Compass

The Chinese believed that the Yellow Emperor, God of the Universe ruled the center of the world and the four other gods ruled over the north, south, east, and west. The four cardinal directions played an important role in ancient China. In the time of the Shang Dynasty almost all doors and graves were built to face to the south. Direction was so important that the Chinese had to find a reliable way to determine direction. They invented the world’s first compass.

A compass is an instrument used to find the four cardinal directions - north, south, east, and west. Today, our compass has a needle that points to the north. To the Chinese, south was the most important direction and so they had compasses that pointed to the south. The compass didn’t have a needle. Instead it had a magnetic stone in the shape of a fish or a spoon. The compass could be used to help navigate a ship or even simply to find the most lucky place on which to build a building.

How Did It Work?

The spoon or fish shaped “needle” on a Chinese compass was made out of lodestones. The lodestones were made so it was delicately balanced with very little friction. This would allow it to turn fairly easily. Lodestones are naturally magnetic so it will be drawn to the natural magnetic field around the earth. No matter which way you turn the compass the needle will always turn towards the north/south line.
Zhang Heng designed the world's first seismograph. A seismograph is used to detect earthquakes. Zhang Heng's seismography couldn't tell you the size of the earthquake but it was able to detect even small earthquakes which could not otherwise be felt.

The seismograph was made out of bronze and shaped like a large pot or vase. Around the outside of the container were eight dragon heads that were made of bronze. In each dragon's mouth was a small bronze ball. When an earthquake occurred the small ball would fall from the dragon's mouth and land in a small container below. This would alert scientists that an earthquake had taken place. Often the scientists could even tell where the quake had happened! The dragon which had dropped the ball was often facing in the direction in which the earthquake had occurred!

Unfortunately, Zhang Heng's original seismograph has never been found so historians have to rely on descriptions of it in order to figure out how it worked. Scientists believe that there was probably a thin metal pole with a heavy weight at the top which was balanced in the middle of the vessel. At the top of the container was a sheet of bronze with eight slots cut in it leading to each of the eight dragon heads on the outside. When an earthquake occurred, the metal pole would tip over and slide down one of the slots causing the dragon to drop its ball. Because it had slid down one of the slots, it would get stuck and not affect any of the other dragons. Only one dragon dropped its ball!
We use paper every day of our lives and in many different ways. Paper is not just for books or for writing. We use paper as money, we use paper to wrap presents, we use it for decoration, we even use paper in the bathroom. So did the Chinese. The oldest paper ever discovered is over 2000 years old and was found inside a tomb built during the Han Dynasty.

Paper is made by taking wet plant fibers from tree bark or bamboo plants and pounding them with a wooden tool. You then pour this mixture onto a flat piece of woven cloth and allow all of the water the drain through. Think about the way that hair and soap collect on a shower drain. When the mixture dries, you can separate it from the cloth and you have a lightweight writing surface!

At first, the Chinese didn't use the paper for writing. At the time, writing was done on bamboo scrolls, wood, stone, or even silk. Instead the paper was used like cloth. People made paper jackets and hats. Some people even made paper armor by folding together thick pieces of paper. It was lightweight and it doesn't rust but just make sure it doesn't rain! Eventually the Chinese started using paper as a writing surface and made scrolls, books and ultimately invented printing.

**I Thought the Egyptians had Invented Paper!**

The Egyptians wrote on papyrus. Papyrus was invented by the Egyptians and was made from the stalk of the Papyrus plant.
In early Chinese history, all writing had to be copied by hand but that was both time-consuming and expensive. The Chinese needed a way to quickly and easily spread information. At the time, the Chinese were already pressing letters and images into coins and official seals and were carving letters into stone. They found that by putting ink onto a carving on a stone and then pressing paper against it, the ink would be transferred onto the paper in the shape of the carving. It worked just like a stamp. A printer could use this stamp to copy the image hundreds of times.

It didn't take long before the Chinese were using this technology to reproduce whole pages of information. A thin piece of paper with writing would be glued face down onto a block of wood. The characters could be seen through the paper like a faint tracing except the image was backwards. The printer would cut away the wood around the characters. What would be left is a “stamp” of that page which could be used to reprint the information as many times as necessary. While one book might need hundreds of these wooden stamps but the blocks could be stored and used again.
Sometimes you might hear very nice plates used at a family dinner or a fancy restaurant referred to as “fine china”. This refers to Chinese porcelain, a type of highly decorated pottery, which was made in ancient China. Not all pottery is porcelain. Porcelain is made out of a special fine white clay. When porcelain is baked or fired at a high temperature it becomes like a cross between delicate pottery and glass.

The first porcelain was made during the Han Dynasty. Later in Chinese history the porcelain became more and more finely decorated like the blue and white pieces from the Ming Dynasty. The Chinese built huge kilns to fire the porcelain where rising heat from fires at the bottom would warm even the very top sections of the kiln. The most delicate pieces of porcelain were fired at the top of the kiln in order to protect them from fast temperature changes. In the “dragon kilns” at the city of Longquan, artists could load over 25,000 pieces of pottery at one time!

Chinese porcelain was highly valued both in China and in other parts of the world. Chinese porcelain was exported to India, the Middle East, and even Africa and Europe. Some Europeans were still working to learn how to make porcelain as late as the 1600’s.
Gunpowder

Many ancient scientists in China and other parts of the world were experimenting with chemicals and trying to find a mixture that could turn lead into gold or could give a person eternal life. Two of the chemicals that were frequently used were sulfur and saltpeter. This combination lead to quite a few explosions! Eventually these scientists discovered that when these two ingredients were combined with charcoal, they would create an explosive mixture called huoyan or gunpowder.

Imagine an enemy army's surprise when the Chinese first demonstrated this new invention! New weapons were quickly developed including rudimentary rockets, which were launched from a bamboo tube. The Chinese created one such weapon that they called “fire arrows”. These were made by filling bamboo tubes with gunpowder and iron bits. These weapons would be attached to an arrow, lit, and then shot from a bow. The Chinese also used gunpowder to make fireworks and signal flares.
If you are injured, your parents will call a doctor or take you to the emergency room. There were no 991 calls or modern emergency rooms in ancient China but they did have doctors to treat you. Chinese doctors studied the human body and the diseases that can affect people. The *Canon of Medicine* written in 300 B.C.E. lists over three hundred different diseases including diabetes, asthma, tumors and mumps. Doctors in ancient China used medicine, surgery, and acupuncture to treat these diseases.

An important tool that Chinese doctors had to treat patients was acupuncture. Acupuncture is done by inserting needles into specific spots on the body. These points are located along invisible lines called meridians. Chinese doctors believed that inserting these needles could correct the flow of *qi* or the body's natural energy which would heal the patient.

Acupuncture was used to treat all sorts of ailments from heart disease to headaches. It was even used to put people to sleep before surgery. The points when the needles are inserted aren't necessarily near the parts of the body that need treatment. For example, a point on the foot might be used to help heal the liver.