belief in the message of Muhammad. Because it was the language of the government, Arabic also spread. The Islamic Empire lasted for a little more than six centuries. Even after it fell, and Islam and Arabic continued to have an important effect on the world.

**HOW THE EMPIRE AFFECTED HISTORY**

Today modern connections to the ancient Islamic Empire can be found throughout the world: place names, words, cultural contributions, architecture, and medical, mathematical, and scientific innovations are just a few of the areas in which the empire has made lasting contributions. Although many of the contributions considered to be “Arab” were, in fact, borrowed from conquered peoples, the Muslims left their own unique mark on them.

The greatest and most lasting effect of the empire, however, is Islam. Although Islam is the world’s youngest major religion, it currently has more followers than any other religion except Christianity. About 1.3 billion people around the globe are Muslims. It is also one of the fastest growing religions in the world.

Islam is a powerful political force in today’s world. There are numerous countries in which Islam is the state religion (the religion officially endorsed by the state), including Iran, Iraq, Pakistan, and Afghanistan. There are also large Muslim populations in many other countries, including Indonesia, India, Israel, China, Russia, Bangladesh, and a number of nations in Central Asia. Although the Islamic religion was born on the Arabian Peninsula, most

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**CONNECTIONS**

**The Significance of Jinn**

Many of the minor gods the Bedouins prayed to were forces of good. But there were also forces of mischief to be dealt with. And some spirits were both.

The jinn were spirits capable of taking the form of a human or an animal. They could also influence people for good or for bad. The Bedouins believed the jinn roamed the desert, causing trouble and spying on humans. However, some jinn also inspired poets.

According to the Quran (sometimes written as Koran), jinn were created out of smokeless fire. One of the best-known jinn is Satan, who was sent out from heaven by God because he refused to bow down to humans. The Quran states that after Muhammad began preaching, a group of jinn heard him and converted to Islam.

The singular of jinn is *jinni*, and in English this word is written as *genie*. The idea of genies was popularized in the West by the *Thousand and One Nights*, a collection of Arabian, Persian, and Indian folktales compiled over hundreds of years. The funny genie in the Disney Studios movie *Aladdin* is very different from the original jinn of the Bedouin world.
Coffee

The history of coffee is something of a mystery. Most experts believe that coffee was first grown in Africa, probably in Ethiopia. Some historians believe coffee had made its way to the Arabian Peninsula by about 675. Others place its arrival there at around 1000. At the very latest, coffee was growing in Yemen by the 1400s.

Even the source of the word coffee is up for debate. Some say the drink takes its name from Kaffa, the Ethiopian province where coffee was first grown. Others say that it gets its name from an Arabic phrase once used to refer to wine, al-qahwa.

At first, coffee beans were chewed rather than ground, roasted, and turned into liquid. By the end of the 15th century, however, coffee had become a popular drink throughout the Middle East. Coffeehouses, where men could meet and socialize while enjoying a cup of the strong beverage, soon sprang up. According to Bernard Lewis in The Middle East: A Brief History of the Last 2,000 Years, the coffeehouse served as the Middle East’s equivalent of the tavern in Europe. Philip Hitti, in History of the Arabs: From the Earliest Times to the Present, calls coffee the “wine of Islam.”

During the 16th century, the production and export of coffee from Yemen became an important part of Middle Eastern trade with Europe. Coffee quickly became as popular in Europe as it was in the Middle East. In the early 1640s, the first European coffeehouse opened for business in Venice, Italy.

Coffee may have been brought to the United States in 1607, when Captain John Smith helped found the first permanent British settlement in Jamestown, Virginia. After the Boston Tea Party in 1773, coffee became the drink of choice of American patriots seeking independence.

Today, coffee is still one of America’s most popular beverages. In 2009, more than half of all American adults drank coffee every day, according to the National Coffee Association. Most coffee imported into the United States is a type called Arabian or Arabica coffee. However, most Arabian coffee today is grown in Central and South America.

Muslims today are not Arabs. Currently, between 15 percent and 20 percent of all Muslims are Arab.

In the United States, Muslims are an important minority. There are about 6 million Muslims in the United States. That number more than doubled from 1990. Large Muslim populations are found in Los Angeles, Detroit, and New York City. There are more than 1,200 mosques in the country, according to the Hartford Seminary, a multifaith educational institution in Hartford, Connecticut.
Abu Bakr moved swiftly to conquer those tribes that tried to pull away. He placed Khalid ibn al-Walid (d. 642), known as the Sword of Islam, in charge of the fighting. Khalid was a great military leader and was brilliant at planning strategy. Historian Philip Hitti, in *The Arabs: A Short History*, calls his campaigns "among the most brilliantly executed in the history of warfare."

