What are sharks?

Sharks are fish that do not have bones made of calcium like other fish (or humans!) but have a skeleton made completely of cartilage (gristle). They have gills very similar to other fish except theirs are elastic, hence the scientific name *Elasmobranchii* which means elastic gills. It is commonly thought that all sharks have to keep swimming in order to breathe and stay alive, this is not true! Most sharks are unable to physically pump water through their gills and therefore must keep swimming continuously so that water passes through, but some sharks like the wobbagong, angle shark and the nurse sharks, lie on the bottom to rest or in the case of the wobbagong to wait for prey.

They are also different from other "bony" fish, in that they do not have a swim bladder to regulate their position in the water. Sharks have to rely on their liver being very big and full of oil which helps them "float" away from the bottom. Sharks that live in open water have very large livers, whereas those that live near the bottom do not. Those sharks that need a large oily liver generally feed on very oily or fatty animals, like tuna or sea lions.

Did you know:
That sting rays are also sharks? That's true; they are flattened versions of sharks and belong to the same family. They are known as *Batoids,* flat sharks or winged sharks. There is also another type of shark called a *Chimaera,* or rat tail shark.

Sharks have been around for more than 400 million years, that's 100 times longer than humans!!! Approximately 200 million years ago most shark species became extinct, but many survived and evolved into the sharks and rays we know today. There are approximately 1,200 known species of cartilaginous shark-like fishes, and approximately 350 species of sharks or *Chondrichthyes*. They are also found in all waters of the earth and although generally only found in salt water seas, some sharks like the Zambezi or bull shark, have been found many miles up river away from the sea! And in South America there is a fresh water lake with sharks! They can also be found in all depths of water, from the surface to several thousand meters in the abyss. Approximately 75 species of shark can be seen on a regular basis by scuba divers worldwide.

Sharks are also vastly varied in their shape, size and form, with many unique and strange shapes. Have you heard of the goblin shark? It is a very rare shark with a long extension of its forehead, almost like a sword, or the saw shark, whose nose is elongated with teeth running down each side like a "saw". Then there is the hammerhead shark with its wide forehead, or the thresher shark whose tail is the same length as its body! And the biggest fish of them all, the whale shark with a length of up to 14m and weighing 15 tons! But don't worry this is a completely harmless shark eating small microscopic creatures called plankton.

Sharks teeth are as varied as they are and have developed according to the type of food they eat, ranging from pointy dagger shaped for catching fish, sharp blade like for ripping chunks out of large animals or flat file like teeth for crushing crabs and other crustaceans (fig). Some sharks are also able to push their jaws forward and

outward in order to get a better bite. Most sharks have a conveyer belt like system of teeth so that if one breaks or falls out the one behind it drops into place (fig.).

The reproduction in sharks is very complicated and, yes, very varied. There are three main types of reproduction:

1. Live young (pups), this is called scientifically *Viviparous*
2. Lay eggs (these egg sacs are also found on British shores!), called *oviparous.*
3. Produce egg sacs that hatch inside the body then give birth to live pups, called *Ovoviviparous*

Some times the pups inside the mother will eat each other or the other eggs/embryos, so that only one remains, this is known as *uterine cannibalism*. Mother sharks rarely have post-natal care and do not look after the pups, once born they have to fend for themselves. In the case of the Great White, the mother stops eating just before and up to 1 month after giving birth in order to prevent herself eating her own pups. But unfortunately other sharks will eat the pups, so they will normally try to hide in mangrove roots or other shallow water retreats where larger sharks cannot enter.

Did you know:
You are 10 times more likely to be bitten by a New Yorker citizen than a shark! Only 75-100 people yearly get bitten by a shark, only approximately 20 fatally. Yet humans kill 100,000 tons of sharks every year! More people are killed by falling coconuts!

Sharks are highly intelligent creatures and posses highly tuned senses. Both sense of smell and hearing are highly sensitive, being able to detect smells and sounds over many miles. Their sense of smell is also directional, meaning they can detect where the smell is coming from. They also have extra senses which we do not have like the sense organs along their noses called *ampullae lorenzini*. These organs are used to detect minute electrical impulses given off by all living creatures. The other unique sense organ is the *lateral line*, two tubes running one on each side of the body, filled with hair-like protrusions which are able to detect minute vibrations in the water, warning the shark the presence of prey or predators. Most sharks also have very good eyesight but some sharks that live close to the bottom can only see close-up. They also rely heavily on their sense of taste, first bite, taste then swallow. The taste and smell of human blood to sharks is repulsive, therefore very few sharks will actually eat humans.

Did you know:
Sharks are able to detect 1 billionth of a volt!! Sharks have been called “swimming noses”. A Great White is able to detect a drop of fish blood in the amount of water that would fill an Olympic sized swimming pool!!

Unlike bony fish, sharks are warm blooded, generally keeping their body temperature close to the temperature of the surrounding water. Yet some sharks, like the Great White and the Mako, need to be able to produce fast bursts of speed to catch their prey and can only do so if their muscles are warm. Therefore these sharks have blood warmer than the water and also have an extra thick set of muscles in the base of the tail in order to burst into action.