

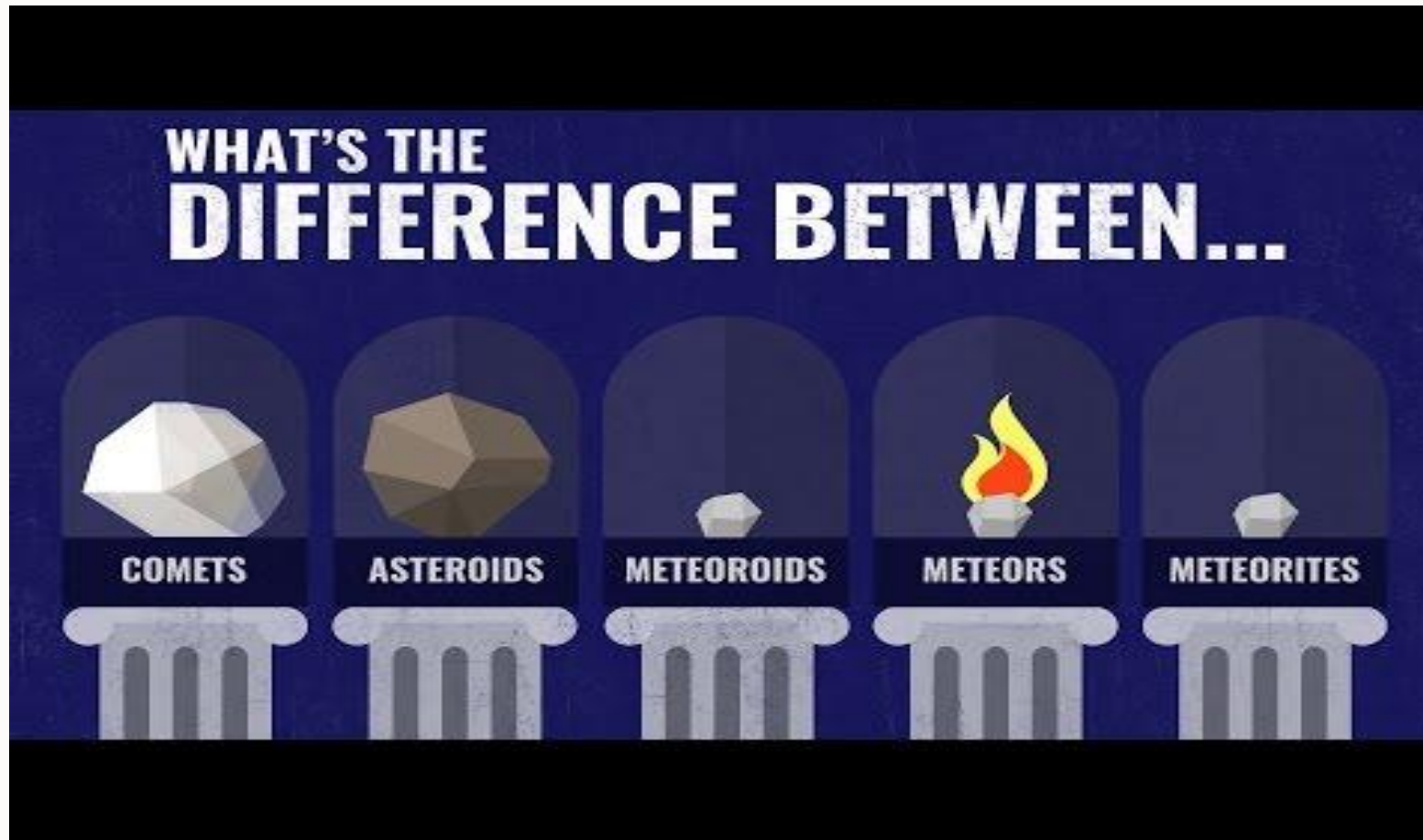
Asteroids

What are asteroids?

- Asteroids are solid, rocky and irregular bodies that are the rocky remnants of the protoplanetary disk of dust and gas that formed around our Sun over 4.5 billion years ago.
- Much of the disk coalesced to form the planets, but some of the debris remained.
- During the chaotic, fiery days of the early Solar System, debris was constantly crashing together and so small grains became small rocks, which crashed into other rocks to form bigger ones.
- Some of the debris was shattered remnants of planetesimals – bodies within the Sun's solar nebula that never grew large enough to become planets.
- This is the how the asteroids originated.