The Muslim troops were made up of volunteers from various tribes, and Khalid’s first task was molding them into a unified fighting machine. The army was divided into divisions, each with an assigned place on the battlefield, including a center, two wings, a vanguard (in the front), and a rear guard. Tribesmen fought together within these divisions. Each tribe had its own banner, which was carried into battle attached to a lance (a weapon with a hard point mounted on a wooden pole).

The general excelled in surprise attacks. With lightning speed, he would ride out of the desert on horseback, his cavalry behind him on horses and camels. He trained his cavalry to use the lance, and it soon became one of the most feared weapons in the world when carried by a Muslim soldier.

Backing up the cavalry was the infantry—soldiers on foot. They were armed with bows and arrows, slingshots, and swords. To protect themselves, the Muslim soldiers wore a light coat of mail (interlocking metal links) and carried a shield.

The battles to bring the rebellious tribes under control are known as the Ridda wars. *Ridda* is an Arabic word that means "leaving the religion." As the tribes were conquered, they once again gave their loyalty to Islam and the new caliph. As a result, the number of troops fighting for Islam swelled. This marked the beginning of the first Islamic army.

By the time he died in 634, Abu Bakr had united the entire Arabian Peninsula under the
Silk and Steel

During the Umayyad dynasty, the capital city of Damascus was an important trade center. The capital was famous for damask, a type of silk cloth embroidered with intricate patterns. Another trademark craft of the city was damascened steel sword blades. Damascened steel has been etched or inlaid with wavy patterns of silver or gold. Damask silk and damascened steel are still highly prized today.

The Shiite Martyr

Today, al-Husayn, the caliph named by the Shiites in 680, is remembered by Shiites as a martyr to their cause. His burial site in Karbala, in present-day southwestern Iraq, is considered a holy site by Shiites. Each year, on the first day of Muharram (the first month of the Islamic calendar), Shiite Muslims commemorate Husayn’s death in battle against rival Sunni caliph Yazid. The 10-day period of mourning includes acts of repentance, self-flagellation (beating), mourning processions, and a play about Husayn’s death called the ta’ziya.

Muawiya had been the governor of Damascus, and he chose to make that city his capital. Damascus was one of the first major cities to be captured by the Muslims, in 635. Under Muawiya and later Umayyad caliphs, Damascus was transformed into a vibrant and thriving capital city. Over the years, it would come to be known as the “pearl of the east” and the “city of many pillars.” Despite the beauty and culture of Damascus, Muawiya’s decision to relocate the capital was controversial. Many Muslims believed Medina, the city of Muhammad, was the true heart of the empire.

For nearly a century, the Umayyads controlled the Islamic Empire from Damascus. During their reign, the empire grew to its largest size. Beginning with Muawiya, the Muslims expanded their conquests farther into North Africa, Western Europe, and Central Asia. By the time the Umayyads were finished, the empire stretched across three continents, from the Atlantic Ocean to the Indus River Valley in what is now Pakistan.

Despite the expansion of the empire and the prosperity that went along with it, the reign of the Umayyad rulers was not smooth. The Shiites did not support the dynasty, and continued to believe that the descendants of Muhammad, through the fourth rightly guided caliph, Ali, should be the leaders of Islam. They created the title of imam to honor the male descendants of Muhammad, and the imams were their true spiritual and political leaders, not the caliphs. (Not every descendant of Muhammad was an imam, but only men from a certain line. In addition, each imam was specifically named by the man who came before him.)

THE UMAYYAD DYNASTY

Before Muawiya’s death, he arranged for his son Yazid to succeed him. To many Muslims, this action was shocking. Caliphs had always been chosen by respected leaders of the community. By naming his son to follow in his footsteps, Muawiya was founding a royal dynasty.
ing to challenge the caliph. So these supporters were killed to prevent them from stirring up any more trouble in the future. This included the Shiites, who had been so important to Abbasid victory during the revolution.

By 756, new leaders were firmly in control of the Islamic Empire. The Abbasid dynasty ruled the empire for the next five centuries, until it fell in 1258.

