Arch

Some archeologists believe that the arch was the Sumerians' greatest architectural achievement. Made of bricks, Sumerian arches were inverted U- or V-shaped openings built above doorways. Sumerians built arches by stacking bricks one on top of the other so that the arches projected out from the walls of a building. The bricks rose in steps from the wall and met in the center. Builders formed the identical bricks by mixing river clay with straw and pressing it into a mold. They then baked the bricks under the sun or in an oven. Around 3000 B.C.E., builders created a special wedge-shaped brick mold that allowed the bricks to fit even more closely together above a doorway.

Arches added both strength and beauty to Sumerian architecture. They allowed builders to create larger openings than when they laid a single piece of wood across two upright posts. The earliest arches were located above doorways leading to tombs. Later, Sumerian builders placed more elaborate arches in bridges, temple entrances, and wealthy people's homes. In addition, the arches enhanced the artistic quality of Sumerian architecture.

City-States/Kings

The first city-states were located in Sumer. City-states were well-protected regions that were made up of a city and its surrounding farmlands. They were different from cities because they were usually larger and highly organized. Sumerians built strong walls that stretched as far as six miles around their city-state. The walls had bronze gates that were closed during times of war to keep out enemies. Sumerians dug deep ditches called *moats* around their city-states to protect themselves from attack.

Sumerian city-states were ruled by kings. Sumerians believed that the Gods had chosen kings to rule on earth while the Gods ruled in the heavens. Kings ruled over their city-states by enforcing their laws, collecting taxes, and making sure the temples and irrigation canals were in good condition. They also led the army. This last role was one of their most important jobs, because city-states were constantly fighting over land boundaries and the use of water.

Cuneiform/Writing

One of the greatest Sumerian achievements was the creation of the earliest highly developed written language, known as *cuneiform* (pronounced kyoo-NEE-a-form). Sumerians developed cuneiform to help them record information about goods that they exchanged with each other. Cuneiform was based on an earlier, simpler written language called *pictographs.* Pictographs were written symbols that represented real objects, such as a snake or water. Scribes (writers) created pictographs by drawing with a sharpened reed on wet pieces of clay. When the clay dried, the marks became a permanent record.

Scribes later drew pictographs using a series of simpler lines. They quickly impressed these lines using a pointed tool made from a reed, called a *stylus.* Scribes "capped" the end of the lines by pressing one corner of the stylus's rectangular end into the clay to create a triangle- shaped (or wedge-shaped) impression. Nineteenth-century scholars later named the Sumerian script cuneiform, which means "wedge-shaped writing." By 1800 B.C.E., cuneiform contained more than 700 written symbols.

Devotional Statues

Sumerians created *devotional,* or religious, statues to express their religious beliefs. The statues depicted people either alone or in couples worshipping the Gods. Sumerians created these statues because they believed that the Gods were pleased when people expressed their sincere religious beliefs, or *devotion.* Kings and wealthy people honored the Gods by placing statues inside temples or their homes. In return, they hoped that the Gods would bless them with long lives, many children, and a successful harvest.

Many statues were detailed and lifelike. For example, archeologists have discovered statues of people standing straight up with their hands folded in prayer. Artists often depicted men with beards and wearing wool skirts, and women wearing one-shoulder dresses or dancer's pants. Statues often showed smiling figures with large, staring eyes. Sumerian artists probably gave these figures such enormous eyes to represent people gazing heavenward toward the Gods.

Games

Sumerians played games for entertainment and to obtain good luck. They played on game boards and used flat, round pieces of shells, stones, and bones to mark their places. Some game boards had exquisite stonework and mother-of-pearl designs. Sumerians used the brilliant blue stone lapis lazuli and red limestone to form detailed patterns. One game board from Ur has 20 decorated squares across 3 sections, including 5 *rosettes* (rose designs) and 4 zigzag-patterned squares. Another game board has 12 squares arranged in a rectangle, with 2 squares decorated with bulls and 10 decorated with goats.

Sumerian games typically began with the players rolling dice and moving their playing pieces across the board. The winner was the first person to move his or her piece off an "exit square" located at one end of the board. Art experts believe that these simple games were used to predict the players' futures. For example, Sumerians believed winners would have luck in gaining food, drink, and love.

Irrigation

Sumerian farmers developed an excellent irrigation system that provided their crops with a regular water supply. The irrigation system guided water from the Tigris and Euphrates Rivers to farmers' fields. Farmers needed to control their water supply because the rivers flooded unpredictably in the spring and then dried up in the summer. Important features of the Sumerian irrigation system included dams, reservoirs, and canals. Farmers built brick dams along the rivers that blocked some of the water from flooding. The blocked water collected in multilevel pools called *reservoirs.* Farmers could then use the water during the dry summer months. *Canals,* or man-made waterways, wound throughout Sumer carrying water from the rivers and reservoirs to farmers' fields.

