
Fizix-Power
Fizix Power
Interactive Discovery, Exploration,
and Application of Physics
A Learning Tool for
High-School and College Physics
Actus Potentia, Inc. (Patent Pending)
START

What will it do for the students?

- High School
  - Build problem solving skills
  - Expose the reality behind the equations
  - Change perception that “physics is hard”
  - Attract more students in science & engineering
  - Help disadvantaged students

What will it do for the students?

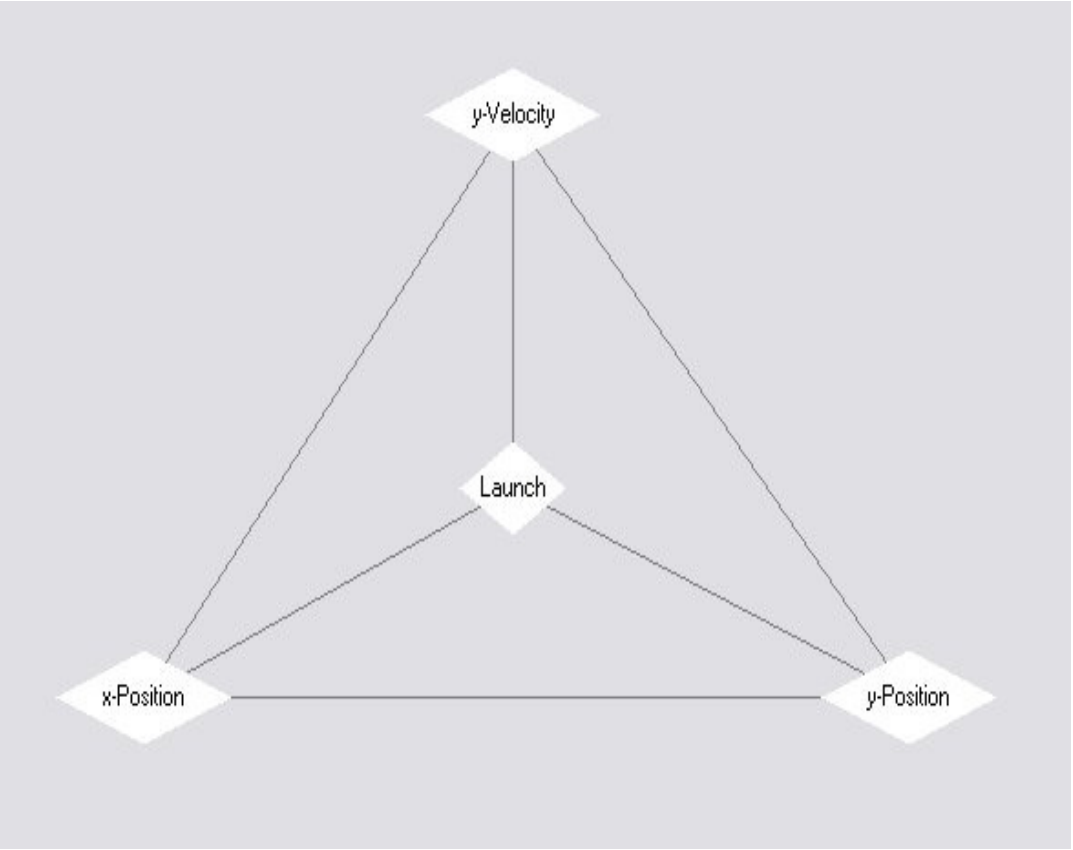
- College
  - 24-7 help in large classes
  - Change perception that “Physics is a weed-out class”
  - Excite them about what lies beyond Introductory Physics
  - Better prepared for specializations
  - Retention

What will it do for the students?

- Helps entire spectrum of performers
  - High performers can explore on their own and go beyond the expectations in a beginning Physics course
  - Low performers improve their ability with more practice and help from the software.