Under the Abbasids, the capital of the empire moved from Damascus in today's Syria to Baghdad in what is now Iraq. In 762, the second Abbasid caliph, Abu Jafar al-Mansur (d. 775), founded Baghdad. The new city signaled not just an end to the old Umayyad dynasty, but a beginning of Abbasid power and glory. Baghdad remained the empire's capital—as well as its political and cultural heart—for nearly 500 years.

The beginning of the Abbasid dynasty also signaled an end to the age of Islamic conquest. The empire at the time stretched from Spain in the west to the borders of India in the east, from central Asia in the north to North Africa in the south. It entered a period of peace and prosperity, a "golden age" of Islamic civilization. Despite many advances in culture and learning, however, the Abbasids would soon lose control over their empire. A new age was coming, and it would not be long before the dynasty was reduced to nothing more than a puppet controlled by other powers within the empire.
Throughout Europe, the spread of learning and knowledge to produce books more quickly and efficiently encouraged people to seek out the vast libraries and manuscript libraries of the East. The treatment of the Orient to Spain's favor in the late-13th century, the introduction of paper, and the publication of European tales of Spain's wealth and power all contributed to the introduction of paper to Europe. The introduction of paper to Europe was the introduction of paper to the Muslim world. The introduction of paper to Spain was a key contribution to the development of European printing.

Many important goods were introduced to Europe thanks to the Muslim conquerors. These goods included many types of fruits and vegetables, as well as spices, rice, sugar, cotton, and many other goods that came from the Muslim world. The introduction of these goods to Europe had a significant impact on European agriculture, industry, and economy.

The architecture of the Alhambra and other Islamic mosques and palaces were first introduced to Europe through the works of the Alhambra, known as Andalusian, Andalusian, and Alhambra. These buildings were decorated with intricate patterns of spirals and interlocks, influenced by the Islamic Empire. The design of the Alhambra was popular in the Muslim world and was used in many other Islamic buildings.

The influence of Muslim culture and learning were significant in Europe. The empire of the Moors, which controlled the southern two-thirds of France, provided a region where culture and learning were valued and encouraged. A region where culture and learning were valued and encouraged. A region where culture and learning were valued and encouraged.
CORDOBA

Cordoba in southern Spain has a long history of being influenced by conquerors. The city was founded around the first century B.C.E. by the Romans. In 572, it was taken from the Romans by the Visigoths, a Germanic tribe. The Muslims took it from the Visigoths in 711. In 756, Abd al-Rahman, the Umayyad prince who had escaped being slaughtered by the Abbassids, took control of Cordoba.

As the capital of the Umayyad emirs in Spain, Cordoba became the jewel of Europe. It was also a center of trade and industry in the area, and the city grew rich and prospered. It was famous for the production of silk and paper. Cordoban craftsmen were especially admired for a deep red decorated leather that they produced. It came to be known—and is still known today—as cordovan.

Cordoba was also a center of learning and culture, not only for the Muslim world but for Europe as well. From Cordoba and other cities in Spain, poetry, science, philosophy, and medical knowledge was absorbed from the eastern Islamic Empire and spread into Europe. Scholars in Cordoba directly influenced European scholars, including such writers as Thomas Aquinas (1225–1274) and Dante Alighieri (1265–1321).

By the early 900s, Cordoba was the largest city on the Iberian Peninsula, with as many as 500,000 people living there. Even Muslims from other parts of the empire believed Cordoba was one of the most beautiful cities in the Muslim world. Many who visited the city chose to move and make their homes there.

**CONNECTIONS**

"Moorish" Architecture

The influence of the Islamic conquerors on architectural styles can still be seen today in areas that were once part of the Islamic Empire, especially in southern Spain. What became known as "Moorish" architecture made its way to the Americas with the earliest Spanish explorers. These explorers built houses, missions, and other buildings that reminded them of their homes back in Spain.

In the United States, the influence of Islamic architecture is especially strong in the Southwest. Here, Moorish touches can be seen in buildings that were built hundreds of years ago, as well as those built more recently. These touches include horseshoe-shaped archways, red-tiled roofs, smooth stucco outer walls, ceramic tiles, heavy wooden doors, and courtyards with a central fountain surrounded by arcades.