In Sumerian city-states, it was the government's responsibility to make sure the irrigation system was in good condition. The government organized workers to clean the canals and repair the dams and reservoirs. A special government group called the *gagullu* patrolled the canals, looking for damage and stopping farmers from taking water illegally. Sumerian city-states successfully maintained their irrigation system and grew many crops such as wheat, onions, and cucumbers.

Mathematics

Sumerians applied mathematics to many important areas of daily life. For example, government officials used geometry to calculate the surface area of farmers' fields, which helped them predict the amount of crops they could tax. Sumerians used multiplication tables and fractions to accurately measure their land boundaries. They also used calculations to weigh goods, to determine how much to enlarge canals, and to count large numbers of bricks for building projects. In addition, mathematics helped people learn the positions of the sun, moon, and planets. Sumerians believed that their knowledge of the heavens could help them predict their futures.

Sumerian mathematics can be seen in daily life today. Sumerians based their counting system on the number 60, which is the basis of our 60-minute hour, 60-second minute, and 360-degree circle. They also used the number 3,600 (60 times 60) to indicate a very large number in the same way that we might use the phrase "a million."

Medicine

Sumerian medicine was a combination of natural healing techniques and surgery. Early Sumerians tried to cure illness by asking spiritual doctors to get rid of the demons they believed made people sick. By around 2500 B.C.E., doctors' treatments for illness focused on applying many different plants and mineral oils to sick body parts. Doctors wrote prescriptions such as, "Wash the sick body part with beer. Then, mix honey with crushed turtle shells to form a soothing paste. Oil the body to prevent the paste from sticking, and spread the paste onto the sick body part."

Archeologists also believe that Sumerian doctors performed a kind of brain surgery called *trephination.* As evidence, archeologists point to skulls with large holes in them that they have found in Sumer. They believe that doctors cut holes in people's skulls to relieve pressure on their brains. But even with doctors' healing efforts, Sumerian people often died from disease as young as 32 years old.

Metalworking

One of the Sumerians' most important achievements was superb metalworking. Sumerians worked with a variety of metals, including gold, silver, tin, lead, copper, and bronze. Metalworkers used these metals to create many different kinds of weapons, tools, and luxury items. For example, they made weapons such as swords, arrowheads, and harpoons. To make weapons, metalworkers first mixed melted copper with tin to make a new, stronger metal called bronze. They then poured the liquid bronze into casts and let it harden into finished weapons. Metalworkers also cast bronze into such tools as axes, knives, saws, and hoes. For wealthy people, metalworkers hammered shiny metals such as gold and silver into mirrors, necklaces, and statues. One wealthy Sumerian named Queen Pu-abi wore silver hair combs and heavy gold earrings, and probably died by drinking poison from a golden cup.

The Mesopotamian plains did not provide metalworkers with the valuable metals they needed to create their works. Therefore, Sumerians had to bring in the metals, or *import* them, from other regions around the ancient Near East. In return for these metals, Sumerians traded their metalworks with people from as far away as central Europe.

Music

Instrumental and vocal music played an important role in Sumerians' lives. Musicians played worship songs because they believed music would bring joy to the Gods as well as to the people of Sumer. In addition, musicians played instruments and sang during temple ceremonies in which people were sacrificed to the Gods. Scholars often connect music with Sumerians' religious practices, but musicians also wrote love songs. One Sumerian love song, called "Love Finds a Way," tells of a woman singing about her husband-to-be: "As I was singing away...he met me, he met me." Wealthy people hired musicians to perform recitals in their homes to entertain guests as they enjoyed a feast.

Sumerian musicians played many instruments including drums, reed pipes, metal pipes, and an ancient small harp called a *lyre*. Lyres were wooden instruments made of a sound box, strings, and a wooden bar holding the strings at the top. They were often decorated with a golden bull's head attached to the sound box. The bull's head had eyes, a beard, and horn tips made of a brilliant blue stone called lapis lazuli. Makers of these instruments elaborately decorated them to show the value of music in Sumerian culture.

Organized Armies

Sumerian armies had excellent organization, weapons, and leadership. Sumerian kings first organized armies to fight other city-states over water usage and land boundaries. The armies included professional soldiers and temporary citizen-soldiers. The citizen-soldiers were farmers whom the king forced to serve in the army during wartime. If they refused to serve, scholars believe they may have been punished with death.

Sumerian armies were made up of different military units. First into battle were the chariots, which were ancient "tanks" pulled by donkeys. These vehicles were square, had a wooden frame, and had two or four wheels. Armies also had two groups of *infantry,* or foot soldiers, who marched into battle in a tightly organized formation. The heavy infantry wore copper helmets and carried short-handled spears. The light infantry wore light helmets and carried axes. All soldiers wore shields to protect themselves from the enemies' arrows. However, large numbers of soldiers still died in army battles. One king claimed that his army killed 12,650 soldiers in a single battle. After the fighting was over, the winning side celebrated their victory by beheading prisoners from the losing side. They also kept some prisoners as slaves.