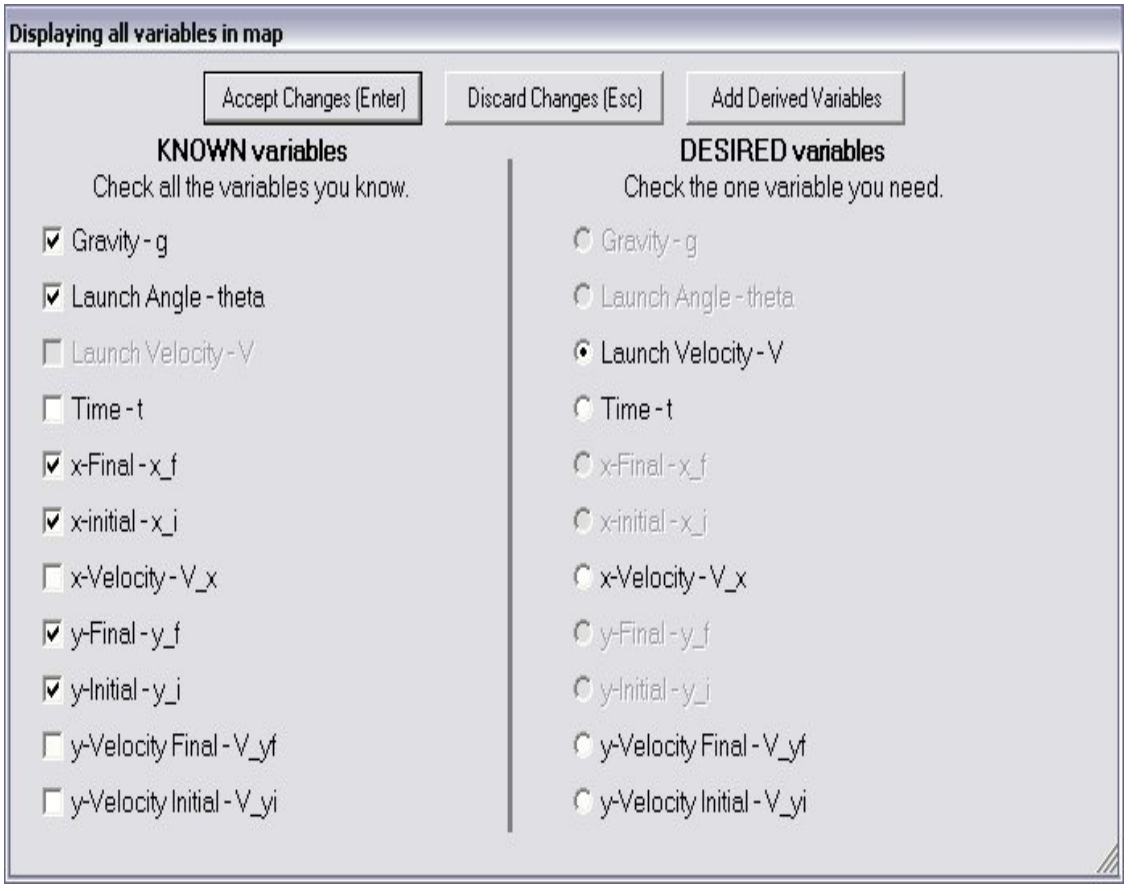
How Concept-Map Works-1

Concept Map for Projectiles



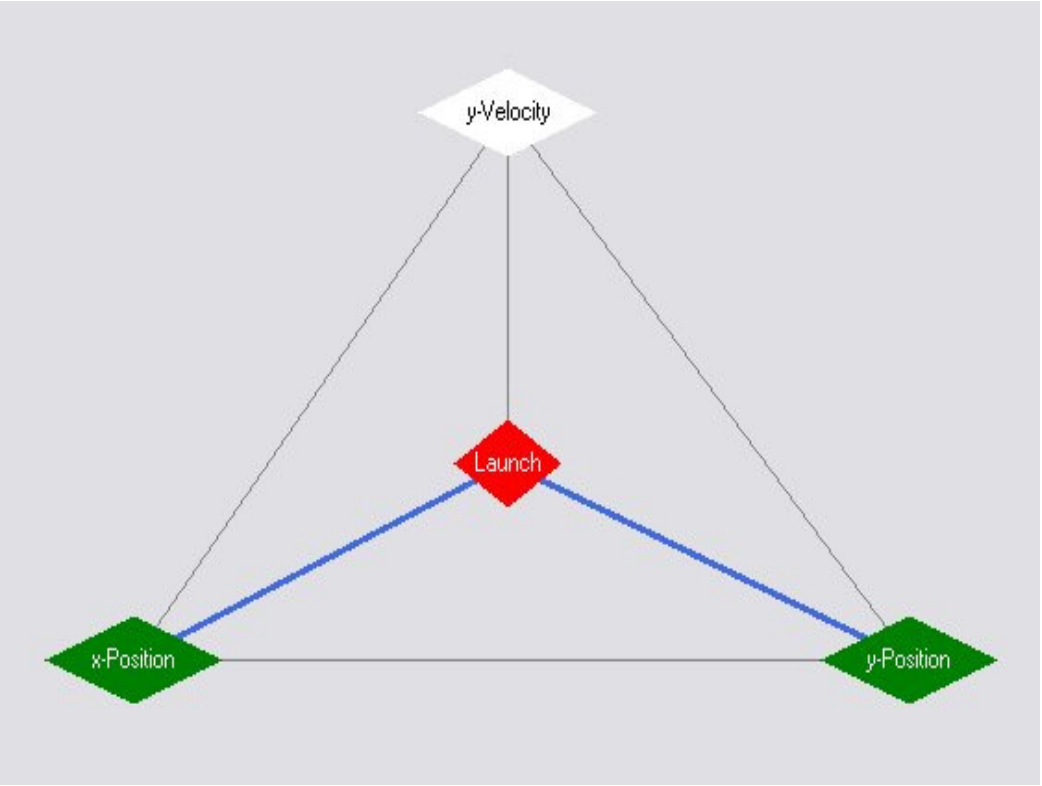
How Concept-Map Works-2

Pose problem on “Variables” window



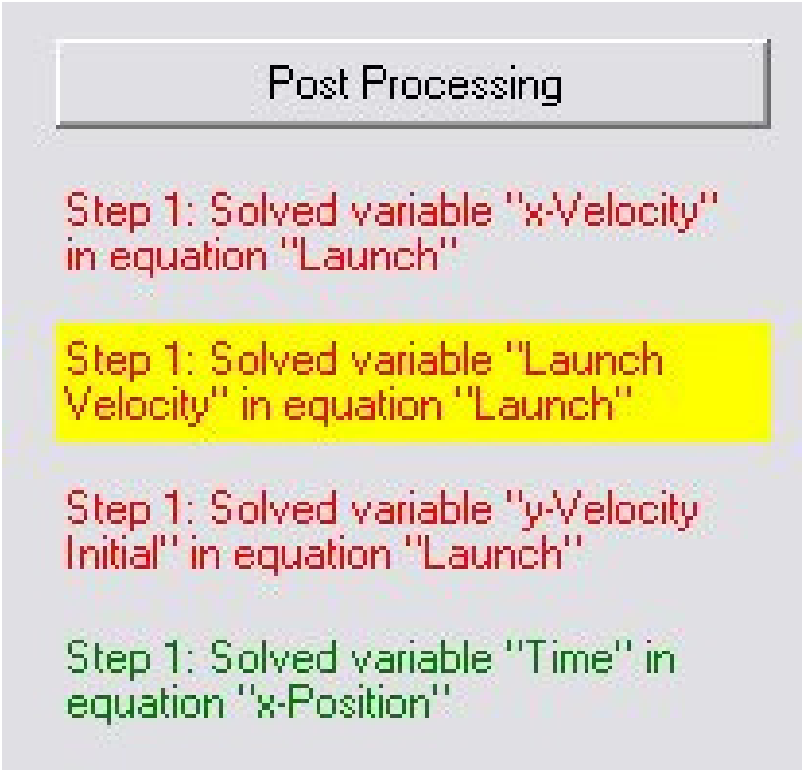
How Concept-Map Works-3

Concept-Map displays solution-path



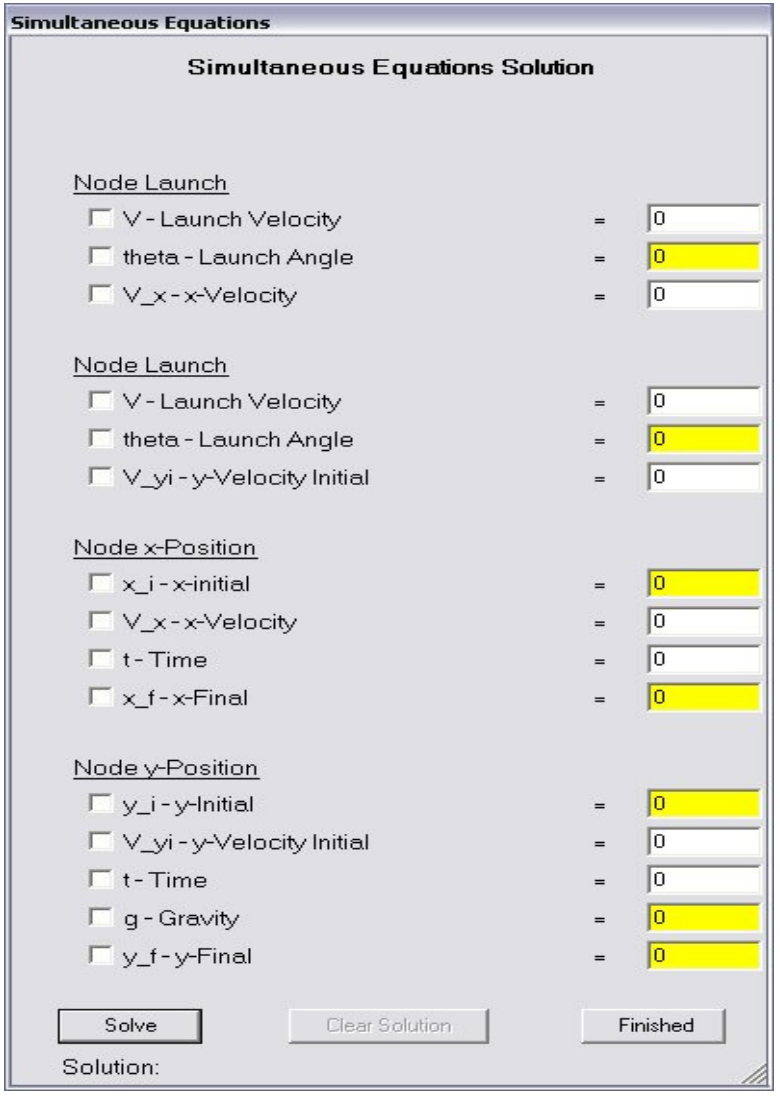
How Concept-Map Works-4

Concept-Map displays solution-steps



How Concept-Map Works-5

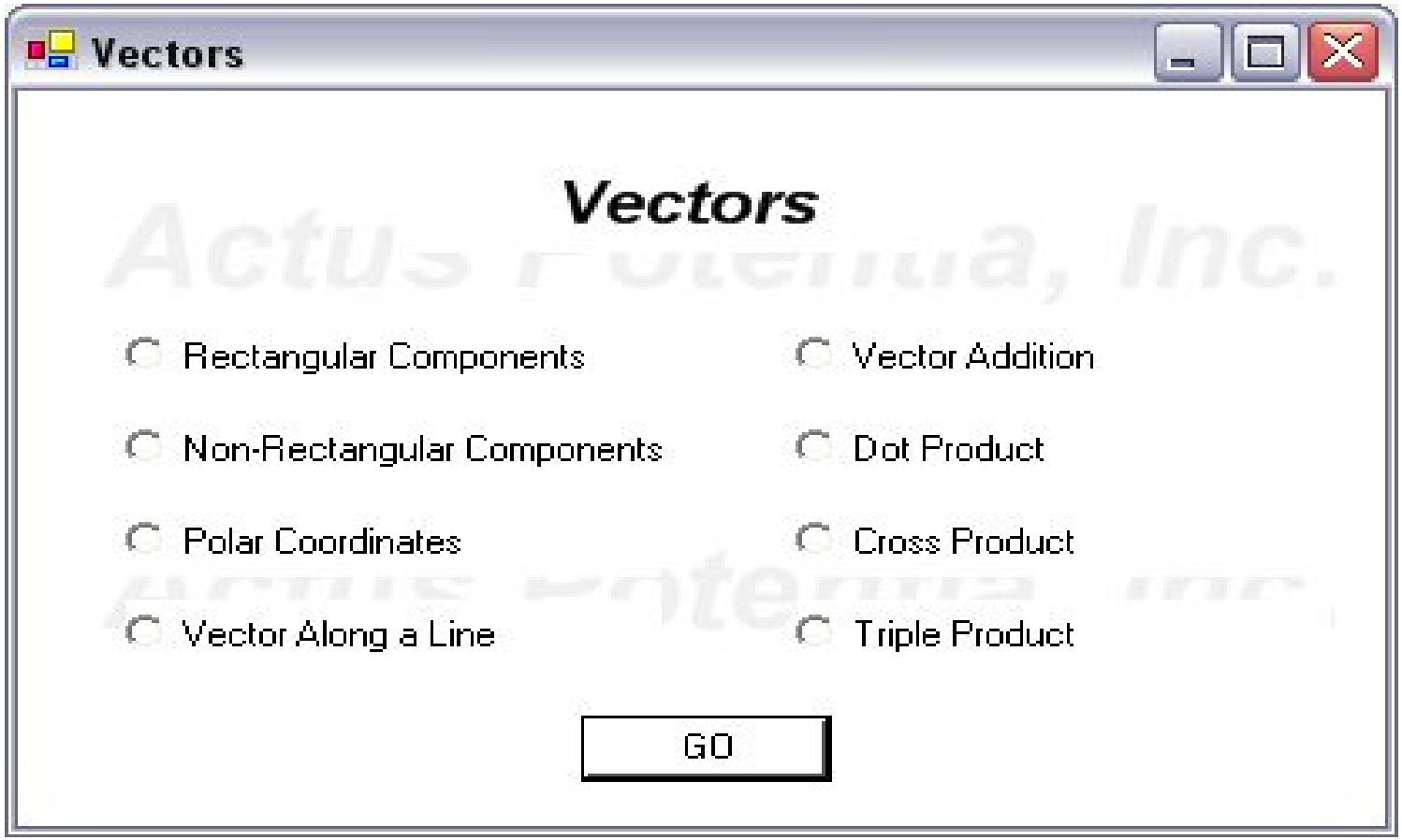
Computations in "Solution" window.



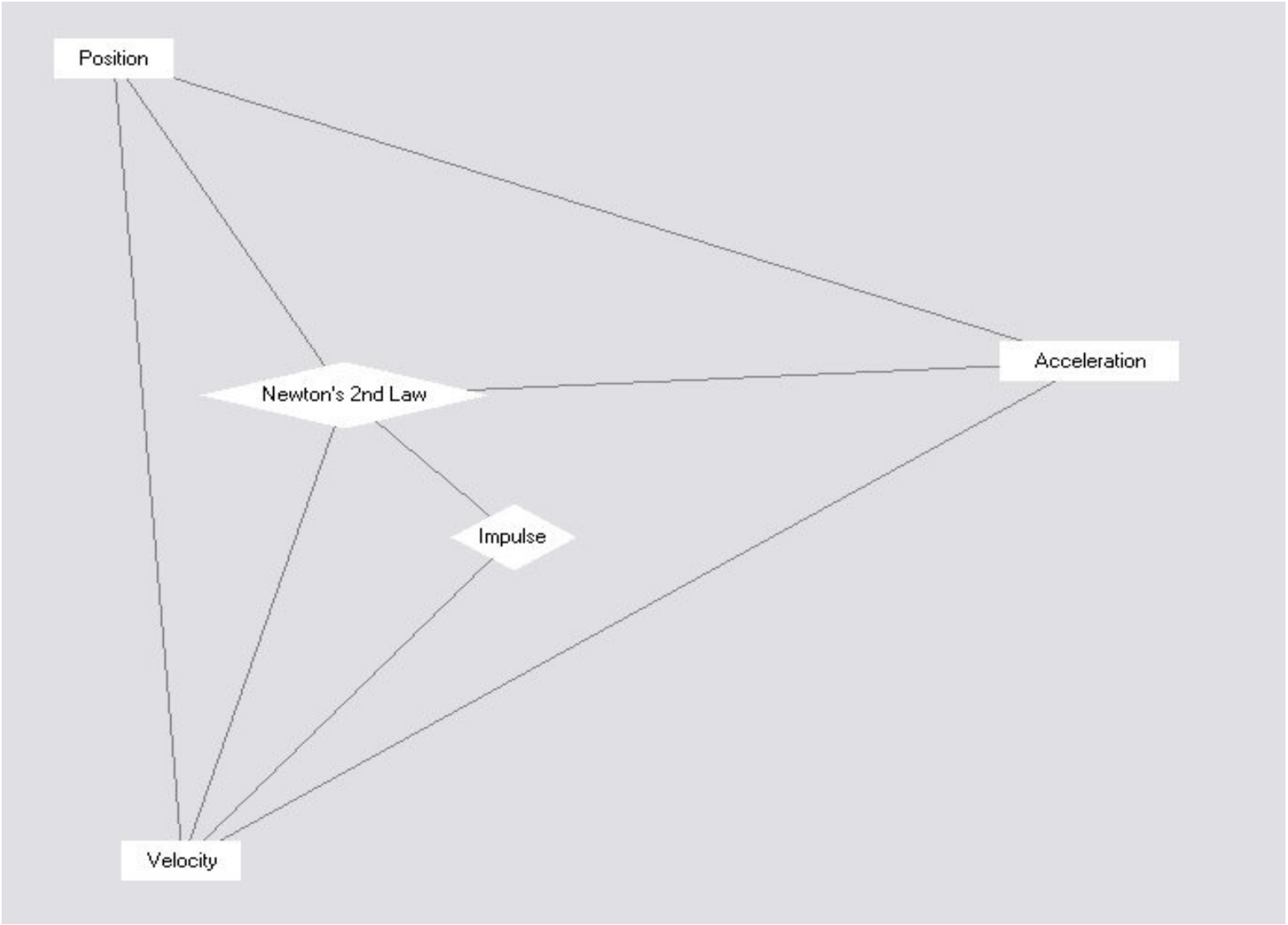
Contents

- Vectors
- Mechanics
  - 1-D Kinematics, Newton's Law
  - Projectile
  - Relative Velocity
  - Circular Motion
  - Coupled Motion of Multiple Bodies
  - Rigid Body Rotation
  - Collision and Momentum
  - Conservation of Energy