The so-called Mediterranean Revival style of building that was popular in Florida in the early 1900s includes elements of Moorish, Spanish, Italian, Venetian, and other styles. Today, home builders can choose a "Spanish" type of home that incorporates some Moorish features into its design.
Banking and commerce in the Islamic Empire was more complex and advanced than anything in Europe at the time. In fact, it would take about three centuries for the Europeans to catch up.

A number of Islamic banking concepts are still used in the financial world today. For example, people throughout the empire understood the concept of credit. They wrote up special documents that could be cashed at a bank or any of its branches throughout the empire. These documents were called *sakk*, from which we get the word *check*.

Other Islamic contributions live on in words that we now use to describe commercial and financial ideas. For example, the word *average* comes from the Arabic word *awariyah*, meaning damaged goods. By the 17th century, the word had evolved to mean the fair distribution of losses due to damaged goods.

Another Arabic word still used in the business world is *tariff*, which is a tax on imported goods. During the Islamic Empire, tariffs were announcements or notifications that were posted so that merchants knew how much tax to pay the empire on shipments of imported goods.

The word *carat*, which we use to describe the weight of precious metals and stones, comes from the Arabic word *qirat*. To merchants throughout the empire, *qirat* was a measure equal to one seed from a carob tree, or four grains. The seeds were used to balance a scale when weighing out gold.

As trade developed, there was a need for a standard system of money and common banking practices. During the Abasid dynasty, two types of currency were used: In the eastern part of the empire, the Persian silver *dirham* was the standard unit of money. The Byzantine gold *denarius* was used in the west. The values of these two currencies went up and down relative to one another, just as the value of currency does today.

To handle currency exchanges, money changers became common in markets across the empire. As the money changer began lending funds and offering credit, his role developed into that of a banker. Because the Quran forbids Muslims from lending money with interest, early bankers in the empire were usually Jewish or Christian. Often they operated with Muslim merchants as partners.

Textile production was a major Islamic industry. Cities around the empire produced cloth made of silk, linen, cotton, flax, and wool. One special type of textile made in the empire was *tiraz*, which was cotton or linen cloth embroidered with passages from the Quran. The cloth was made by the caliphs and gifted to the wealthy and to their friends and officials.

From the 8th century to the 13th century, the Islamic Empire was the largest and most advanced in the world. The empire stretched from modern-day Spain to eastern Asia. The empire included farmers, merchants, and traders who helped exchange ideas and goods across the region. The empire was a center of learning and culture, and it had a strong impact on the world that followed.
The book contained recipes for many gourmet dishes that were served to the caliph and the rest of the court. These include a pureed eggplant and walnut dish and baked hen served on top of flatbread.

Muslims could buy all kinds of foods at the local outdoor market. One type of shop, called a harras, sold ground meat that was combined with wheat and then fried. Other shops sold sauces, relishes, breads, and desserts.

Eggplant was probably the most common vegetable. It was used in a variety of dishes and could be prepared in many different ways. Lentils were also popular. However, only the wealthiest subjects ate meats such as lamb, chicken, or veal. Pork was not eaten, because Muslim dietary law forbids it.

Spices were an important part of the preparation of any meal. Popular cooking spices included cardamom, ginger, turmeric, and coriander. These spices gave Middle Eastern cuisine the distinct flavor it retains to this day. The Arabs introduced these spices to Europe.

Water was the drink of choice. Because of their desert history, many Muslims considered water to be a source of life and purification. To give a person water, according to Muhammad, was an act that deserved the highest praise.

The Muslims did enjoy other drinks, though. One was sekanjabin, which was water flavored with mint syrup. Water was also flavored with lemons, violets, roses, bananas, and many other sweet substances. Drinking alcoholic beverages was forbidden.

Despite the variety of foods available, dates retained their popularity and importance. These

sweet, fragrant, and not to mention sweet, fragrant, and

palm trees. Indeed, sugar was a popular beverage throughout the population on this

Before modern times, however, sugar was a luxury. As the

important food, it was used in a variety of dishes and could be prepared in many different ways. Lentils were also popular. However, only the wealthiest subjects ate meats such as lamb, chicken, or veal. Pork was not eaten, because Muslim dietary law forbids it.

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The Mattress Comes to Europe

One of the new ideas brought back to Europe by crusaders was the mattress. The crusaders borrowed the Arabic practice of sleeping on pillows, cushions, and rugs thrown upon the floor. Before that, the common people in Europe slept on piles of straw, tree boughs, or similar material heaped in a corner of their house. The word mattress comes from the Arabic word matrah, which means a place where something is thrown.

