios begin with finding slope of time and position on the orbital using the *focal radius* as numerator and g-field controlling vertex curvature as denominator to determine first derivative value for slope of **RT** position on an energy curve. Focal radii of operating inverse square curvature of orbit limits can be found in the property sheets for our moon and planet group.

$$\left|\left(\frac{focalradius}{2p}\right)\right|^{-1}$$

The absolute value bars will return positive values of velocities for slope of *motion* on the **RT** is sometimes negative and sometimes positive.

Orbital properties to establish velocity ratios EARTH/MOON

Orbital position	r-aorb	π	α	m (π)	m (α)	ASI
Radius observed	384403	363299	***405506***	0.946606	***1.05641***	***192202***
focal radius	384403	363878	***406085***			
velocity	1.0176 km/sec	1.0751 KM/SEC	$.9632\ \mathrm{km/sec}$			
f(t)⟶△KE	Unity ratio	20524.7	***-21682.3***			

First derivative of the **RT** $\left(t, \frac{t^2}{-4p} + p\right)$ will be $\left(\frac{t}{-2p}\right)$ where t is the focal radius and (p) = **ASI** (radius).

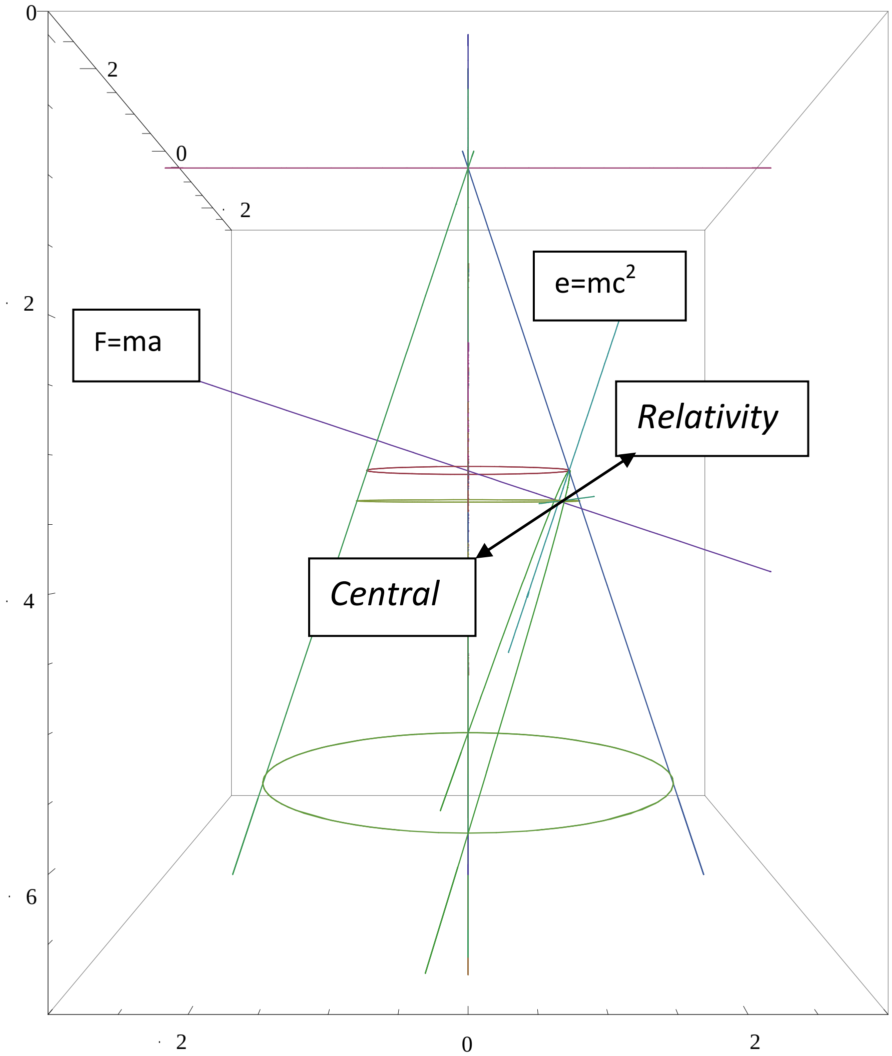
Find slope values of (π) and (α) using first derivative of **RT** $\left|\left(\frac{2p - f(t)}{2p}\right)\right|$.

$$\left\{\pi = \left(\frac{2*192202 - 20524.7}{2*192202}\right) \xrightarrow{yields} 0.946606\right\} \text{And} \left\{\alpha = \left(\frac{2*192202 - (-21682.3)}{2*192202}\right) \xrightarrow{yields} 1.05641\right\}$$

Establish ratios for relative velocity of orbital position with average velocity of period as the extreme proportional $\left(\frac{m=1}{v@m=1}\right)$. Required velocity of orbital slope/position will be the fourth proportional.

Velocity perihelion: $SolveEquation\left[\frac{1}{1.0176} == \frac{0.946606^{-1}}{v}, v\right] \xrightarrow{yields} 1.0750\ km/sec$

Velocity aphelion: $SolveEquation\left[\frac{1}{1.0176} == \frac{1.05641^{-1}}{v}, v\right] \xrightarrow{yields} .9633\ km/sec$



alexander@sandboxgeometry.com