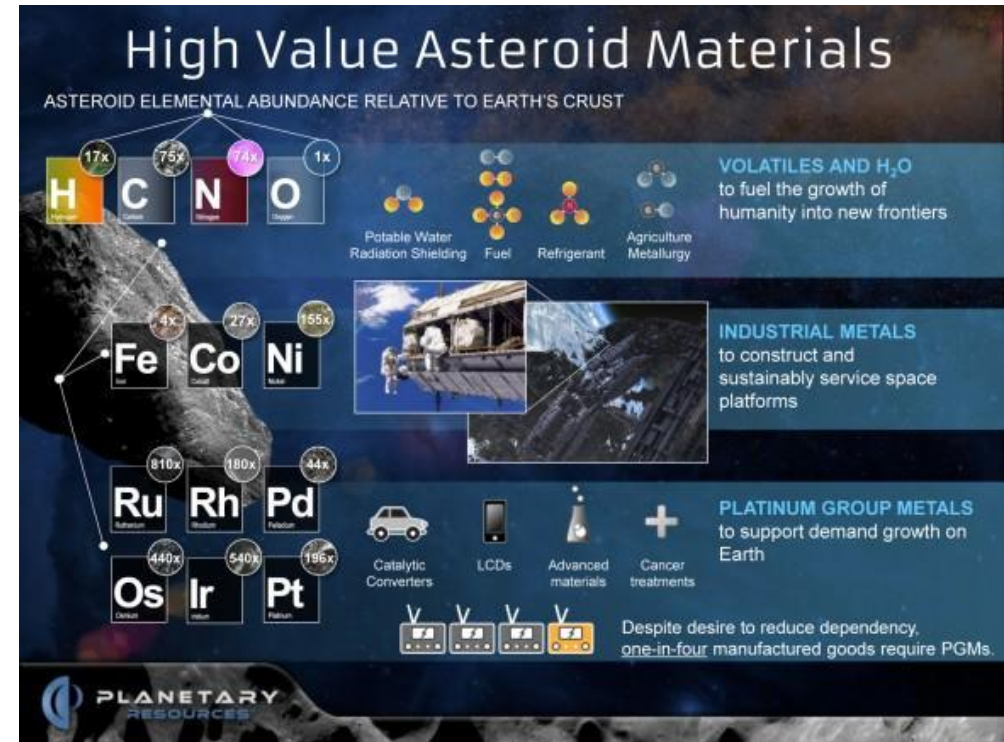
Comets, Asteroids, Meteoroids, Meteors & Meteorites