STYLE

The early Bedouin people wore simple clothes designed to protect themselves from the scorching rays of the desert sun. Their clothing consisted of a long shirt with a sash (sash is an Arabic word) and a flowing upper garment.

As the empire expanded, the basic style of clothing remained the same, with some refinements. Women and men alike continued to wear long shirts that covered the upper part of the body. Beneath this tunic they wore loose pants. Women covered their heads with long, flowing scarves and veils, while men often wore cloaks around their shoulders. These cloaks were multi-functional, serving as a rain or sun shield, a blanket, or a sack to carry goods.

Muslim men, like women, also covered their heads. Many used pieces of cloth that could be wrapped around the head in many different ways, similar to today’s turban.

The courtiers of the Abbasid dynasty introduced many new styles to the empire. During warmer weather, silk gowns became the fashion. In colder weather, quilted clothing was popular.
Enjoy the connections.

**Salukis: The Dogs of Caliphs**

The Saluki is one of the oldest-known breeds of domesticated dogs. Thousands of years ago, Bedouin tribes used the sharp-eyed and lightning-fast Salukis, also known as gazelle hounds, to hunt gazelle and other animals. The dogs were so highly prized that they were even allowed to sleep in the tents of their masters.

In ancient Egypt, the dogs were kept by pharaohs and became known as the “royal dogs of Egypt.” Only royalty were allowed to keep these animals, and a favorite dog might be mummified and placed in his master’s tomb.

After the rise of the Islamic Empire, the dogs became popular as pets of the caliphs. They accompanied the caliph on hunting expeditions, and were often given to friends and important people as signs of royal favor and esteem.

Salukis are sleek, silky animals that hunt by sight and are part of a group of dogs known as sighthounds. Like Greyhounds, they are swift and intelligent animals. In some countries, Salukis are raced against one another.

Poetry recitations. However, at home there were restrictions on with whom men could socialize (particularly in the homes of non-relatives). Women usually had more freedom than men to socialize in private homes.

For children, education began at home. From an early age, children were taught to memorize passages from the Quran. As they grew older, the Quran and the Hadith were used to teach them to read. Later, boys would receive more formal lessons at mosques, schools, or Islamic centers.

During the Abbasid dynasty, boys usually began attending mosque schools at around the age of seven—as long as their families could afford to pay a small tuition.

Wealthier boys continued their education longer. They might attend seminars, discuss poetry, and read classic works of Greek that had been translated into Arabic. These lessons prepared the wealthy young men for positions of importance. The empire’s first universities were founded in the 10th century under the Abbasid dynasty.

Two Abbasid caliphs, al-Mahdi and al-Hadi, were responsible for the construction of a large number of libraries and centers of education in Baghdad. Scientists and scholars from all over the empire went to the capital to teach and learn in the universities (also known as “houses of knowledge”) and madrasas (Islamic schools).

**IT IS GOOD TO BE THE CALIPH**

The ruling dynasty—especially the Abbasids—lived a much different life than did the average Muslim in the Islamic Empire. As the Abbasid caliph turned to:

The court of the caliph was a microcosm of the empire, with the ruler and his family at its center. The court was not only a place of political power but also a center of culture and learning. The caliph was often surrounded by a group of poets, musicians, and scholars, who were at his disposal.

The caliph was also the supreme religious authority in the Islamic world. He was responsible for the interpretation of the Quran and the Hadith, and his decisions were respected throughout the empire.

The caliph was also expected to lead by example, demonstrating piety and virtue in his daily life. He was expected to be a model of good behavior, both in his personal life and in his public duties.

The caliph was also responsible for the distribution of wealth throughout the empire. He was expected to patronize the arts and sciences, and to provide for the poor and the needy.

The caliph was also expected to be a wise and just ruler, who would work to ensure the safety and security of his subjects. He was expected to be a fair and just judge, who would administer justice to all without regard to status or wealth.

The caliph was also expected to be a good husband and father, who would provide for his family and ensure their well-being. He was expected to be a devoted husband and a loving father, who would always put the needs of his family first.

The caliph was also expected to be a devout Muslim, who would always follow the teachings of the Quran and the Hadith. He was expected to be a pious and humble man, who would always strive to please Allah and to be worthy of His favor.

The caliph was also expected to be a peaceful and just ruler, who would always work to promote peace and harmony throughout the empire. He was expected to be a wise and just judge, who would always strive to ensure justice for all.

