

The Visual Arts



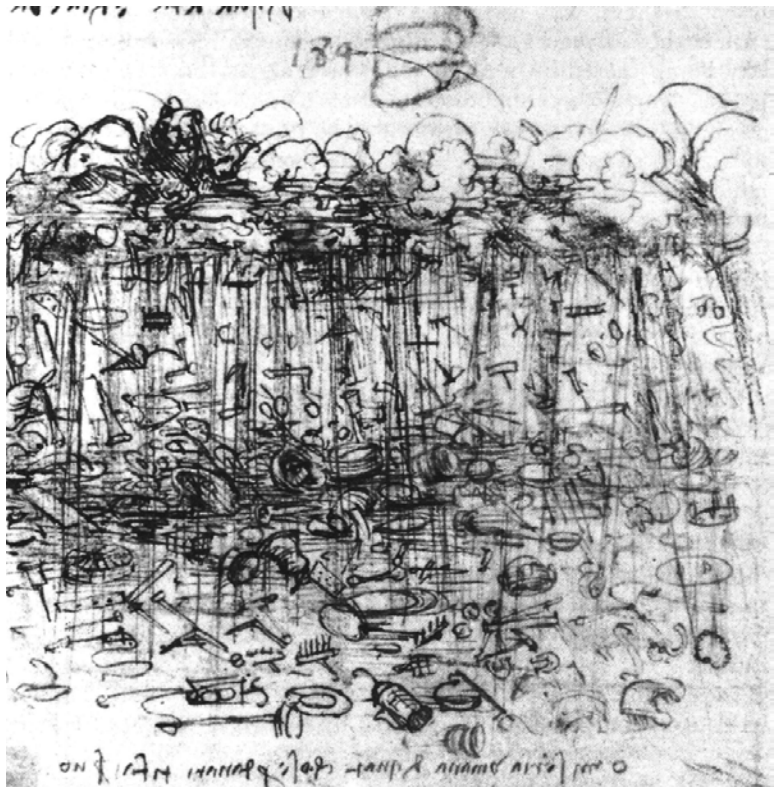
MATERIAL WEALTH:

A SIGN OF THE TIMES, A REFLECTION OF CULTURAL VALUES

We all have limited resources for buying new things. First we take care of our **needs**, essential items for survival, such as shelter, food, clothing and medical care. When our basic human needs are met, we can turn our eyes toward **luxuries**, things we want that add comfort and pleasure to our lives. These might include fashionable clothing that projects a message about who we are. Likewise, the material goods with which we furnish our homes, adorn our bodies or serve our dinner guests also make a statement about who we are and what we value.

By the middle of the 11th century, the European economy had entered a period of expansion and growing prosperity. This reflected its transformation from a “subsistence economy,” in which people labored simply to provide for a minimal level of basic needs, to a “money economy,” where people enjoyed a surplus of money beyond their needs. The surplus was used to buy local and imported products that began to appear in Europe’s growing markets.

The main causes for this dramatic change in Europe’s economy were improvements in agriculture. A better plow enabled farmers to dig deeper into the soil and cultivate moist, richer lands. Swamps were drained and farmed, and new methods of crop rotation were developed. Food production increased with the introduction of the collar harness and horseshoe which enabled farmers to turn from the use of oxen to the more efficient horse for pulling their plows. The waterwheel and the windmill were some of the new inventions that enabled quick and efficient grinding of grain.



Leonardo da Vinci's drawing, "Rain of Consumer Goods".

Though they continued to live in fear of diseases that we can cure or prevent today, this increase in food production created a stronger, healthier European whose life expectancy increased with every agricultural advance. With longer life spans, agricultural surplus and new sources of wealth from trade, European towns developed, offering jobs to rural laborers who left their country homes for urban centers.

As cities grew, their population created demand for food, labor, clothing, and household goods. Trade routes reached out to broader markets, and soon Europeans were linked into commercial networks with the rest of the Eastern Hemisphere.

Migrations, plagues, wars and trade all created a web of interaction that changed their lives forever. In 1271, Marco Polo, who so well typifies the adventuresome spirit of the age, departed for his journey to the court of Mongolian ruler Kublai Khan in China. His journeys, like those of the African explorer Ibn Battuta in the 14th century, crossed the Muslim lands into the palaces of the Far East, stunning Marco Polo with the wonders of a world only a few Westerners had seen before him. This tremendous exchange between far-reaching parts of the world held immense possibilities for religion, philosophy, literature, the arts, technology and commerce.



THE HIGH MIDDLE AGES: A TIME OF FEAR, A TIME OF VITALITY

A time line of the High Middle Ages (1050-1270) shows that some momentous events took place on the Afro-Eurasian continent during that era, which had a significant effect on world history. The Crusades, the rise of great trade centers in Africa, the spread of Islam from Spain to the borders of China, and the movement of the Turko-Mongolian peoples out of the Central Asian steppes and into China where they created the brilliant Yuan Dynasty are among major historic events.

It was also during this time that three incidents in particular ushered in an era of upheaval within the Christian Church and shook the foundations of European society:

1. The Christian Church was divided by the Great Schism of 1054 CE.
2. The Crusades were launched in the 11th century in an attempt to wrest control of the Holy Lands from Muslim rulers.
3. The Turks, who were converting to Islam, threatened Constantinople, the Byzantine capital of Eastern Orthodox Christianity. Though the Turks failed to take the city several times, they sent tremors of fear throughout Europe.



The Great Schism reflected the hostility between the *Roman Catholic Church*, based in Europe and the *Eastern Orthodox Church*, based in the splendid city of Constantinople, capital of the Byzantine Empire. Among other things, the conflict centered on questions about the nature of Christ, the authority of the Pope, and the question of whether or not icons should be banned in accordance with the Old Testament prohibition of their use (see Exodus 20:4). To the medieval mind, these were critical issues which made the difference between looking forward to an eternity spent in heavenly bliss or dreading endless damnation. In 1187, devout Christians of Europe were shaken even further by the fact that Salah al-Din (Saladin), a Kurdish Muslim, had recaptured Jerusalem for the Muslims, for whom it is also a sacred city.

Interestingly enough, however, this time of upheaval, insecurity and fear blossomed into an era of remarkable growth and development for Europe. As knights, pilgrims and merchants traveled along the Old World trade routes, they returned to their homeland with tales of wealth, splendor and brilliance of the East. Setting theological differences aside, the Byzantine Empire, as a neighboring Christian culture, held special fascination for European travelers. Located along the strategic trade routes of the time, it was the site of a highly developed

culture which strongly reflected Greek, Persian, Islamic and Asian influence.

Grand Byzantine palaces, refined court culture, thriving bazaars, elegant dress and a highly developed intellectual tradition dazzled even the most sophisticated Europeans (or “Latins” as the Byzantines called them). Busy Byzantine ports along the Mediterranean and the Black Seas traded in furs, hides, grain, salt, wine and slaves from Russia, spices, precious stones and pearls from India and Arabia, porcelain, silk and tea from China, and gold, ivory and slaves from Africa. As early as the 10th



European merchants exchange cloth for spices.

century, wealthy Europeans had developed a taste for the exotic goods of the Byzantine, Muslim and Asian worlds. A formal reception at the imperial court of Constantinople would expose the traveler to such wonders as silks, African ivory carvings and *automata*, fantastic moving mechanical structures which were sometimes covered with gold. (The idea for this popular court amusement originated in China and spread across the Muslim domain into Byzantium.) These courtly wonders astonished visiting officials such as Liudprand of Cremona who served as Italian ambassador to the court of Constantinople, and wrote the following comments in the year 948:

ECHO FROM THE PAST

Liudprand of Cremona's Visit to Constantinople in 948

“ Before the emperor's seat stood a tree made of bronze gilded over, whose branches were filled with birds, also made of gilded bronze, which uttered different cries, each according to its varying species. The throne itself seemed so marvelously fashioned that at one moment it seemed a low structure and at another it rose high into the air. It was of immense size and was guarded by lions, made either of bronze or of wood covered over with gold, who beat the ground with their tails and gave a dreadful roar with open mouth and quivering tongue. Leaning upon the shoulders of the two eunuchs I was brought into the emperor's presence. At my approach the lions began to roar and the birds to cry out, each according to its kind....After I had three times made obeisance to the emperor with my face upon the ground, I lifted my head and behold! The man whom just before I had seen sitting on a moderately elevated seat had now changed his raiment and was sitting on the level of the ceiling. How it was done I cannot imagine, unless perhaps he was lifted up by some sort of device as we use for raising the timbers of a wine-press.”¹

1. Antapodosis, VI, v, in *Works of Liudprand of Cremona*, trans. F.A. Wright, (London: Routledge and Kegan Paul Ltd., 1930), pp. 207-208.

THE RISE OF THE EUROPEAN MERCHANT CLASS

By the end of the Crusades (13th century) Europeans had developed a taste for luxury items from long-distance trade. An extensive web of commercial traffic linked cities such as Sevilla, Fez, Timbuktu, and Cairo in the west, with Baghdad, Samarkand, Hangchow and Xian (most likely the largest city in the world at that time) in the east. Other branches reached Arabia, dipped south into India, or extended over the Caspian Sea to Russia and Central Asia. Italian cities, which had never entirely given up their links with the Mediterranean sea trade, funneled eastern luxuries at a great profit into northern Europe.

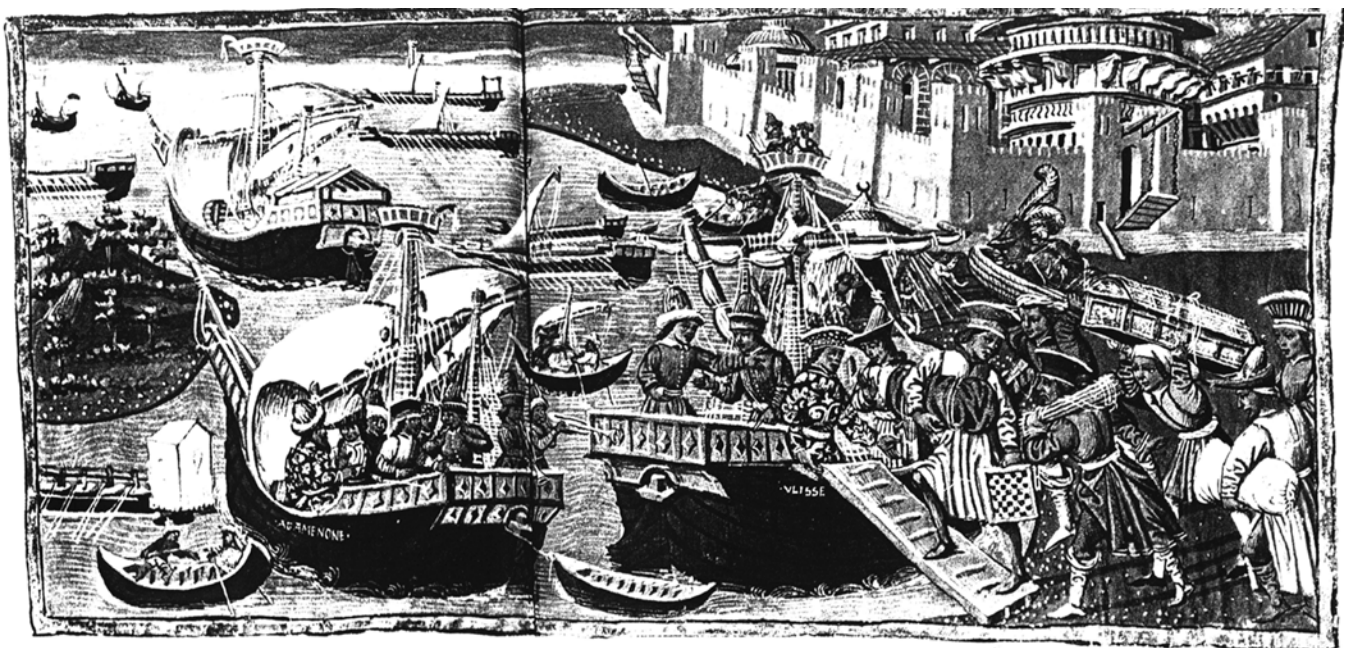
As Europe's demand grew, a new class of entrepreneurs emerged to meet the needs of the great urban centers. By the time of the Renaissance (14th-16th centuries) Italian port cities such as Venice and Genoa had created commercial wealth beyond anything seen in that part of the world before. In the north, Flanders had taken the political and economic lead, and the cities of Bruges, Ypres and Ghent rivaled the Italian sea ports in beauty, grace and fortune.

Long distance trade was risky. Merchants could easily fall prey to bandits, natural disasters on land and sea, starvation, political upheaval or disease. On the other hand, for those brave enough to take the risk, the new trade became extremely lucrative. As the new merchant class developed, traders formed mercantile associations which shared the risks, split profits, protected monopolies, and developed an elaborate system of banking. A new capitalist spirit emerged as these bold and confident merchants became the economic, social and political leaders of their day, generally laying the foundations for the development of the urban culture of Renaissance Europe.

CHANGES IN LIFESTYLE AND TASTES

As Europeans began to live longer and healthier lives they developed a fresh confidence that enabled the upper classes to enjoy increased contact with other cultures as well as a new pride in their own Greco-Roman heritage. Europe's ruling nobles and families who had made their fortune in trading and banking were leaders in the development of a new sense of style and international tastes.

Europe's merchants, Christian missionaries and political ambassadors traveled around the world while embracing Renaissance culture and confidence with enthusiasm. Those who formed the new upper crust of society could boast of homes filled with goods from across the globe. Houses were eagerly filled with trade



goods which served as symbols of worldliness and wealth. Hosts would impress their visitors with Persian carpets, Chinese ceramics and rare spices which could be purchased at the great trade fairs in cities such as Ghent, Antwerp and London. Luxuries from the Near and Far East in particular became the hallmark of success.

Gold poured in from Africa and the New World, along with precious stones from the Middle East and India, setting new standards for ornamental jewels. Although European women were still mainly confined to the house, their status increased and the markets reflected their influence. Silks, brocades and jewels appealed to the female buyers who were concerned with presenting themselves to society in the best light possible. Home furnishings became an important reflection of status; Persian carpets, textiles and tapestries became “necessities” to wealthy urbanites. Each family had to have a library or study to reflect their intellectual sophistication. Furniture from around the world proclaimed the family’s success in business and trade.

As a more worldly and sophisticated outlook developed among Europeans, it became more acceptable to celebrate the individual—his or her personality, talents and achievements. A measure of this change is the increasing popularity of portrait painting. In an age before photography, a painted likeness might serve to let a king view a potential wife in a foreign court, or help the family of the potential bride decide whether to accept an offer of marriage. During the Renaissance, painters—who were considered craftsmen—enjoyed increased demand for portraits of prominent families, officials, and local notables. People suddenly desired to have themselves memorialized, and the art of portraiture, which was not particularly appreciated before, took on great significance. A mere likeness was not enough—they wanted their achievements, temperament and person-

ality to be revealed in the painting. Family portraits showed individuals with their prized belongings as well. Artists frequently spent at least as much time depicting the details of one’s material goods as they did on the person being portrayed. Portrait art also reflected increasing communication among the wealthy and educated in Europe. A Milanese noblewoman wrote to a friend, “We ask if you would be good enough to send us your portrait by this messenger so that we may be able not only to compare the works of the two artists, but also to have the pleasure of seeing your face again.”² The lady who received the letter is the subject of *Lady with the Ermine*, a famous painting by Leonardo da Vinci. Not only nobility, but even “tailors and butchers have their portraits painted”, complained one Renaissance writer, warning that the popularity of portraiture was a disgrace of the age.



Among the wealthy, elaborate new rules for proper behavior and manners developed.

Following a formalized ritual of proper etiquette became an indication to others that one held a high position in society and knew how to behave with dignity. Women were trained, for example, how to pretend to “faint” in the proper manner if something crude or unpleasant occurred in their presence. People tried to be more elegant at the table in particular, where new rules forbade behavior that had been accepted in earlier times, such as sharing eating utensils or taking food from a platter with bare hands. Grand dinner parties in homes filled with Greco-Roman sculpture, oriental carpets and family portraits proclaimed to the elegant guests that their hosts were members of the new urban elite. Even as we view such articles of status from the European Renaissance in museums today, it is obvious that the owners of these articles were successful in the new era which ushered in vastly expanded world trade, international culture, and commercial development.

2. John Hayes, editor, *Genius of Arab Civilization: Source of Renaissance*, (Cambridge: MIT Press, 1983), p. 265.



LOOKING AT HOME INVENTORIES

While a wealthy, educated merchant class was developing in eastern and western cities along the great trade routes, most people continued to live simple lives as agricultural laborers or artisans. People who had wealth—even moderate amounts—often kept detailed inventories of their belongings. These inventories served several purposes:

- ❖ they provided a record of belongings in the case of theft or fire
- ❖ they kept records which were used for taxation records
- ❖ they helped the owner make a will, and helped families distribute property in the event of the owner's death
- ❖ they indicated a family's wealth, status and social position
- ❖ they helped to keep a large home organized.

Following are two home inventories from different geographic and cultural regions. One is from the home of a merchant in 16th century Damascus, Syria. The other is from the home of a 16th century banker in the Belgian port city of Bruges. Neither is an actual historical document, but the lists are compiled from historical sources that describe some items in actual homes, as well as items that were in common use at the time in homes of that social class.

DIRECTIONS:

1. Compare the inventories of these two homes to discern how they differ and how they are alike. *Look for clues* in their inventories for such things as the climates they live in, the things that are important to them, how they spend their free time, and what they eat and wear.
2. List the values that the items in these inventories reflect. Compare them with the values our society reflects today. Explain why you think the similarities or differences reflect positively or negatively on the culture.
3. **Map Project:** (you will need a large felt tip marker, yarn of two different colors, and push pins or thumb tacks for attaching the yarn to the map.)
 - Place a world map on the wall and circle the places from which products in these two houses originated. (Use temporary markings to avoid damage to the map.)
 - Using push pins or thumb tacks, attach one color of yarn to the map to connect these geographic sources of trade items to the city of Bruges.
 - Using the second color of yarn, connect the origins of trade items to the city of Damascus.
 - Do the maps share some sources of trade goods?
 - If the sources aren't listed, see if you can determine their origin. For instance, wool items probably would have come from England or Flanders. Incense could very well have originated in Yemen. Keep in mind that items from the "New World" were also being introduced to Europe at this time. Use the map on page 296 for help.

SOURCES FOR STUDENT ACTIVITY “LOOKING AT HOME INVENTORIES”

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INVENTORY #1: A DAMASCENE MERCHANT'S HOME, 1600S



In the name of God, the Compassionate and the Merciful

Through the grace and mercy of Allah, I, Mustapha ibn Abdullah ibn Abdul-Ghani, have been blessed with a life of abundance, health and joy. The needs of my family are not many, and yet we have plentiful goods (thanks to the grace of Allah), which are partially listed below. May the blessings of Allah and the guidance of the Prophet Muhammad (peace be upon him and his family) continue to sustain me and my family throughout our days and may we be blessed with the joys of eternal bliss upon our passing from this world.

