## Minor Members of the Solar System

* 1. \_\_\_\_\_\_\_\_\_\_\_\_ - composed of dust grains, chunks of dirt, and ice. Apart from water, cometary ice also contains carbon dioxide, ammonia, and methane
* Comets orbit the Sun along highly elliptical paths;"\_\_\_\_\_\_\_\_\_\_\_\_" comets (SPC) - <200 years to orbit; "\_\_\_\_\_\_\_\_\_\_\_\_" comets (LPC) - longer orbital periods
* Comes from the Oort Cloud (LPC) and Kuiper Belt and/or Scattered Disc (SPC)
* Orbit is 10 billion mi away
* Gravitational influence of a passing star displaces a comet out of its orbit
* Comet’s icy layers evaporate near the Sun releasing dust and dirt to form a curved dust tail; liberated gases glow producing the \_\_\_\_\_\_\_\_\_\_ (luminous envelope surrounding the solid core); ionized by Sun's radiation and pushed backwards by solar wind, the heated gas trails behind and also glows, forming a straight tail.
  1. \_\_\_\_\_\_\_\_\_\_\_\_ - Minor planets; rocky or metallic bodies; material that failed to form a planet
     + Asteroid Belt
     + \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (NEO)
     + Trojan Asteroids and Greek Asteroids
  2. \_\_\_\_\_\_\_\_\_\_\_\_ – small fragments of natural space debris
  3. \_\_\_\_\_\_\_\_\_\_\_\_ - upon entry into the Earth’s atmosphere, they burn up resulting to a bright streak of light known as a meteor or shooting star. Dust trail from comets cause meteor showers.
  4. \_\_\_\_\_\_\_\_\_\_\_\_ - are pieces of rocky or metallic debris that actually collide with the Earth; 3 types: Stony, Iron, and Stony-iron
  5. Trans-Neptunian Objects (TNO)
     + Kuiper Belt Objects (KBO), Scattered Disc Objects (SDO), Detached Objects
     + Oort Cloud Objects (OCO)
     + Centaurs (TNO refugees that have become Cis-Neptunian)

##### **Three Big Bang Theory**

* 1. First Big Bang – cosmic explosion 13.7 BYA
  2. Second Big Bang – Supernova; gave birth to the Solar System 4.5 BYA
  3. Third Big Bang – Stellar Companion Hypothesis

# Stellar Companion hypothesis

* A dim companion star (Nemesis; Richard Muller, 1984) or a gas giant (Tyche; John Matese, 1999)
* Elliptical orbit around the sun passing through Oort Cloud, dislodging comets toward the inner solar system
* 26 million years to complete the orbit (Nemesis)
  + - Extinction of dinosaurs during the Cretaceous era (65 MYA)
    - 100+-mile impact crater (\_\_\_\_\_\_\_\_\_\_\_\_ Crater) at the Yucatan Peninsula, Mexico
    - Gubbio, Italy – rock formations provide a critical boundary between Cretaceous and Tertiary periods
    - Red Clay (1/2 inch thick) in between limestone layers of the 2 periods contains an abundance of iridium (30 x normal rock), which is abundant in the earth’s core, cosmic dust from supernova, asteroids and comets
    - “Shocked” Quartz in 65 M year-old rocks found near the impact site
    - Decline in pollen/fern ratio