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HOLIDAYS
Throughout the empire, Muslims observed several religious and nonreligious celebrations. The most important religious holiday throughout the kingdom was Eid al-Adha (the feast of sacrifice). The holiday sid caliphs passed their control over the government to others, they turned to a life of rituals, pleasure, and entertainment.

The caliph was almost constantly surrounded by courtiers. Those who wished to meet with the caliph had to kneel down in front of the ruler and kiss the floor. During the early Abbasid dynasty, a leather carpet was kept unrolled before the caliph’s throne. If need be, the royal executioner could step up, chop off the head of anyone who displeased the caliph, then take the dead body away without making a mess. The executioner was always ready, with his sword drawn, to obey the caliph’s signal.

The Abbasids enjoyed many different types of entertainment. Musicians and poets were very popular at court, and the most talented ones often received regular payments from the caliph. Another popular pastime was hunting. The caliph rode on horseback, using dogs, falcons, ferrets, and even cheetahs to help him track wild game.

As might be expected, dining was a grand experience at the palace. Under the caliph al-Mamun, diners were offered foods from far away that were shipped in lead boxes packed with snow to keep them fresh. Al-Mamun’s guests were also the first Arabs to dine using tables and chairs instead of sitting on the floor. The caliph’s tables were made of gold and silver.

Harems became more common during the Abbasid dynasty. In addition to their four wives allowed by the Quran, caliphs kept hundreds—sometimes thousands—of concubines. Concubines might be female slaves or prisoners of war who caught the caliph’s eye. Eunuchs (castrated slaves) were often employed to guard the women.
The Oud and the Guitar

The Arab musical instrument, the oud, led to the development of the lute in Spain. In fact, the word *lute* comes from the Arabic phrase *al oud*. The lute is a musical instrument with a pear-shaped body and six pairs of strings.

The lute and other stringed instruments helped create a new class of performing artists in Europe: minstrels and troubadours. These skilled musicians moved from city to city strumming on ouds and other instruments, singing ballads, folk songs, and Christmas carols. Troubadours became very popular and well-respected in royal courts throughout Europe in the 12th and 13th centuries.

The guitar, which is a member of the lute family, may also have originated in Spain. The word *guitar*, which comes from the Arabic word *qitara*, originally was used to describe a flat-backed, four-stringed instrument. The guitar was easier to play than the lute, and by the late 1500s, it had passed its cousin in popularity in Spain and other parts of Europe. As the years went on, a fifth and then a sixth string were added to the guitar.

The guitar and Arabic music influenced the development of flamenco music in the Andalusia region of Spain. Flamenco combines guitar music with singing, dancing, and rhythmic clapping to create a unique and dramatic performance style. Historians believe that Flamenco combines Arabic, Roma (Gypsy), and Spanish musical styles from the medieval period. Today, flamenco is still a popular art form in Spain.

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instrument was played by plucking the strings with the fingers or with pieces of horn.

Percussion instruments included the *darbukka*, or *tabla*, a small hand-held drum made by stretching goat, calf, or fish skin over a large clay container. The *mihbaj* was a multi-functional Bedouin instrument that doubled as a coffee grinder. *The mihbaj* was about a foot tall, with a two-feet tall pestle (a rounded stick) used both for grinding coffee and making percussion sounds.

The *nay* was a simple reed pipe, similar to a flute, adapted from the Sumerians. The *nay* most often had six holes in the front, with one hole underneath for the thumb. It was one of the few wind instruments used in the Islamic Empire. During a performance, musicians might use as many as seven *nays* of different sizes to produce a variety of sounds.
Scientific Words with Arabic Origins

alchemy: from *al-kimya*, which means the sciences of alchemy and chemistry; in English it means the “science” of trying to turn ordinary metals into gold

alcohol: from *al-kuhl*, which means ground cosmetic powder; it was later used to describe refined or distilled substances

algebra: from *al-jabr*, which means the joining together of disorganized parts

borax: from *buraq*, a white, powdery mineral used in cleaning and soldering

camphor: from *kafur*, a strong-smelling tree gum often used in medical ointments

elixir: from *al-iksir*, in medieval alchemy, a material that would change other metals to gold; in English it means a magical potion

nadir: from *nazir*, the lowest point

pancreas: from *bancras*

zenith: from *samt*, the highest point

zero: from *sifr*, which was translated into Latin as *zephyrum* and then into Italian as *zero*

Many Greek works were translated during the reign of Caliph Al-Mamun (r. 813–833). Some of these Greek works were taken when Muslims conquered Byzantine and Sassanian areas. In other cases, the caliphs sent out groups of scholars to find Greek writings in other cities, including Constantinople.

