Art

POETRY

Even before Islam, oral poetry was the highest form of art to the Arabs. In melodic verses, poets chanted the dangers of desert journeys, the joys of battle, the glories of their tribal clans, or the nobility of nomadic life. After the arrival of Islam, religion became as popular a topic as any. Rabia al Basri (715-801 CE) was an Arab poet from Basra, Iraq who lived during the Abbasid period. Her poetry reflects her religious devotion and Sufi influence. Poetry remained important even after the Abbasid period. Centuries later, the Persian poet Jalaluddin Rumi (1207-1273 CE) would become one of the most famous Muslim poets of all time.

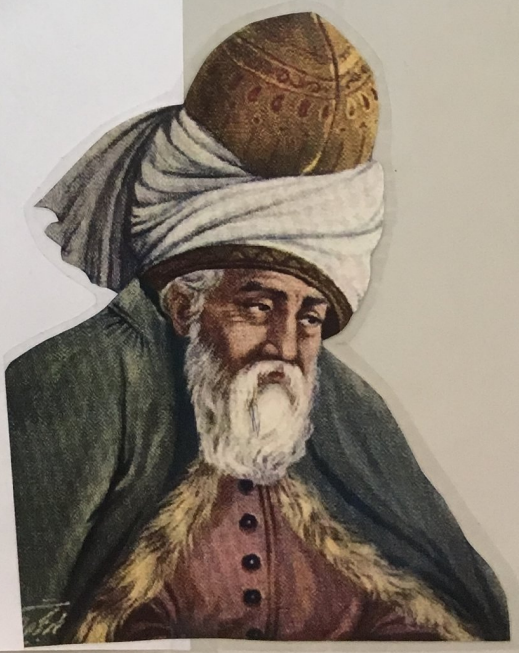
If I Adore You

If I adore You out of fear of Hell, burn me in Hell!
If I adore you out of desire for Paradise,
Lock me out of Paradise.
But if I adore you for Yourself alone,
Do not deny to me Your eternal beauty.
—Rabia al Basri

The Body is Too Slow for Me

Toward the gardens,
Toward the orchards,
I am going.
If you want to stay here,
Stay here -
I am going!
My day is dark without His Face,
Toward that bright flame
I am going.
My soul is racing ahead of me.
It says, The body is too slow for me -
I am going.

The smell of apples arises
from the orchard of my soul.
One whiff and I am gone -
Toward a feast of apples
I am going…
— Jalaluddin Rumi



Decorative Arts

Islamic Calligraphy

What is it? Calligraphy is beautiful, artistic writing. Ever since the Qur'an was written down, the act of writing has played an important role in Islamic tradition. This importance is illustrated in an Arabic proverb that says "Purity of writing is purity of the soul." In fact, transcribing the Qur'an is considered a sacred act.

Why did it develop? Islamic teachings prohibit showing statues or pictures of anything that has a soul in religious contexts. Words and plants, however, may be shown. As a result, Muslim artists and artisans have lavished great care on calligraphy, often combined with plant forms. A primary use of calligraphy is transcribing sacred works of Islam. Calligraphy is also applied to buildings, pottery, textiles, and metalwork throughout the Islamic world.

Why is it important? Islamic calligraphy adds rich beauty wherever it appears. For Muslims, the use of calligraphy is also an expression of faith.

This panel on a mosque in Shiraz, Iran, displays a script called *kufic*, which is more squared off than the flowing cursive style. Kufic script is well suited to tilework.

▲ A calligraphic tile panel in Iran

▲ A calligrapher in Medina writes out the Qur'an.

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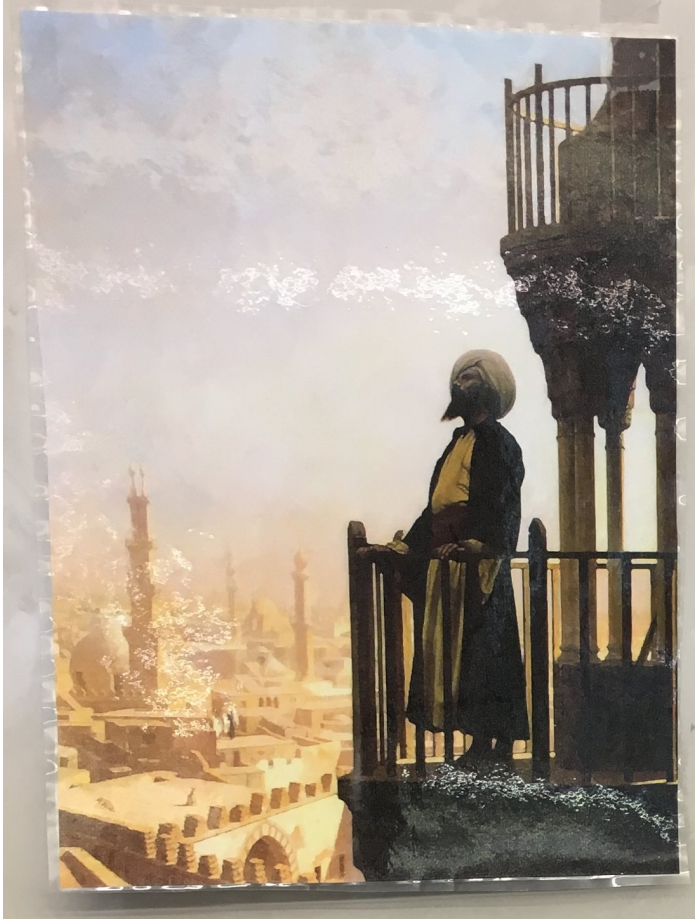
Architecture