- four *mushaf* [copies of the Qur'an], in illuminated calligraphy with leather binding stamped with a geometric pattern in gold.
- 7 strings of prayer beads
- seven prayer rugs
- blue tiles for repairing the two ablution fountains used for washing before prayers (one for the men and one for the women)
- three scrolls embroidered with Qur'anic verses in gold and silver thread. Purchased during the Hajj to Makkah.
- items kept in the main library (the one with the inlaid wooden paneling and the fireplace of ceramic tile from Hebron, Palestine):
 - books (124 volumes in number, catalogued on sheets kept in the book press)
 - a large library desk decorated with inlaid ivory in geometric patterns
 - wooden pen boxes from Sana decorated with inlaid camel bone
 - maps (6 in number), accompanied by two guide books to the Hajj
- folding, carved wooden table stands to support round metal trays
- brass trays with hammered and etched designs and from the *suq* (bazaar) in Isfahan, Persia
- 2 wooden chests inlaid with camel bone for the storage of bedding for cold evenings
- 5 bricks of beeswax for candles
- 10 oil lamps
- one *sehtar* (lute) and two *nayh* (flutes of bamboo) produced in Baghdad
- 1 chess board with set of intricately carved ivory figures made in Toledo
- three caged nightingales in the rose garden
- textiles:
 - 14 carpets (7 from Persia, 3 from Bukhara, 2 from Anatolia, and 2 from Xian)
 - multi-patterned cotton fabrics from Delhi for pillow covers
 - Cantonese silks for making clothing
 - brocades native to Damascus workshops
 - pillows and tapestry pillow-covers for the *diwan* (long sofa)
 - Nubian striped cloth for covering the cushions in the rose garden

- 9 storage baskets woven by the finest craftsmen from Alexandria, Egypt
- six fine swords of Damascene steel
- 4 hooded capes of silk (2 with fur trim for evening outings)
- ceramic jars filled with dried spices for cooking:
 - pepper
 - dill
 - saffron
 - cardamom
 - Persian sumac
 - mint
- 2 flower vases of porcelain from Hangchow
- a ceramic serving bowl with fish and sea design (a gift from a merchant of Genoa)
- 8 cut glass cups for sherbet, made in Prague
- 2 samovars [large, intricately carved metal pots for brewing tea] from Kiev
- porcelain serving dishes (serving for 25) from a city called “Hokaido”
- 20 hempen sacks [burlap] for storing oranges, dates, figs, apricots and rice
- 3 round metal storage tins (made by people called “Muscovites” who do fine work in metal) for storage of tea and Yemeni coffee
- muslin cloths for covering sugar cones
- churns for making fresh goat cheese and butter
- horses (six in number, one with foal to be given to my daughter Fatimah)
- two pair of leather riding boots from Tashkent
- jewelry belonging to my wife and daughters
 - 4 jade bracelets bought in Samarkand
 - necklaces crafted in Cairo from the gold of Mali
 - one brooch of fine craftsmanship in silver—made by a Christian artisan in Constantinople
- pair of incense burners of brass inlaid with silver
- five metal boxes from Marakesh with latches, for storing henna, frankincense, lavender, dried rose petals and incense
- 1 dagger and sheath decorated with lapis lazuli [a blue stone from Central Asia]
- one Italian wood cupboard for the bedchamber of my wife’s mother
- three mirrors from Fez, with stamped metal frames
- a lacquered black and gold box from Canton
- a brass astrolabe engraved with Qur’an verses
- one rare “bughola” or “Earth Sphere” from Bombay, Hindustan, (India) etched with images of four continents, written in Sanskrit
- 2 copper cooking pots from Ghent
- 3 leather saddles made by the craftsmen of Cordoba



INVENTORY #2: A BRUGES BANKER'S HOME, 1500S

Anno Domini 1584

In the year of Our Lord, 1584

I, Jon Josef van der Weyden, did set to the pen this partial inventory of household goods owned by myself and my family, may Christ Our Lord endow them with his Mercy, and may the Blessed Mother protect them in this life and for a joyous eternity.

- ◆ five Bibles. (printed in Germany) one with a colored frontispiece depicting St. Jerome
- ◆ six rosaries (two made of ceramic beads from Toledo, Spain)
- ◆ a painting of the Virgin Mother seated upon the Throne of Heaven (kept in the lower sitting room)
- ◆ an oil painting depicting Adam and Eve's expulsion from the Garden (kept in the chamber of my eldest daughter, Athena)
- ◆ a crucifix (one from the Holy Land of Palestine, decorated with inlaid silver)
- ◆ a vial of holy water purchased in Jerusalem
- ◆ one large desk of mahogany for the upper floor library (transported by river and sea from Warsaw)
- ◆ books (98 in number)
- ◆ a globe of the world from Portugal with silver inlay
- ◆ beeswax for making candles
- ◆ 9 oil lamps
- ◆ sitting chairs:
 - 9 of leather
 - 4 of printed fabric with flowers and cherubs from the finest markets of Paris
- ◆ a cloisonné enamel pill box from Fugien Province in China
- ◆ a red lacquer chest decorated in gold with paintings of pagodas made in Xian
- ◆ a small marble bust of a Roman noblewoman, purchased in Venice
- ◆ a family portrait in oils by a Flemish painter, framed in gilt
- ◆ 10 earthenware soup bowls for everyday service
- ◆ pantry items:
 - six wooden storage chests for vegetables, apples and flour
 - two wooden barrels for storing ale and wine
 - two hanging baskets for the storage of eggs
 - four iron hooks for hanging and curing fowl
 - a butter churn



A dying man surveys his possessions.

- ❖ 4 wash basins
- ❖ 2 each of fur coats, boots, and fur hats from Muscovy
- ❖ feather quilts and hides from Kiev for use in the bedchambers
- ❖ 3 Persian rugs from the markets of Isfahan
- ❖ a small stock of tiles made in Bruges (black and white) for repairs to the dining area
- ❖ a ceramic serving bowl from the markets of Hangchow, decorated with blue flowers on a white background
- ❖ a loom for weaving wool and flax by the servants
- ❖ indigo dye from Bombay
- ❖ 5 ricks of wood
- ❖ 2 stoves covered with Delft tile
- ❖ two carved bed warmers from Amsterdam
- ❖ a perforated brass hand-warmer from Damascus, inlaid with silver
- ❖ an armoire for storing fabrics and textiles:
 - 4 lengths of Cantonese silk to be used by the ladies of the house
 - a damask table cloth
 - four lengths of lace (from York and Kent) for window curtains
 - woolen capes (six from Warsaw, two from Dublin)
 - 6 lengths of linen for underclothing
 - a patterned bed cover from Bombay
- ❖ two Tuscan wall tapestries: in the library and the sitting room
- ❖ cochineal, a red dye from the New World which is made from crushed bugs
- ❖ two leather saddle bags given to us by a brave merchant who has traded with the heathens of Tashkent
- ❖ a still life oil painting of fruit, tapestries and flowers
- ❖ a lute crafted in Baghdad
- ❖ 2 saltcellars of etched glass from Prague
- ❖ items of jewelry for my wife and daughters
 - an ornately carved ivory hair comb from Nubia
 - 3 necklaces of pearls from Muscat
 - a necklace of Mother-of-Pearl and gold made in Venice
 - 2 crosses on chains of gold from Marrakech
- ❖ 6 Bavarian tankards of pewter, silver and tin
- ❖ 20 spoons, knives and forks of pewter
- ❖ ladle of silver from Constantinople
- ❖ 2 silver candlesticks from Fez





THE FABRIC OF PRESTIGE AND ELEGANCE: IMPORTS AND IMITATIONS OF MUSLIM TEXTILES

During the mid-19th century, the German artist Friedrich Fischbach wanted to study the fine textiles used in Europe in centuries past. He prepared a design book of color lithographs (a new, “hi-tech” process at that time) showing the patterns of antique luxury fabrics. His purpose was both artistic and practical. During the early machine age, many artisans wanted to improve the artistic quality of machine-produced consumer goods and provide marketable ideas as well. By 1883, he had made 160 color plates that reproduced examples of actual textiles found in museums and private collections, as well as those appearing in European oil paintings. While Fischbach included some examples of ancient Egyptian, Persian and even Peruvian textile designs, the bulk of his plates included textiles of Europe and the Near East (Muslim and Byzantine cultures). He excluded textiles of the Far East because, while their textiles have been both rich and technologically innovative, he probably wanted to limit the range of his study.



Muslim cloth merchant with a porter carrying a bolt of cloth.

Chances are, you have been reading about the eastern spice trade since you first heard about Columbus and the other European explorers. You may have learned about the Silk Road—the routes from China along which silks were brought. You may not realize that textiles were perhaps the most important goods traded between Europe and the eastern Mediterranean. Because of the high cost and risk of transport, usually only the finest fabrics were imported for use by wealthy nobles and rulers, for Church officials and for church vestments and other articles used in worship services. Brocades woven with Arabic sayings and even religious phrases found their way into use as vestments for the clergy and altar cloths. The Cleveland Museum of Art contains a piece of Spanish Muslim fabric in silk and gold. Woven into it is the Muslim creed *La ilaha illa Allah* (“There is no god but God”). The fabric was found in a tomb, as the grave clothes of the Bishop of Barcelona, who died in 1284 CE.

Throughout human history, it seems, beautiful and rich fabrics have always played an important role in ceremonies. They clothe the powerful figure with majesty and authority. Historians have noted that even during the early Middle Ages in European history, when trade was nearly extinguished by invasions and instability, a supply of these ceremonial textiles continued to be upheld. Italian cities such as Venice, Amalfi and Naples maintained continuous trade links with eastern Mediterranean ports throughout the Middle Ages. The island of Sicily, which was under Muslim rule from 820 to 1091 CE, remained even afterward a center of Muslim cultural influence and textile production, as shown in the slides that accompany this reading.

Well into the fourteenth century, Italian trade with the eastern Mediterranean was made up of spices, silk and other luxury textiles, and cotton fiber, yarns and cloth. Natural dyestuffs like indigo blue and red madder



Fabric made for a Muslim ruler's court.

into the design of these court fabrics was the *tiraz*, lettering with the name of the ruler, often bearing a religious saying or formula. The *tiraz* actually became a design element in European fabrics as well, though in fake lettering, meant to look like Arabic.

The reasons for wanting to copy these fabrics are obvious. The market for fine fabric was expanding rapidly with the class of burghers grown rich on trade, and wanting to display their wealth. Sporting rich clothing would no longer be just for kings, great lords and bishops. The obvious impulse of the Italians, who were in close touch not only with the exporters, but with the manufacturers, would be, “Why don’t we manufacture these ourselves, sell them a little cheaper than imports, and pocket the profits?” The decision on what styles, colors and patterns to manufacture would be natural—make as close a copy to the “real thing” as they could! In this way, the designs of Muslim textiles, already valued and worn and traded as the essence of cultured finery, also influenced the way native European artists and designers developed their art, as they had already influenced their tastes. It often takes an expert eye to tell which designs are copies and which are original oriental manufactures.

Of course, as time went on, and Italian, then French and other manufacturers gained confidence and market share, the designs became more distinctively their own. Even then, however, native European manufactures did not entirely replace the eastern fabrics, for the next five (5!) centuries. Until the mid-19th century,

were another important luxury item. In payment, Italian merchants traded raw materials like metals, wool, honey and some food products. Manufactured goods included soap and increasingly, woolen and linen textiles. Textiles from Europe would be the growth products of the trade from that period on. With the growth of towns and rise in trade, demand in Europe for fine textiles grew. Europeans adopted the technologies—spinning, weaving, dyeing and finishing—for producing the textiles from raw and semi-processed fibers. This technology was directly transferred from the Muslim world to Italian, then French, then other manufacturing centers through merchants who had resident agents in the eastern Mediterranean. Technology such as the pedal loom for weaving complex designs, and techniques for weaving fabrics such as satin, had originated in China, but had traveled—along the same route as paper and silk manufacture, toward the west via the Muslim world. Not only the technology, but the artistic qualities were copied, along with specific kinds of fabric like gold brocade, damask, satins, heavily embroidered fabrics and velvets.

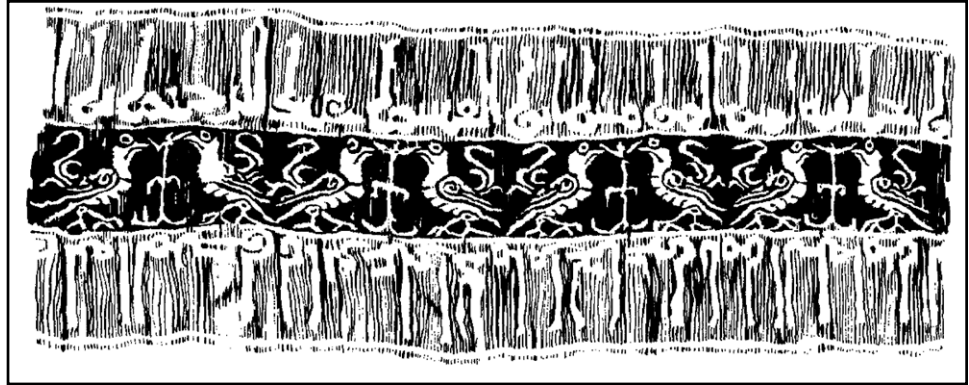
One especially treasured item seems to have been the brocades produced for the courts of Muslim rulers. They were often presented as diplomatic gifts or robes of honor, so they were also coveted marks of prestige. Woven or embroidered



11th-century Sicilian fabric.

fabric weaves and blends, techniques, colors and designs continued to be copied from, as well as traded to and from, the Mediterranean and other parts of the Muslim world.

Indeed, even today, there is a strong specialty market for traditional textiles—batik, tie-dye, African prints, oriental silks, oriental carpets and embroidery, Indian cottons, and hand painted fabrics, both for home decoration and clothing. The traditional styles which today make up a small handicraft market compared with mass produced goods are only a shadow of what they once were. During their heyday, they represented the state-of-the-art in manufactured goods, and they seriously affected the economics of exporting and importing countries alike. Most of the highly-skilled artisans who populated whole towns in textile producing regions of Asia and Africa have died out, often leaving hard-pressed descendants crushed by the competition of cheap machine goods. As in ancient days, only the very wealthy can afford the work of the few determined, quality artisans who preserve the best of the traditional arts.



Border of a court fabric with the Muslim ruler's name.

HISTORIANS' VOICES

TEXTILES

Andre Clot, in *Harun al-Rashid and the World of the Thousand and One Nights*:

“Textiles were the great industry of the Muslim world. They were the most evolved product of the Middle East, the most refined and diverse: heavy, thick woolen stuffs from north Africa; light fabrics from Iran; gauze, voile, and linen from the Nile delta; luxurious *foulards* from Khorasan and Kabul, which were sent to China itself; silk hangings from Antioch and Baghdad; lush Armenian carpets, and many others. From *washi* (luxurious embroidered material) to the cotton fabrics of Syria and Egypt, not forgetting the coarse materials in which the Baghdad poor swaddled themselves, the Muslim empire made everything imaginable to clothe human beings.”³

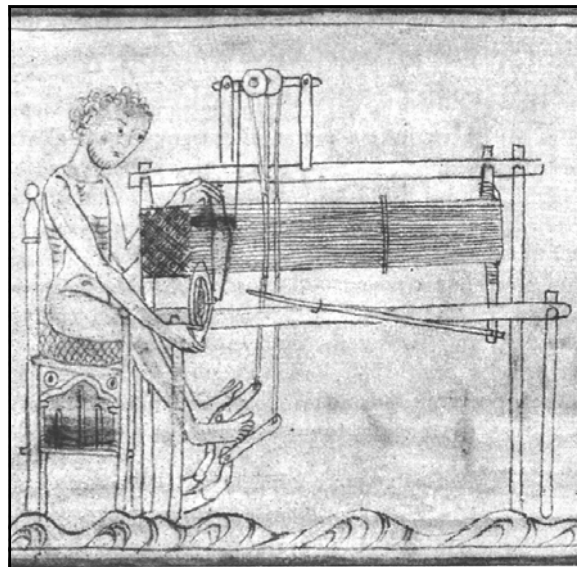
The 9th-century Muslim regions that historian Andre Clot describes as textile centers were part of a wide network of shared technology and trade. In addition to the textile workshops that served the rulers' courts, there were also many private workshops that made goods for local use and export. Each locality tended to specialize in a type of cloth, depending on the particular fibers that were raised nearby or available through regional trade routes. In some towns, suburbs or villages, almost the whole population worked in textile manufacturing. Farmers and shepherds, spinners and carders earned very low wages, but as the work added more value and artistry, skilled artisans commanded more pay.

Spinning was done with a distaff, and the spinning wheel is an invention that probably got its start in Central Asia and moved west. Most weaving was done on horizontal looms or pedal looms—inventions from China. Other complex techniques from the Far East included tapestry weaving and studding with pearls and jewels. When this technique was adopted in France, they called it Gobelin, a tapestry technique. Muslim weavers also worked gold and silver threads into the fabric. Spain and Persia specialized in silver weaving.

3. Andre Clot. *Harun al-Rashid and the World of the Thousand and One Nights*. (New York: New Amsterdam Press, 1993), pp. 188, 19-21.



13th century Italian brocade with imitation Arabic.



Late medieval European weaver working on Chinese-type pedal loom.

Clot says, “Gold first appeared in fabrics at the end of the 8th century, in the form of a thin leaf of metal rolled around a thread. By the 9th century, weaving techniques for brocade enabled weavers to make any pattern of plants and animals.” These complex patterns, using pedal looms, were later copied by Europeans. During the early Industrial Revolution, they were mechanized in the Jacquard loom, which is still used today. Oddly, the development of the computer owes much to gradual developments of brocade-weaving looms.

The beauty and harmony of brocades from the Muslim world created a large, steady demand, over centuries, and museums still treasure them today. Because of their appearance in paintings, many people associate them strongly with the Renaissance in Europe.

When these fabrics passed to Europe through trade, many retained their Muslim place-names—*muslin* from Mosul, *tabby* silk blend from Attabiyyah (suburb of Baghdad), *damask* from Damascus. Later, another such fabric would become so famous that it would seem to have originated in the West—*calico*—from Calicut, India, the famous, light, friendly cotton wood-block printed fabrics that were a staple of the Industrial Revolution, worn by common folk all around the world. India, both in Muslim and Hindu regions, continued to provide styles and techniques in fabric design well into the industrial age. Many of these fabrics first reached Europe through Muslim ports and export houses. There are many other such names, but they are mostly familiar to tailors and designers. During the Middle Ages, Italian, and later French, merchants in the Mediterranean, as well as Flemish and German merchants on the northern and East European routes, went regularly to the textile centers for wares to take back home.