  - Planets & Satellites
- Heat & Thermodynamics
  - Ideal Gas Law
  - 1st Law of Thermodynamics
  - Cyclic Processes
  - Carnot Cycle
  - Gas-Diesel Engines
  - Efficiency
- Waves/Oscillation/Sound
  - Simple-Harmonic-Motion
  - Organ Pipe
  - Doppler Effect
- Fluid Mechanics
  - Bernoulli Equation.
- Electricity
  - Point charges, field, potential, lines of force
  - Distributed charges on Cylinder, sphere, disk, rod, plane
  - Capacitors
  - Capacitors in Series & Parallel
  - Resistors in Series & Parallel
  - RC Circuits
- Magnetism (under preparation)
- Optics
  - Lenses
  - Mirrors

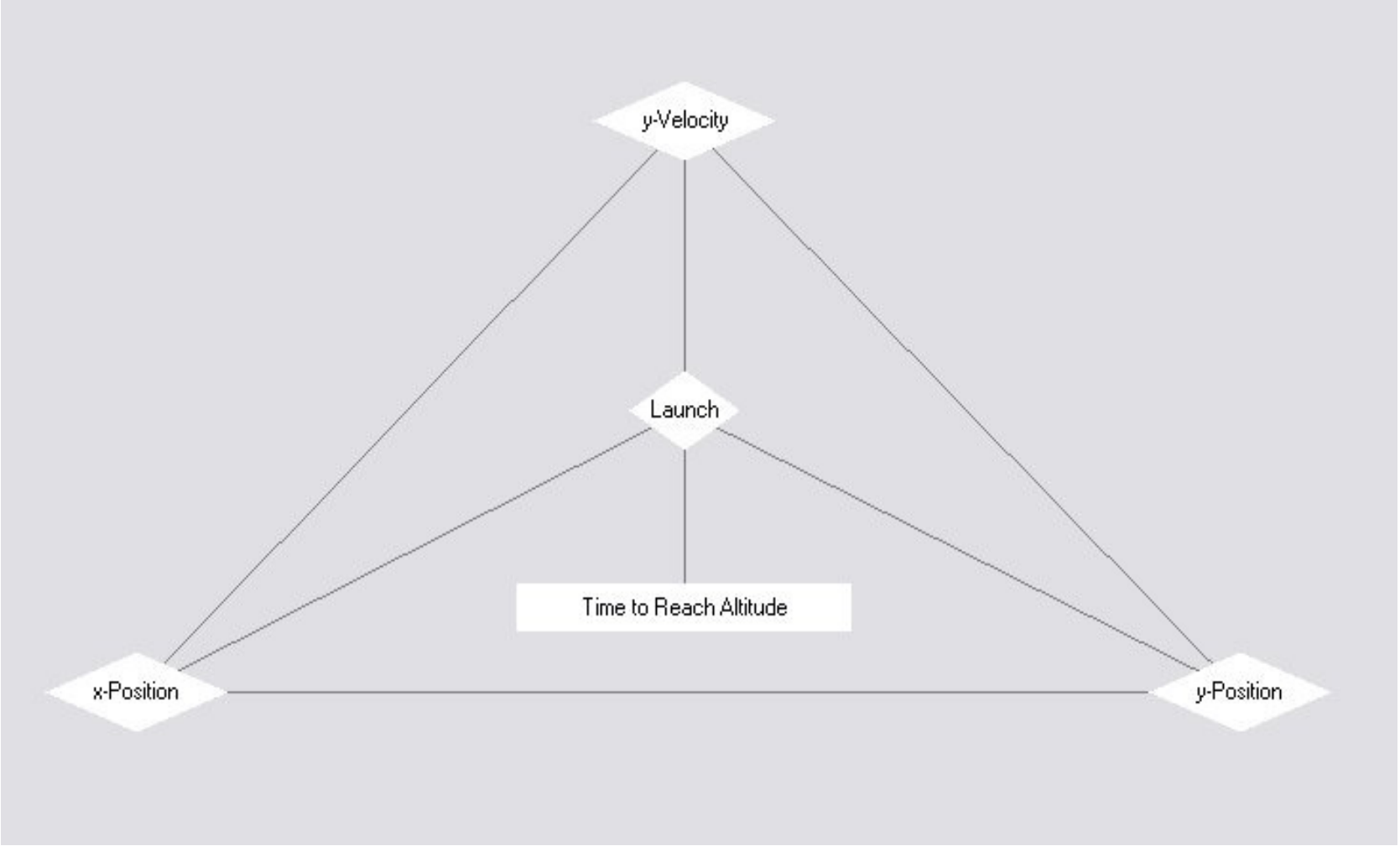
Vectors


Vectors
Vectors
Rectangular Components
Non-Rectangular Components
Polar Coordinates
Vector Along a Line
Vector Addition
Dot Product
Cross Product
Triple Product
GO