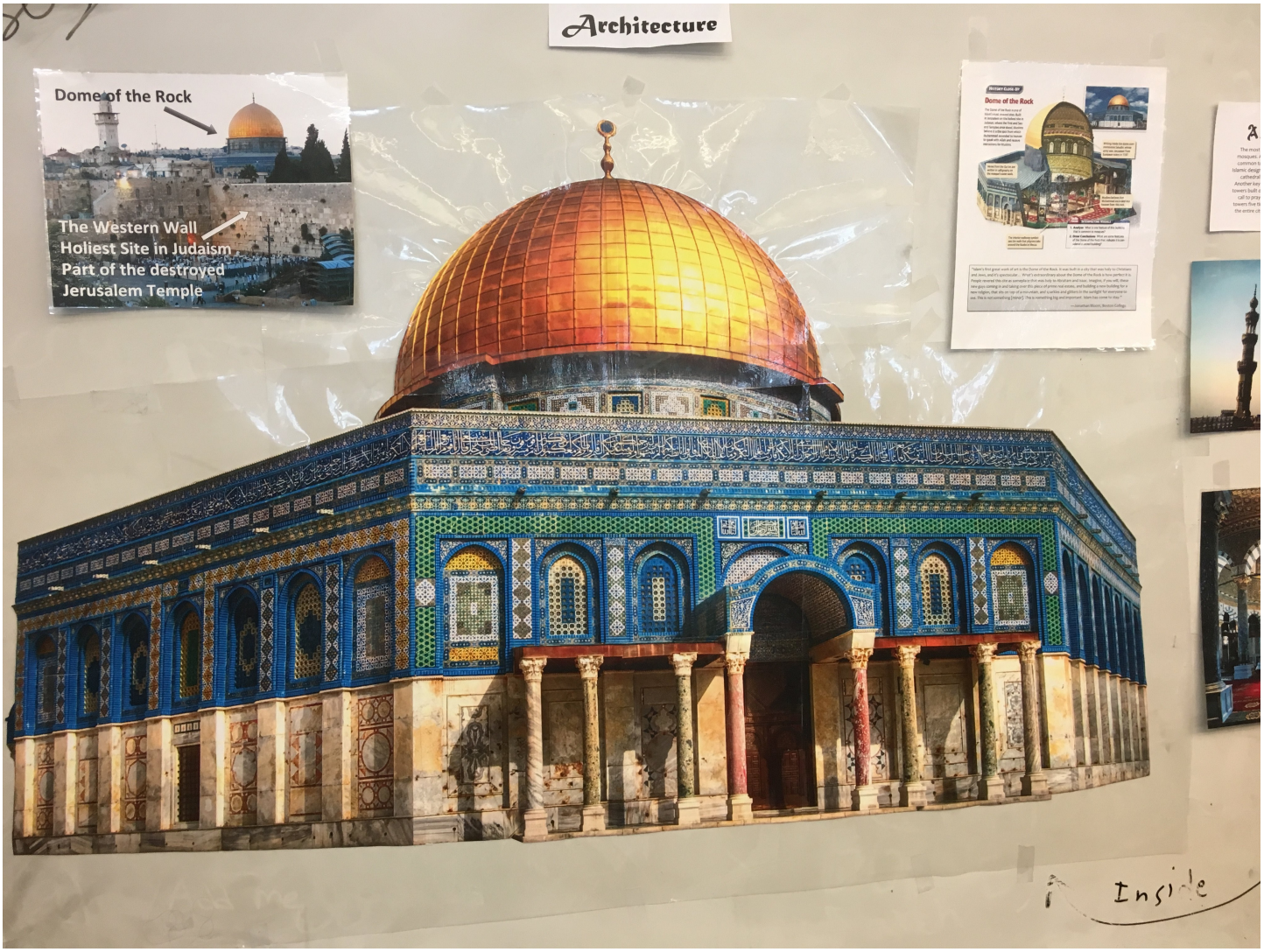
The most important architectural works in the Muslim world are mosques. As Islamic architecture developed, two features became common to many mosques. The dome, which became symbolic of Islamic design, was borrowed from the Byzantines, who used it in their cathedrals, most famously the Hagia Sophia in Constantinople. Another key feature of mosque design was the use of Minarets. Tall towers built on the sides of mosques, they were used for the Azan, or call to prayer. Callers, or muazzins, would go to the top of these towers five times a day to melodically recite the call loud enough for the entire city to hear. The height of the minaret helped carry their voices far and wide.



Arabic version playing on computer in the back!