The widespread geography of textile production, spinning, weaving, dyeing and finishing shows its importance in the Muslim world. Cotton and wool were worked in Morocco and the rest of North Africa. Silk and wool were important products of Spain. In Sicily, Syria (today’s Lebanon and Palestine included), and Khurasan (north-eastern Iran), silk and cotton were raised and worked. The cities of Iraq contained factories for all sorts of fabrics—cotton, silk and wool in all of its forms, from sail cloth and tent stuffs to the sheerest silk and cotton veils. Carpets, whether knotted plush or needlepoint, were made in many regions of the Muslim world, from the thick, Berber rugs of North Africa to the silk and/or wool masterpieces of Iran and Central Asia. They are often pictured in Renaissance paintings, and even today they are a symbol of luxury all around the world. The three largest areas of textile

manufacture were Fars, Khuzestan and the Nile Delta. Originally, carpets, silk brocades, wall hangings, furniture fabrics and cotton clothing were produced, as well as linen. At least twenty Egyptian towns were employed in the production of linen, gauze, voiles of all colors, patterned cloth, velvets, brocades, fringes and flowered materials. The Egyptian Delta is still a major textile center today, with its largest factories in Mehalla, a town appearing on maps in the 12th century.

RENAISSANCE FABRICS

PRE-VIEWING INTRODUCTION

Distribute the reading entitled “The Fabric of Prestige and Elegance: Renaissance Imports and Imitations of Muslim Textiles.” The slides are from Friedrich Fischbach, *Historic Textile Patterns in Full Color*, (New York: Dover Publications, Inc., 1992).

Slide

1

11th-Century Islamic Fabrics

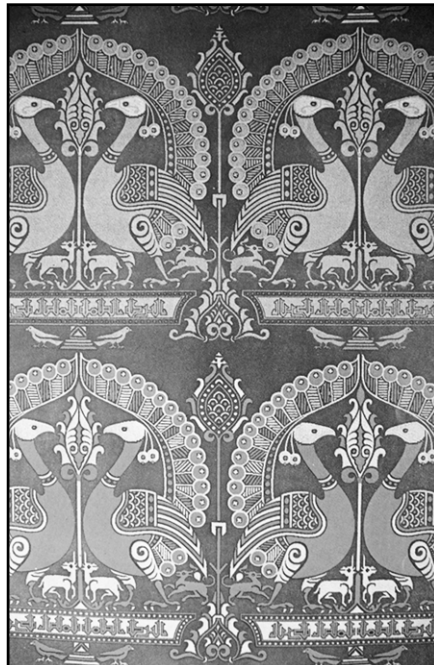
[Fischbach, plate 24]

Script:

Fabrics like these were purchased from the Muslim manufacturing centers of the 11th century, located in the eastern Mediterranean, also called the Levant. From there, European monarchs and nobles had access to the brocades of Damascus, the silks of Armenia, velvets of Iraq and Persia, the linen of Egypt and cotton of Africa and India. The most fascinating and luxurious aspect of the richest cloths was the pattern of birds and beasts, flower, fruit and leaf designs that intertwined and repeated. Scenes from famous stories were worked into the cloth, often with symbols reflecting bravery, wisdom, faith and love. This was literally “power dressing”, in which the design symbolized qualities of the ruler. Such fabrics were traded over centuries, making fortunes for merchant families and contributing to the wealth of cities.

On-screen Questions:

1. What fibers (cotton, wool, linen, silk, etc.) were probably used in these fabrics?
2. Can you recognize specific animals, fruits or flowers?



Slide

2

**12th-Century Sicilian Fabric,
from an Islamic Court Robe**

[Fischbach, plate 19]

Script:

Sicily was an important crossroad of Muslim and Western European culture. The island was ruled by Muslims from 820 to 1091 CE, and Islamic influence continued under the Norman kings. This slide shows fabric from a Sicilian Islamic court robe. The pattern of wide bands shows stylized but well-proportioned animals, flowers and trees. Often these animals were used in royal garments as symbols of power and virtues like bravery and courage. The cloth also includes geometric designs. Worked into the panel is an oval frame with lettering in Arabic. These inscriptions were very common on the robes worn by rulers. They were manufactured especially for the courts. The lettering was called *tiraz*. *Tiraz*, a Persian word, originally meant a robe or fabric with embroidered inscriptions. The word was also used for the factories where fabrics for the court were woven and embroidered.

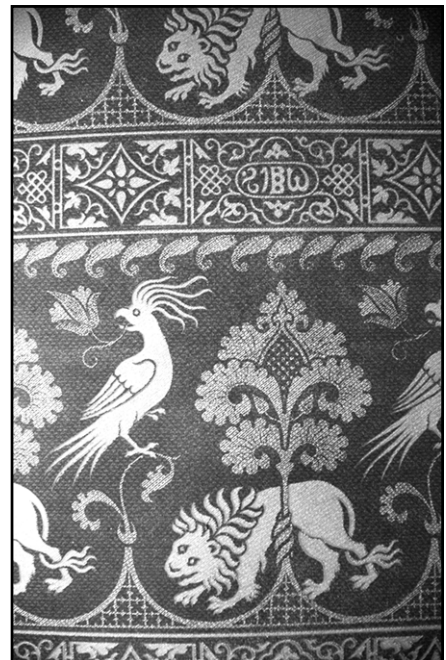
We can learn more about the *tiraz* on this fabric from the famous Muslim historian and “father of sociology,” Ibn Khaldun, who lived in Muslim Spain and North Africa from 1332-1406. He wrote about this type of fabric and about the very common practice of giving robes of honor to people who served at court, or to distinguished scholars or visiting dignitaries. Another 14th-century source, Ibn Battuta, also mentioned receiving robes of honor from rulers whom he visited. Listen to what Ibn Khaldun writes:

“It is part of royal and government pomp and dynastic custom to have the names of rulers or their peculiar marks embroidered on the silk, or brocade, or pure silk garments that are prepared for their wearing. The writing is brought out by weaving a gold thread or some other colored thread of a color different from that of the fabric itself into it...Royal garments are embroidered with such a tiraz in order to increase the prestige of the ruler or the person of lower rank who wears such a garment, or in order to increase the prestige of those whom the ruler distinguishes by bestowing upon him his own garment when he wants to honor them or appoint them to one of the offices of the dynasty...In the Umayyad and Abbasid dynasties the greatest importance was attached to the tiraz.”⁴

The *tiraz* might consist of the ruler’s name, or an Islamic blessing or phrase. Similar precious fabrics in gold and silk brocade were often used as vestments and altar fittings in churches, especially in Spain.

On-screen Questions:

1. If someone received a *tiraz* fabric or robe, where or on what occasions might they have wanted to wear it?
2. What statement would an Arabic *tiraz* fabric make about a European merchant or diplomat who might have received it? How else might a merchant acquire one?



4. Clot, Andre. (John Howe, translator). *Harun al-Rashid and the World of the Thousand and One Nights*, (New York: New Amsterdam Pr., 1989), p. 191.

Slide

3

13th-Century Sicilian Fabric, with “pseudo-Arabic” Lettering

[Fischbach, plate 18 and/or 46]

Script:

For several centuries after Sicily’s conquest by the Christian Normans, Muslims continued to live there and practice their faith, and even to serve at the court. A famous 12th-century Norman king, Roger of Sicily, had his coronation robe woven and embroidered in Cairo. The famous cartographer al-Idrisi was head of an atlas project for Roger of Sicily that lasted 15 years. Sicily was also a textile center—one of the first to produce Muslim-influenced designs for European consumers. In this slide, you can see the typical interlaced animal and plant designs, but the weavers have also copied the *tiraz*. The only difference is that the lettering is now fake. Friedrich Fischbach called this lettering “pseudo-Arabic,” because the letters are very similar in form, but mean nothing. Of course, someone in Italy or elsewhere in Europe would not have known Arabic, so the fabric would look just as “royal” as if it had been draped over his back by the Sultan himself!



On-screen Question:

1. Why might the Sicilian weavers have put fake Arabic lettering into the design of their own fabrics? Make several hypotheses. How could a historian look for evidence to explore the reason?

Slide

4

14th-Century Fabric from Lucca, with “pseudo-Arabic” Lettering

[Fischbach, plate 38]

Script:

Lucca is a city in Italy, near Pisa. Lucca was a textile manufacturing center during late medieval times. This fabric, also with “pseudo-Arabic” lettering was produced a century after the one from Sicily that you just saw. Fischbach included many examples of fabrics from Lucca in his book, from sources in Italy and northern Europe. He copied some from Renaissance paintings made in these places, but he recognized them as Lucca fabrics. That tells you how far they traveled, and how esteemed they were, since subjects wore their best finery in portraits. Historian Andre Clot notes that the *tiraz* in Abbasid times were woven in “Kufic” script, which looks very like these imitations that Fishbach recorded.



On-screen Questions:

1. What elements of the Sicilian and Luccan patterns are common to both fabrics, made about 100 years apart?
2. Why might a merchant or his customer want to own a fabric that looked like it came from the court of a Muslim ruler? Why else would they have wanted the *tiraz* on such fabrics? What social groups were able to buy such things?

Slide

5

**15th-Century Italian Painting
(fabric with “meaningless lettering”)**

[Fischbach, plate 35]

Script:

A century later, this fabric appeared in a painting done in northern Italy. The fake script is still there, but it is very cleverly worked into the plant design. The form of the letters seems now to resemble Arabic and Latin at one and the same time! Again, the large, repeating patterns are typical of Eastern brocade fabrics. They were woven in flat and velvet, gold and wool blend versions. The fabrics depicted in paintings show that yards and yards were used in a single garment. Some of them were quite heavy to wear, while others, of pure silk, or silk blends, were rich but light.



Slide

6

**14th- to 17th-Century German
Fabrics, with Woven Lettering**

[Fischbach, plates 7 and 49]

Script:

The fabric on the left appears in a German Renaissance painting. The *tiraz*-like inscription, in German, is readable; it says, “Cross of Christ.” The unicorn symbolizes the Virgin Mary, and was also a symbol of purity. On the right is a border woven in flax (linen), a northern specialty, along with wool. The lettering “IHS” is an abbreviation of “Jesus.”

On-screen Question:

1. Why do you think that European textile designers used decorative lettering like the Islamic *tiraz* to weave religious inscriptions into their luxury fabrics? What evidence do you see of similarity in the patterns and motifs?



Slide

7

13th-Century Brocade Fabric

[Fischbach, plate 29]

Script:

Imitation of fabrics like brocades (interwoven colors) and damask (tone-on-tone) continued during the Renaissance and far beyond. Early on, imitations became so skilled that even an expert like Fischbach had to label these “Islamic or Italian imitations.” The craft of brocade weaving passed to France and Germany. Italians and French competed hotly over the next centuries to import raw silk and cotton from Syria and elsewhere, along with new design ideas. European merchants began to compete for sales of their fabrics with oriental goods in Eastern markets. By the 17th century, for example, Lyon, France, had a thriving silk-weaving center that traded with Lebanon and produced fabrics of beautiful style. Venice and Genoa produced velvet brocades that Harun al-Rashid, 9th-century ruler of Baghdad, would have been pleased to wear. Even in America, the fabric that covers tables on special occasions is still called *damask*, from the time when it passed from the Muslim world to Europe through Italy and Spain.

On-screen Questions:

1. Do you think that the sequence of fabrics shows that ideas, tastes and techniques passed from Muslim to European culture? What weakness or strength do you find in the evidence? Are there other possible explanations for similarity?
2. What other influences have you noticed in the fabrics that we consider part of our culture and tastes?





REVIEW QUESTIONS AND ACTIVITIES

1. In the previous “Historians’ Voices”, why does the author use the word “itself” in the phrase, “which were sent to China *itself*”?
2. Why would Italian imitators of *tiraz* fabrics imported from the Muslim world include in their designs pseudo (fake)-Arabic lettering? Is there a message about values in the fact that the market must have demanded this embellishment and made it popular? If so, what would the wearing of such a fabric tell about its owner?
3. Describe the types of historical evidence used to document the link between Muslim and Renaissance Italian cultures in this example of cultural and technological transfer through textiles. (*for answer, see footnote*)⁵
4. How does the traditional story of “The Emperor’s New Clothes” relate to the values and role of textiles discussed in this segment?
5. Write a description, draw a picture or collect magazine clippings that illustrate the role played by clothing and fabrics in today’s society. What patterns and styles lend prestige among different classes of people today? Do textiles used in the home differ in terms of prestige from those people wear?
6. Can you recognize any similar design elements, styles or colors from these Renaissance fabrics that still appear in modern fabrics? Where have you seen them?
7. Would these fabrics look familiar on a modern living room couch? Do you think that styles from the Renaissance have influenced our ideas about luxury, beauty and comfort? What cultures outside of Europe have contributed to these technologies, cultural values and styles?⁶
8. Collect fabric samples (or perhaps wallpaper, since these are often based on fabric designs) that document the influence of many cultures on home and fashion design.



-
5. **Answers to Question #3: physical evidence** from surviving textiles and their appearance in paintings, as well as transfer of the technology such as the looms to make complex patterned fabrics; **primary source narrative** in Ibn Khaldun’s 14th century explanation; **linguistic evidence** in the names of fabrics and design elements
 6. **Answer to Question #7: China, India, Persia, Arabia and North Africa**



OPTICS BRINGS A NEW PERSPECTIVE ON SEEING AND ART

When people think of the Renaissance, the first thing they may “picture” is a Renaissance painting hanging in a museum. If you ask how a “Renaissance painting” is different from other styles and periods, you might receive this reply: “The pictures look more realistic.” This is a good way to describe the difference between Renaissance and earlier European painting, but if you asked why, and how the artists achieved this, it might be more difficult to get an answer. The story of how Renaissance painting developed in Italy out of earlier, medieval European styles is complex, involving input from several cultures.

CLASSICAL MODELS

One element of the story is humanism. Humanist scholars and writers sought to revive the glories of classical Greek and Roman culture. The arts of Greece and Rome had survived mainly in the form of architecture and sculpture, remains of which were found all over Italy, Greece, and other Mediterranean lands. Examples were also found north of the Alps, where the Romans had built cities. Roman sculpture and architecture, of course, had been strongly influenced by Greek styles and subjects. The early Renaissance humanists focused first on classical literature. They were opinion leaders among the cultured classes in the cities, especially those who had money and power to build and beautify the Italian cities, to spend on paintings and sculptures to decorate their palaces, and to donate artwork to churches. The humanists set the tone—the cities would be beautified on classical lines, and they would try to measure up to the glory of ancient Rome or Athens. Influences from the Byzantine and Muslim cultures were also a factor in terms of artistic techniques, decoration and styles.

The problem was: how could the Italians build and sculpt like the Romans and Greeks had done? Interested and competitive architects, in search of work and a good reputation with wealthy patrons, set about measuring the classical ruins around them. They measured columns, portals, gates and arches, although sometimes just a corner or foundation of a Roman building might be left standing. These artists measured and analyzed statues as well. Among the things they discovered was that classical sculpture had two important qualities. First, the subjects usually stood in natural, expressive and lifelike poses. In contrast, many medieval statues show rigid poses. Second, they realistically portrayed the human body, in the round. Many medieval statues were part of the wall behind them, a kind of half-relief. Renaissance studies of sculpture influenced painting as well.



This image is an allegory, or symbol, of the sorry state of architecture during the early Renaissance. A sad classical figure sits near broken Roman ruins overgrown with grass, pointing to signs of decay and death. Can you identify the symbol of hope and renewal?

OPTICS: PHYSICS INFORMS ART

Like many other important changes during the Renaissance, a new line of thinking in and around the university towns made a difference in the way painters would work. The Italian university of Padua was a center of early Renaissance scholarship and one of the earliest entry points of Arab and Greek learning in Europe. Humanist teachers taught out of small chambers all over town. An interesting topic of the day—and one of the more important scientific fields—was optics, a branch of physics. Optics is the science of how we see—how the eye makes and processes an image, how light passes through a lens, how a rainbow comes about, and how we see colors. The leading authority in Europe at the time was an Arab scientist who worked in Cairo, Egypt, in the 11th century. His name was Ibn Haytham, latinized as Alhazen. Ibn Haytham was very advanced in his thinking and experimentation in physics, and most important, he disagreed with Aristotle's ideas about how vision works.

Ibn Haytham had written the definitive textbook on optics, the *Kitab al-Manazir (The Book of Optics)*, which had been translated into Latin in the 12th century. Aristotle had taught that the eye sent out rays of light to illuminate objects. Ibn Haytham considered that to be nonsense. Color in objects was thought to change the color of the eye itself. Ibn Haytham, who supported his scholarly work by copying mathematical works like Euclid and Ptolemy, was a great physicist and experimenter. He studied reflection of light from mirrors, using mathematics. He studied the anatomy of the eye. He developed a lathe to grind lenses and studied how light is refracted, or bent when passing through plate glass, water, prisms and lenses. He studied natural and prism-made rainbows. Ibn Haytham determined that the eye does not give off light in order to see, as Aristotle had said, but that the eye is specially made to receive light coming from the world around us. He then was able to concentrate on studying the way light enters the eye from objects in front of it. For example, why do the many sources of light not confuse the eye? Ibn Haytham concluded that the eye does not receive all light because the light acts selectively. An object struck by light sends off rays in every direction, but only those rays

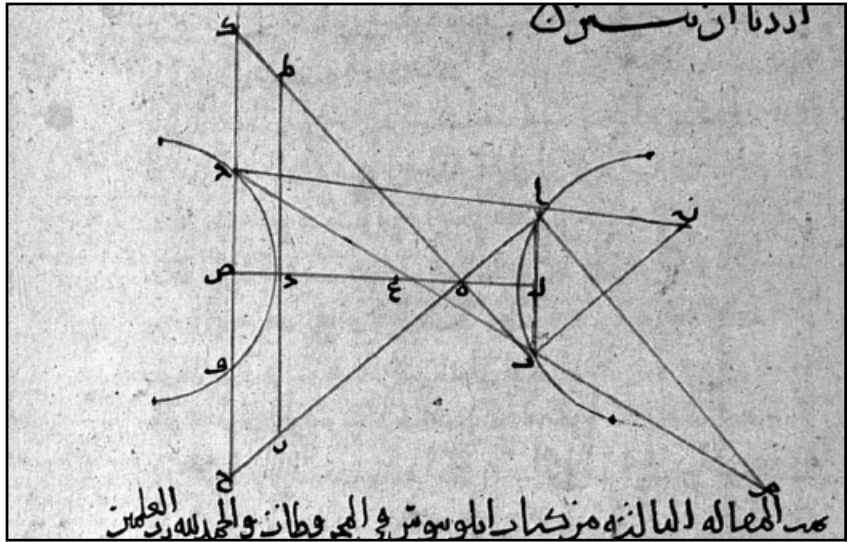
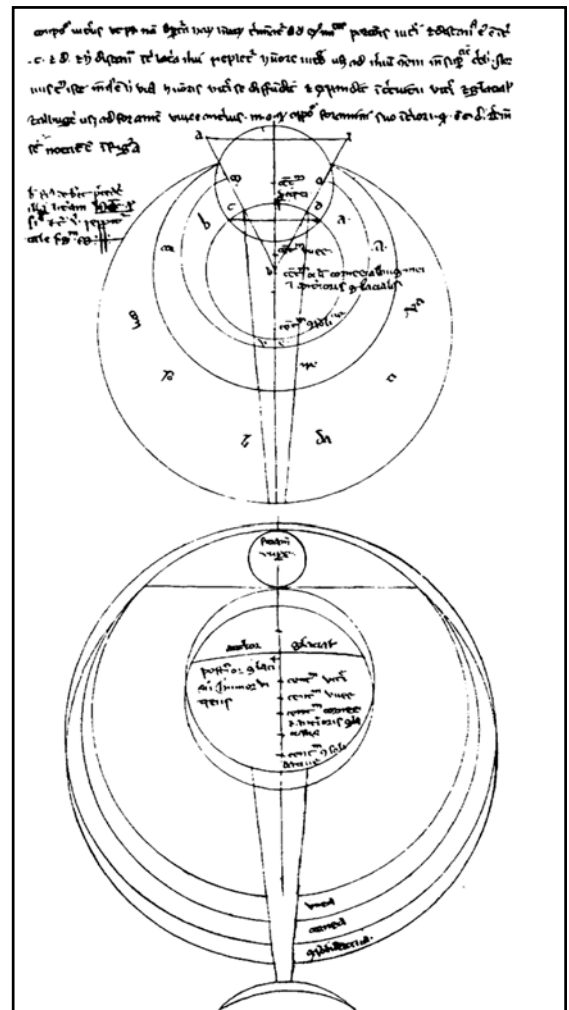


Diagram of Ibn Haytham's famous solution to a problem on refraction.



