Small Bodies in the Solar System

Bigger is not better...
The Sun, planets, and moons are not the only objects in the solar system. Scientists estimate there are up to a trillion smaller bodies in our solar system. These bodies lack atmospheres, and have weak surface gravity.
Small bodies include:
Dwarf planets
Kuiper Belt Objects
Comets
Asteroids
Meteroids
The largest of the small bodies, the dwarf planets, are found in regions known as the asteroid belt and the Kuiper belt. The asteroid belt is between Mars and Jupiter. The Kuiper belt is beyond the orbit of Neptune.
In 2006, astronomers created a new group of solar system bodies called dwarf planets. A dwarf planet is a celestial body that orbits the sun and is round because of its own gravity.

However, a dwarf planet does not have enough mass to have cleared other bodies out of its orbit around the sun.
5 dwarf planets, made of ice and rock have been identified (to date)
The Kuiper Belt is a region of the solar system that begins just beyond the orbit of Neptune and contains small bodies mostly of ice.

The Kuiper Belt is thought to be made of matter that was left over from the formation of the solar system.
KBO’s

Kuiper Belt Objects are any of the minor bodies in the Kuiper Belt. They are usually made of methane ice, ammonia ice, and water ice with an average speed of 1 km/s to 5 km/s. First discovered in 1992, now have identified 1300 KBO’s.

Quaoar is a KBO about the size of Pluto.
What do we know about comets?

A comet is a small body of ice, rock, and dust that follows a highly elliptical orbit around the sun.

As a comet passes close to the sun, it gives off gas and dust in the form of a coma and a tail. The speed of a comet will vary depending on how far from or how close to the sun it is.
All comets have a nucleus that is composed of ice and rock. Most comet nuclei are between 1km and 10 km in diameter.

If a comet approaches the sun, solar radiation and heating cause the comet’s ice to change to a gas.
A coma is a spherical cloud of gas and dust that comes off the nucleus. The ion tail of a comet is gas that has been ionized (stripped of electrons) by the sun. The solar wind pushes the gas away from the comet’s head. So the comet tail is always pointing away from the sun.

A second tail made of dust and gas curves backward along the comet’s orbit. This dust tail can be millions of kilometers long.
There are two regions of the solar system where comets come from. The first is the Kuiper Belt, mostly short period comets.

The second region is the Oort cloud (long period comets). The Oort cloud is a spherical region that surrounds the solar system and extends almost halfway to the nearest star.
Short Period Comets

SPC’s occur from collisions of KBO’s. SPC’s take less than 200 years to orbit the sun. So, they return to the inner solar sytem every few decades or centuries. They have short life spans. Every time they pass by the sun, they lose layers.
Long Period Comets

Again, formed from two objects that collide or from a disturbance by gravity from a nearby star and is sent into the inner solar system. LPC’s may take up to hundreds or thousands of years to orbit the sun.
Asteroids

An asteroid is a small, irregularly shaped, rock object that orbits the sun. Most asteroids are located b/w the orbits of Mars and Jupiter, known as the asteroid belt. Pallas is the largest known asteroid with a diameter of 570 km. Most asteroids have a 3-8 year orbital period.
Trojan asteroids - groups of asteroids are also located in the orbits of Jupiter and Neptune and in the Kuiper Belt.

Near-Earth asteroids cross the orbits of Earth and Venus. Eros is a near-Earth asteroid.
Composition of asteroids vary. Scientists think their dark surfaces are rich in carbon. Some have an iron and nickel core, while some have a rocky core surrounded by ice.

Asteroid Itokawa is a ‘rubble-pile’ asteroid which means it is from several types of rock loosely held together by gravity.
A sand grain- to boulder-sized rocky body that travels through space is a meteoroid. As meteoroids enter Earth’s atmosphere, they heat up to thousands of degrees Celsius, causing them to glow.
The atmosphere around a meteoroid’s path also gets hotter and glows because of friction between the meteoroid and air molecules. This is called a meteor.

A meteorite is a meteoroid that reaches Earth’s surface without burning up.
Meteorites come from the asteroid belt, Mars, the moon, and comets. Most do not reach Earth’s surface. However, some meteoroids are big enough to strike Earth’s surface. These occur every 300-400 years. The 45 meter Barringer Crater in Arizona is a good example.
Meteorites have different compositions. Stony meteorites are the most common and are made of silicate minerals, like rocks on Earth. They may contain organic matter.

Iron meteorites are composed of iron and nickel.

The stony-iron meteorites are composed of both silicates and iron-nickel metals.