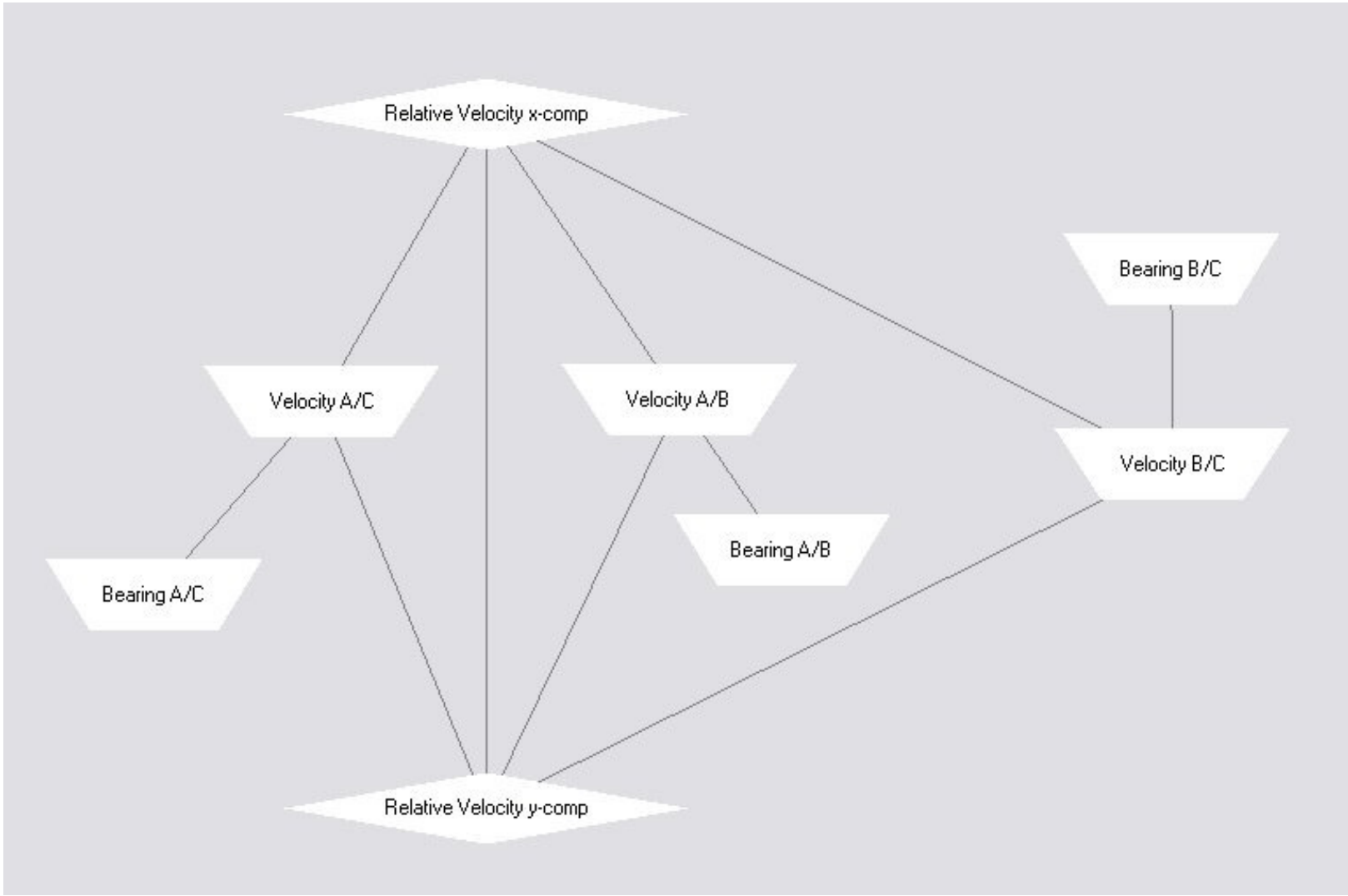
1-D Kinematics & Newton's Law



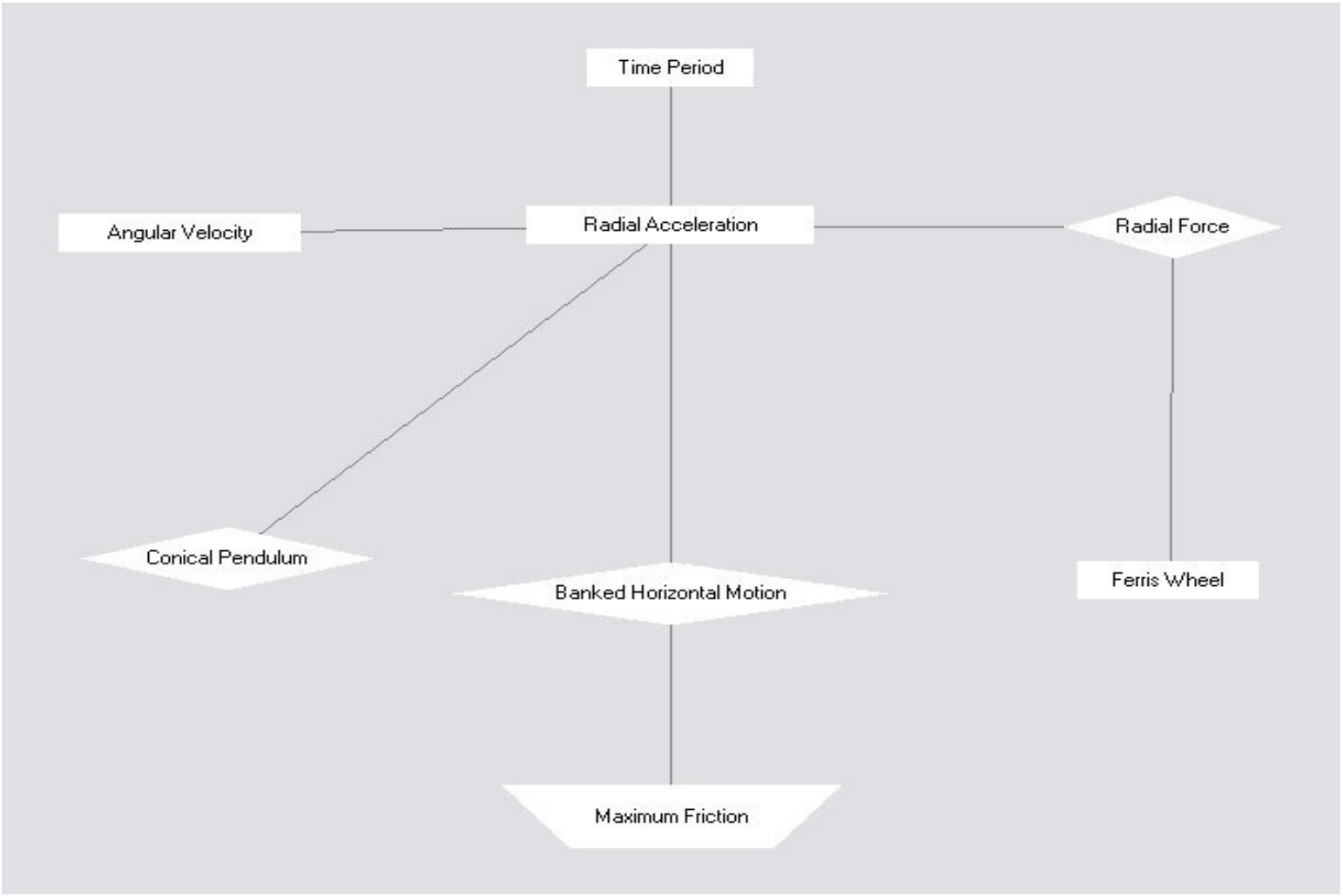
Projectile


y-Velocity
Launch
Time to Reach Altitude
x-Position
y-Position

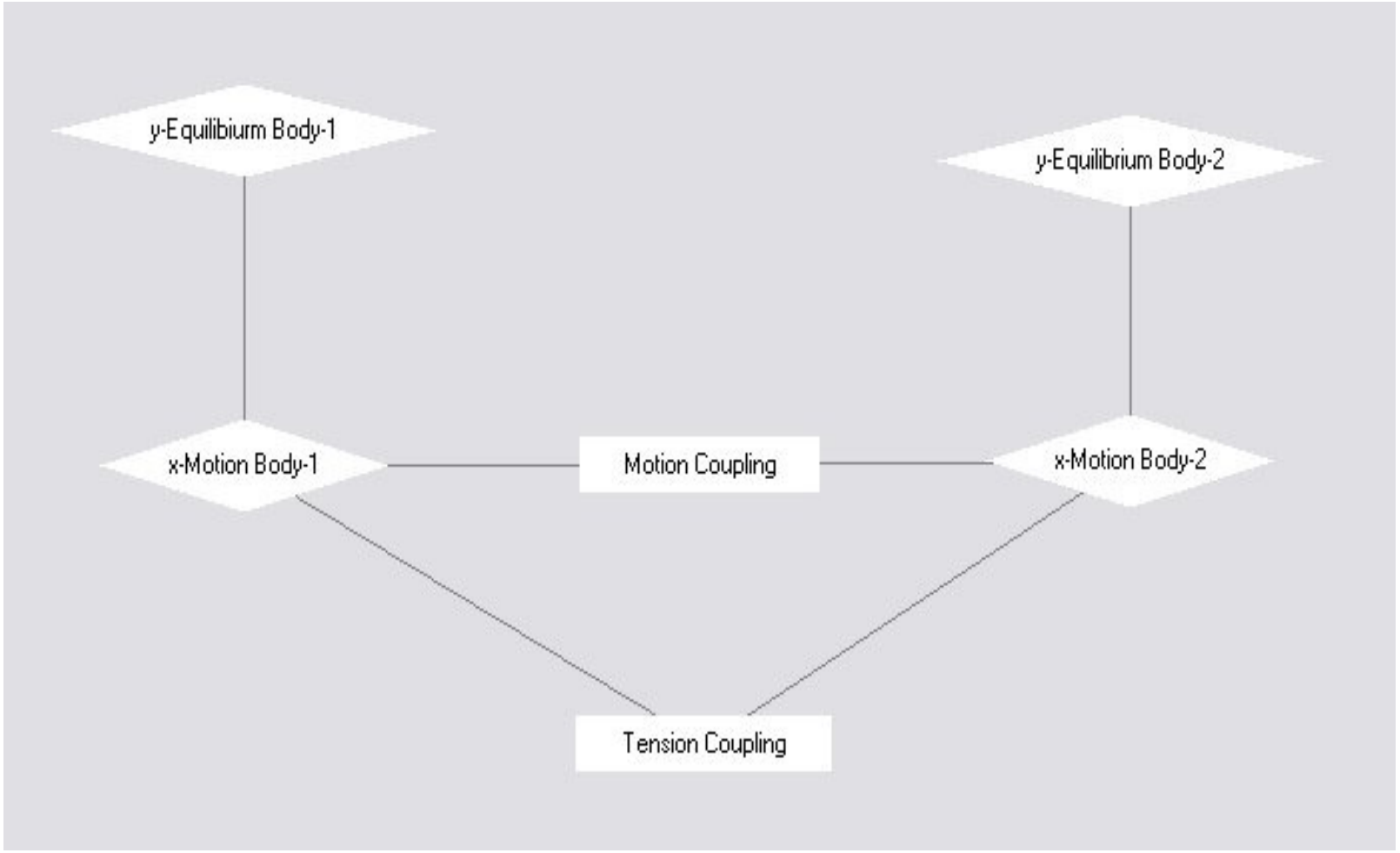
Relative Velocity



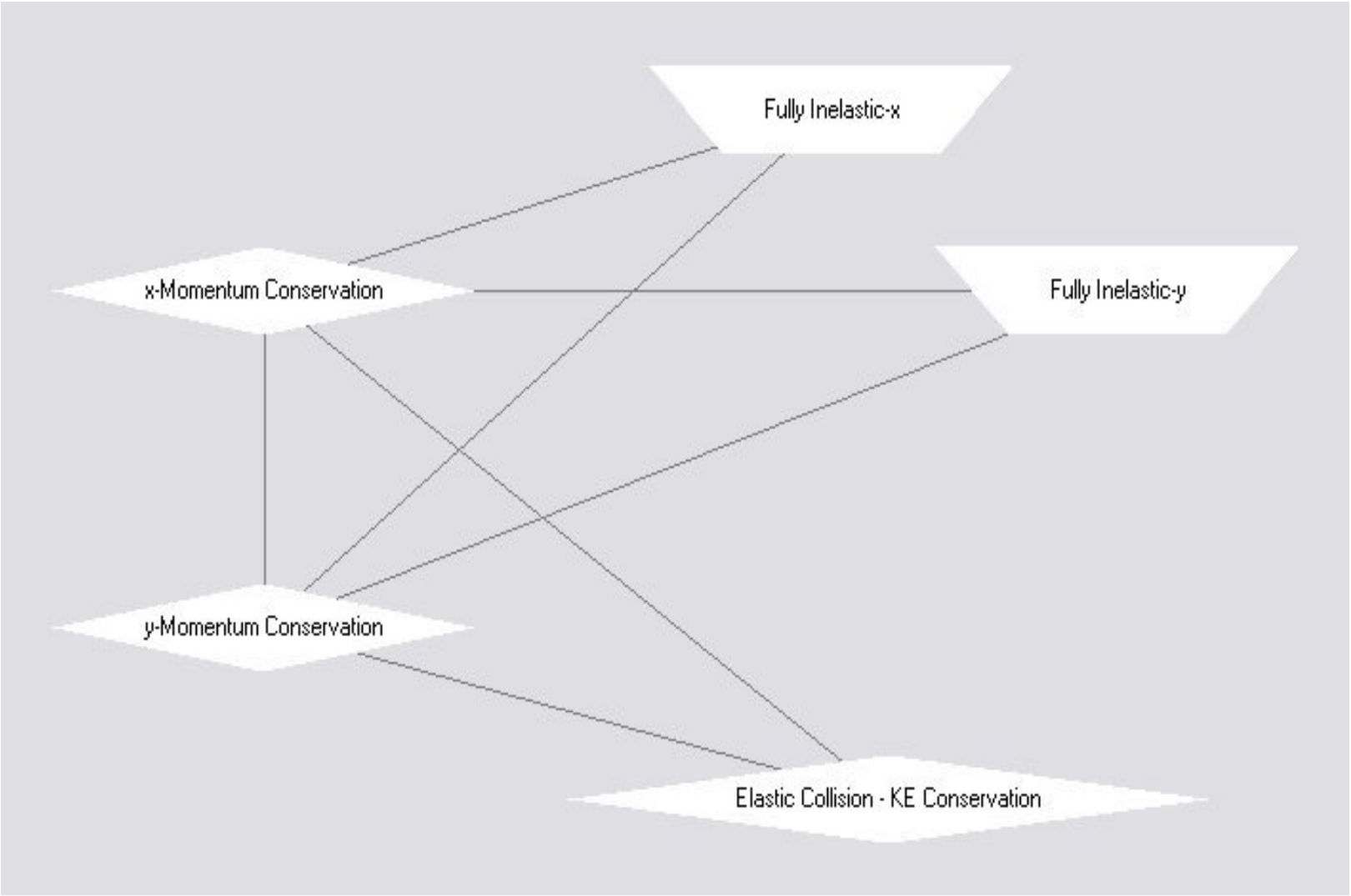
Circular Motion



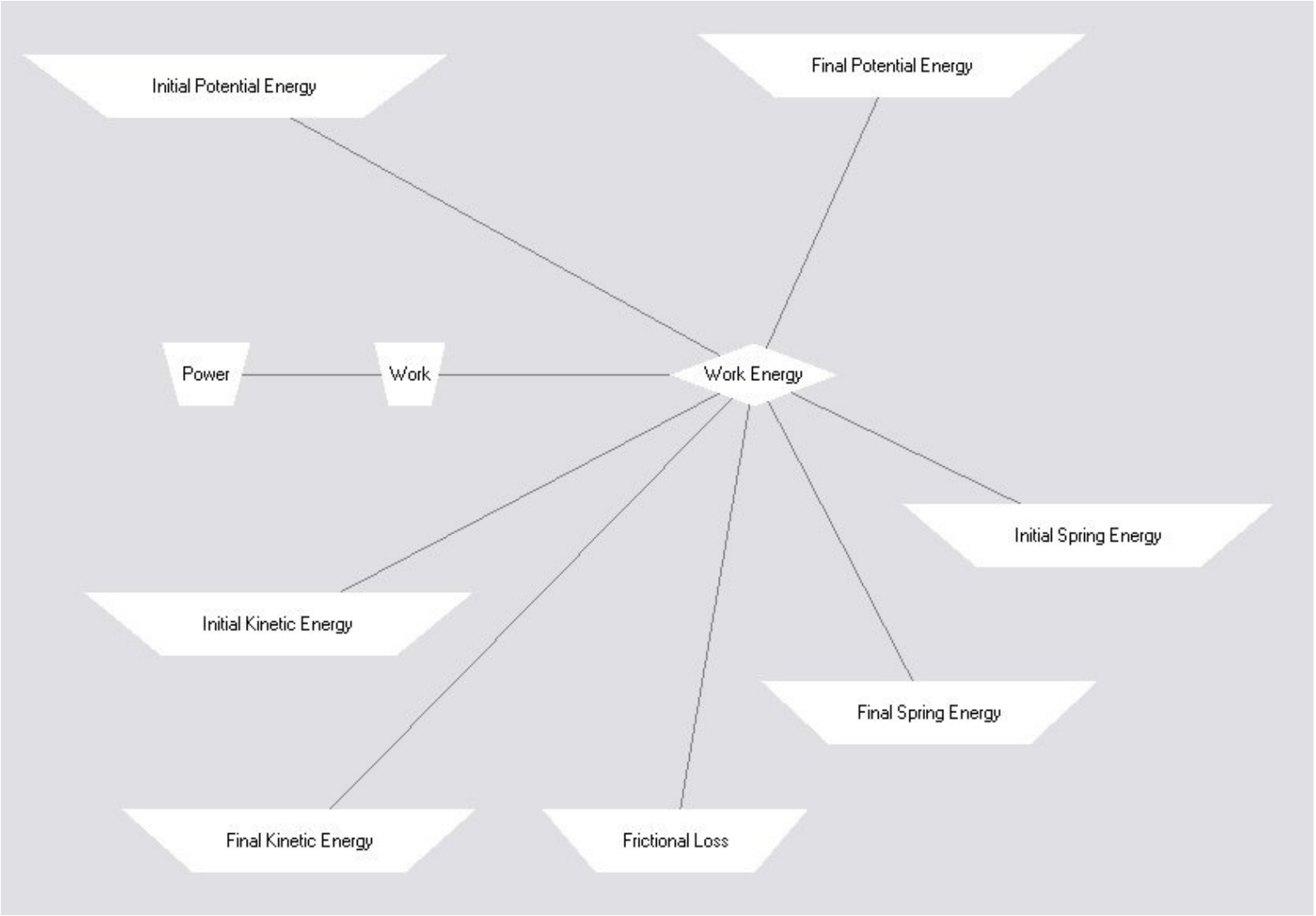