The Muazzin's Call to Prayer

God is Great, God is Great
God is Great, God is Great
I bear witness that there is no god but God
I bear witness that there is no god but God
I bear witness that Muhammad is the messenger of God
I bear witness that Muhammad is the messenger of God
Come to Prayer
Come to Prayer
Come to Success
Come to Success
God is Great, God is Great
There is no god but God

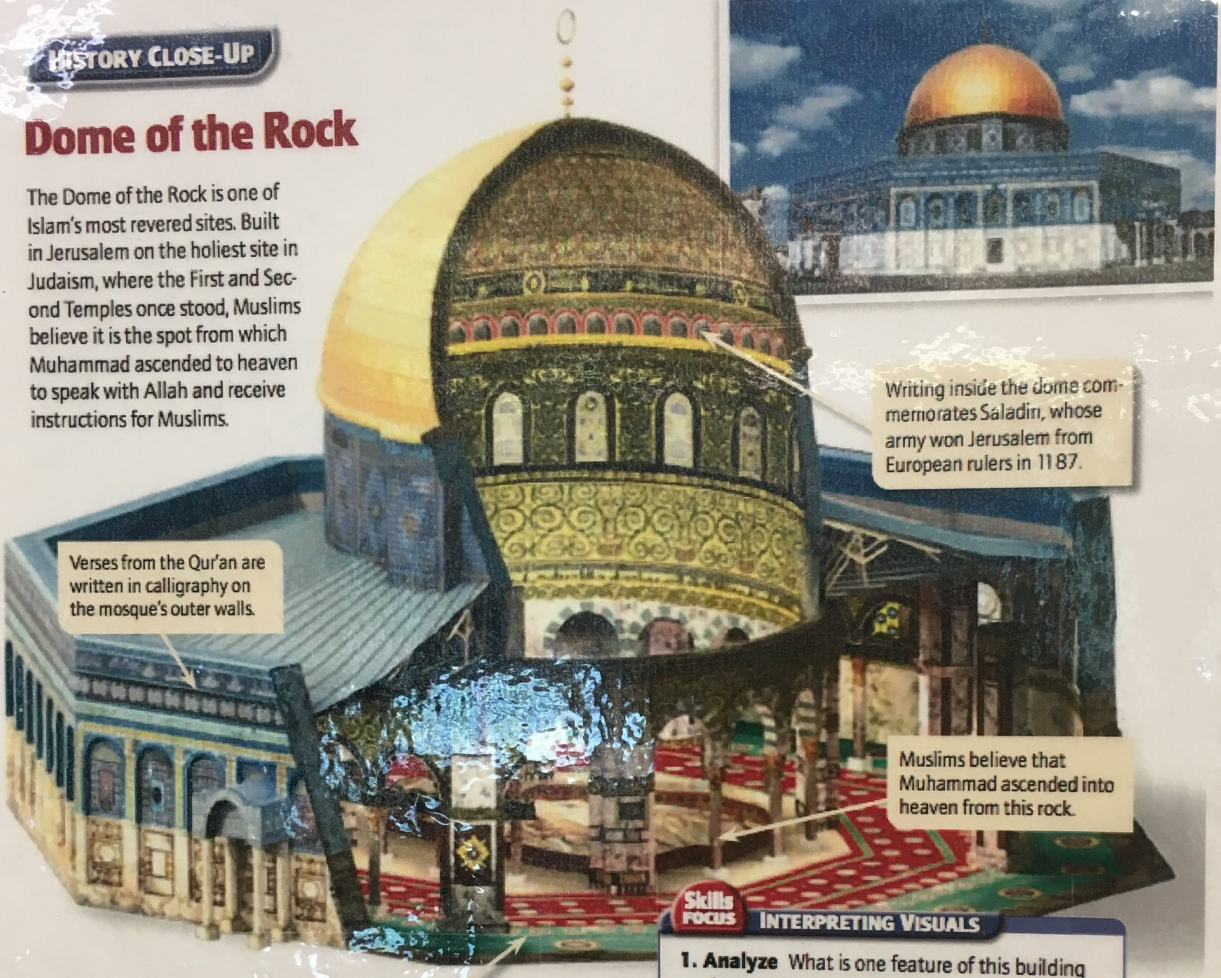

Architecture
Dome of the Rock
The Western Wall
Holiest Site in Judaism
Part of the destroyed
Jerusalem Temple
Dome of the Rock
Inside

Inside

HISTORY CLOSE-UP

Dome of the Rock

The Dome of the Rock is one of Islam's most revered sites. Built in Jerusalem on the holiest site in Judaism, where the First and Second Temples once stood, Muslims believe it is the spot from which Muhammad ascended to heaven to speak with Allah and receive instructions for Muslims.



Skills Focus INTERPRETING VISUALS

1. **Analyze** What is one feature of this building that is common to mosques?
2. **Draw Conclusions** What are some features of the Dome of the Rock that indicate it is considered a sacred building?

"Islam's first great work of art is the Dome of the Rock. It was built in a city that was holy to Christians and Jews, and it's spectacular... What's extraordinary about the Dome of the Rock is how perfect it is. People revered this cite as someplace that was holy to Abraham and Isaac. Imagine, if you will, these new guys coming in and taking over this piece of prime real estate, and building a new building for a new religion, that sits on top of a mountain, and sparkles and glitters in the sunlight for everyone to see. This is not something [minor]. This is something big and important. Islam has come to stay."