Roger Bacon's diagram of the eye adapted from Ibn Haytham.

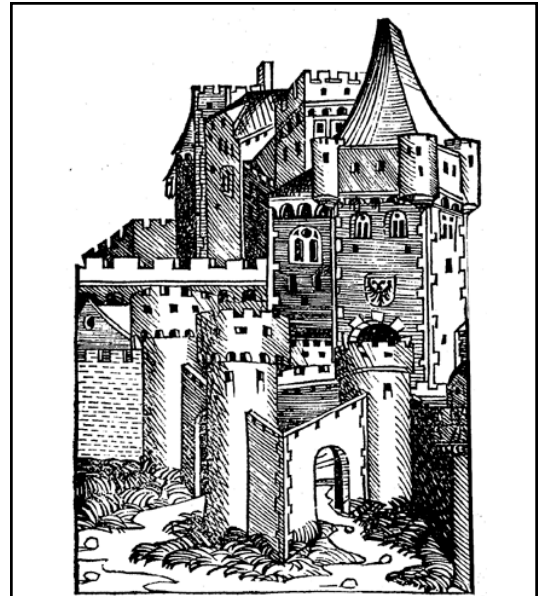
going straight into the eye (centric rays) are received by the eye's receptors. Other rays coming in at an angle are bent, or refracted, and thus are not seen. Furthermore, big or near objects send off more rays than objects that are small or distant.

These findings would prove very important to artists. Even more important for Renaissance artists, Ibn Haytham had determined that the field of light entering any lens—or the field of vision of the eye—is shaped like a pyramid. In simpler words, we see in front of us a visual pyramid. Rays come into your eye from everything in your field of vision, converging on your eye. This was “hi-tech” theoretical physics for the 15th-century students in Italy. This theory and its applications attracted a student at Padua named Toscanelli, who studied and admired Alhazen. Toscanelli, a Florentine, met the not-yet-famous Florentine architect, Brunelleschi, in about 1424 CE. Brunelleschi was one of the architects with the desire stirred by the humanists to recover the architectural skills of classical Rome.

MAPS, GRIDS AND PAINTING IN A MIRROR

Toscanelli's theoretical understanding of Ibn Haytham's work was crucial for Brunelleschi's achievement in painting and architecture. Toscanelli, like many other Italians of the time, was also very excited about the manuscript of a world atlas of the ancient Greek, Ptolemy, that had been recently rediscovered. The atlas attributed to Ptolemy—the *Almagest*—was known to Europe by its Arabic title, *al-Majisti*. It had first come to Europe as a Latin translation of the Arabic version. Ptolemy's system of geography and mapping had been the basis of Arab astronomy and cartography, but the view of the world in the *Almagest* probably reflects the knowledge of landforms of the later Muslim period. Muslim scientists, map-makers and navigators were very familiar with the system of longitude and latitude shown on the “Ptolemy” map. Muslims had used the system of longitude and latitude coordinates to orient *masjids* (mosques) toward Makkah from any city.

The grid system from mapping and the geometry of optics would combine to give Renaissance paintings their typical characteristics. Brunelleschi listened as Toscanelli spoke about the theoretical physics of Ibn Haytham, and showed him the maps from which Ptolemy's and the Arabs' grid system was based. The map of the world attributed to Ptolemy had an interesting feature. It was modeled on the half-round planispheres in many Eastern libraries. The map projection drawn in the atlas was not flat, with the gridlines even and parallel. Instead, the grid helped show that the surface of the earth was rounded, and the gridlines narrowed toward the poles. This created an optical effect, as though the poles were farther away from the viewer than the widest part of the sphere. Toscanelli thought these ideas would be useful to Brunelleschi, the architect, in recovering the lost classical skills, particularly *the idea that an artist or architect can understand, and then manipulate, what the viewer sees using geometry and mathematics*. Brunelleschi's design of new buildings would be based on geometric representation of what we see. So it happened that Toscanelli's mathematical and optical principles were put to work in the service of Brunelleschi's architectural designs in Florence.



The woodcut illustration at the top shows medieval understanding of perspective and proportion, while the Renaissance woodcut below it shows use of a perspective framework by the artist.

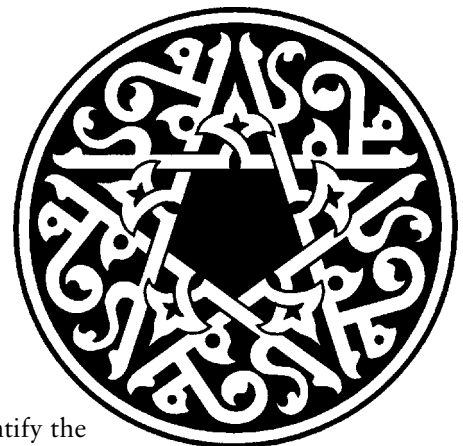
They also applied these geometric ideas to painting. Brunelleschi performed an experiment at Florence based on Alhazen’s optical principles. The experiment would change the way people perceive things, and the way artists represent the visual world on a flat surface. In 1425, at the front door of the famous Florentine church on which Brunelleschi had built his beautiful dome, he set up his experiment in applied optical theory. Brunelleschi set up two easels exactly 6 feet inside the door of the church, opposite the Baptistery building in the city square. One easel held a mirror with a handle, set to give him a reflection of the Baptistery as he stood with his back to it. The other easel held a square wood panel prepared for paint, but with a small hole drilled in its center. He planned to paint the scene behind him, using geometrical principles. Architect that he was, he had planned the experiment with precision. The Baptistery was exactly as high and as wide as the distance between him and the building. This would give his painting a simple spatial relationship. He then began to use geometry tools—dividers, triangle and rulers to lay out the lines of the scene reflected in the mirror. Brunelleschi proceeded to lay out optical geometry lines on the wooden panel. The lines went outward from the hole in the center of the panel to its lower and upper edges. These lines represented Alhazen’s visual pyramid—what the eye takes in from a scene. He made a perspective framework, with the horizon line at the level of the hole. The lines going up were above the horizon, the lines going down were the floor level. He painted the symmetrical Baptistery building shown in his mirror, with the surfaces of the building slanting according to their position on the perspective framework. He did all this with his back turned toward the subject of his painting!

As he stood painting in the church doorway, passers-by might have thought him an amateur painter—hardly impressive to the sophisticated Florentines. He was not a skilled artisan with paint as some Florentines of the time. What he did that day, however, changed painting for centuries to come. The effect on the people who gathered around the church door was stunning. Brunelleschi invited the bystanders to view the painting. Brunelleschi had created an optical “illusion”! You remember that Brunelleschi had drilled a hole in the center of the wood panel. When the viewer went around to the back side of the painting and put his eye to the hole, he could view the Baptistery building just as Brunelleschi had seen it in the mirror, and just as Brunelleschi had painted, based on his geometric layout. The hole, and the viewer’s eye, were at the center of Alhazen’s optical pyramid, at its apex. Then, Brunelleschi slipped the mirror slowly in front of the viewer’s eye, and the viewer saw the reflected painting in the mirror. As he moved the mirror away to reveal the building again, the viewer replied with an astonished gasp. Why, the reflection in the mirror and the view of the real building were exactly the same!! This is *trompe l’oeil*—to trick the eye. Those 15th-century Florentines in front of the church could hardly get enough of what they saw.

Using geometry, Brunelleschi had achieved a method for painters to reproduce in paint an image of exactly what the eye saw, using correct proportion. The sight lines that Brunelleschi laid out gave the painting the correct sense of perspective, or depth. Perspective geometry could let the artist arrange all the objects in a portrait, a street scene, an interior or a natural landscape. Painting became a marriage of mathematics with the artisan’s skill with charcoal and paint. Artists could represent real scenes, or they could plan realistic imaginary scenes.

Brunelleschi’s accomplishment was the first painting based on Toscanelli’s ideas about the science of optics. The feeling of depth in the painting, and the accurate, lifelike arrangement of objects on the surface of the picture seems ordinary today, especially since we can do what he did in a split second with a camera. In fact, Ibn Haytham had been the first to describe the earliest prototype of the camera—the *camera obscura*—a black box fitted with a lens, on the inside wall of which an upside-down image of the light coming through the lens was reflected.

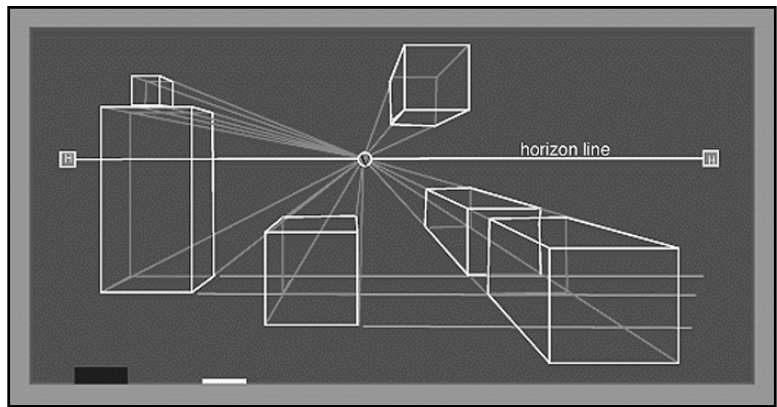
Realism in the placement and size of objects, and the ability to represent depth, gave Renaissance painting some of the features that distinguish it from medieval work. These questions will help you identify the changes in visual representation that characterized the Renaissance.



- ❁ Are the objects that are pictured arranged in a realistic way?
- ❁ Is their size correctly proportioned to the objects and other figures around them?
- ❁ What do you think is the basis of the artist’s decision about how large to make them, or where to place them in the picture?
- ❁ Do the figures look rounded or flat?
- ❁ Do the landscape and sky look real? How are distance and depth represented?

The answers you gave to these questions also show the difference between medieval and Renaissance art. In medieval paintings, objects were sized according to their importance, especially religious importance. The proportion was not true or realistic; a man might be shown as half as tall as a cathedral, for example. The figures seemed flat, and they were not anatomically correct nor well proportioned. Together with their voluminous and artificially draped clothing, they seemed to be one solid shape. Natural objects were often symbolic instead of natural, and there was little effort to create the illusion of depth and space. This is not to say that medieval paintings were not expressive, artistically valuable or beautiful. It is simply to describe the differences between the style of one period in European art and another.

In many other cultures, such as China, India, Africa and the Muslim world, the description of scenes on flat surfaces would continue to be handled in a clearly two-dimensional way. This is especially true in the miniature representational art of the Muslim world, where realistic representation of nature—especially living things—was not encouraged from a religious point of view. It was viewed as an approach to idolatry, or making objects of worship. **Far from being merely simple, unrealistic or “childish,” such symbolic representational art reflects a certain value system in the cultures that produce it.** Persian, Chinese, and Japanese artists were incomparably skilled in painting technique, for example. African artists have shown wonderful mastery of color and form. The lack of realism also does not represent a lack of necessary geometry skills. Muslim decorative artists, for example, created extremely complex interlinked geometric designs in paint, glaze, tile and ink. Each culture’s art expresses its own sense of values and aesthetics (beauty) at a given period in its history when it was made.



An artist’s perspective framework.

PAINTING IMAGINARY WORLDS

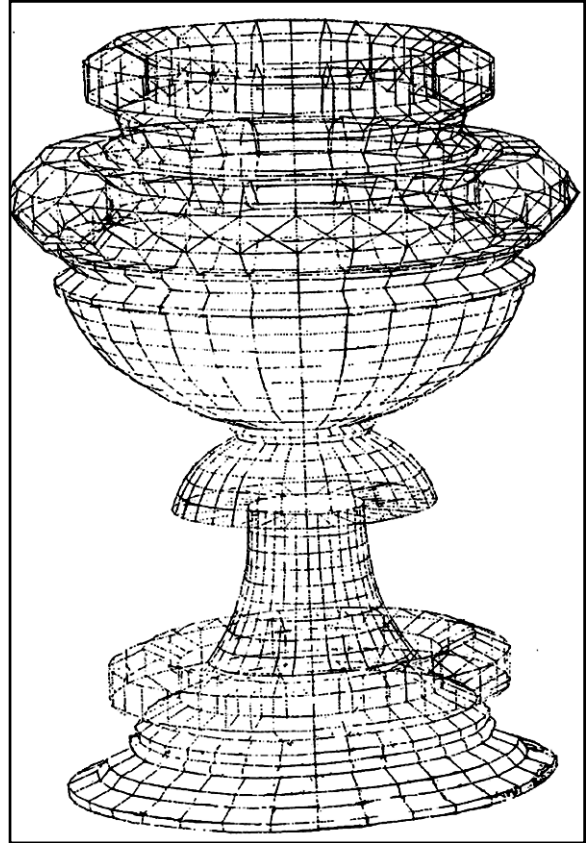
The Renaissance European painter used the canvas as a magic box in which to portray an imaginary world, tricking viewers with mathematics, optics and psychology into thinking they were seeing in three dimensions. Today, artists and draftsmen learn how to follow Brunelleschi’s pioneering methods. It is called “vanishing point perspective.”

Shortly after Brunelleschi’s discovery of perspective drawing became known, a painter named Alberti wrote a guide for painters, dedicating it to Brunelleschi. Like a kind of “paint-by-number,” Alberti showed painters how to reproduce a natural scene. The painter was to prepare a wooden frame strung with threads to form a grid of squares. The painter should set up the grid between him- or herself and the scene, and use it to establish the size of objects relative to each other. The grid represented a slice through Alhazen’s visual pyramid of all the light reaching your eyes from a scene. If the system was followed accurately, copying the scene square by square, the painter would be able to faithfully represent the scene to look three-dimensional and lifelike. This

was an excellent system for portraits and landscapes, and cityscapes, but what if the painter wanted to invent a scene? The next step in Alberti's guide answered that need. Alberti showed painters how to draw a perspective framework.

Using geometry to make a perspective framework is now a basic lesson in drawing classes everywhere. This is how it works:

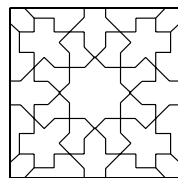
1. At eye-level, draw a horizon line and mark its center point.
2. From the center point, draw a vertical floor line, with more floor lines radiating from the center point and ending at regular intervals from the vertical.
3. Determine a point outside the painting from which a viewer would look at the painting. (This is the artist's choice, according to the effect desired, i.e. looking up at the painting from below, or from the right or left.) Draw lines from eye level to the end of each floor line.
4. Where the sight lines cut the frame of the painting, draw horizontal lines, giving a perspective checkerboard that allows the artist to place and size figures and architectural or natural elements.
5. Add roof lines—just like the floor lines—for positioning objects above the horizon.



This perspective framework for drawing a vase was made during the Renaissance in pen and ink. Notice how it anticipates wire-frame Computer Aided Design (CAD) techniques used by today's engineers.

Soon, other Florentine artists adopted Brunelleschi's system, followed by Italian painters in other cities.

The technique spread to northern Europe, and became a widespread characteristic of Renaissance painting and design. By making a perspective framework, they could create a realistic, miniature world within the frame of the canvas. More than that, the possibility of creating the illusion of space around figures provided a dramatic background that emphasized the roundness, the shape, and the solid presence of human, animal, and other natural forms. Painting on all subjects flourished all over Europe during the Renaissance. The new technique was employed to depict religious subjects, classical themes, subjects from everyday life, and portraits. Perspective gave artists a method for portraying man-made landscapes, cityscapes and other objects. The method of drawing in perspective was also very useful in science and engineering. An artist could make an accurate drawing of a machine, a tool, a plant or anything for scientific purposes. When made into a woodcut or engraving and placed in one of the thousands of scientific books printed during the first centuries of printing, precise communication between persons at distant locations became possible. This contributed to the rapid advancement of the sciences and dissemination, or spread, of technology.



MEDIEVAL AND RENAISSANCE PAINTING

THE “TRIUMPH OF ST. THOMAS” AND “THE SCHOOL OF ATHENS”

INTRODUCTION

Slides 8 and 10 show two paintings on a similar subject—the organization of knowledge and the ancient thinkers and writers from other cultures whom European scholars honored for their contributions. Since one of the most important characteristics of the Renaissance was the new appreciation for ancient wisdom and learning, and its relationship to religion, these two paintings give us an important insight into attitudes during that time. In addition, these two paintings on the same subject represent a very different visual treatment of the subject. Comparison of the two works of art clearly illustrates some basic differences between medieval and Renaissance painting.

Slide 8

Slide 9

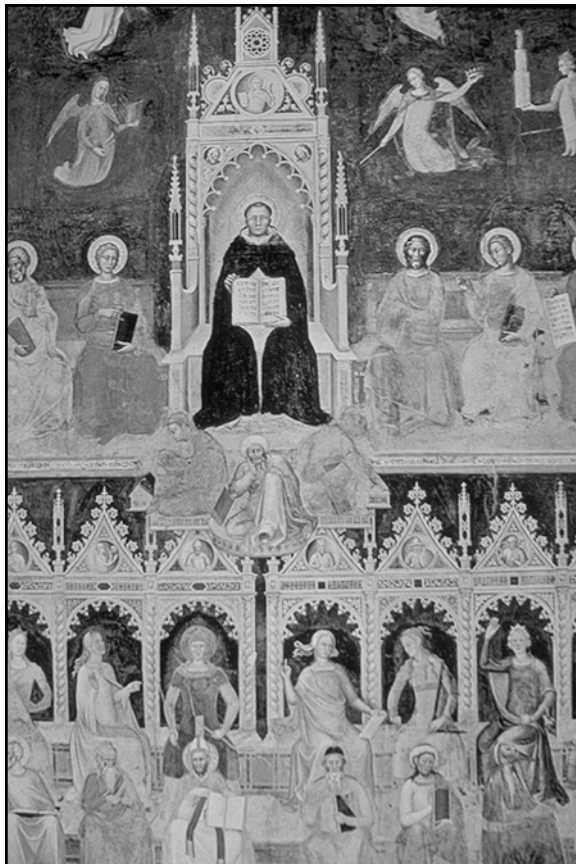
Triumph of St. Thomas

Artist: fresco attributed to Andrea de Firenze

Place: 14th century, Santa Maria Novella Church, Florence

Script:

A fresco is a work of art painted directly on a wall, in wet plaster. This art form was most common in Italy, being used to decorate the insides of buildings both before and during the Renaissance. The medium gives a very soft, almost floating quality to the images. This painting on the wall of a church is very tightly organized into a scheme that represents the elements of St. Thomas Aquinas’ achievement, which the painter and his patron greatly respected.