Coupled Motion of Two Bodies



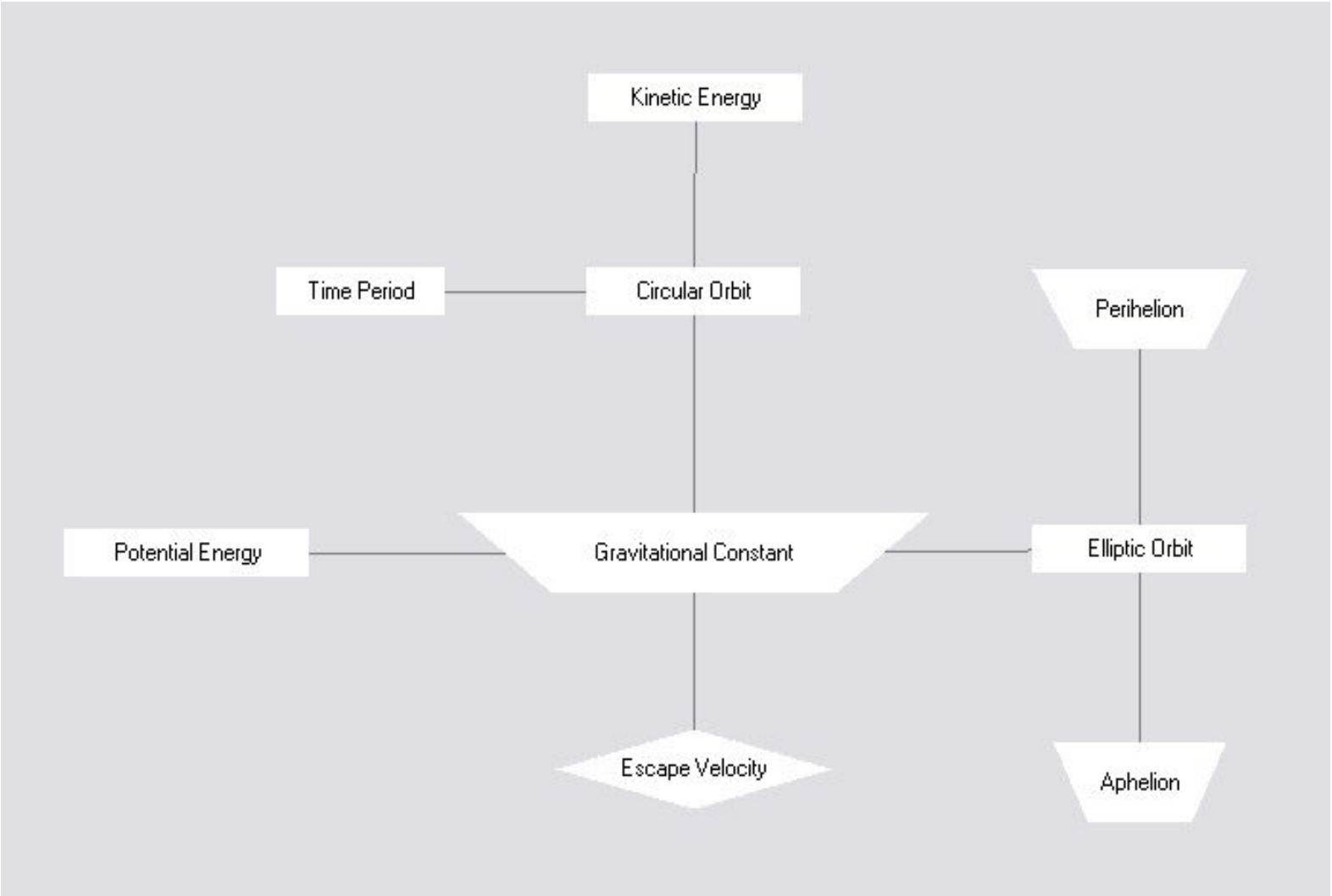
Collision & Momentum



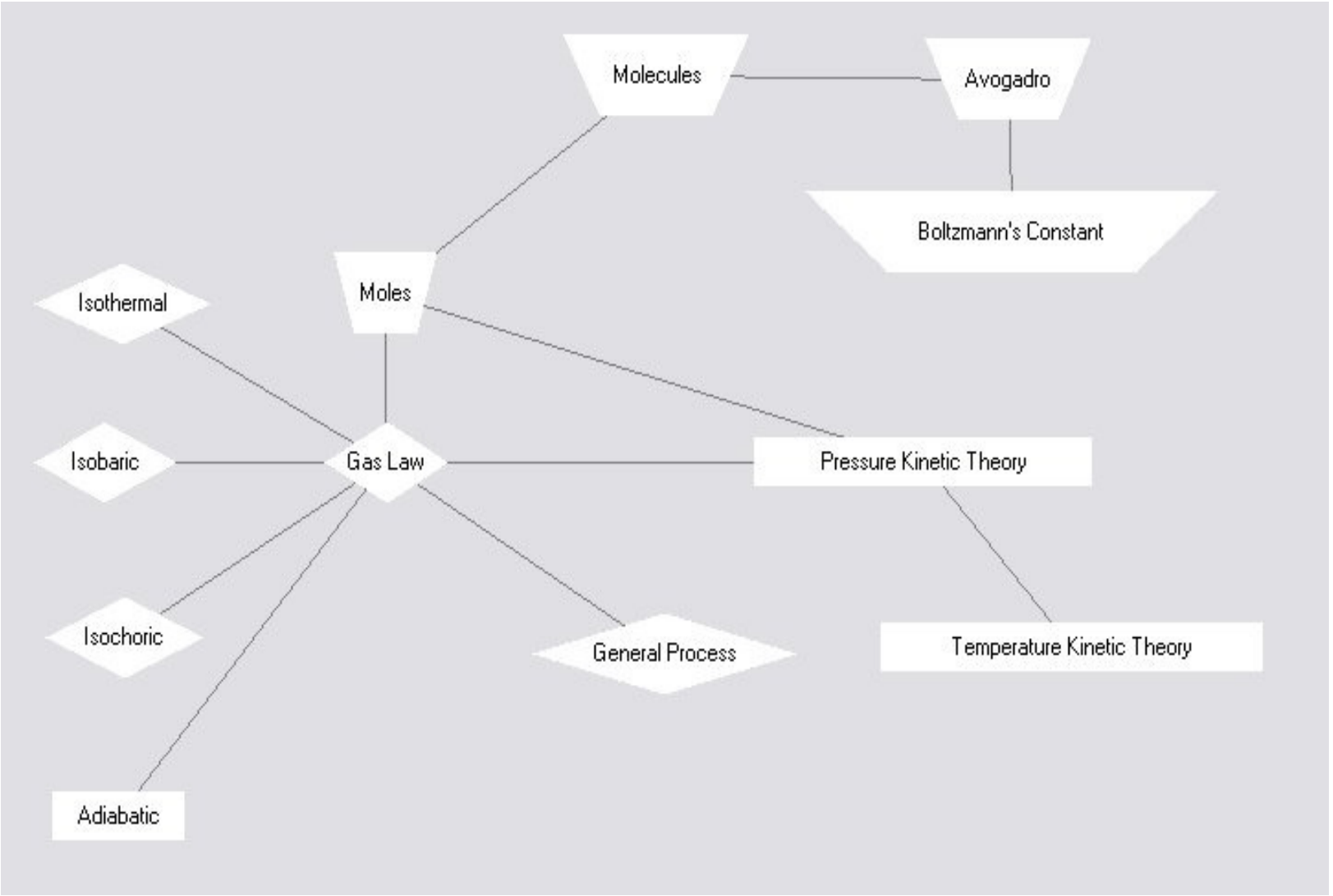
Conservation of Energy



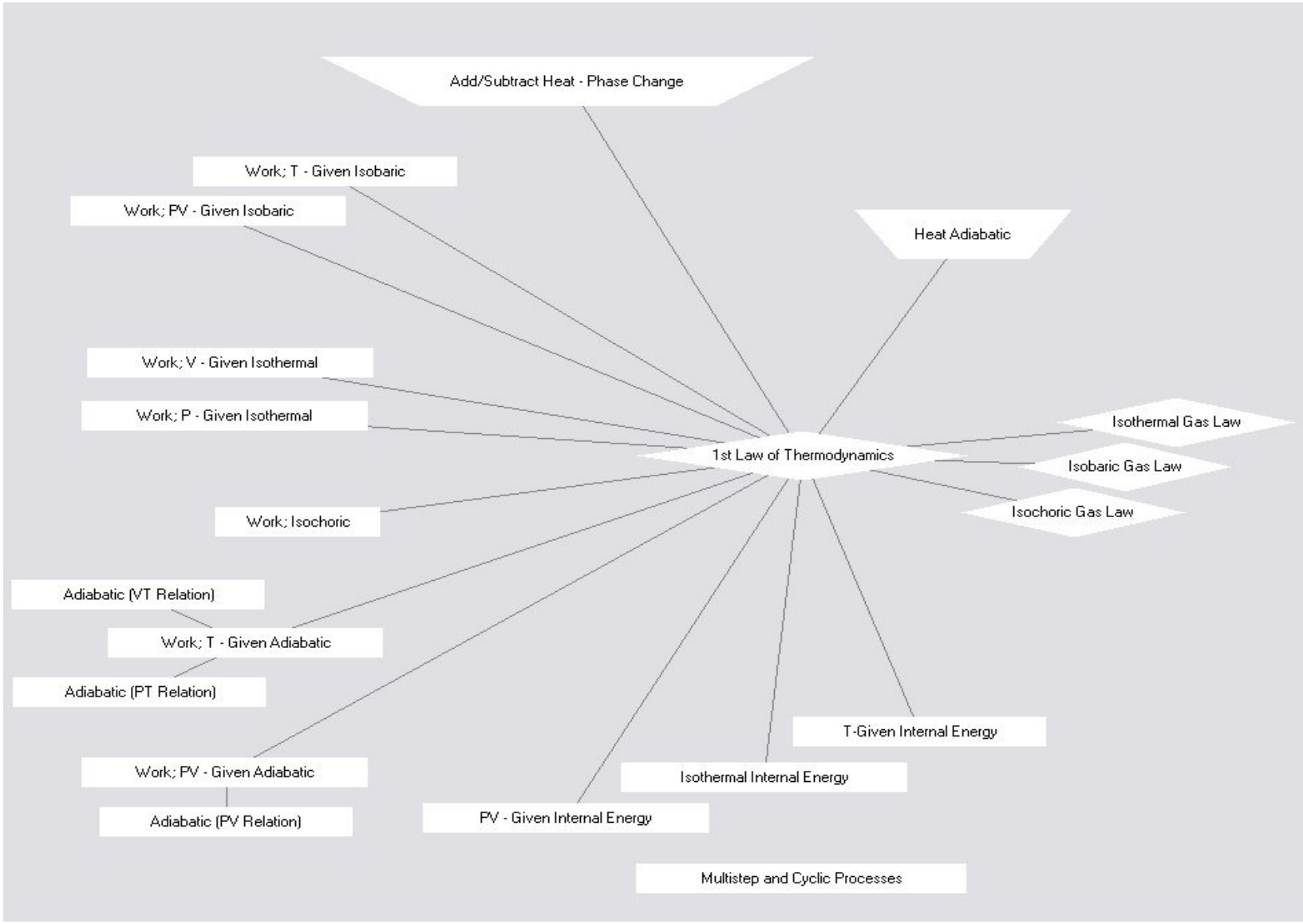
Planets and Satellites



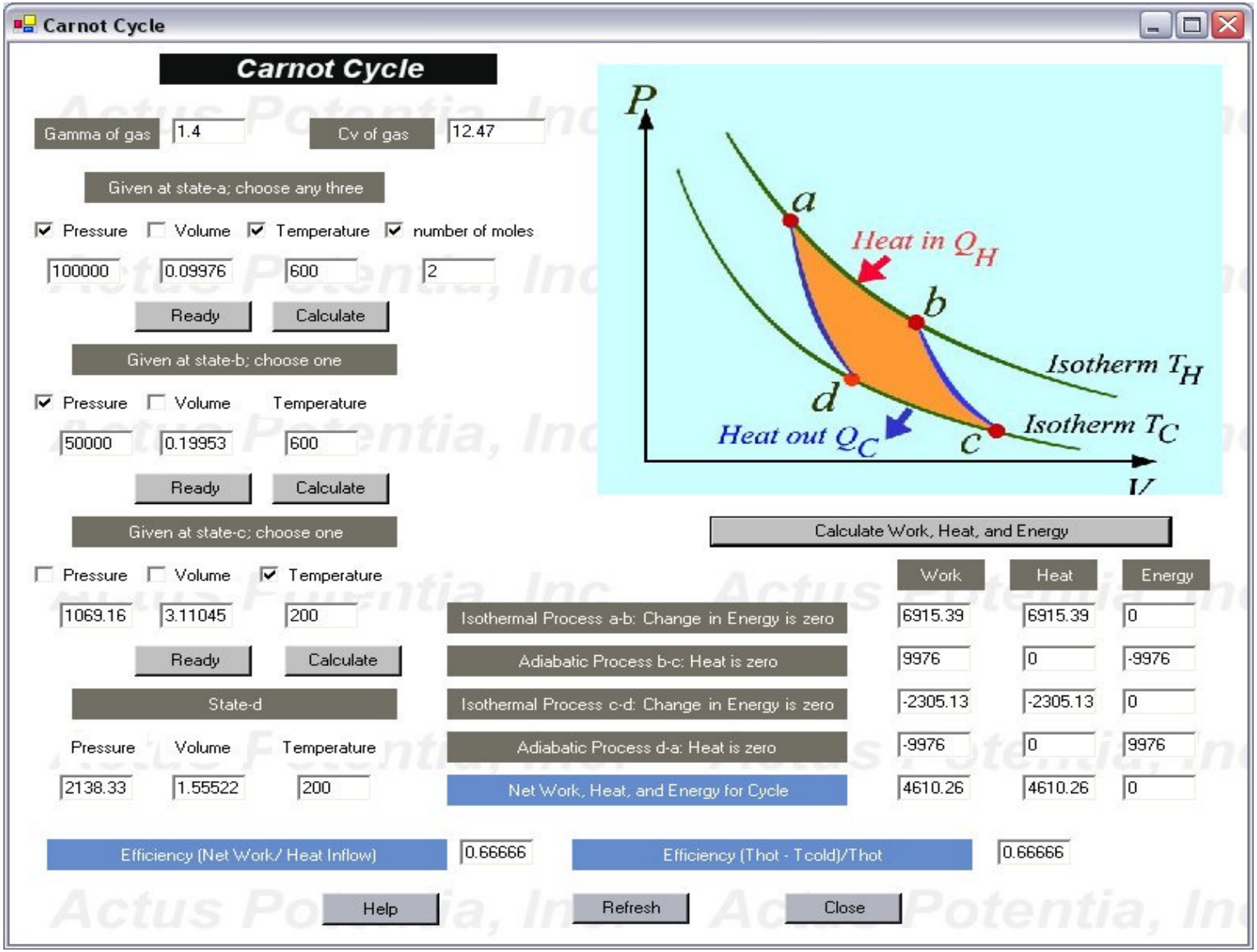
Ideal Gas Law



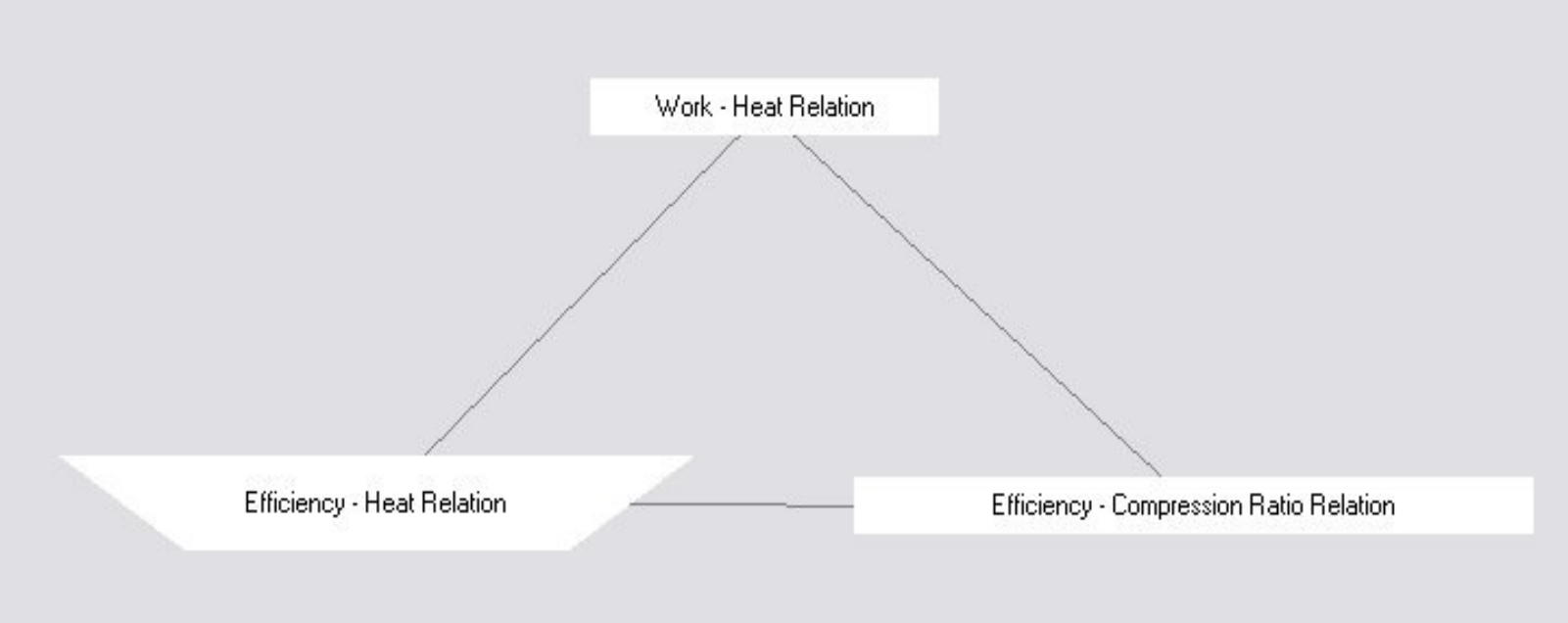