—Jonathan Bloom, Boston College

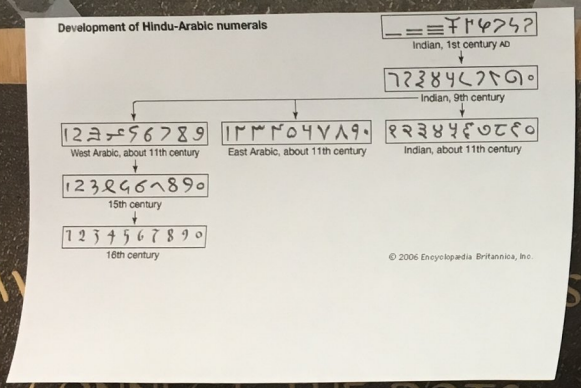
VII. LOGOS

PRESENT THE FACTS,

GE

Mathematics

CONNECT BACK TO YOVR POSITION, BE ACCVRATE



X. MODERATORS

SCRIPT YOVR DEBATE, SPEAK IN MO

CONNECT THE DOTS, ALWAYS BE CLEAR, KEEP IT SIMPLE

IX. REBVTTAL

FACES OF HISTORY

al-KHWARIZMI

c. 780–c. 850

Some of today's students may not yet realize that algebra has practical uses. But when mathematician Muhammad ibn Musa al-Khwarizmi developed algebra, he did so to solve real problems. For example, Islamic law required that inheritances be divided according to proportions. Figuring out how much each heir should receive was made easier with algebra. Al-Khwarizmi also recommended using algebra to help with lawsuits, business deals, measuring land, and digging canals. In fact, we owe the word *algebra* to al-Khwarizmi, who used the Arabic word *al-jabr*, meaning "completion," in the title of a book on mathematics.

Quick Maths!

One of the first Directors of the House of Wisdom in Bagdad in the early 9th Century was an outstanding Persian mathematician called **Muhammad Al-Khwarizmi**. He oversaw the translation of the major Greek and Indian mathematical and astronomy works (including those of Brahmagupta) into Arabic, and produced original work which had a lasting influence on the advance of Muslim and (after his works spread to Europe through Latin translations in the 12th Century) later European mathematics.

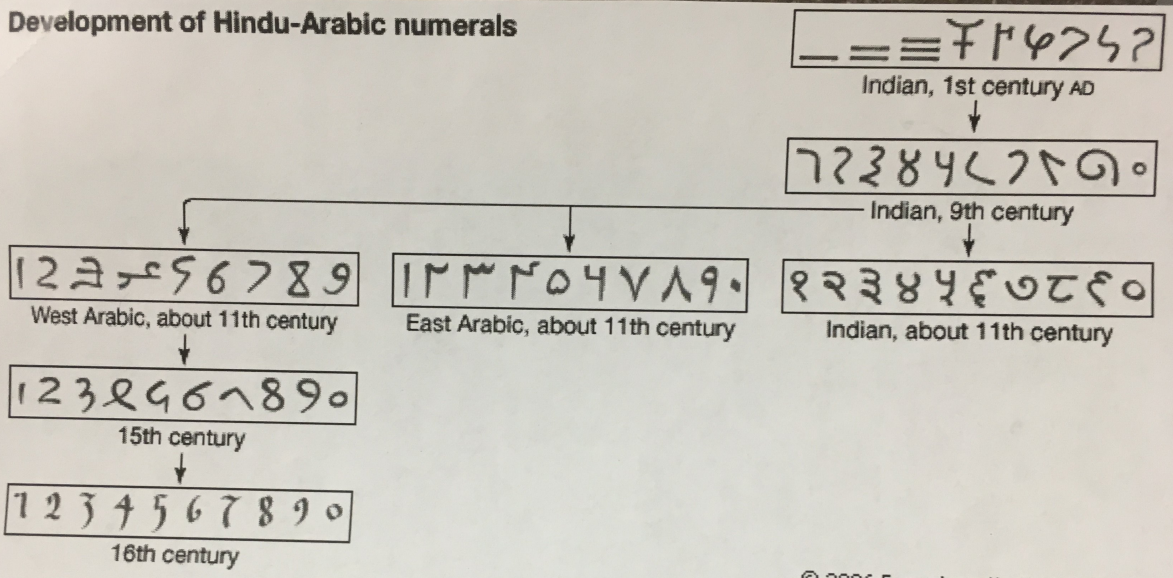
The word "algorithm" is derived from the Latinization of his name, and the word "algebra" is derived from the Latinization of "al-jabr", part of the title of his most famous book, in which he introduced the fundamental algebraic methods and techniques for solving equations.

Perhaps his most important contribution to mathematics was his strong advocacy of the Hindu numerical system, which Al-Khwarizmi recognized as having the power and efficiency needed to revolutionize Islamic and Western mathematics. The Hindu numerals 1 - 9 and 0 - which have since become known as **Hindu-Arabic numerals** - were soon adopted by the entire Islamic world. Later, with translations of Al-Khwarizmi's work into Latin by Adelard of Bath and others in the 12th Century, and with the influence of Fibonacci's "Liber Abaci" they would be adopted throughout Europe as well.