Composition of Asteroids

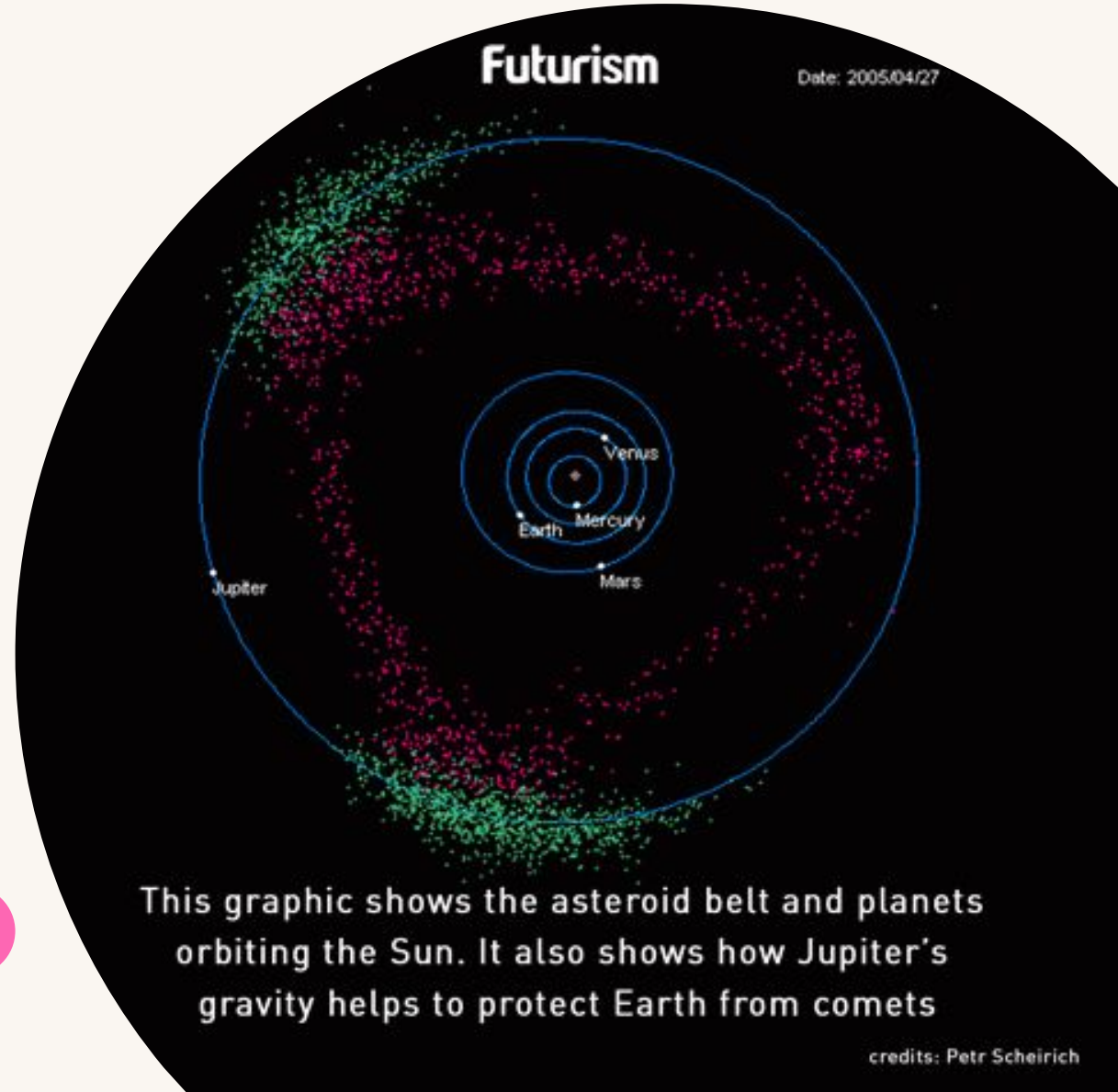


- An asteroid's composition is mainly determined by how close it is to the Sun. The asteroids that are nearest the Sun are mostly made of carbon, with smaller amounts of nitrogen, hydrogen and oxygen, while the ones further away are made up of silicate rock.
- Silicates are very common on Earth and in the Solar System. They are made up of oxygen and silicon which just so happens to be the two most common materials that make up the Earth's crust.
- The metallic asteroids are composed of up to 80% iron and 20% a mixture of nickel, iridium, palladium, platinum, gold, magnesium and other precious metals such as osmium, ruthenium and rhodium.
- In addition to the metals, the elements to create water are present in asteroids and there are indications that asteroids contain water or ice in their interiors
- All asteroids are covered in space dust called regolith. This dust is usually a rocky rubble more than dust. It is the result of the constant collisions the asteroids undergo in space.



Jupiter's Gravity

- Jupiter's size gives it the role of a planetary shield.
- Slings most comets entering our solar system back out of our solar system.
- Reduces chances of large scale comets colliding with earth.
- Many signs of comets colliding with Jupiter have been recorded giving us glimpses of our potential fate had it not been for Jupiter.



This graphic shows the asteroid belt and planets orbiting the Sun. It also shows how Jupiter's gravity helps to protect Earth from comets

The Asteroid Belt

- A collection of rocks and ice found between Mars and Jupiter
- Initially thought that it was formed from a planet destroyed through collisions with comets.
 - Not enough mass in the asteroid belt to account for this hypothesis.
- Large variances in chemical compositions of asteroid belt mean they didn't come from a single object.
- Most accepted theory is that the asteroids were formed from gas clouds at the same time as the formation of the solar system.
- These asteroids broke up into smaller pieces due to Jupiter's gravity and now circle the sun in an orbit like that of Jupiter.

Historic Effects of Asteroids

- The Chelyabinsk meteor – February 2013, Russia, 20 meter wide meteor, exploded 18.2 miles above surface of earth.
- The Chicxulub crater – 66 million years ago, Yucatán Peninsula in Mexico, 7-50 miles across, underwater so can easily be studied, responsible for the extinction of over 75% of species on earth including dinosaurs.
- Source of water?



Double Asteroid Redirection Test (DART)



Elon Musk ✓
@elonmusk



Avenge the dinosaurs!!



NASA Asteroid Watch ✓ @AsteroidWatch

Asteroids have been hitting the Earth for billions of years. Now, we begin to make it stop.

@NASA's planetary defense test mission – the #DARTMission – has lifted off and is now on a journey to impact an asteroid in the fall of 2022. Read more: go.nasa.gov/3OR5x58



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