PHYSICS 109 TOPICS

Ancient Scholarship: The Greeks were different

- Thales
  - All is water
  - Similar triangles
- Pythagoreans
  - All is number
  - Musical scales
  - Pythagorean theorem
  - Irrational numbers

Sun, Moon, Stars, Planets

- Ecliptic, equinoxes, solstice, eclipses, retrograde motion
- Size of Earth, distance to moon, distance to sun
- Aristarchus

Plato

- Two levels of reality
- Four elements and regular solids

Aristotle

- Deductive, Inductive logic
- Natural, violent motion
- Falling bodies

Ptolemy

- Planetary model: Deferent, epicycle, equant, eccentric circle, retrograde motion

Copernicus

– Heliocentric model, retrograde motion, distances to sun, criteria for a good theory in science.

Kepler and Brahe

Mars trick, the three laws

Galileo

Telescope: Mountains on moon, Moons of Jupiter, Phases of Venus

Description of Motion:

Graphs, Relative motion, Principle of Inertia, Inclined plane

Constant velocity

Uniform acceleration

Projectile motion

Galilean principle of relativity

Scaling

Newton

The three laws of motion

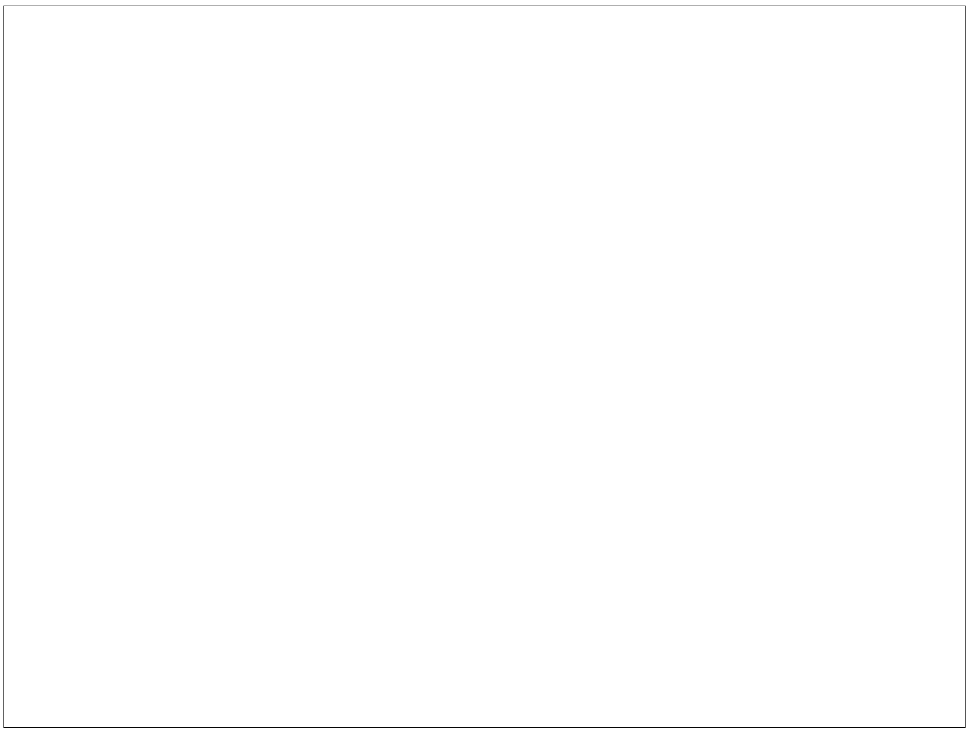
Circular motion

The apple and the moon

Law of gravity and Kepler’s third law

Tides

Discovery of new planets



Work and Energy

KE, PE

Conservation

$$E = KE + PE$$

Light

Newton’s particle theory

Refraction

Waves

Interference: two slit, soap films

Maxwell’s equations

Ether

Michelson and the interferometer

“Save the Ether”

Does speed of light depend on motion of source?

Einstein

The Photon

The two principles of relativity

Synchronizing clocks

Simultaneity, time dilation,
length contraction, time of flight

Test of time dilation

Energy has inertia

Fusion reactions in the sun

Adding velocities, Train and tunnel, Twin paradox, Spacetime