Al-Khwarizmi's other important contribution was **algebra**, a word derived from the title of a mathematical text he published in about 830 called "Al-Kitab al-mukhtasar fi hisab al-jabr wa'l-muqabala" ("The Compendious Book on Calculation by Completion and Balancing"). Al-Khwarizmi wanted to go from the specific problems considered by the Indians and Chinese to a more general way of analyzing problems, and in doing so he created an abstract mathematical language which is used across the world today.

Source: StoryOfMathematics.com

Development of Hindu-Arabic numerals



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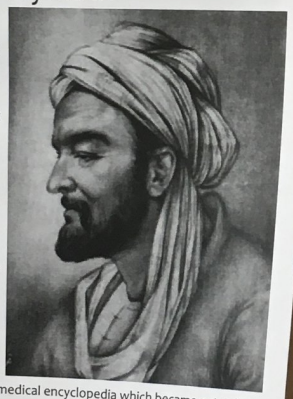
Medicine

I. PREPARATION

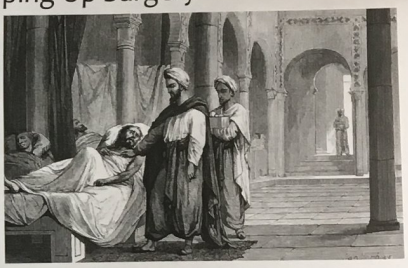
The Persian Polymath



Was there anything Ibn Sina could not do? The Persian scholar **Ibn Sina**, later known as **Avicenna** in Europe, first mastered philosophy and religion. Then he gained fame as a physician and trained other doctors who came to him for guidance. While teaching and treating the sick, Ibn Sina began to study the law. After all these efforts, surely Ibn Sina had reached old age. But he was only 16 years old! The next year, when he was all of 17 years old, Ibn Sina cured a powerful local leader of a disease that had frustrated other doctors. For his reward, the famous doctor asked only to use his patient's library. Ibn Sina contributed to medical libraries of the future by compiling a massive encyclopedia of known medical knowledge.
***Source**: Susan Ramirez, World History: Human Legacy*

Ibn Sina was a Persian polymath who is regarded as one of the most significant physicians, astronomers, thinkers and writers of the Islamic Golden Age. He has been described as the father of early modern medicine. Of the 450 works he is known to have written, around 240 have survived, including 150 on philosophy and 40 on medicine. His most famous works are The Book of Healing, a philosophical and scientific encyclopedia, and **The Canon of Medicine**, a medical encyclopedia which became a standard medical text at many medieval European universities and remained in use as late as 1650.
***Source**: Wikipedia*

Stepping Up Surgery



One of the great figures of Muslim Spain was Abu al-Qasim al-Zahrawi, later known as Albucasis in Europe, the greatest medieval Muslim surgeon. He revolutionized how surgery was performed by inventing new methods and tools to help heal patients. His thirty-volume encyclopedia of medicine was used as a standard text for medicine throughout Europe for centuries. The impact he had on how medicine was practiced was truly revolutionary.

His encyclopedia of medicine, al-Tasrif, is divided into 30 volumes. His most influential volume is the 30th, the one dedicated to surgery. In it, he explains in detail how to perform certain surgeries to cure certain ailments. He insists in it that all surgeons must first be very well versed in general medicine, anatomy, and even the writings of philosophers who studied medicine.

Al-Zahrawi pioneered many of the procedures and materials still used in operating rooms today. He was the first to use catgut as the thread for internal stitches. Catgut is a thread made from the lining of the intestines of animals. It is the only material that can be used for stitches and still be absorbed by the body, preventing the need for a second surgery to remove internal stitches. He invented many tools necessary for modern surgery. He was the first to use forceps in childbirth, greatly decreasing the mortality rate of babies and mothers. He performed tonsillectomies with the same tongue depressors, hooks, and scissors

both local and oral anesthesia in order to reduce the pain patients experienced during surgery. He performed mastectomies, removing a woman's breast if she had breast cancer, a procedure still done today. He described how to set bone fractures, amputate limbs, and even how to crush bladder stones. To describe all his "firsts" in medicine would take a book of its own.

Source: Firas Alkhateeb, "The Pioneer of Modern Surgey", Lost Islamic History

Diagram of Surgical Tools from Original Arabic Text

Diagram of Surgical Tools from Latin Translation

Heading to the Hospital

The first modern hospital with nurses and a training centre was in Cairo. In the Ahmed Ibn Tulun hospital (named for the founder of the Tulunid dynasty), which was established in the year 872, all patients received free health care – a Muslim tradition which was institutionalized with the advent of the hospital. Slightly more basic hospitals had existed prior to this in Baghdad. But it was the Cairo model which would later serve as the template for hospitals all around the globe.

***Source**: Sebastian Christ, "8 Great Modern Innovations We Can Thank Muslims For", Huffington Post*

Depiction by Muslim artist of Aristotle teaching his students

Philosophy

BIOGRAPHY

Ibn Rushd (Averroës)

While growing up in Spain, Muslim scholar Ibn Rushd (1126–1198)—known to Europeans as Averroës—was interested in almost every subject and profession. He focused first on medicine and became chief physician to the Muslim ruler in Spain. Later, he studied astronomy and wrote several important books on the subject. Ibn Rushd also studied law, became a famous judge, and wrote a digest of Islamic law.