Historian Richard Hunt explained the meaning of the figures in the painting: St. Thomas is shown on a throne as a symbol, or allegory, of learning. Above his head are the four Christian virtues (Prudence, Temperance, Fortitude and Justice), and the three religious virtues (Faith, Hope and Charity). The book St. Thomas holds is the Wisdom of Solomon, showing the phrase, “I prayed, and understanding was given me.” On an extended platform at the foot of the throne are two thinkers who proposed *heresies*, or interpretations of Christianity that differed from the Church (Arius and Sabellius). Between the two is the Muslim philosopher and translator/commentator on Aristotle, Ibn Rushd (Averroes). Flanking St. Thomas are the Evangelists and prophets, with the bearded Moses holding the Tablets of the Law. The row of women seated in cubicles under the throne represents the theological sciences and the liberal arts (seven of each). The four on the right are Arithmetic, Geometry, Astronomy and Music, and the men seated in front of them are supposed to be those who invented these arts: Pythagoras, Euclid, Ptolemy and Tubalcain. On the other side, those sitting in front of the theological sciences symbolize the estates of human society: pope, emperor, king, cardinal, duke and bishop. The fresco as a whole, according to Hunt, “*provides a comprehensive scheme of medieval learning: its roots, its aims and its complete identification with Christianity.*”⁷

7. Joan Evans, ed., *The Flowering of the Middle Ages*, New York: Bonanza Books, 1985), p. 148.

The great task for scholars of the late Middle Ages was to absorb learning from sources outside the church and reconcile it with faith. While this knowledge, respected as “ancient wisdom,” was considered extremely valuable, it did not originate in Christianity, but either in pagan or in Muslim culture. It is most interesting that Aristotle’s writings arrived in medieval Europe with Ibn Rushd’s commentary, since the Muslim philosopher had also wrestled with the same problem as Thomas Aquinas did—understanding and accepting Aristotle’s work as a believer in one God, or monotheistic religion. Notice how the painter gave Ibn Rushd great visual prominence in the painting (see detail, slide 9). Thomas Aquinas devoted his life to study, teaching and writing during the time when universities were just developing in Europe. He was an Italian who studied at Naples, Paris and Cologne, and became a Dominican friar. His major work is the enormous *Summa Theologica*, a work on Christian theology and philosophy.

Onscreen Questions:

1. How are the layers of the fresco organized? Which is given the most importance?
2. What is the central focus of the painting? What visual techniques does the painter use to draw the eye to the main subject?
3. What sense of time does the painter convey?
4. What messages do the size of the figures and their spatial relationship convey?
5. What observations can you make about the use of color and clothing in the painting?
6. What visual characteristics of the painting give Ibn Rushd a prominent place in the painting? What relationship is Ibn Rushd given to the other figures? Why do you think he is portrayed in this way, in a picture about Christian learning?
7. How has the painter shown the relationship between the classical branches of learning and Church teachings? What qualities are needed for the pursuit of knowledge? What is the role of faith in learning?

Explanation:

This painting illustrates the way medieval painters approached their subject. Their purpose was more symbolic than realistic. The arrangement of the picture matches the subject of organizing knowledge—tightly ordered and symmetrical. The size of the characters and



objects is not naturalistic, but reflects and defines their place in the scheme of knowledge. The largest figures are the most important and most central. Notice how the subject is placed on a throne surrounded by religious and otherworldly figures. It is interesting to note how Ibn Rushd is thrust into the center of the painting by his placement at St. Thomas’ feet, with the pointer formed by the contrasting black and white of his robe. Ibn Rushd’s pose is also quite unique—relaxed and naturalistic. The other figures seem to gesture more symbolically and impersonally. The objects held by the figures symbolize their status, but are not always in proportion to real objects. The figures—modeled but still two-dimensional—seem pasted onto a flat background, without depth. They have static expressions. The spatial relationships are

also two-dimensional, and the few architectural features, like the throne, and the row of niches for the branches of learning seem more like borders than spaces. This is not to say that the painting lacks artistic interest or beauty. It is simply to contrast the purpose and effect of medieval artwork with its Renaissance counterparts.

Slide 10 **Slide 11**

The School of Athens

Artist: fresco by Raphael

Place: 16th century, Vatican, Rome

Script:

This painting is one of the most famous images of the Renaissance period. It is one of a set of four frescos, each showing a path mankind has followed in his search for “truth.” *The School of Athens* represents “Philosophy,” while the others are “Theology,” “Law” and “Poetry.” Philosophy represents the search for truth by using the human power of reasoning.

It is helpful to modern viewers to explain the figures in the picture: At the center, Plato and Aristotle stand together. Plato points upwards, showing the prominence of ideas, while Aristotle gestures towards the earth, representing his study of the natural world.



Around the two philosophers are groups of ancient Greek and Roman philosophers of the ancient world, including Socrates. Others grouped on the steps and in the foreground are some “philosophers” whom we would today call scientists. Euclid, the mathematician, bends down to demonstrate geometry. Ptolemy, the geographer, holds a globe. Pythagoras is writing, while a youth holds a tablet with a musical diagram. There are many other figures, like Diogenes, lying down on the steps. As in the painting of St. Thomas, Ibn Rushd is given a place in the search for truth and ancient wisdom. He stands, in a green robe, wearing a turban and looking over Pythagoras’ shoulder.

While the subject is very similar to the St. Thomas fresco, the treatment by the painter illustrates the great difference between medieval and Renaissance painting. The following questions will help to bring out the contrast:

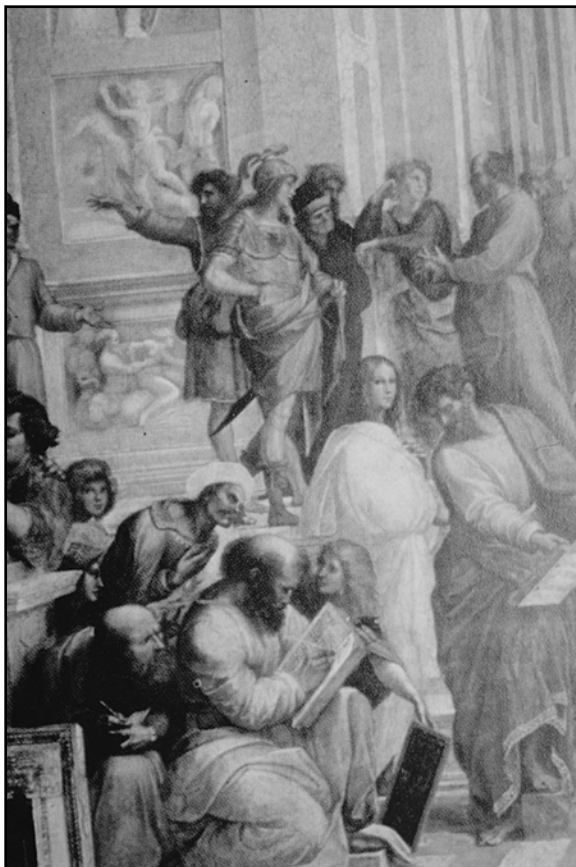
On-screen Questions:

1. What mood does the painting convey? What visual images and techniques are used by the painter to create this feeling or mood?
2. How is space used in the *School of Athens*, and how does its use differ from the medieval painting?
3. Describe the effect of the faces and figures, their clothing and poses. Contrast them with the figures in *St. Thomas*. What relationship to the viewer do they invite?
4. Describe the background of the painting and explain what role it plays in conveying a message.
5. How was geometry used to create this painting, and what effect does it achieve?
6. What is the purpose of the statues that are partly visible and partly hidden? Do they seem similar to any of the figures in the St. Thomas painting? Contrast the treatment in each.
7. Describe the artist’s attitude toward the search for knowledge. How does it differ from the attitude shown in *Triumph of St. Thomas*?
8. Identify the prominent figures in the painting with important contributions to learning.
9. How is the Christian Church represented in *Triumph of St. Thomas*? Do you see anything comparable in *The School of Athens*?

Explanation:

This famous Renaissance painting offers a good illustration of change and continuity from the medieval period to the Renaissance. While the subject is parallel to that of *Triumph of St. Thomas*, the visual treatment is a world apart. In contrast to the neutral background and two-dimensional use of space, Raphael's painting gives an almost infinite sense of space and depth. In contrast to the artificial light in Andrea di Firenze's painting, Raphael's is flooded with natural light that adds to the mood and to the sense of depth. The use of perspective techniques creates a believable, but fanciful architectural space in which the figures are placed like actors on a stage. The figures are painted in a very naturalistic, sculptural manner. Their anatomy and clothing add to the illusion that they are round and have mass, standing out from their surroundings. While the expressions and poses are still idealized and symbolic like the medieval painting, the faces, gestures and body language convey an entirely different attitude toward the activity of learning. Compared with the remote, placid, rigid figures in the medieval scheme of *St. Thomas*, these philosophers seem to have come to life. Everyone in the painting seems to be enjoying the excitement of communicating with one another, even though the tone is serious. The costumes are a mixture between classical Greek, Roman, medieval and Renaissance dress; a variety of cultures, age groups and times is also represented. The figures might seem small within the monumental architectural space, but the painter seems to imply that it was their knowledge that built it. For that, it seems to make them loom larger. The time frame, instead of seeming frozen, seems more universal. In sum, Raphael's *School of Athens* represents a very skillful expression of the Renaissance quest of the humanists to bring ancient wisdom to life by imagining and recreating the true spirit in which it was brought by the ancients themselves.

Notice also how the painting illustrates the changes in education and learning. In *Triumph of St. Thomas*, there is a narrow emphasis on the seven liberal arts. Each is confined and ordered. Each of the religious virtues has its place. The *School of Athens* shows the many new fields of knowledge that have come into the view and understanding of Renaissance scholars. The attitude toward learning in the Renaissance painting seems more open to unpredictable possibilities, while the rigidly categorized medieval system seems more set and focused on a 'truth' that sits enthroned in each field. The value of education clearly proceeds from each painting, and the virtues and personal qualities needed for the pursuit of knowledge are also reflected, but the atmosphere in each is very different.





STUDY QUESTIONS AND ACTIVITIES

1. Give other historical and present-day examples of the relationship between science and art, both in subject and techniques artists use.
2. Research optical illusions that can be reproduced on a flat surface.
3. Look at the works of the 19th-century German artist M.C. Escher to see how he utilized the rules of perspective drawing to create special effects. Notice also Escher's tessellations based on geometric "all-over" patterns developed in Islamic art.
4. What is your opinion about realism in painting? Should the artist try to reproduce nature or create the illusion of reality, or are symbolism and abstract design more important stylistic tools for an artist?
5. Make a grid on a clear sheet of plastic, or purchase such a grid transparency from an art store. Place the grid over a photograph and copy it, square by square.
6. Draw a cube in perspective.
7. Invent or draw a scene using a perspective framework.





MATHEMATICS IN THE VISUAL ARTS

The growing wealth and activity of cities, in Europe as in Muslim civilization, brought about demand for beautiful architecture. Palaces, places of worship, towers, bridges, hospitals, public buildings, streets, and squares were a must for the needs and pride of citizens. They were objects of competition among cities, rulers and prominent families. The construction of urban spaces stimulated technology and the arts. Humanism helped provide the tools for recovering the skills possessed by the ancients and the more advanced cultures of the Eastern Hemisphere. The models for style were classical. Renaissance buildings were closer to human size in their scale, and less lofty than Gothic architecture. Their proportions were taken from the study of mathematics, geometry and nature.

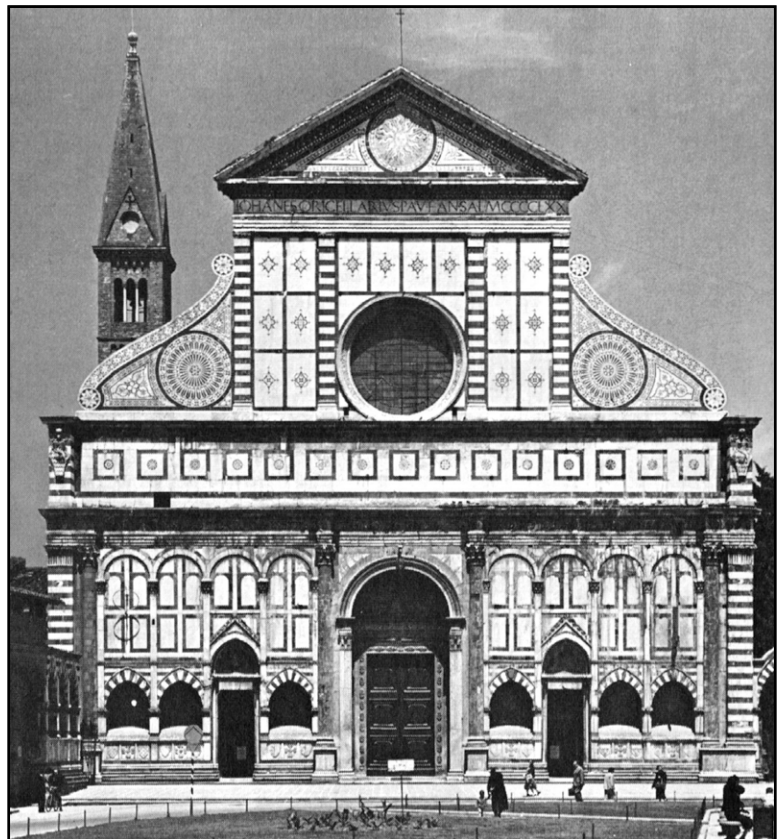
APPLICATIONS OF GEOMETRY AND MATH IN RENAISSANCE DESIGN

The principles of perspective drawing can be used to make a flat canvas look three-dimensional with mathematical precision. The system can also be used by architects to design pleasing and dramatic buildings. As one historian put it: *“Paintings can be made to look like buildings, and buildings can be designed like paintings.”* For example, Brunelleschi designed the interior of the church of San Lorenzo in Florence according to classical and optical principles. The design on the floor, the symmetrical row of columns, the moldings and archways all lead the eye toward the altar. Gone is the hodgepodge of gothic statues peeking out from everywhere. Gone are the high, pointed arches that make the viewer feel awed and tiny. Instead of an endless variety of details, the eye is calmed and focused by repeated design elements. The scale of the whole building is more attuned to natural and human proportions than an awe-inspiring Gothic cathedral.

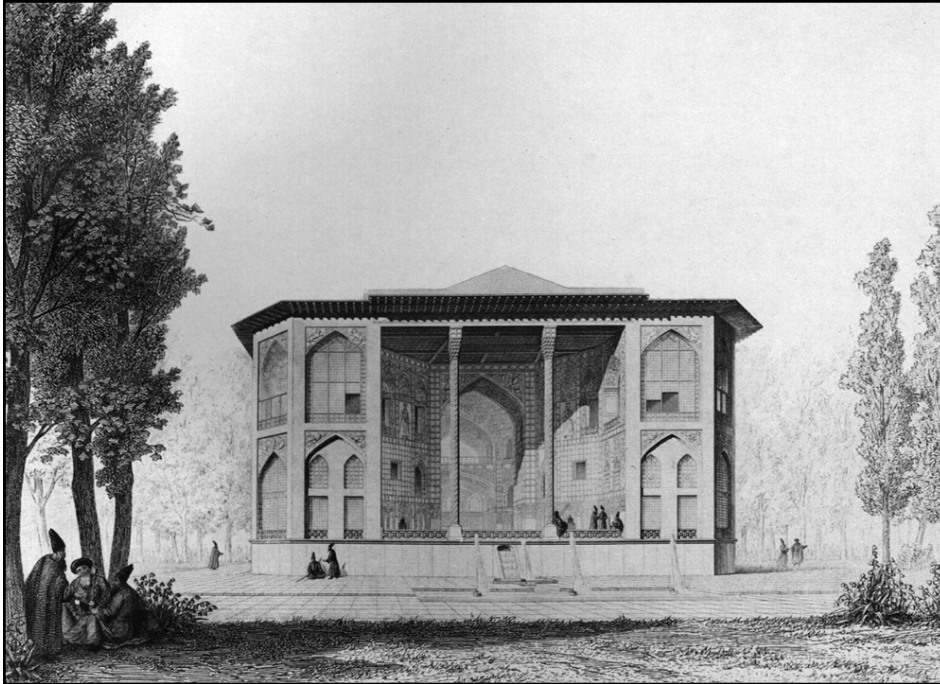
GOLDEN RECTANGLE, GOLDEN SECTION IN ARCHITECTURE

The most striking aspect of a work of art is often the least noted. Most people are immediately struck by the color, the subject, the details of a painting, an object or a building. The overall effect of an artistic creation, however, seems to depend a lot on its proportion. Proportion means the relation, for example, between the sides of a rectangle that outlines the overall shape from ground to roof, a door, a window, or smaller design elements that divide up the surface.

Students of art, mathematics and even botany and biology share a common quality in their object of study—proportion. Certain proportions have been found to recur in the artwork of many cultures



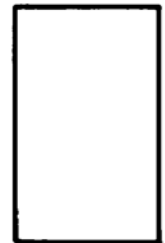
Alberti's Church of St. Maria Novella, Florence.



Masjed at Isfahan, Iran, with Golden Rectangles.

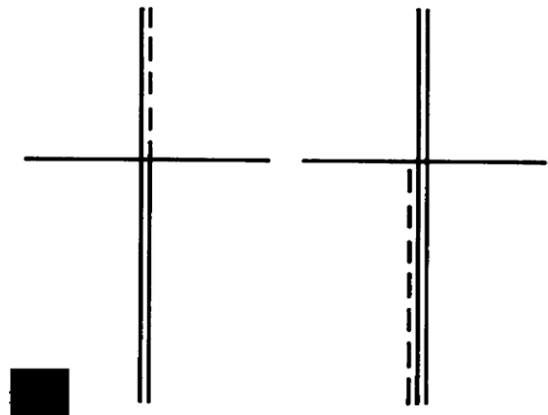
around the world, from earliest times to the present. These same proportions have been found in the structure of natural objects, too, like the shapes of plants and their patterns of growth, the shapes and growth in shells, and even in the relationship of the parts of the human form. These proportions, it turns out, follow definite mathematical patterns. They are closely related to a sequence of numbers with astonishing properties. They are related to the Fibonacci sequence. Fibonacci was the brilliant mathematician Leonardo of Pisa, whose education in Muslim North Africa introduced him to advanced mathematical concepts, including Arabic numerals—which he introduced to the West.

Fibonacci is perhaps best known for having described a remarkable series of numbers. The **Fibonacci sequence** is an infinite series of numbers. Each Fibonacci number is the sum of the previous two numbers, starting with 1. The number before 1 is 0. When added together they give 1 again. Each time you add the last two in the series, it gives you the next Fibonacci number. $1 + 1 = 2$. Adding the last two in the sequence, $1 + 2$, gives you 3, then 5, 8, 13, 21 and so on, to infinity.