To help scholars translate and study these works, Al-Mamun founded the House of Wisdom in Baghdad. The House of Wisdom included a library, a translation bureau, and a school. There was also an observatory from which scholars and scientists could study the stars and planets—and even discover new ones.

At its height, the House of Wisdom had as many as 90 scholars working on translations. These translations eventually made their way to Muslim Spain and Sicily, and from there, to the Western world, where they were translated into Latin. This preserved the vast wealth of knowledge of the ancient masters.

PHILOSOPHY AND HISTORY

Many important Islamic philosophers emerged in the ninth century. Islamic philosophy, like other areas of knowledge, was profoundly
Monumental Medical Advances

Islamic contributions to medicine were monumental. Many of the practices that Muslim doctors described, improved, or pioneered are still used today in one form or another. Advances in medicine during the empire included:

**The pharmacy:** In *A History of the Arab Peoples*, Albert Hourani writes, “It has been said that the pharmacy as an institution is an Islamic invention.” Because of the vast Islamic trading network, Muslim doctors had access to many new drugs. Muslim scholars wrote books about the properties and effects of a wide variety of drugs. They were also the first to create a systematic method of determining dosages for medicines. Pharmacology was considered an important profession. Beginning in the early 800s, pharmacists, like doctors, had to pass examinations and become licensed.

**Surgical milestones:** At a time when European clergymen were encouraging doctors to stop performing any type of surgery, Muslim doctors were moving ahead in successful efforts to cure their patients surgically. They performed operations to remove bladder stones, cataracts and other eye diseases, and varicose veins. They also created many new surgical instruments and pioneered the use of anesthesia, especially opium, to make a patient unconscious before surgery. The anesthesia was administered by practicing medicine when he was just 18 years old. He later served as the personal doctor to the sultan of Bukhara. Over the years, Ibn Sina also became interested in philosophy, physics, mathematics, astronomy, and even music theory.

Milestones in Ibn Sina’s career include his descriptions of skin diseases and psychological illnesses. He was the first person to realize that tuberculosis can be spread from person to person, and that some diseases are spread by water and soil. For cancer, his treatment is still followed today: Treat the illness during its earliest stages and remove all the diseased tissue.

Ibn Sina’s best-known work was *Al-Qanaf’I Tibb* (the canon of medicine). This encyclopedia of medical knowledge was studied throughout the Islamic Empire and in European universities from the 12th through the 17th centuries.
holding a drug-soaked sponge under-
neath the patient’s nose.

**Understanding disease:** The Muslims were among the first to understand that many diseases are contagious. In the 14th century, Ibn al-Khatib described how disease is spread (quoted in Bernard Lewis’s *A Middle East Mosaic*): “The existence of contagion is established by experience, study, and the evidence of the senses, by trustworthy reports on transmission by garments, vessels, ear-rings; by the spread of it by persons from one house, by infection of a healthy sea-port by an arrival from an infected land.” Muslim doctors were the first to describe the differences between smallpox and measles, and to identify scabies and anthrax.

**Hygiene and health:** Some of the most important contributions to medical knowledge by Islamic physicians came in the field of hygiene and its relationship to health. They were the first to describe the germ-killing effects of alcohol and to use it in hospitals. The idea of a healthy environment was also pioneered by the Muslims. To determine the healthiest place for a new hospital in Baghdad, the famous physician al-Razi hung slabs of meat in various parts of the city. The area where the meat rotted most slowly was chosen as the hospital’s new site.

**Record keeping:** Islamic hospitals were probably among the first to keep medical records on all patients. The records included information on the patient’s condition and treatment.

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**ASTRONOMY AND THE ISLAMIC CALENDAR**

Astronomy, the study of the stars and the planets, was an important field of study in the Islamic Empire. Astronomy was a useful science because it helped people find their way on land or at sea. Astronomy was also approved by the Quran (Sura 6, verse 97), which states, “[Allah] has appointed for you the stars, that by them you might be guided in the shadows of land and sea” (quoted on the Web site World Scripture).