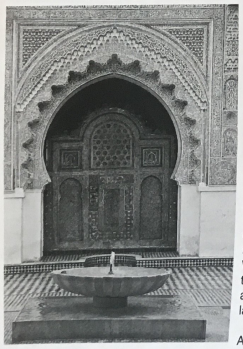
Ibn Rushd is best known as a philosopher. Muslims, Jews, and Christians alike have studied his commentaries on Aristotle for centuries. For part of his life, however, Ibn Rushd lived in exile outside Spain because some Muslim religious leaders felt that his writings contradicted the teachings of Islam. **What role did Ibn Rushd play in increasing the knowledge of people during the Middle Ages?**

Geeks for the Greeks

The philosophers of Ancient Greece had a tremendous impact on the philosophers of the Islamic Golden Age, and none more than **Aristotle**. The first of the Muslim Aristotelian philosophers was **Al-Kindi** (801-873), who introduced Greek philosophy to the Arab world and presented its ideas through an Islamic perspective. **Al-Farabi** (872-950), from modern-day Kazakhstan, was called "the Second Teacher" because he was viewed as second only to Aristotle himself. The Persian scholar **Ibn Sina** (980-1037), called Avicenna in Europe, was well known for his advances in medicine, but was also a major Aristotelian philosopher who also incorporated ideas from another Greek philosophical school: Neoplatonism. Finally, the Andalusian scholar **Ibn Rushd**, known in the West as Averroes, wrote at least 38 commentaries on Aristotle. His works spread beyond Spain into Europe and helped to shape late medieval Christian understanding of Aristotelian philosophy.

***Source**: Simon Elijah Johnson, "Aristotelian Philosophy in the Muslim World"*

University of al-Qarawiyyin, Fez



Fatima Al-Fihriya was an Arab Muslim woman who is credited for founding the oldest existing, continually operating and first degree-awarding educational institution in the world, The University of Al Qarawiyyin in Fes, Morocco in 859 CE, which subsequently became one of the leading spiritual and educational centers of the historic Muslim world. The madrasa she founded is still in operation today. It was incorporated into Morocco's modern state university system in 1963 as the University of Al Qarawiyyin. It is the oldest continually operating educational institution in the world, the first degree awarding educational institution in the world according to UNESCO and Guinness World Records, and is sometimes referred to as the oldest university. The mosque is also still in operation, and is one of the largest in North Africa.

Al-Fihri was the daughter of a wealthy merchant, and had been educated. The family was part of a large migration to Fes from the town of Qayrawan (in modern Tunisia), and so the town lent its name to the mosque and madrassa.

***Source**: Wikipedia (adapted)*

House of Wisdom, Baghdad

One of the most valuable contributions of Muslim scholars was the translation into Arabic of works by scientists and philosophers of ancient Greece. During early Abbasid rule much of this work took place at an academy in Baghdad called the House of Wisdom that was maintained by the government. Through their translations, the resident scholars made texts from Hippocrates, Euclid, Galen, and Ptolemy available to a new audience. Once translated into Arabic, the Greek texts stimulated further study throughout the Muslim world.

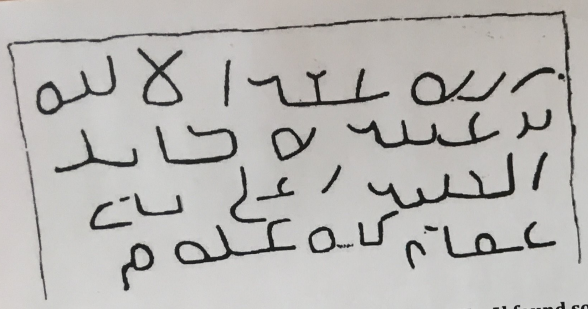
The influence of these texts extended to Europe. The Arabic versions of many works were eventually translated into Latin. In this way, they became available to European scholars. In fact, much of the science and philosophy taught in European universities during the Middle Ages came from these translations.

***Source**: Susan Ramirez, World History: Human Legacy*

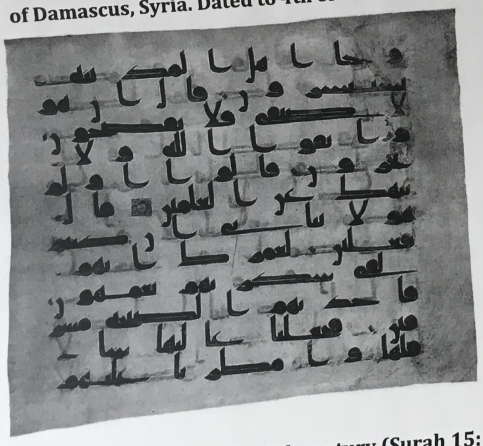
The **House of Wisdom** (Arabic: *Bayt al-Hikma*) was a major intellectual center during the Islamic Golden Age. The House of Wisdom was founded by Abbasid Caliph Harun al-Rashid (reigned 786–809) and culminated under his son al-Ma'mun (reigned 813–833) who is credited with its formal institution. Al-Ma'mun is also credited with bringing many well-known scholars to share information, ideas, and culture in the House of Wisdom. Based in Baghdad from the 9th to 13th centuries, many learned scholars including those of Persian or Christian background were part of this research and educational institute. Besides translating books into Arabic and preserving them, scholars associated with the House of Wisdom also made many remarkable original contributions to diverse fields.

