



## Kuiper Belt Objects in the Solar System

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### DESCRIPTION

The Kuiper belt is a ring-shaped disc at the solar system's outer periphery it is vast and mysterious, cold and dark. The Kuiper Belt along with the Oort Cloud, the heliosphere and Jupiter's magnetosphere is one of the most important regions in our solar system. The Kuiper Belt is similar to the Asteroid Belt but it is 20 times larger and up to 20–100 times more massive. This is comparable to cometary nuclei and we now believe that Jupiter-family short-period comets originate in the Kuiper Belt. An asteroid disc billions of miles long exists beyond the orbit of the solar system's final planet Neptune. This disc is far from the warmth of our burning sun and home to worlds that are extremely cold.

This asteroid family similar to the Asteroid Belt but many times larger includes comets, asteroids, minor planets, dwarf planets and centaurs among others. The Kuiper belt extends beyond Neptune's orbit to a distance of about 50 Astronomical Units (AU) from the Sun. The known Kuiper belt objects are icy bodies up to the size of Pluto, one of the largest Kuiper belt objects. Most of the remaining debris was then swept into the sun or out of the solar system by the planets. However, bodies further out remained safe from the gravitational tugs of planets like Jupiter allowing them to slowly orbit the sun. The Kuiper Belt and its companion, the more distant and spherical Oort Cloud contain remnants from the solar system's birth and can provide valuable insights into its formation. Kuiper Belt objects are remnants of the original solar nebula from which our sun and planetary system formed.

It is estimated that there are approximately 35,000 Kuiper Belt objects with diameters greater than 100 km larger celestial objects such as Eris, Pluto, Makemake, Haumea, Quaoar and other smaller figures are also found in the Kuiper Belt. Pluto was the first true Kuiper Belt Object (KBO) to be discovered. The belt's existence was not discovered until Jewitt and Luu discovered a slow-moving small world in the outer solar system. Sedna a KBO roughly three-quarters the size of Pluto was discovered. It is so far away from the sun that a single orbit takes about 10,500 years. Kuiper Belt objects are classified into three main dynamical classes: classical, resonant and scattered.

Classical KBOs have semi-major axes between 42 and 48 AU and account for the vast majority of Kuiper Belt objects discovered thus far. They have low eccentricity and inclination orbits implying that their orbits haven't changed much since they condensed out of the solar nebula.

Resonances Neptune's KBOs live in one of Neptune's mean motion resonances. The 3:2 resonances, which contain Pluto and nearly 25% of the detected KBOs, are the most populated. According to the name of the resonance, these objects complete two orbits around the Sun for every three orbits of Neptune.

Scattered KBOs (scattered disc objects) have Kuiper Belt perihelia (between 30 and 48 AU), but they also have large orbital eccentricities. This means that their aphelia are at distances greater than 60 AU and they spend only a very small fraction of their time close enough to the Sun to be detected by current observational surveys. As a result, only a small number of dispersed KBOs are known.

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