1st Law of Thermodynamics



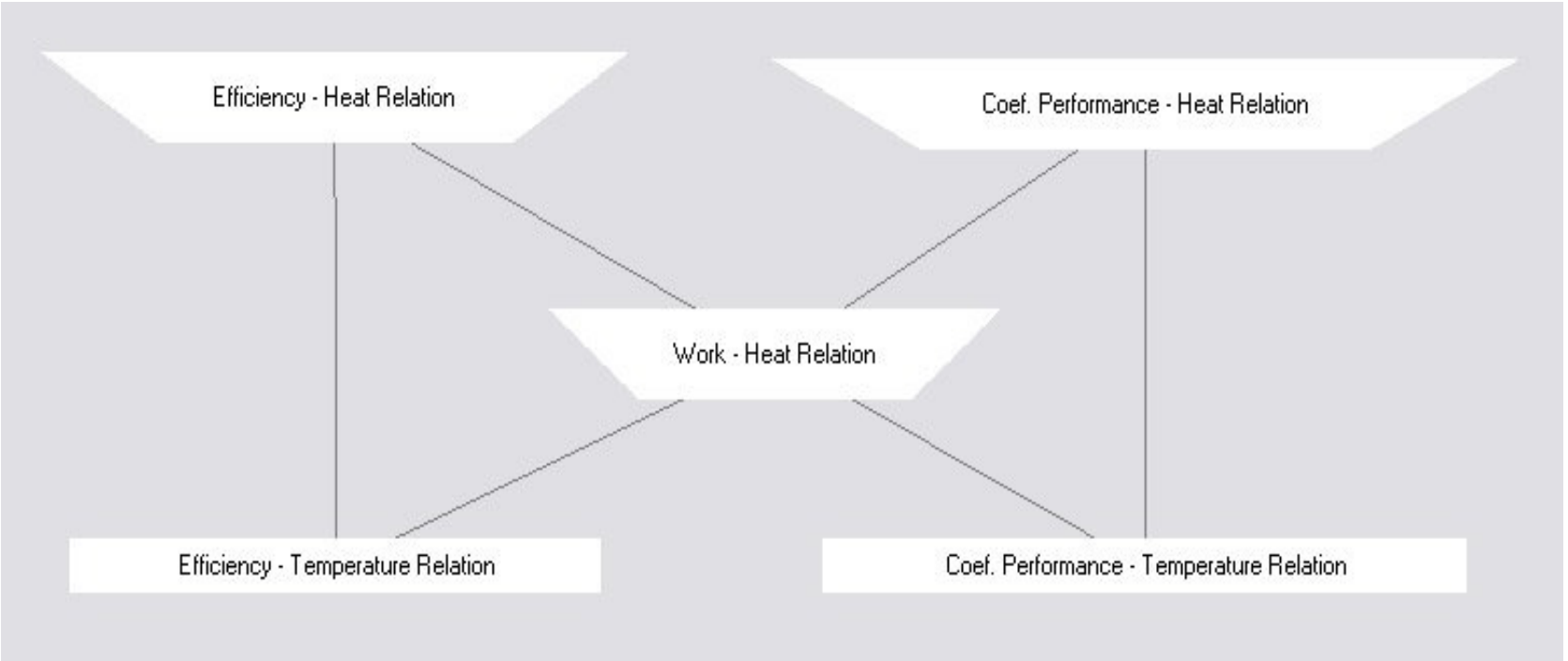
Carnot Cycle



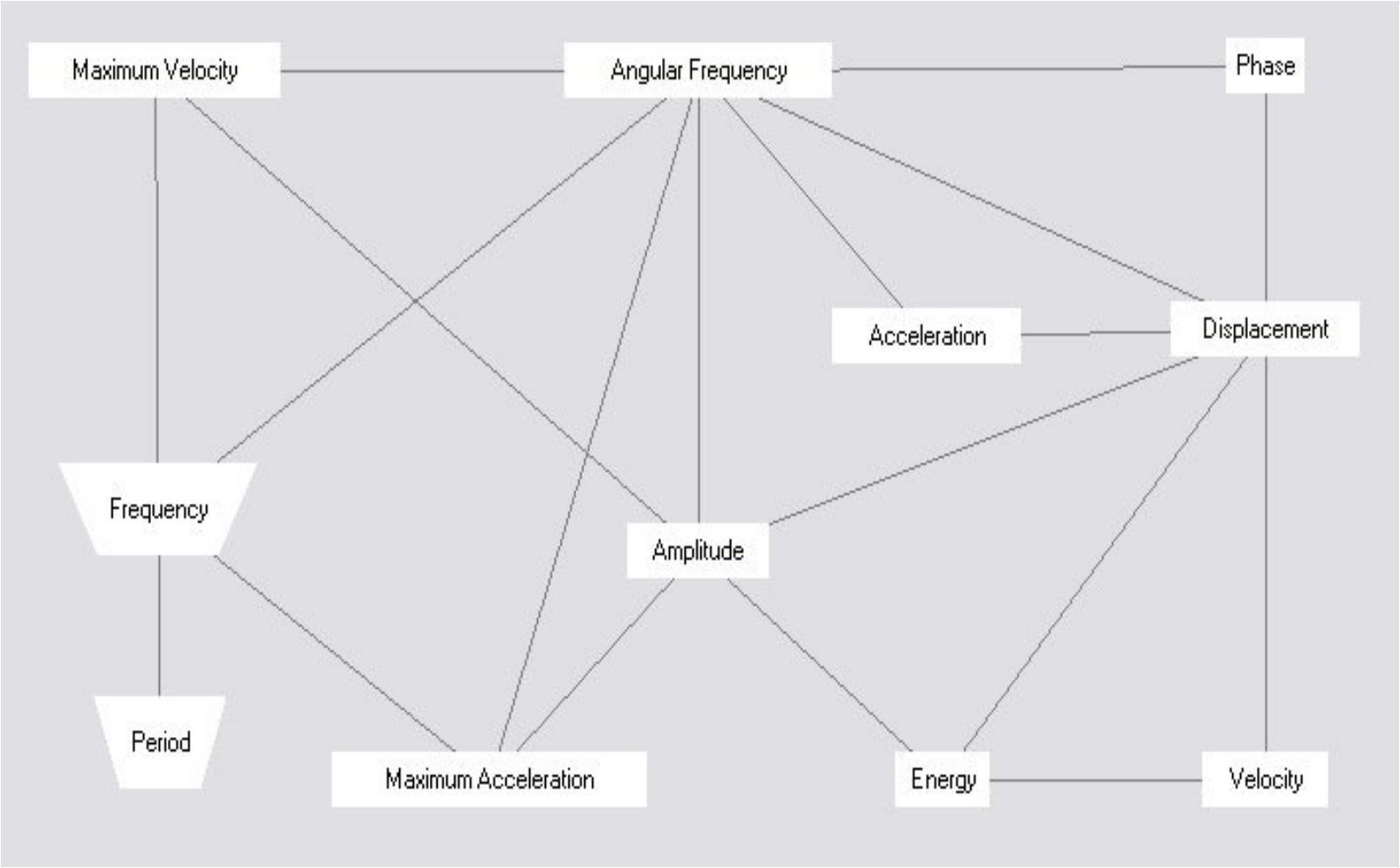
Gas/Diesel Engines



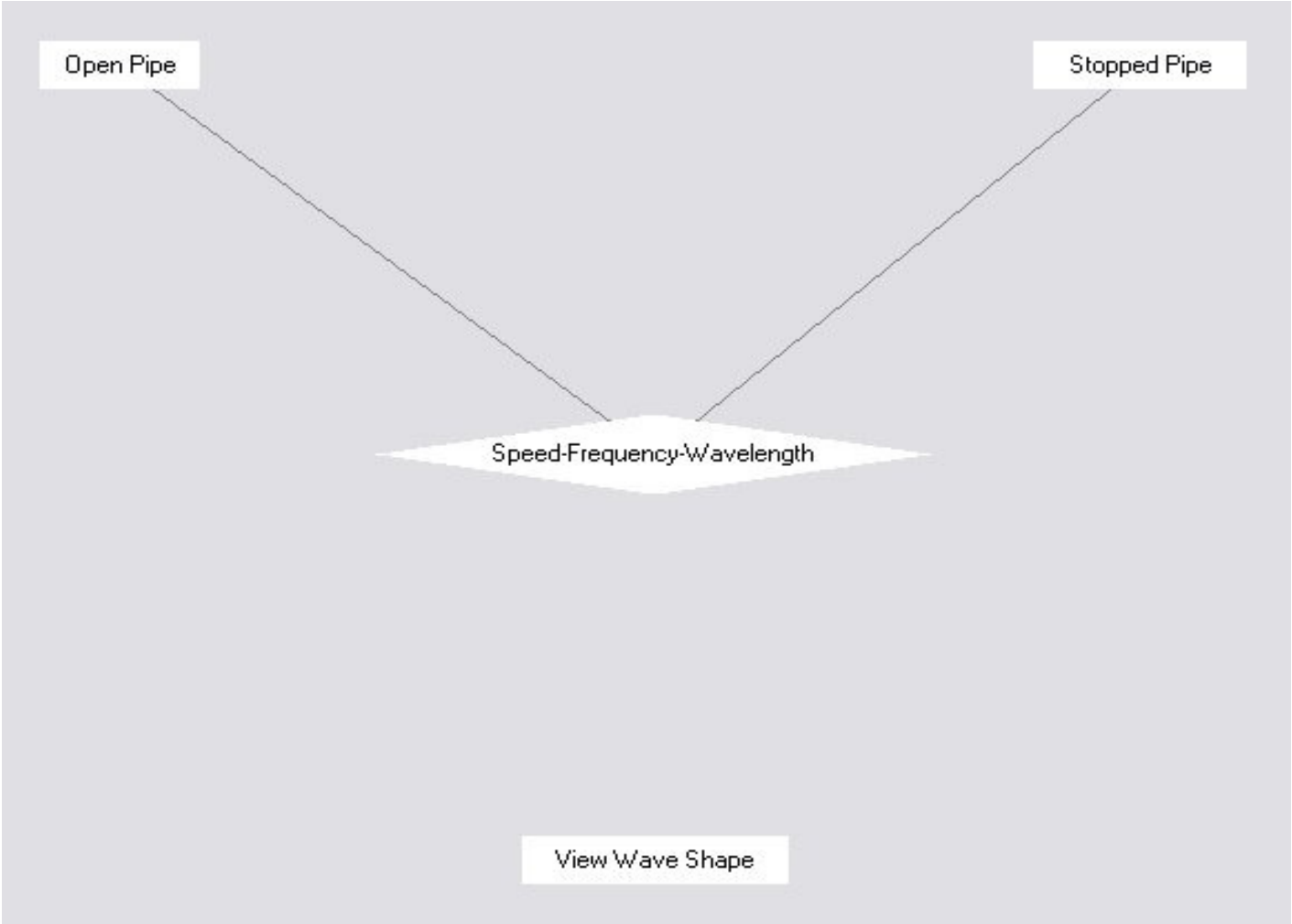
Efficiency


Efficiency - Heat Relation
Coef. Performance - Heat Relation
Work - Heat Relation
Efficiency - Temperature Relation
Coef. Performance - Temperature Relation