During the reign of al-Ma'mun, astronomical observatories were set up, and the House was an unrivaled center for the study of humanities and for science in medieval Islam, including mathematics, astronomy, medicine, alchemy and chemistry, zoology, and geography and cartography. Drawing on Indian, Greek, and Persian texts, the scholars accumulated a great collection of world knowledge, and built on it through their own discoveries. By the middle of the ninth century, the House of Wisdom was the largest repository of books in the world. It was destroyed in the sack of the city following the Mongol Siege of Baghdad (1258).

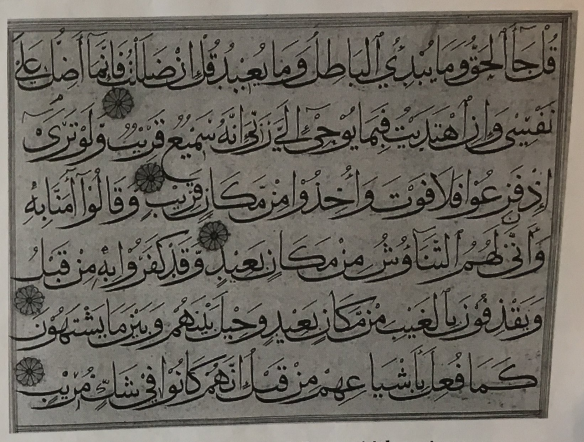
***Source**: Wikipedia (adapted)*



Pre-Islamic Arabic Jazm inscription of Umm al-Jimāl found south of Damascus, Syria. Dated to 4th or 5th century



Page from a Qur'an in Kufic style, 8th century (Surah 15: 67–74)



Folio of Qur'an, Mamluk Egypt, 14th century

Evolution of the Arabic Script

While the Arabic language has existed orally since the Iron Age, the Arabic script or writing system developed rather late. The first recorded text in the Arabic alphabet was written in 512. This earlier version of the Arabic alphabet was generally written without any dots to distinguish letters that otherwise look the same. For example, the letters b, t, th, n, and y look exactly the same (in most cases) without their dots, and could only be told apart by the context. Since most people in Arabia were not literate and did not need to read, these issues were of little concern. After Islam came to Arabia, however, people needed a way to read and write the Quran that was clear and consistent. To avoid confusion or misreading, the Arabs further developed the Arabic script by adding not only dots to tell similar letters abut also vowel markings and other symbols to make sure everything was pronounced exactly as intended.

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Science & *Technology*

Astronomy

Muslim interest in astronomy developed from the need to fulfill three of the Five Pillars of Islam—fasting during Ramadan, performing the hajj, and praying toward Mecca. A correct lunar calendar was needed to mark religious periods such as the month of Ramadan and the month of the hajj. Studying the skies helped fix the locations of cities so that worshipers could face toward Mecca as they prayed. Extensive knowledge of the stars also helped guide Muslim traders to the many trading cities of the ancient world.

INTEGRATED TECHNOLOGY

RESEARCH LINKS For more on astronomy, go to **classzone.com**

The device shown here is called an **armillary sphere.** The man standing in the center is aligning the sphere, while the seated man records the observations. Astronomers calculated the time of day or year by aligning the rings with various stars. This helped Muslims set their religious calendar.

Muslim observatories were great centers of learning. This scene depicts astronomers working at the observatory in Istanbul. They are using many instruments including an astrolabe like the one shown on this page.

The astrolabe was an early scientific instrument. It had a fixed "plate" and a rotating "rete." The plate was a map of the sky and the rete simulated the daily movement of the earth in relation to the stars. Using this tool, one could calculate time, celestial events, and relative position. For Muslims, the astrolabe helped determine where they were in relation to Mecca.

This is the plate. The plate was etched with a map of the sky for a certain latitude.

This is the rete—it rotated over the plate. The rete was mostly cut away so the map beneath was visible.

These pointers on the rete represented different stars. At night, observers could look at the sky, position the pointers, and make their calculations.

Connect *to* Today

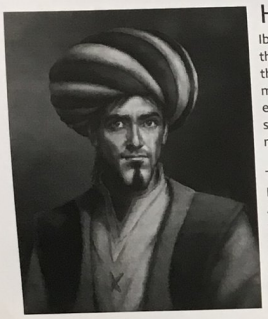
1. **Recognizing Effects** How did fulfilling religious duties lead Muslims to astronomy and a better understanding of the physical world?

See Skillbuilder Handbook, page R6.

2. **Comparing and Contrasting** Muslim astronomers developed instruments to improve their observations of the sky. We do the same thing today. Research how modern astronomers make their observations and compare their methods with early Muslim astronomers. Write two paragraphs on how their methods are similar to and different from each other.