Plow

Sumerian farmers' invention of the plow helped them provide their city-states with a stable food supply. Before farmers invented the plow, they used animal horns or pointed sticks to poke holes in the earth. They would then plant seeds in the holes they had made. This method of cultivating crops was extremely slow, and farmers needed a faster way to prepare the soil for planting seeds.

The Sumerians made the first plow out of wood. It had one crooked end for cutting into, or *plowing,* the earth. Farmers operated the plow by pushing and pulling it along the ground, or had animals such as oxen pull the plow. Around 4000 B.C.E., Sumerian farmers began to develop plows with stronger blades made of metal, such as copper and bronze.

While plows allowed farmers to cultivate larger areas of land quickly, plowing was still hard work that required many steps. Farmers had to plow their land twice, rake it three times, beat it with hammers, and then plow it again. To speed up the planting process, farmers attached containers to their plows that dropped seeds through a funnel into the freshly-plowed ground.

Sailboat

The Sumerians' invention of the sailboat allowed them to more easily travel and transport traded goods by water. The earliest sailboats were small and shaped like round baskets. They were made of reeds and covered with animal skins. The sailboats had a central post, called a *mast,* to which a single sail was attached. The sail powered the sailboat by catching the wind and pushing the boat forward. People used these early boats mostly for sailing on rivers and canals. Sumerians later built larger sailboats out of wood. The larger sailboats measured up to 60 feet in length and weighed as much as 5 tons. They were designed for sea travel, and the sides of the boats were fitted with oars to help sailors steer them.

Sumerian traders used sailboats to travel from Sumer to distant lands. In preparation for their journey, they piled their sailboats high with farmers' extra grain and woven materials, or *textiles*. Sumerians traded these goods in exchange for wood from Ethiopia or spices and gemstones from India. As traders exchanged goods, they also shared ideas and values from their homelands.

Wheel

The earliest examples of the wheel are from Sumer and date back to 3500 B.C.E. Sumerian potters used the first wheels as a surface on which to shape clay into pottery. These potters' wheels were balanced, flat-side up, on axles. Sumerians discovered that if they flipped the potter's wheel on its edge, it could be rolled forward. They used this new discovery to create wheeled carts. Sumerians built the wheels by clamping three pieces of wood together to form disks.

The wheel greatly improved Sumerians' daily lives. Before the invention of the wheel, people had to drag their goods on flat-bottomed structures called *sledges.* This method of transporting goods was difficult because the sledges often got stuck in the river mud and they could not support heavy loads. Wheeled carts allowed people to transport goods more easily over long distances. Animals, such as donkeys and oxen, could pull three times more weight on wheeled carts than they could on the sledges. The wheel also increased the speed and strength of Sumerian armies. Sumerians built two- or four-wheeled chariots that were usually pulled by four donkeys. During battles, chariot drivers balanced themselves on top of the wheel axle while driving the vehicle and hurling spears at enemy lines.

Written Laws

The Sumerians were the first group of people to develop a system of written laws. Their laws helped maintain order among people in Sumerian society. The first law code was written on clay tablets and dates back to 2050 B.C.E. The code was probably written for King Ur-Nammu of Ur by his son Shulgi. Sumerian kings were responsible for overseeing the laws for their city-states. King Ur-Nammu and another king, Urukagina, both claimed that their attention to written laws helped "set Sumer free."

Written laws were part of a Sumerian legal system that included trials and legal agreements. When a person was accused of a crime, judges organized a trial with witnesses to determine the person's innocence or guilt. If the person was found guilty, Sumerian laws usually specified a fine as punishment. For example, a person who crushed another person's arm with a club had to pay a fine of one mina of silver (about two years' salary for a lower-class person). People who felt that a judge's decision was unfair could complain to the king. Legal agreements, such as property rights agreements signed by married couples, were also guided by Sumerian law.

Ziggurat

One of the Sumerians' key contributions to ancient architecture was the temple tower known as a *ziggurat.* The word ziggurat means "mountain of God." Ziggurats were extremely important to Sumerians because of their religious significance. Sumerian priests and kings stood inside them to ask for the Gods' blessings. Sumerians also believed the Gods lived inside the towers. They built special temples for the Gods on the top of the ziggurats. Scholars believe that the builders may have placed a bed inside this special temple in which the Gods could sleep. Outside the ziggurat, they attached a staircase of approximately 100 steps, which they believed the Gods could use to climb down to earth.

Ziggurats were made of mud bricks and were built near temples located in the center of each city-state. They stood as high as 80 feet, extended as wide as 200 feet, and could easily be seen from 20 miles away. Because ziggurats had several levels, hundreds of people were required to build each one. Inside, the ziggurats were decorated with zigzag and triangle patterns on the walls and columns.