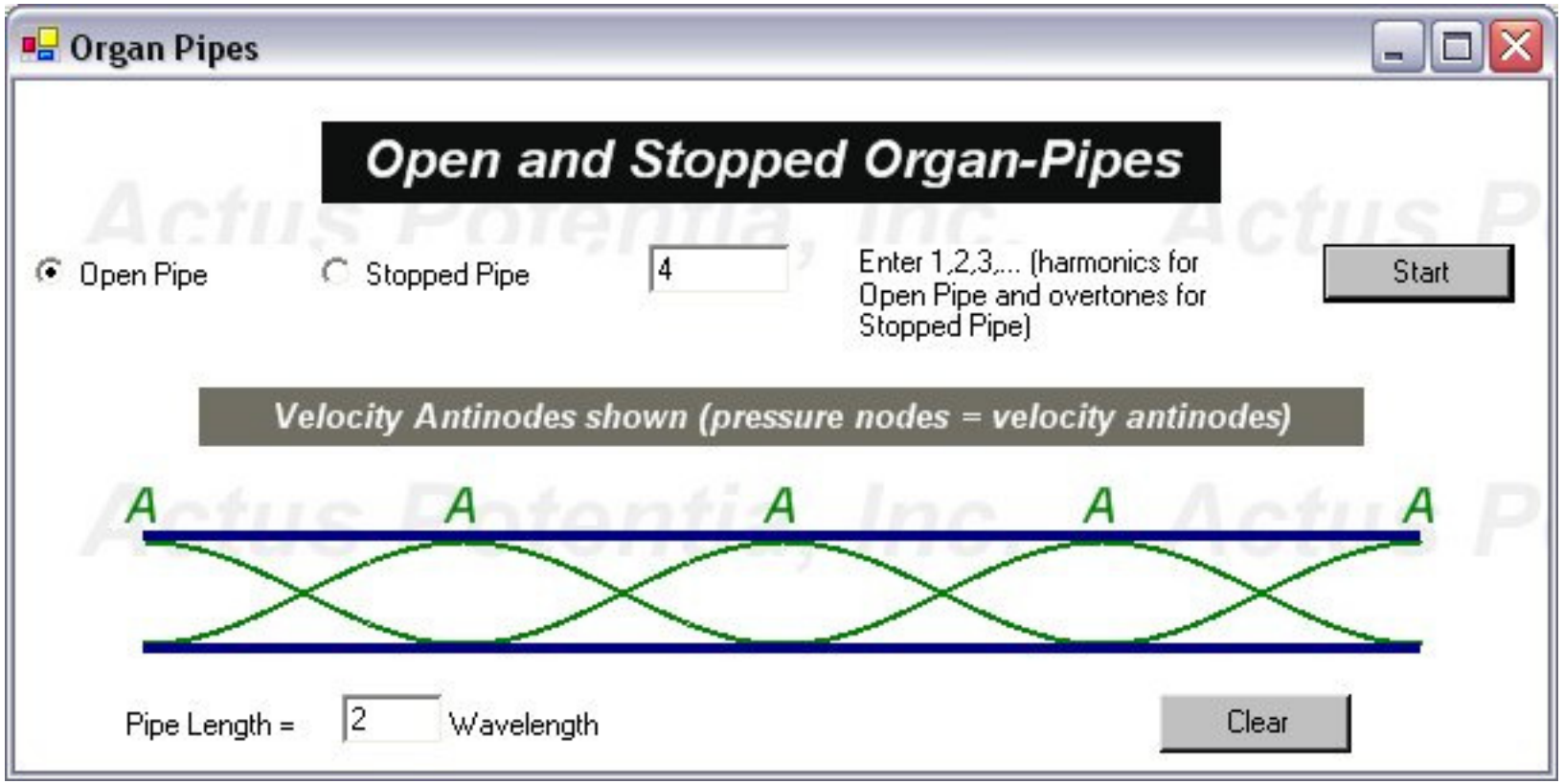
Simple Harmonic Motion



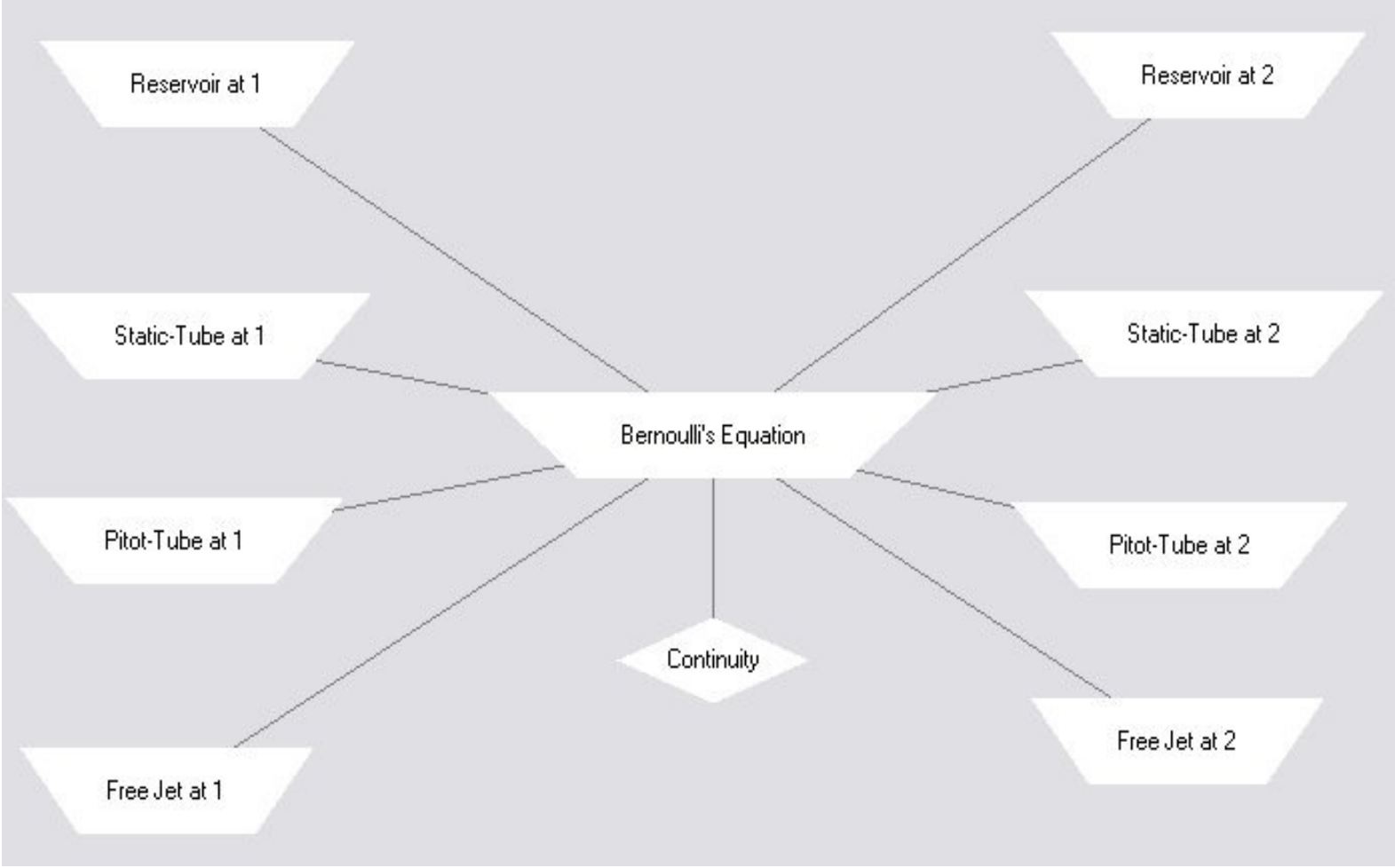
Organ Pipe


Open Pipe
Stopped Pipe
Speed-Frequency-Wavelength
View Wave Shape

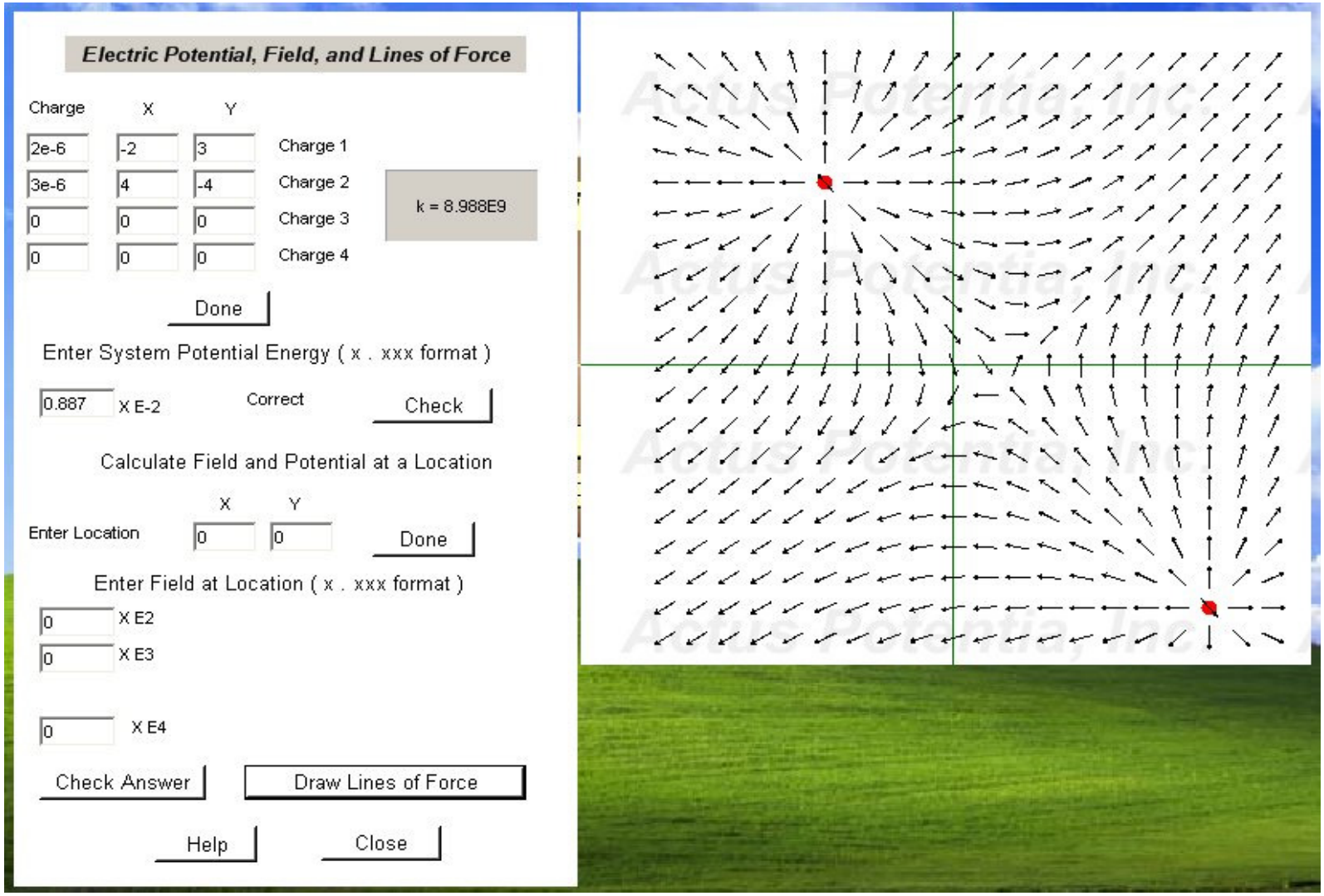
Organ-Pipe (contd.)