Arabs had always been interested in the sky. Early Arabs named certain planets and stars, using these heavenly bodies to guide them safely across the desert. After the conquest began, Islamic scholars used information learned from the ancient peoples of Persia, Greece, and India to improve and advance the field of astronomy.
Contributions to Astronomy

Islamic scientists excelled in astronomy. Al-Battani (ca. 858–929) more precisely calculated the length of a solar year than anyone had ever done before. He calculated it was 365 days, 5 hours, 46 minutes, 24 seconds. The most recent modern measurement is 365 days, 5 hours, 48 minutes, and 45.5 seconds. The Polish astronomer Copernicus (1473–1543), who proposed the theory that all planets in the solar system rotate around the Sun, mentioned in one of his books that he learned a great deal from the work of al-Battani.

Islamic scientists were the first to use the observatory (a special building for watching the skies) as a scientific institution. From observatories in Baghdad, Cairo, and other places in the empire, Abul Wafa (940–998) and other astronomers watched and described the movements of the Sun, planets, and stars. In the 16th century, Danish scientist Tycho Brahe (1546–1601) watched the movements of the Moon and made the same discoveries Islamic astronomers had made centuries earlier. From an observatory in Egypt, al-Battani catalogued close to 500 stars.

As the empire was being torn apart in the early 1250s, Islamic scholars continued to make advances in the field of astronomy. In 1274, Muslim astronomer Nasir al-Din al-Tusi (1201–1274) convinced the Mongol invaders to allow him to build a huge observatory in what is today northwest Iran. The observatory at Maragha was a center for astronomical research for many years and provided a model for future observatories.

One way in which astronomy affected the Islamic Empire was through the Islamic calendar. This calendar is based on the cycles of the Moon. This is different from the Gregorian calendar used by most Western countries today, which is based on the movements of the Sun.

Like the Gregorian calendar, the Islamic calendar has 12 months. These months alternate between 29 and 30 days each. There are also leap years. Because it is a lunar calendar, though, the Islamic calendar falls about 11 days behind the solar calendar each year. As a result, the Islamic calendar does not follow the seasons.

The Islamic calendar was created in 638 by the order of Caliph Umar. Umar wanted the calendar to begin with the year 1 being the Hijra, Muhammad's migration to Medina and the birth of Islam. Therefore, in the Islamic calendar every date after July 16, 622, is marked A.H., which means after the Hijra.
Making Sense of Math

Many of the mathematical theories developed during the height of the Islamic Empire advanced the disciplines of arithmetic, geometry, algebra, and other branches of mathematics. Perhaps most important, Muslim scholars made mathematics useful and practical.

The Muslims owed much of their early knowledge of mathematics to texts written by ancient Greeks and Hindus. Islamic scholars then expanded upon this Greek and Hindu information, developing and advancing concepts and theories. Centuries later, texts written in the Islamic Empire would inspire and teach European scholars.

One of the most significant Islamic contributions to math was popularizing a new system of numerals borrowed from the Hindus. These numerals, which are now known as Arabic numerals, are the same symbols that are used today for numbers. Before this time, numbers were represented with letters of the alphabet or with Roman numerals, which were difficult to work with.

The new numeral system enabled merchants and others to more quickly and efficiently solve math problems without the use of an abacus (a counting device using beads strung on wires) or a process known as “finger reckoning.” (Finger reckoning, or counting on the fingers, was widely used by merchants before the introduction of Arabic numerals.) By using the new numbers, problems could now be solved with pen and paper.

A second important Muslim contribution to mathematics also originated with the Hindus. It was a system of arithmetic based on 10 and included zero. Before the use of zero, those solving math problems had to arrange their numbers in columns to make clear their different values. The use of the base-10 system and zero made arithmetic logical and practical, and was adopted by European mathematicians centuries later. The zero also enabled Muslim scholars to further develop the decimal system and fractions.

Muslims also advanced other Hindu concepts, taking square and cube roots to fourth, fifth, and even higher roots.

Another branch of mathematics that blossomed during the Islamic Empire was algebra. Algebra (which comes from the Arabic term al-jabr, or “the joining together of disorganized parts”), was more fully developed by Muslim mathematicians. They pioneered the use of linear, quadratic, and cubic equations. They also devised a step-by-step process to solve problems, called an algorithm. The concept of “x” as the unknown variable in algebraic equations came about from a Spanish translation of the Arabic word shay, or “thing.” Geometry and trigonometry were also advanced by Muslim scholars.