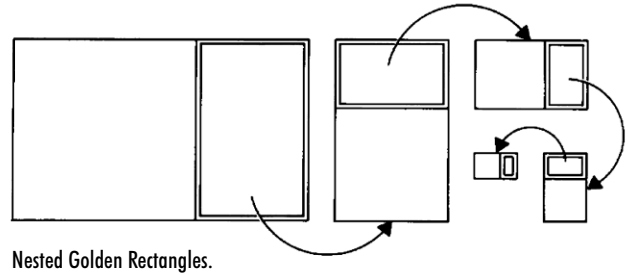
When Fibonacci numbers are used as units to make shapes, and even musical intervals, they seem to be harmonious, beautiful and satisfying to the human senses. You have examples of them around you. An ordinary 3×5 index card is a rectangle using adjacent Fibonacci numbers. Many book formats, doorways and windows are, too. The rectangle formed by measuring the height and width of a chicken egg, a spruce tree, and a human face show the same proportions. The rectangle formed by the height and width of the Greek Parthenon, a statue of the Buddha, a Chinese bowl, and many other works of art have the same proportions. The sides are Fibonacci numbers, and they have the same mathematical relationship to one another. That relationship is: the short side is in the same proportion to the long side, as the long side is to the sum of the two sides. In mathematical notation:

$$\frac{S}{L} = \frac{L}{S + L}$$



The Golden Section.

The resulting rectangle is not too long and thin, and not to short and fat. It is perfectly pleasing. The ancient Egyptians used it; the ancient Greeks named it “the Golden Rectangle.” Muslim geometers and designers used it in their art and architecture, as well. Using this same proportion, a line or a rectangle can be divided to get the Golden Section. The short piece is to the long piece as the long piece is to the whole. By removing a square from the Golden Rectangle (the Golden Section) a new Golden Rectangle is formed. This process can be continued to an infinite number of nested shapes.

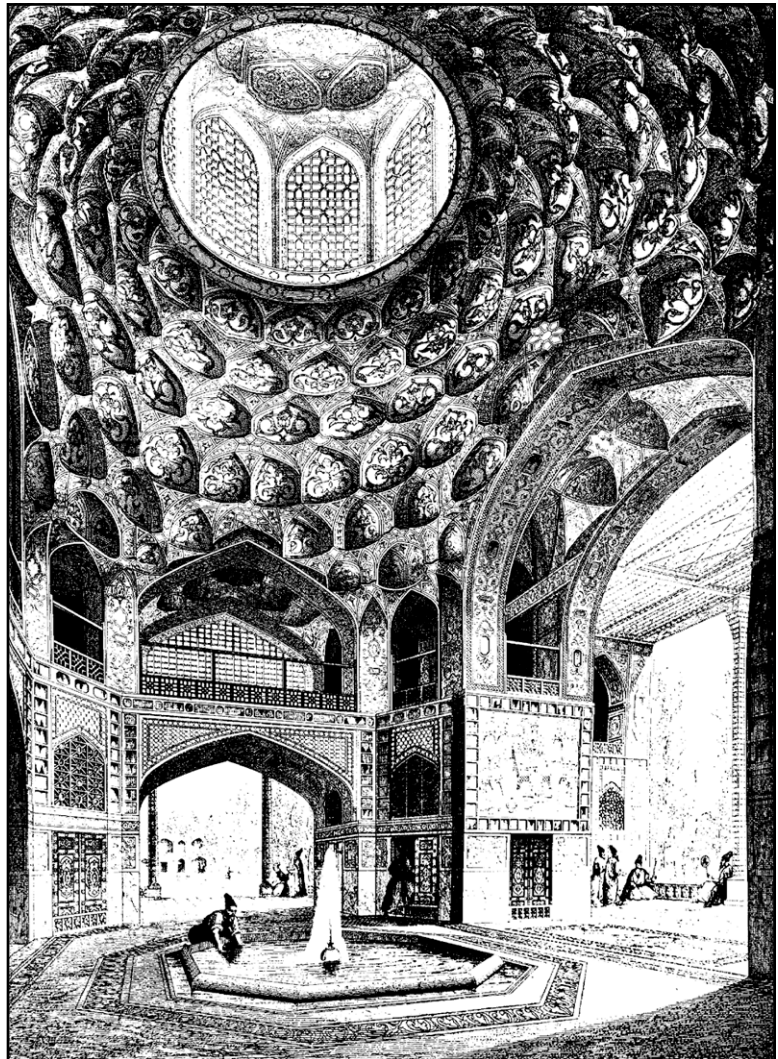


Nested Golden Rectangles.

In geometric design, such as the familiar “all-over” patterns of Muslim decoration, the Golden section and golden rectangles appear frequently. The dimensions of *masjids* and other buildings utilize these pleasing proportions, as well as Islamic calligraphy.

As in the classical tradition and the medieval system of knowledge, geometry held a high rank along with mathematics, astronomy and music. Al-Khwarizmi, Umar al-Khayyam and Ibn Haytham (Alhazen) all made significant original contributions to geometry beyond the teaching of their Greek mentors. Use of geometry in Islamic architecture is very complex, and cannot be reduced to a simple, systematic explanation or modular applications such as Alberti and some other Renaissance architects recommended.

Geometric shapes and symmetry might be used in one *masjid* to draw the eye to a focal point, just as Brunelleschi did in the San Lorenzo church. On the other hand, a Muslim architect or craftsman could use a complex geometric “all-over” pattern in tile or stucco or pierced stone to make a solid wall seem to dissolve into nothing. Two Muslim mathematicians several centuries apart wrote manuals linking architecture systematically to geometry. They are al-Buzjani, who died in 998 CE, and al-Kashi, who died in 1429 CE, near the beginning of the European Renaissance. Al-Kashi recommended similar use of proportions as did his near contemporary Alberti, but he encouraged flexibility in proportioning height to depth, rather than a strict formula.



Complex design elements in interior of Isfahan masjid.



Roman pediment in proportion to a face.

Renaissance architecture included these proportions in a systematic way. Brunelleschi and Alberti were again pioneers. Renaissance architects trying to recapture Roman skill in designing buildings took measurements of the ruins in Italy. They discovered the use of mathematics, and the way it corresponded to proportions in nature. One Renaissance artist saw these proportions in Roman architecture: Leone Battista Alberti wrote a guide for architects, in which he tried to raise the profession from a manual skill to an art. He recommended the use of geometry and rational integration of proportions. Alberti thought that nine basic shapes should be used in designing churches, for example. Three of them derived geometrically from the circle, and another three from the square. The facade of Santa Maria Novella Church in Florence illustrates this complex integration of shapes. Look again at the illustration of Alberti's facade, and see how many Golden Rectangles

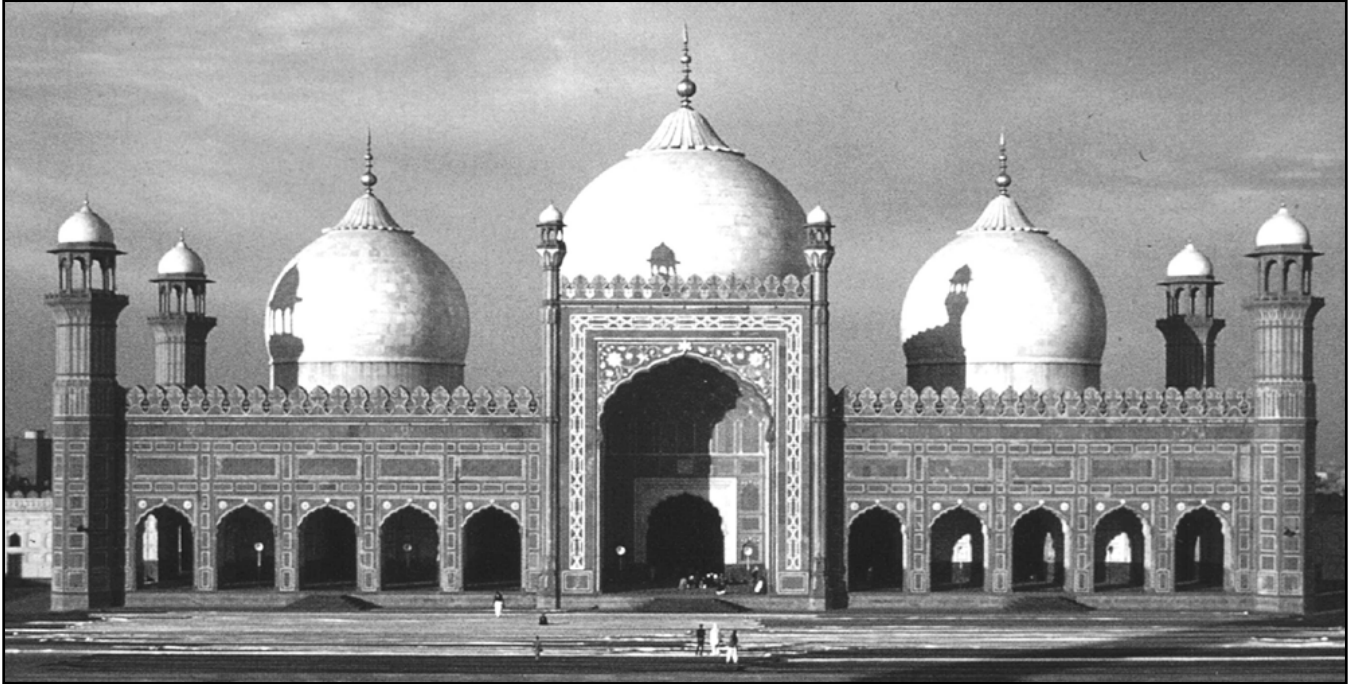
you can find, including nested ones. Brunelleschi became a master of proportion. He used repetitive symmetry and the Golden Section in the facade of the Hospital of the Innocents, in Florence, completed in 1424, and the shapes in the floor plan of the Pazzi Chapel. Wealthy ruling families in Italy and elsewhere also had palaces built for themselves using these new principles of architecture, proportion and design. Artists also included them in the fantastic architectural backgrounds that were fashionable in paintings.

Designs for dramatic cityscapes using geometric layouts and broad vistas for city squares were much admired during the Renaissance. A few were built. Interestingly, this development was shared in parts of the Muslim world at the same time. Timur's Registan Square in Samarkand was an early example of a dramatic cityscape, with three monumental buildings facing each other. In Mughal India, the idea was carried to near perfection in the Taj Mahal, with its reflecting pool and serene proportions seen from a distance. The Badshahi Masjid at Lahore, Pakistan is a fine example of Mughal architecture masterfully using proportion and harmony. It is known that the Medici rulers, who were among the foremost patrons of Renaissance art and architecture, exchanged embassies, ideas and techniques in art with the Mughals.



Filippo Brunelleschi, Church of San Lorenzo, Florence. Can you find examples of the Golden Section and Golden Rectangle?

The sense of civic pride and the competition among rulers to patronize the arts and wed them to the sciences was a hallmark of the Renaissance spirit. These architects were extremely successful, since their buildings are among the most famous tourist destinations in the world.



Badshahi Masjid, Pakistan.



STUDY QUESTIONS AND ACTIVITIES

1. Find examples of the Golden Section and Golden Rectangle in natural and man-made objects around you.
2. Research a famous Renaissance architect or an architect from the Muslim world and make a visual, written or oral presentation on his life and works.
3. Research the topic of proportion and use of geometric shapes in the architecture of various cultures. What are some common relationships between height and area, common floor plans, etc.?
4. Research some other characteristics of the Fibonacci sequence. Why are they still of great interest to mathematicians today?





ART, ECONOMY AND GEOGRAPHY: MAPPING TRADE FROM RENAISSANCE PAINTINGS

In order to make a visual image of trade during a certain period of history, we can draw trade maps. On such a map, we place dots to represent cities, with snaking lines representing overland and sea routes. We can draw icons for the various goods moving about the world. These symbols give us the big picture, but they do not tell us a very personal story.

Artworks can also give us a visual summary. What is more, they help us to see where the trade routes lead directly into people's lives. Renaissance painting can open an especially wide window on the daily life, tastes and values of the people they portrayed, because the artists tried to make their scenes very realistic. In a Medieval painting, the facial expression and body language are often neutral and impersonal. A Renaissance portrait or scene, on the other hand, can tell you how the people felt about themselves, their clothing, and the objects with which they surrounded themselves. Not just wealthy and powerful people were painted, but artists also portrayed ordinary people and everyday life with realism. Beggars, people with disabilities, peasants, foreigners, shopkeepers, pirates, children, pets and wild animals were included on their canvases, along with objects as ordinary as a cucumber or a piece of string.

A painting or drawing invites the viewer first to look at its color, its light and the beauty of its subject. It invites us to wonder at the painter's skill at making us see what he saw in the small world within the rectangular frame. Painters like Raphael, Caravaggio, Leonardo da Vinci, Vermeer, Van Eyck, and scores of others made their canvases glow with an inner light that almost seems to turn the lifeless pigment into the thing itself.

There are, however, many other ways to look at a piece of artwork. Along with the expression of personal feelings, artwork can let us view a slice of life from long ago. It can give us a great deal of historical information about social relations, economic values and conditions, about religious beliefs and attitudes about other cultures. Historians of technology and science can sometimes date the transfer or spread of techniques, influences and specific items using painted evidence. These are only a few examples.

Artwork has a geographic dimension, too. It can be used to study objects of trade and commerce as people used them. After all, the two ends of every trade route are the producers and the consumers. In between, of course, there may be many merchants, porters, bankers, pack animals, ships and even highway robbers or pirates. By studying the paintings shown in these slides, we can take a look into the lives and values of people who lived long ago.

GEO-ART

The list below is an assembly of several types of Renaissance paintings—portraits, still lifes, religious scenes, domestic scenes and street scenes. They represent various artists and geographic regions of Europe. They all belong to the period from 1400 to 1600 CE. They were selected for the information they provide about the movement of people and products from place to place during the Renaissance. These paintings have been included in the resource collection as slides #12-17. In addition to these five examples, a list of other possibilities for the period from the Renaissance to the 18th century has been given, along with references in which color reproductions are located for classroom use. All are commonly found in public and school libraries.

Slide

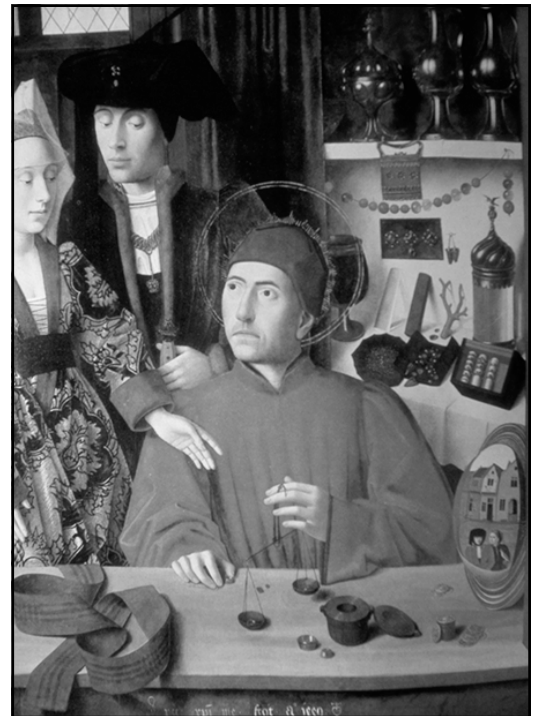
12

Saint Eligius

Artist: Petrus Christus

Date and Place: 1449, Bruges

This is one of the first genre paintings, or detailed portrayals of everyday life. The title refers to St. Eligius, the patron saint of goldsmiths. Art historians note, however, that the man in red probably represents a goldsmith of the Renaissance rather than the saint. The two people with him are a bride and groom in their wedding finery. The goldsmith is shown weighing a gold ring that he is selling to the couple. On the table and on the shelves behind him are many articles on display.



Directions:

1. Study the objects pictured very carefully. With a partner or in a small group, identify and list as many objects as you can. Be precise. For example, don't just write "coral," write red, branched coral. Notice the fabrics and their characteristics, noting small details and the substances of which the items, including clothing and furnishings, are made.
2. Categorize the items according to various criteria:
 - Are they imported or of local origin?
 - Were they imported from outside of Europe?
 - Are they raw materials or finished goods?
 - Are they luxury items or necessities?
3. Research the origin of the goods pictured, using books on trade, historical maps, atlases, or encyclopedia. Label each item on your original list with the country or region from which the goods originated. (see this unit's Bibliography for some leads).
4. Make a poster map of the Eastern hemisphere, and using a postcard or other reproduction of this painting, use pushpins and colored yarn to connect each item in the painting to its place of origin. Label both item and place of origin, and/or make a map key to help viewers identify the goods.

Slide
13

The Moneylender and His Wife

Artist: Quentin Massys

Date and Place: early 1500s, Antwerp

The painter is a famous Dutch artist of the Northern Renaissance, one of the pioneers of painting everyday life in great detail. This painting is similar in many ways to Petrus Christus' work, but it is more revealing of the personalities of the couple. Compare this painting to Petrus Christus' *St. Eligius*. Do the shopkeepers seem to share the same degree of wealth and social class? Compare the scenes reflected in the curved mirror. Describe the atmosphere outdoors.



Directions:

1. What messages about values are conveyed by the artist? Does the painting seem to be symbolizing a message or portraying a real-life scene? List the objects and people that might have meaning and suggest what the meaning might be.
2. Describe the social values suggested by the clothing of the couple. Compare with dress in cities of the Muslim world during the same period or earlier.
3. What does the clothing and furnishing tell you about the climate and vegetation in Northern Europe?
4. How many goods pictured seem to be imported from elsewhere? What kind of objects are they?
5. What domestic, or local products are pictured, and how are they used?
6. What was the geographic origin of the gold that was minted into coins in Europe during the 15th century?
7. The curator of the Louvre Museum, Paris, where this painting hangs, noted that the painting used to bear an inscription on the frame that was probably put there by the artist. It read: *“Let the balance be just and the weights be equal.”* (Leviticus, 19:36) What is the source of that quotation, and what beliefs and values does it represent? Compare to the verse from the *Qur’an*, the chapter entitled *al-Rahman*, “the Most Beneficent,” verse 9: *“And observe the weight with equity and do not make the balance deficient.”* What characteristics of life in Antwerp in the 1500s would have brought out this new type of painting? How do these circumstances compare with conditions in cities of the Muslim world? Does the painting encourage or discourage money-lending?
8. **Optional Project:** Research and compare the Islamic and European views of money-lending. What do the sacred texts of both faiths say about usury (charging interest)? What forms of credit were preferred and developed in the Muslim world and in Europe?