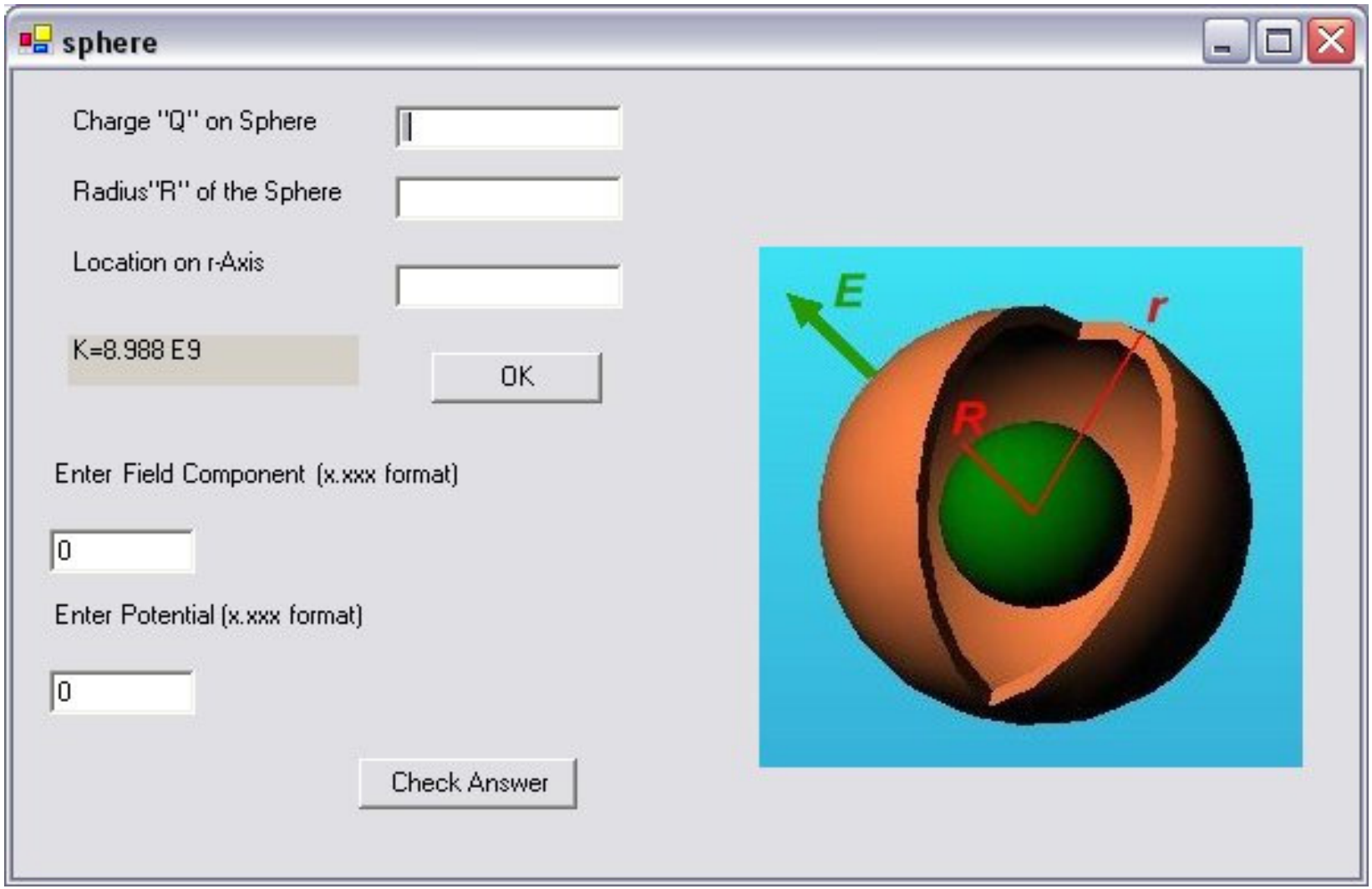
Bernoulli Equation



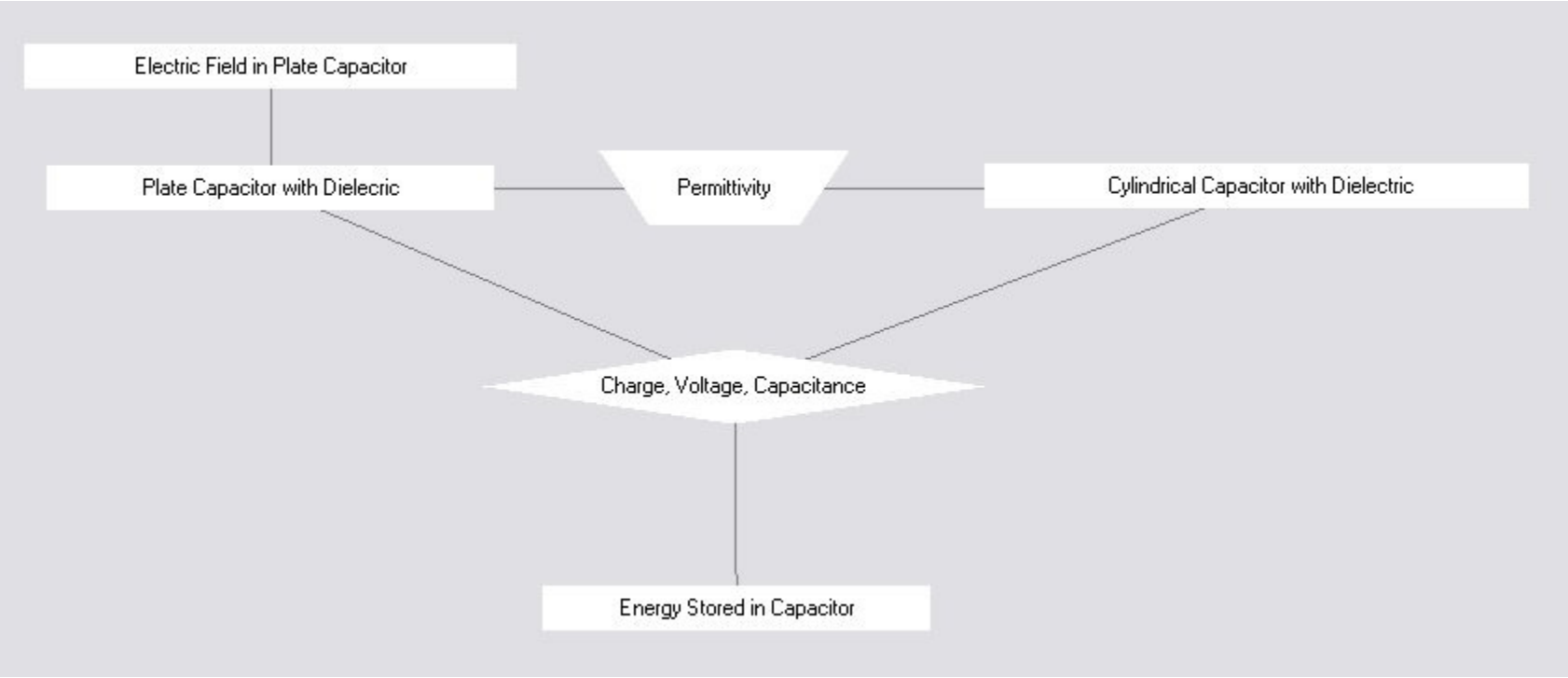
Point Charges



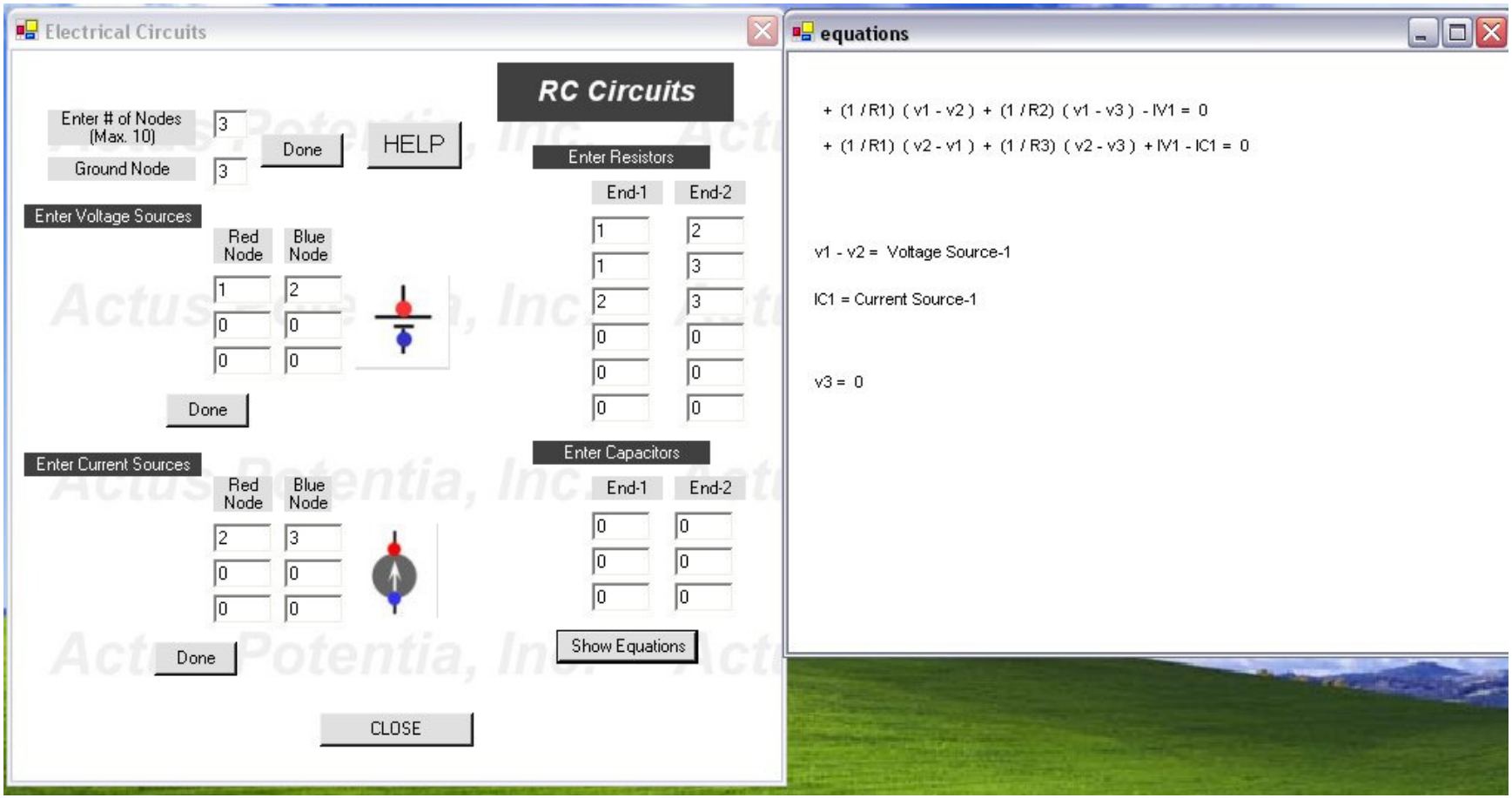
Distributed Charges



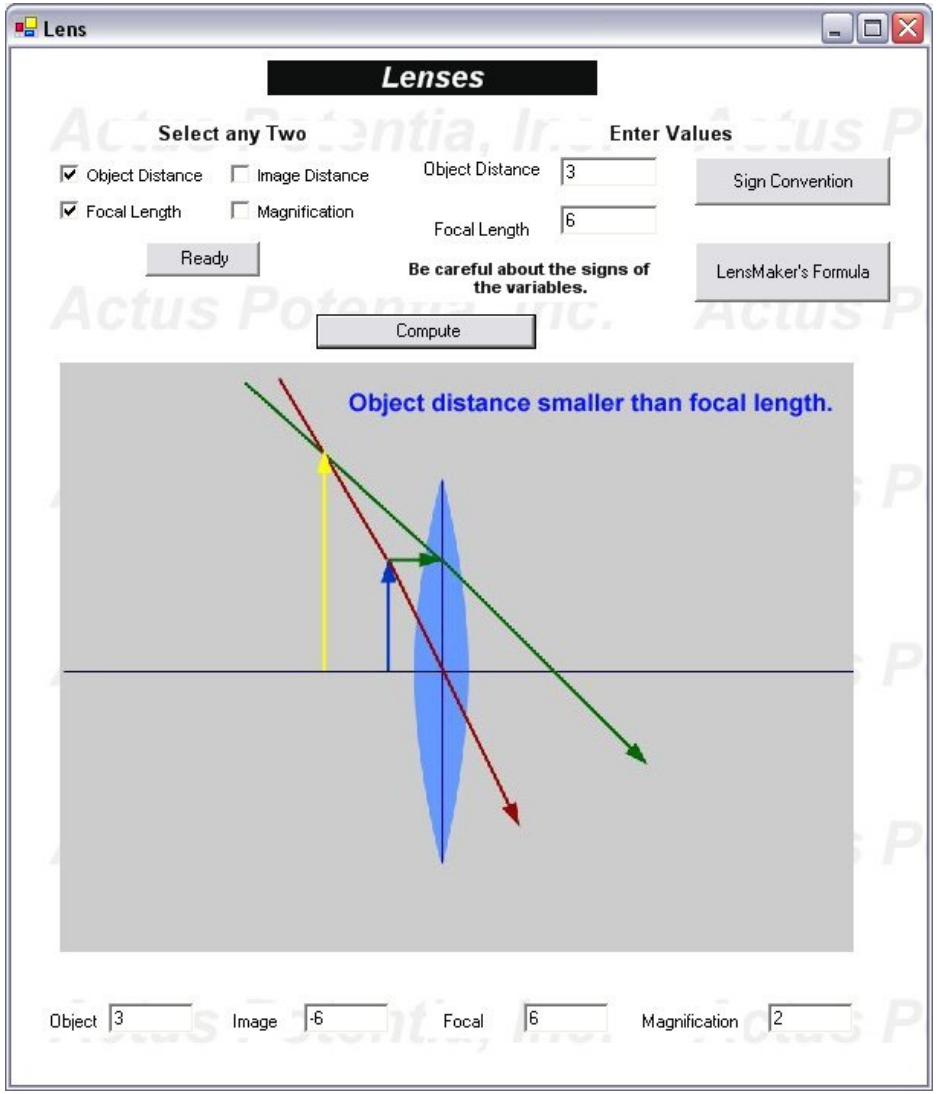
Capacitors


Electric Field in Plate Capacitor
Plate Capacitor with Dielecric
Permittivity
Cylindrical Capacitor with Dielectric
Charge, Voltage, Capacitance
Energy Stored in Capacitor

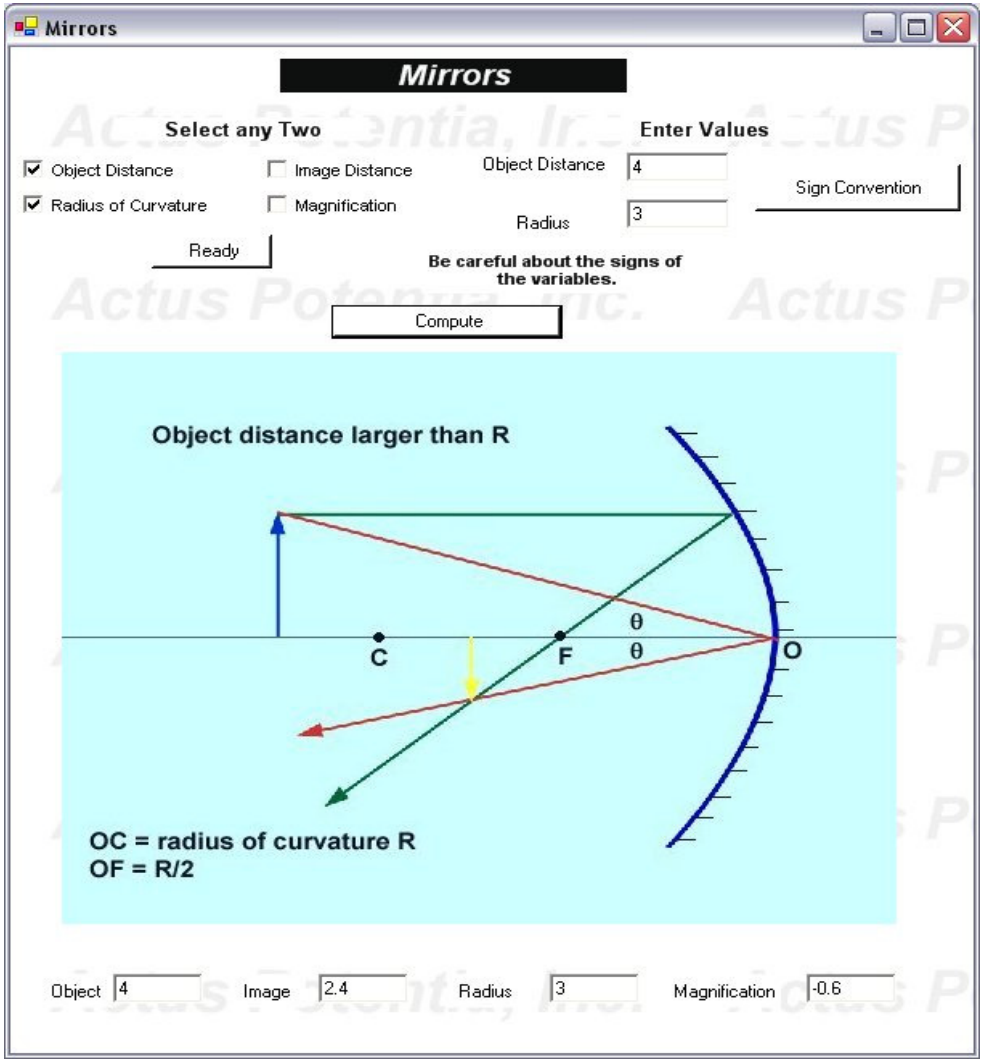
RC - Circuits


Electrical Circuits
RC Circuits
Enter # of Nodes (Max. 10)
3
Done
HELP
Ground Node
3
Enter Voltage Sources
Red Node
Blue Node
1
2
0
0
0
0
Done
Enter Current Sources
Red Node
Blue Node
2
3
0
0
0
0
Done
Enter Resistors
End-1
End-2
1
2
1
3
2
3
0
0
0
0
0
0
Enter Capacitors
End-1
End-2
0
0
0
0
0
0
Show Equations
CLOSE
equations
+ (1 / R1) (v1 - v2) + (1 / R2) (v1 - v3) - IV1 = 0
+ (1 / R1) (v2 - v1) + (1 / R3) (v2 - v3) + IV1 - IC1 = 0
v1 - v2 = Voltage Source-1
IC1 = Current Source-1
v3 = 0

Lenses


Lens
Lenses
Select any Two
Object Distance
Image Distance
Focal Length
Magnification
Ready
Enter Values
Object Distance
3
Focal Length
6
Be careful about the signs of the variables.
Compute
Sign Convention
LensMaker's Formula
Object distance smaller than focal length.
Object
3
Image
-6
Focal
6
Magnification
2

Mirrors


Mirrors
Mirrors
Select any Two
Object Distance
Image Distance
Radius of Curvature
Magnification
Ready
Enter Values
Object Distance
4
Radius
3
Sign Convention
Be careful about the signs of the variables.
Compute
Object distance larger than R
C
F
O
θ
θ
OC = radius of curvature R
OF = R/2
Object
4
Image
2.4
Radius
3
Magnification
-0.6