Technology

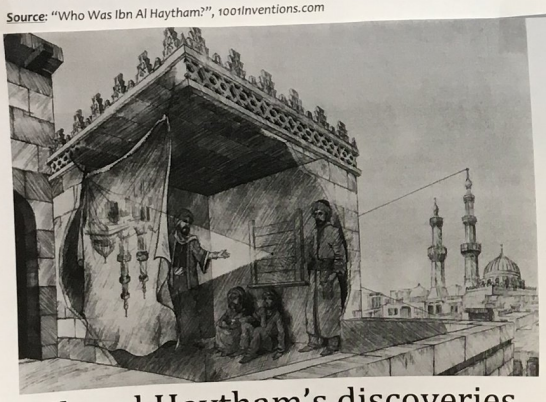
He Let You Take a Selfie



Ibn al-Haytham was a pioneering scientific thinker who made important contributions to the understanding of vision, optics and light. His methodology of investigation, in particular using experiment to verify theory, shows certain similarities to what later became known as the modern scientific method.

To explore the nature of light and vision, Ibn al-Haytham used a dark chamber he called "Albeit Almuzlim," translated into Latin as "camera obscura" – the device that forms the basis of photography. He observed that light coming through a tiny hole travelled in straight lines and projected an image onto the opposite wall. Based on such experimentation, Ibn al-Haytham concluded that vision is accomplished by rays coming from external luminous sources and entering the eye, rather than through rays emitted from the eye as was commonly believed.

Source: *"Who Was Ibn Al Haytham?", 1001Inventions.com*



Ibn al Haytham's discoveries with early camera technology

The Man With Wings

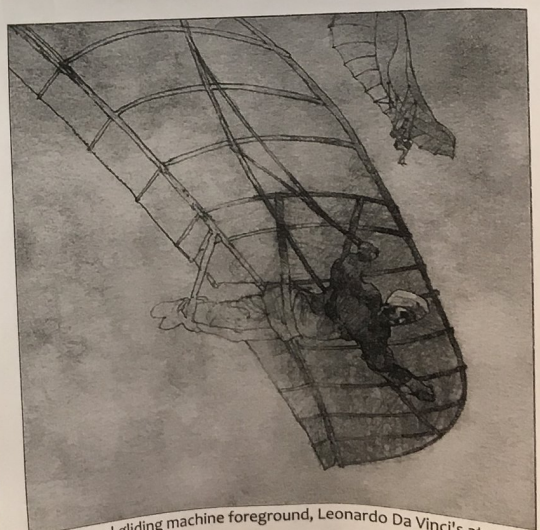
The word "futuristic" best describes the work of an Andalusian musician, glassworker, thinker and inventor, **Abbas Ibn Firnas**. Although documentary proof of his work is not as extensive as many Arab-Muslim thinkers, multiple accounts have survived in credible second and third hand histories, enough to give him the title of father of modern glider aviation.

Working in the Umayyad court in Cordoba in 852, he is said to have observed a gambler-daredevil named Armen Firman take bets and parachute off the top of the minaret of the Great Mosque in Cordoba. This rudimentary parachute flight, which Firman survived, inspired Ibn Firnas to redirect his work away from music and glassware to the mechanics of flight.

He studied birds, falling seeds, leaves, feathers, and bats and devoted more than 20 years to building what seems to have been the first modern glider, with wings sewn of silk, wood, and actual feathers. When in his 60s, he took a number of friends and observers to the Sierra Morena, a ridge outside Cordoba. Accounts say that he jumped off the hillside into the wind and remained airborne for 10 minutes, sailing over the fertile irrigated plain outside Cordoba. Only upon landing did he remember that he had omitted a critical part of his design, something not unlike a bird's tail that allows it to control its descent. This important realisation came too late, because Ibn Firnas hit the ground fast and hard, breaking bones and leaving him in pain for the rest of his life, which lasted another 12 years. So he did survive to talk about his discovery, even if the outcome was less than perfect.

Illustrations of his flying device are not unlike the design for a glider that Leonardo Da Vinci drew nearly 700 years later. Ironically, Da Vinci is given credit for being the first modern thinker to seriously address the means of flight. Whether Da Vinci saw drawings or read about the flight of Abbas Ibn Firnas will never be known. But even if not, it demonstrated that two great minds would independently solve in a similar way one of the greatest engineering puzzles of history: how to transfer the skills of birds and insects to mankind.

Source: *Arab Science: A Journey of Innovation, The Qatar Foundation*



Ibn Firnas' gliding machine foreground, Leonardo Da Vinci's at rear

From Sufis to Starbucks

Now the Western world's drink du jour, coffee was first brewed in Ethiopian or Yemen around the 9th century. One story goes that an Arab named Khalid was tending his goats in the Kaffa region of southern Ethiopia, when he noticed his animals became livelier after eating a certain berry. He boiled the berries to make the first coffee. Certainly the first record of the drink is of beans exported from Ethiopia to Yemen where Sufis drank it to stay awake all night to pray on special occasions. By the late 15th century it had arrived in Mecca and Turkey from where it made its way to Venice in 1645. It was brought to England in 1650 by a Turk named Pasqua Rosee who opened the first coffee house in Lombard Street in the City of London. The Arabic qahwa became the Turkish kahve then the Italian caffé and then English coffee.

Source: "How Islamic Inventors Changed the World", The Independent