FIREBALLS in the sky

WHAT IS A COMET?

Comets are small clumps of dust and ice with eccentric orbits.

Comets spend most of their lifetimes in the outer solar system but periodically fly close to the Sun. Comets are normally frozen solid when in the outer solar system but as they come closer to the Sun, solar radiation vaporises the ice into gases which rapidly escape from under the surface. These gas jets form a thin atmosphere called a coma made of small particles and vapour.

COMET TAILS

As the comet comes closer to the Sun the solar winds become stronger and blow away the coma to form a distinctive comet tail. A comet's tail will always point away from the Sun because the solar wind exerts a force on the dust and gas particles. The tail itself is often split into two; a bright dust tail which curves slightly behind the comet and the faint gas tail which always points directly away from the sun. This occurs because the dust particles are less affected by the solar wind than the lighter gas particles.

HOW BIG ARE COMETS?

The solid core of a comet is called the nucleus and is actually rather small, with the largest being only 60 kilometres across (the biggest asteroids are up to 500 kilometres wide). However, comet tails can stretch over thousands of kilometres. Some tails can even become longer than the distance between the Earth and the Sun.

HOW DOES A COMET MAKE A METEOR SHOWER?

When the Earth passes through the remnants of a comet's tail, the floating dust and meteoroids enter the atmosphere and create spectacular meteor showers. Meteor showers can have hundreds of meteors shooting through the sky every hour but these meteors are usually incredibly small and very few survive re-entry.

Meteor showers are associated with a parent comet that crossed the Earth's orbit, meaning that meteor showers occur at regular times every year. For example, the Orionid meteor shower which regularly peaks in October is made of debris from Halley's Comet.

HALLEY'S COMET

Halley's Comet is perhaps the most well-known comet in the world. It returns to the inner solar system once every 76 years and has been recorded many times throughout history. The last time it visited the inner solar system was in 1986, and it won't be visible again until 2061. Spacecraft that visited Halley's Comet in 1986 were able to find out that the nucleus is only 15 kilometres long and is shaped like a peanut. The nucleus itself was very dark and made mostly of dust with only small amounts of ice and other gases under the surface. Most other comets have a very similar "dirty snowball"composition.

GLOSSARY

Coma: The thin atmosphere of vaporised gas and dust that forms around a comet when it flies near the Sun.

Comet tail: The tail is formed by pressure from the solar wind pushing the coma into a long stream. The tail is often split into two parts; a gas tail and a dust tail. Sometimes there is a third tail called an antitail which is actually the dust tail curving around the comet due to our viewing angle.

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WHAT IS A COMET?

Eccentric orbit: A non-circular (oval shaped) orbit around a larger body (the Sun for example). The nature of the orbit means that the comet accelerates as it flies close to the sun, and decelerates as it flies away and so only spends a brief amount of time in the inner solar system. Most comets have eccentric orbits. Other bodies with eccentric orbits include the dwarf planet Pluto, some robotic spacecraft and many near earth asteroids.

Halley's Comet: A short period comet which completes its orbit every 75-76 years. Halley's Comet is named after Edmund Halley who calculated the comet's return in 1758.

Meteor showers: A regularly occurring rain of meteors that radiate from a point in the sky. These meteors are the remnants of a comets tail.

Orionid meteor shower: A meteor shower that occurs in mid-October from the debris of Halley's Comet. During the Orionids it is possible to see up to 70 meteors an hour. These meteors appear to radiate from between the constellations of Gemini and Orion, which is why they are named the Orionids.

Outer Solar System: The region of the solar system beyond the orbit of Jupiter. The solar radiation is less intense in this region so most objects are able to hold on to gaseous materials such as ammonia, methane and water without it being vaporised away.

Solar radiation: Energy emitted by the Sun in the form of light. As objects move closer to the Sun, the intensity of the radiation increases and they become hotter.

Solar wind: Waves of charged particles and plasma released from the surface of the sun. The solar wind interacts with comets, blasting away loose bits of dirt and gas particles into a tail. Planets are protected from the solar wind by their magnetic fields; however, the solar wind still affects Earth by producing the aurora or Northern lights effect near the poles.