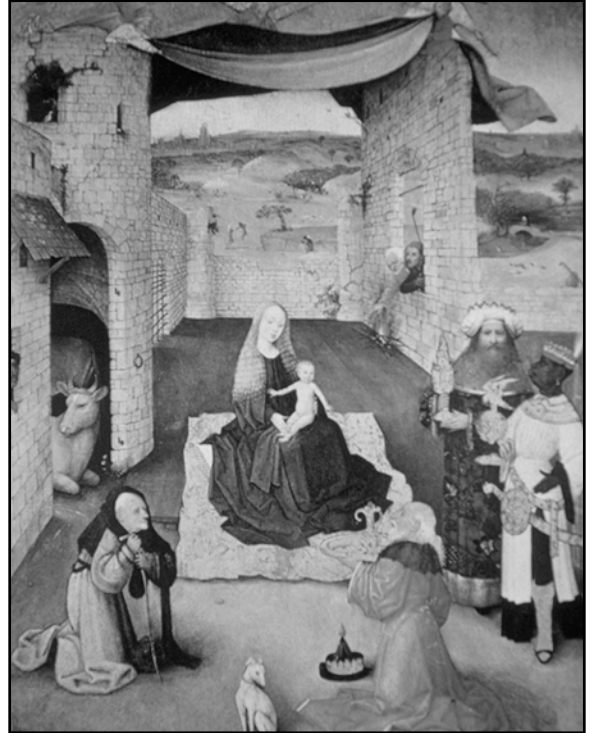
Slide

14

Adoration of the Magi

Artist: Hieronymus Bosch

Date and Place: ca. 1490, Flanders



Slide

15

Adoration of the Magi

Artist: Quentin Massys

Date and Place: 1526, Flanders



Slide

16

Adoration of the Magi

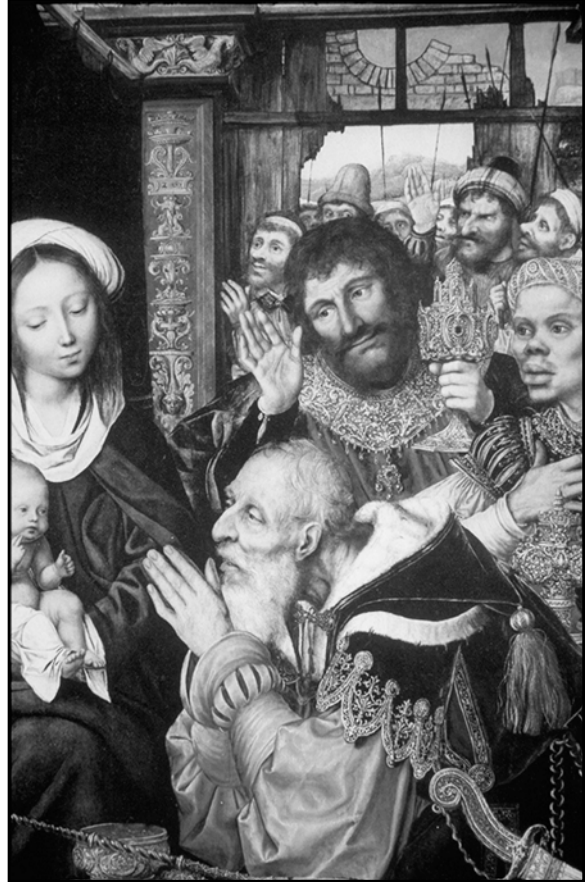
Artist: Ulrich Apt the Elder

Date and Place: late 1400s-early 1500s, Augsburg

Directions:

Study the scenes, concentrating on the clothing and articles carried by the Magi, or wise men of the East. Even when Renaissance artists portrayed religious scenes that they knew had taken place over a thousand years earlier, they often dressed the characters in the scene in Renaissance clothing. They sometimes honored friends, acquaintances or other people by having them model for the painting, and they placed contemporary objects in the painting along with symbolic ones. Focus on the portrayal of the Magi in these paintings.

1. What observations can you make regarding the appearance of the Madonna and Child?
2. What appears to be the regional origin of the persons portrayed as the Magi? What is your evidence for this?
3. How likely is it that the painter captured, from personal observation, what a wealthy person from the East or Africa would have looked like during the Renaissance? In other words, is the painter conveying a current impression of people from those faraway places, or an imaginary view of those places and people in the past? In making your decision, consider the possibility of actual contacts, based on the geographic location of the painters.
4. What observations can you make about the way the Magi are dressed and the articles they carry with them that seem characteristic of their place of origin? Are they wearing items that Europeans are known to have imported from those places?
5. Contrast the African characters in the paintings. What other persons of non-European origin have been portrayed?
6. Contrast the setting in style and decoration. Which cultures are represented in these styles?



Slide

17

Interior with Figures

Artist: Pieter de Hooch

Place: mid 1600s, Holland

The Dutch artist was a pupil of Rembrandt and probably worked with Vermeer as well. His interiors are lighter than most Dutch paintings of this type, and show lots of detail, like the view into another room, with the figure looking in the mirror. This type of painting was very typical of the time and place, and shows the wealth of the Dutch middle class, which came from trade and overseas colonies. The wall covering shown is leather, imported from Cordoba, Spain.



Directions:

Imagine you had just been dropped by parachute into this Dutch home from a time machine. Because you are in a time warp, the people cannot see you. Study the scene carefully.

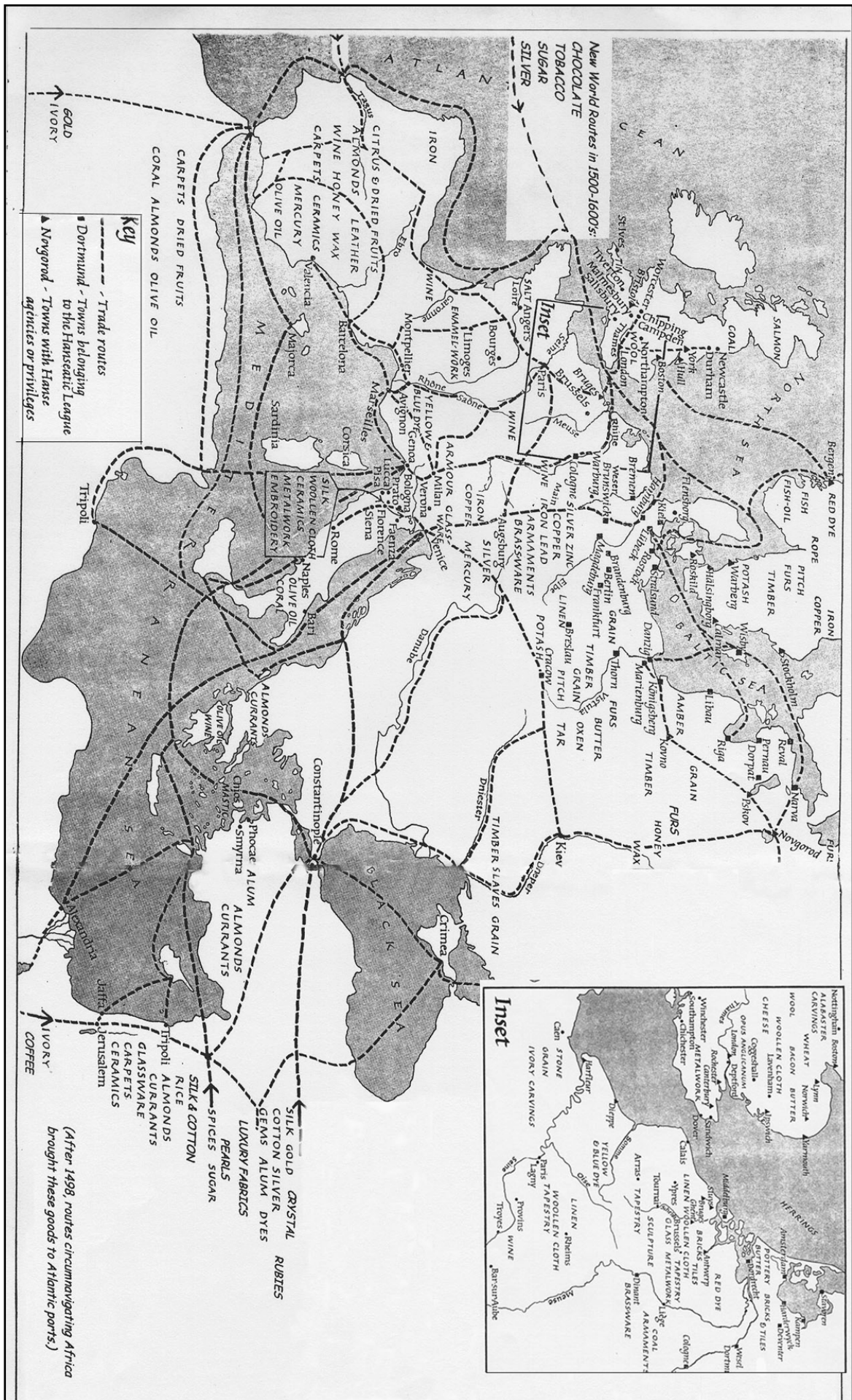
Identify the characters

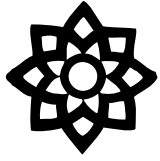
in the picture and write dialogue for them. The dialogue will give you information about life in Holland during the 1600s. Use the following questions as a guide.

1. Who are the people pictured? (Don't forget the man in the other room.) What is their relationship to one another?
2. What might be their occupations and level of education?
3. Do you think the scene outside would be city or countryside? Why?
4. How do you think these items came to be in the house? Might the seated man have returned from a long journey by sea? What might have been its purpose? What ports might he have visited? What might he have brought as gifts?
 - an Italian chest with ebony wood and gilt
 - Delft pottery bowls
 - leather wall covering from Cordoba, Spain
 - An Oriental rug
 - a clay tobacco pipe
 - a Japanese fan
 - marble floor tiles
 - a French painting
 - a large silvered mirror
 - woolen, linen, silk and velvet clothing
 - Moroccan leather slippers

WESTERN TRADE ROUTES OF THE MIDDLE AGES AND RENAISSANCE

from Evans, Joan, ed. *The Flowering of the Middle Ages* (New York: Bonanza Books), 1985.





IMAGES OF THE SACRED

A LOOK AT THE RELIGIOUS ARCHITECTURE OF CHRISTIANITY AND ISLAM

Among the Abrahamic faiths—Judaism, Christianity and Islam—there are many similarities in the way art and architecture express beliefs in a Divine Reality. There are also, of course, many ways in which these artistic traditions differ, with each work of sacred art speaking to the religious world it serves in a clear voice. In this section we will look at cathedral and *masjid* (mosque) architecture and try to understand how building a sacred space can serve as a reflection of a society's beliefs concerning both the Divine Creator and the world that surrounds us.

CATHEDRAL ARCHITECTURE

When we view a work of sacred art, we see a reflection of the belief system of the culture and time in which it was produced. Sacred art also teaches the faithful, and so it also serves to support that belief system. Works of sacred art are created not only for the aesthetic gratification of the artist, but as a divine act. Whether stringing together handmade prayer beads, tooling an image of a saint into the leather cover of a Bible, or applying *Qur'anic* scripture to the dome of a *masjid* (mosque), works of art and architecture are an expression of piety. They also indicate the basic tenets of the religion they represent. One only need to compare a Quaker Meeting House (church) in England to a Baroque cathedral of northern Europe to see the contrast in how sacred spaces can differ. While the Quaker Meeting House reflects grace through simplicity, the Baroque cathedral reflects an era of confident opulence.

Slide 18

Reims Cathedral Reims, France, 13th century

The Gothic period of Cathedral architecture, dated roughly from the mid-12th century to the end of the 14th century, best represents what most people in Western culture imagine when they think of a cathedral. This is because the great Gothic cathedrals such as Chartres, Notre Dame and Amiens are among the purest and most moving form of Christian sacred architecture. This was also the era in which Europeans stopped depending upon Roman architecture as the prototype for cathedrals and developed their own style. This new style still had some Romanesque form to it, but now sacred space was dominated by distinctly European Christian elements.

Reims Cathedral represents High Gothic architecture in its mature form. The exterior of the building is completely covered with intricate decorations such as statues, small columns, arches, pinnacles, circular rosettes, and other decorative stonework. These are meant to disguise the heaviness of the stone core of the structure. But even though the exterior of the building is completely covered with



intricate decorations, there is actually a very logical division within the design. If your eye is trained like that of the Medieval believer, you could detect certain design elements that serve as a “map” of the interior. In this way, before you even enter the building, you know exactly what is inside.

The front door is divided into three different segments, reflecting the interior’s central aisle, or *nave*, and the two smaller aisles next to the nave. You can detect the next obvious segment of the building by looking at the horizontal division along the side. This shows you where the *triforium* is on the inside. The triforium looks like a columned gallery, or balcony that overlooks the magnificent nave. At the next level, a giant Rose Window,—or round stained glass window—lies above the entrance. When the sun is in just the right position, this window showers the inside of the cathedral in brilliant colors. Columns, rosettes and pinnacles fill the spaces on either side of the Rose Window. Statues of Biblical figures circle the entire building at this level, again, showing a clear and logical division of the structure from the outside. This level reflects where the *clerestory* is on the interior. This is the level where stone and glass work together in the upper reaches of the cathedral. This section creates an odd combination of elements that are the extreme opposite of each other. Delicate and fragile stained glass alternates between massive stone columns to bring light into the dark interior of the building. Looking back at the *facade*, or front of the cathedral, you see the “Kings Gallery” above the Rose Window. This is a line of ornately carved statues depicting Biblical figures. All this is crowned by two massive towers which house the bells that call the faithful to prayer.

LINKS BETWEEN SCRIPTURE AND SYMBOLISM IN CHRISTIAN ARCHITECTURE

THE CATHEDRAL AS ALLEGORY

To the men and women of Medieval times, *allegory*, or symbolism, was used to express emotions and beliefs, to teach religious doctrine and to create a sense of understanding that the medieval mind could contemplate. Though most people were illiterate at the time, by attending religious services, many had developed a remarkable knowledge of Biblical scripture since childhood. For this reason, many elements of Cathedral architecture communicated a deeper meaning to a medieval visitor than the modern observer can grasp. The Gospel of St. John and the Book of Revelation are two examples of sacred scriptures that inspired visitors to the cathedrals and those who labored to build them. With such sacred spiritual passages for inspiration, artisans who crafted the cathedrals of Europe understood that their work was an act of piety and an affirmation of their faith.

The Portals as the Gates of Paradise

When medieval craftsmen carved images of saints, angels or demons for the great cathedrals, they didn’t simply think they were chopping and shaping a piece of stone. They knew their work would be viewed by generations of Christians, who would not only appreciate the artistic quality of the image, but would contemplate the religious message of the work as well. Until the Renaissance and even beyond, the average European was illiterate. For this reason, cathedrals were places where ordinary people could learn about Christian teachings simply by walking through the doors. The portals, or the area surrounding the cathedral’s entrance, were heavily embellished with scenes from the life of Christ, or the works of saints. Some portals reminded people of the gates of hell and heaven, through which the visitor would have to pass when this life on earth came to an end.

Upon approaching a sacred space, the entrance always reminds visitors that they are leaving the material world of humanity behind, and entering the world of the spiritual—the realm of God. All great cathedrals give elaborate attention to the portals, the dividing line between the outer, physical world and the inner, contemplative world. The vivid lessons, in the form of statues, carvings, symbols and icons, remind believers that the way to God leads through the teachings of the Church.

For the medieval believer, passing through these doors symbolized acceptance of Christ’s guidance:

“*I am the Door, by me, if any man enters in, he shall be saved.*” (John 10:9)

Cathedral portals are usually made up of several elements such as columns, a lintel or horizontal stone above the door, and a half circle, or “*tympanum*” that lies over the door. The *tympani* over the doorways of Europe’s gothic cathedrals contain a wealth of art work that indicates a wide variety of Christian beliefs. Many Romanesque and early Gothic cathedrals depict Christ as the final judge, sending sinners to damnation. As Europe approached the time of the Renaissance however, cathedrals began to include depictions of a gentler Christ, the savior of humanity, offering forgiveness and guidance.

Carvings on the lintels and columns depict a broad array of subjects. Some are otherworldly, such as demons, angels, and signs of the zodiac. Others depict such ordinary things as peasants performing their daily tasks of farming, cooking or raising children. The message believers receive while passing through these “gateways to salvation” is that people’s daily deeds, no matter how insignificant they may seem, can also be sacred works. The fundamental understanding is that *all* acts of humanity, whether good or evil, will be observed by a sovereign Lord who offers guidance, salvation and paradise to believers, but damnation, punishment and suffering to unbelievers on Judgment Day, which is described in vivid detail in the Book of Revelation.

THE ROYAL PORTAL OF CHARTRES CATHEDRAL

Gothic cathedrals placed most emphasis on the west entrance, which was regarded as the “Gateway to Heavenly Jerusalem”. These elaborate doorways are referred to as “Royal Portals” because statues of Old Testament kings and queens frequently grace the area flanking the doorway. The statues on this entrance are visually linked to the Heavenly City (Jerusalem) through the use of symbolism—those on the right and left doors have a small building crowned with a tower depicted over their heads.

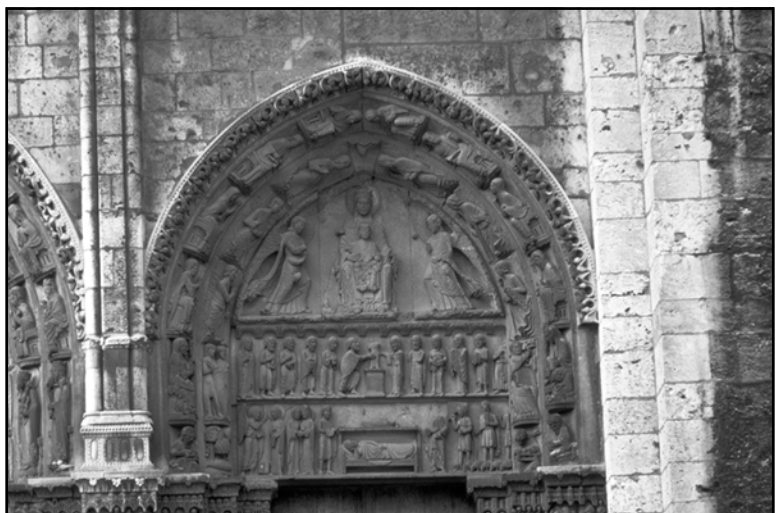
This Royal Portal at Chartres is considered the purest example of Early Gothic sculpture. The entrance to the cathedral is divided into three gateways which together represent the most complete expression of Christian doctrine to have ever been carved into a cathedral doorway. Each section depicts some aspect of the Church’s view of Christ.

Slide
19

Royal Portal of Chartres Cathedral: right door Chartres, France, 1145-1170

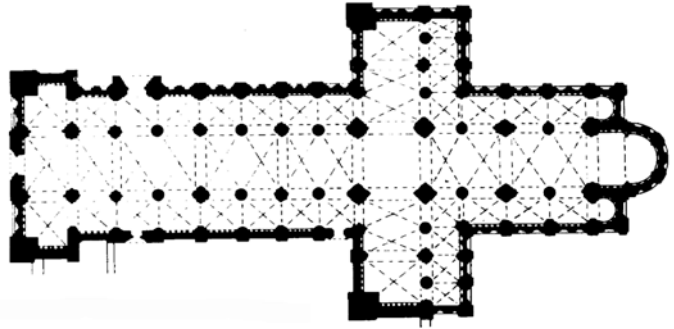
On the right portal are scenes from the life of Christ. The lower level depicts the *Annunciation* in which the Angel Gabriel tells Mary that she will give birth to the Christ Child. This is followed by the birth of Christ, and his presentation at the temple. The rounded tympanum is dominated by a central scene of the Christ child seated on the lap of his enthroned Virgin Mother. On each side of the scene is an archangel, following a Byzantine tradition of swinging a censer (incense burner) through the air.

This depiction of the enthroned Mary and Child is an important symbol of Divine



Salvation. Just as the nature of a mother surrounds her child, a soul which has found Perfect Knowledge (of God) also has in its center, the Divine Light-the Christ. According to Medieval theologians, the Virgin Mary possessed all the Wisdom which humankind was capable of obtaining. The analogy between the Virgin Mary and the Illuminated Soul is further expressed through the symbolism of the Seven Liberal Arts,-areas of study which were considered to be the foundation of Medieval learning. These are carved into the arches surrounding the image of Mother and Child. To the more sophisticated medieval believers, these seven Liberal Arts also held symbolic meaning, linking each area of intellect with a celestial body, as listed below:

<i>Grammar</i> (language)	Moon
<i>Dialectic</i> (logic)	Mercury
<i>Rhetoric</i> (speech as an art)	Venus
<i>Arithmetic</i> (number)	Sun
<i>Music</i> (time and harmony)	Mars
<i>Geometry</i> (proportion)	Jupiter
<i>Astronomy</i> (motion and rhythm)	Saturn



Birds-eye view of typical cathedral plan.

The planets, according to Medieval philosophers, governed the world of the human soul. (With the Virgin Mary representing perfection of the soul.) This counterbalances the left door, which represents the celestial world.

Slide
20

Royal Portal of Chartres Cathedral: left door
Chartres, France, 1145-1170

The left portal depicts Christ's ascension into heaven. Christ is carried aloft on a cloud held by two angels who look away in awe of his Light, which even angels are not capable of looking at. The scene below has angels reaching down from clouds like thunderbolts. They are announcing the good news of Christ's ascension to the twelve apostles who look on in wonder. The scenes surrounding the central arch depict signs of the zodiac. These signs represent celestial constellations which are unchanging and fixed in the heavens. They symbolize the kingdom of the Divine Spirit, the Spirit of Christ, to whom this door is dedicated. Next to each sign of the zodiac, one finds depictions of the various labors of the seasons (one for each month). These are the earthly reflections of the signs of the zodiac, linking man's activities with the cycles of the seasons and the gifts and bounty of each month. By putting the zodiac and monthly tasks together, the door brilliantly makes a connection between the celestial realm of God and the earthly realm of humanity.



Slide

21

Royal Portal of Chartres Cathedral: central door

Chartres, France, 1145-1170

It is the central portal that is considered the greatest masterpiece of the three piece unit. This work of art reminds the faithful of the approaching Judgment Day when all people will be held accountable for their thoughts and actions. This scene depicts the Second coming of Christ, on the Day of Judgment. But here one finds a very significant difference between this depiction of Christ and those of earlier cathedrals. As Europe began to leave the Dark Ages behind and take steps toward the Renaissance, the attitude toward the nature of God changed dramatically. Even though this is a depiction of Judgment Day—a concept that can be very frightening—the anger of a damning Christ has now been replaced by the mercy of a God who offers salvation to those who believe in him. A gentle Christ figure looks down upon the believers who enter the cathedral. This serves as a reminder that He has been sent to mankind as a savior.

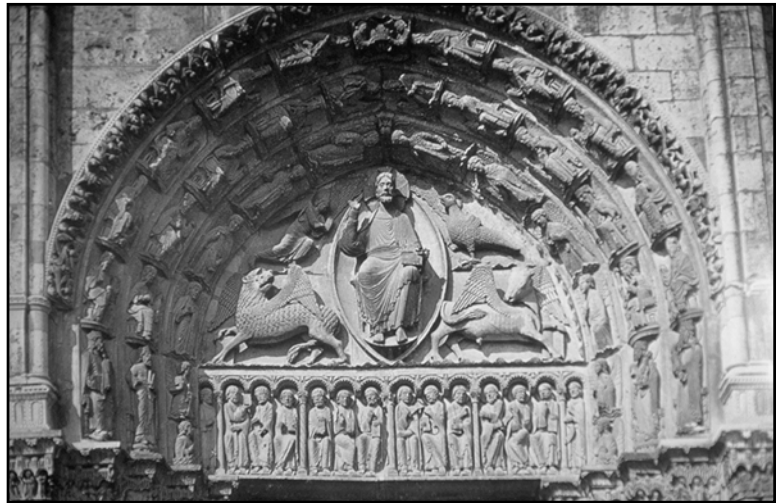
The majestic Christ figure is surrounded here by the signs of the Four Evangelists (Matthew, Mark, Luke and John), each one being represented by a fantastic beast described in the Book of Revelation in which St. John tells of his vision of the apocalypse:

“And round the throne, on each side, are four living creatures, full of eyes in front and behind: the first living creature like a lion, the second living creature like an ox, the third living creature with the face of a man, and the fourth living creature like a flying eagle,...and day and night, they never cease to sing, ‘Holy, Holy, Holy, is the Lord God Almighty, who was and is and is to come!’” (Revelation: 4:8).

The central scene is surrounded by three rows of figures; an inner row of angels and two outer rows depicting the 24 Elders of the Apocalypse who are seated on thrones with crowns on their heads. Below Christ is a depiction of the 12 apostles, flanked on either side by a prophetic witness—probably Elias and Enoch who are expected to return at the end of time.

With this depiction of the Last Day, the central portal completes the message that the other two gates had started. On the right entrance is the Beginning, the Alpha—the arrival of Christ on earth. On the left is the Ascension, the Omega—Christ’s departure from the earthly realm. In the center is that which remains stable—that which “was and is and is to come”. Believers who walked through this extraordinary middle door saw in the stone sculpture a summation of Christian theology in the words of the 24 Elders of the Apocalypse who are quoted in the Book of Revelation:

“Worthy are thou, our Lord and God,
to receive glory and honor and power,
for thou didst create all things,
and by thy will they existed and were created.” (Revelation: 4:11)



THE CATHEDRAL AS BODY OF CHRIST

Geometric Proportions, the Source of Harmony and Grace

According to Christian theology, Jesus is the Word of God, manifest in human form and brought among humanity with a message of salvation. Besides symbolizing the Heavenly City, cathedrals were created to be an earthly representation of the body of Christ. This becomes apparent in a “bird’s eye” view of classical cathedral design. The church is built in the form of a crucifix, with a long, narrow stem of the building (*nave*) cut across by perpendicular arms (*the transept*) and topped off with a rounded area where the choir is sometimes placed (*apse*). The *altar* is usually placed directly under the site where the nave and the transept intersect, indicating this spot as the timeless center, just as Christ is understood by Christians to be the timeless center of man’s existence. This design serves as an analogy between the Temple of God and the Body of Christ, as indicated in the Gospel of John, Chapter 2, verses 19-21:

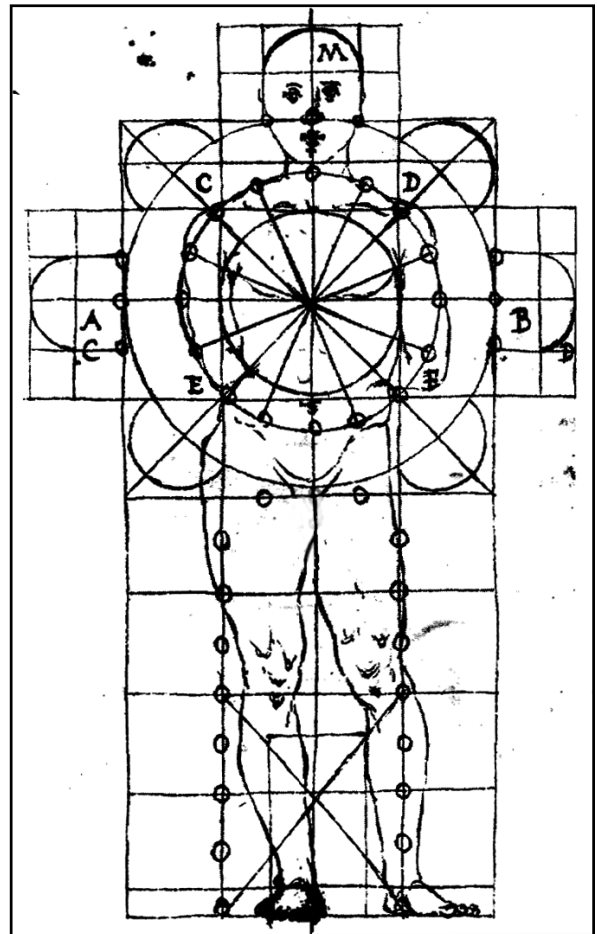
“Jesus answered them *“Destroy this temple, and in three days I will raise it up.”*

The Jews then said, “It has taken forty-six years to build this temple, and will you raise it up in three days?”

But he spoke of the temple of his body.”

There are many Medieval depictions of cathedrals as seen from above with the crucified body of Christ literally depicted within the outlines of the building—his head in the rounded tip or apse, his arms extended across the transept and the rest of his body filling the nave. Because cathedral architecture in its purest form corresponds perfectly to the proportions of the human body, this places the heart of Christ exactly where the altar, or the heart of the church service, would be found.

Music and mathematics also influenced church architecture, because they were seen as the two primary sources of harmony and serenity. To the medieval mind, music was primarily a *science*, one of the seven liberal arts. Harmonic chords were appreciated first for their mathematical qualities, and only second for their ability to please the listener. As early as the 5th century, the writings of Saint Augustine articulated the importance of music, numbers and proportion in bringing order and peace to a chaotic world. The writings of this North African philosopher created a synthesis between mystical numerology, the thoughts of Plato and early Christian theology. Augustine felt that, like music, a visual expression of perfect proportions creates an inner harmony within the viewer, enabling that person to participate in divine beauty and peace. For this reason, any part of a cathedral, large or small, can be “translated” into geometric terms. By superimposing imaginary forms such as circles, squares and triangles over different parts, it is possible to see complex spatial relationships. The height of a column, for instance, may be two times the width of the nave, which is twice the length of the transept, etc. This orderliness, along with the fact that the cathedrals seem to reach toward heaven with their spires and columns, creates a sense of calm and awe which assists worshippers in their contemplation of the spiritual world.



Drawing in a Renaissance architectural treatise by Vitruvius.

Slide

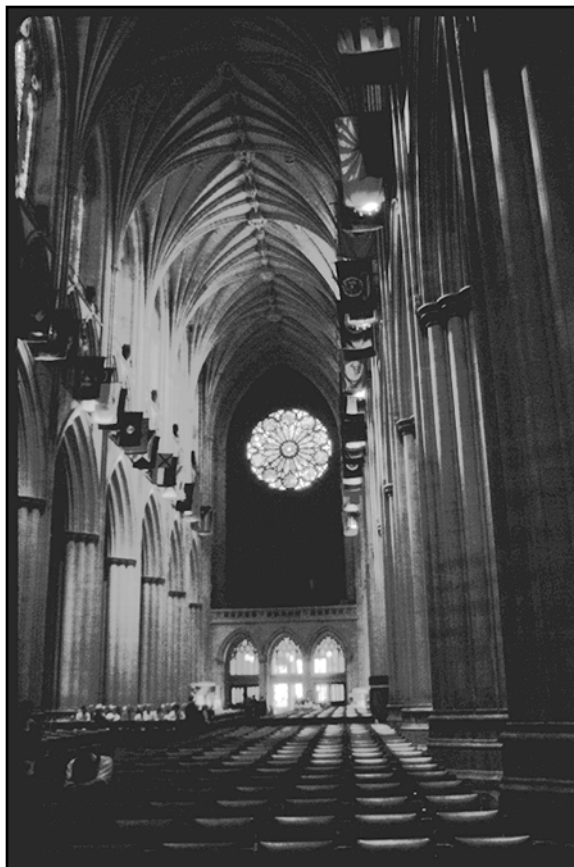
22

Nave: National Cathedral Washington, D.C., 20th century

By the 13th century, cathedrals were seen as an architectural summation of the Christian universe as well as an earthly representation of the Heavenly City of Jerusalem. As such, they were designed to be elaborate, soaring reminders of the majesty and awesome power of the Creator. The Gothic cathedral finally developed into an enormous cross-shaped structure with certain stylistic elements that are repeated no matter where you find the building. The central aisle, or Nave, is the longest segment of the building. It's meant to draw the believer through the front door and toward the altar, or the "heart" of the church. There are smaller aisles on either side of the nave, flanked by towering columns. Above the nave is the gallery which looks like a balcony with columns that overlook the nave. At the top of the building, the columns branch out into delicate curved vaults which support the roof. In between the vaults are stained glass windows.

Through tremendous technical advances, builders were able to fulfill their dream of constructing enormous buildings of stone, a heavy, oppressive material, while making the structure seem as though it was so light that it could reach to the heavens in an effortless journey toward God. One way to make a potentially heavy stone building look "weightless" was to use colorful stained glass to fill in the areas between the stone pillars, arches and vaults that gave the building its shape and strength. This was a dangerous adventure, and many cathedrals came crashing to the ground as Medieval stone masons experimented with methods of construction which attempted to do the impossible; make a heavy building look light.

There are two focal points to the central nave; the altar at one end and a stained glass "Rose Window" at the other end. A Rose Window is a large round window which depicts some aspect of Christian theology. They are frequently the most impressive work of art within the church, and fill visitors with a sense of awe when viewed. All fully developed Gothic cathedrals have three Rose Windows. The most majestic one is usually over the front entrance, or the Royal Portal. The other two are found at each end of the transept—the long "arms" of the cathedral which intersect the nave above the altar, giving the cathedral its cruciform shape. The themes of most Rose Windows are Christ in Majesty, the Virgin Mary, and the Second Coming of Christ (Judgment Day). These "walls of glass" were tremendous architectural feats. Some of these intricate weavings of stone, metal and glass have withstood the forces of gravity, nature and time for 700 years, attesting to the genius of Medieval engineers!



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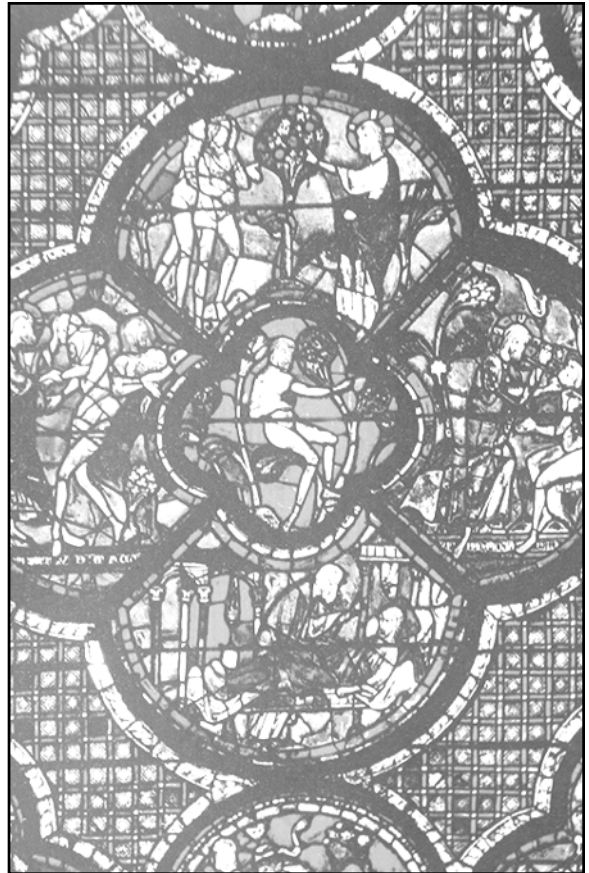
23

Good Samaritan Window: Chartres Cathedral Chartres, France, 13th century

For the believers who couldn't read, the great cathedral windows offered lessons in Christian belief. Through the use of stained glass, the stories of Jesus, Mary and saints and martyrs came alive in vivid colors that filled the viewers' hearts with joy and hope. Some stained glass windows were designed to teach Biblical stories such as this one which depicts the tale of the Good Samaritan. In this story, Jesus was discussing with some followers, the things one must do in order to inherit salvation. One of the deeds Jesus mentioned was to "love your neighbor with all your heart". When a man asked Christ to elaborate on this, the parable of the Good Samaritan was told in which a man was stripped naked, robbed, beaten and left for dead. When a priest encountered the man, he passed by on the other side of the road. When a Levite encountered him, he also passed by without helping. Finally a good Samaritan found him and showed compassion. He cleansed the man's wounds and took him to an inn where he nursed him. When he had to leave, the Samaritan gave money to the innkeeper to support further care of the recovering stranger. After relating the story, Jesus told the crowd to "go and do likewise."

The use of such elaborate stained glass windows did not develop without resistance from within the Christian church itself. Some Medieval theologians felt that these works of art were too elaborate, and strayed from the simplicity of the life and times of Christ. This attitude was countered by people such as Hugh of St. Victor, a church leader who saw these works of art as an instructional tool that could depict Christian beliefs to the illiterate, thereby increasing Biblical knowledge among the masses. He expressed his feelings in a letter which stated:

“Stained glass windows are the Holy Scriptures...and once their brilliance lets the splendor of the True Light pass into the church, they enlighten those inside.”⁸



8. Gardner, Helen, *Art Through the Ages, 8th edition*, (San Diego: Harcourt Brace Jovanovich, 1986), p. 393.

The Cathedral as Heavenly City

The cathedral was considered to be an architectural reference to Jerusalem—the “Heavenly City.” Jerusalem was seen as an earthly manifestation of paradise. Though many people from barons to serfs made the pilgrimage to the Holy City of Jerusalem some time during their lives, most citizens had to make do with a visit to the local cathedral. There, awed by the lofty structure in stone and glass, they could experience a spiritual presence. Upon entering the building they felt as though they had just entered the divine presence of God. Harmonic proportions, the use of light, and expressive art were woven into a place of contemplation, repose and spirituality that lifted the medieval worshipper out of everyday life and into a sense of the sacred. For those who knew their scripture well, the Book of Revelation (9:10-11) would come to mind upon entering the space:

“*And in the spirit he carried me away to a great, high mountain, and showed me the holy city Jerusalem coming down out of heaven from God, having the glory of God, its radiance like a most rare jewel, like a jasper, clear as crystal.*”

CHRIST AS THE DIVINE LIGHT

A correctly-built cathedral is constructed according to careful proportions. If we look again from a bird’s eye view, we could draw a perfect circle around the cathedral, and the four outer corners of the building would touch the inner walls of the circle in perfect harmony. Medieval Christianity had absorbed the ancient tradition of drawing a cross inscribed in a circle. In the hands of Christian thinkers, this archaic design became both a symbol of Christ and a symbol of the Cosmos, with Christ at the center of the universe. This symbol also represents the link between Christ and the circular sun, ideas also found in ancient Roman philosophy. This connection between Christianity and Roman thought was strongest when Christianity was in its formative stage.

Medieval philosophers viewed light as the purest of all physical creations and the most direct manifestation of God. Christian theology was centered upon the idea of Christ as a light to mankind, a beacon in the darkest of times. This idea is beautifully expressed in the beginning of the Gospel of Saint John:

“*In him was life, and the life was the light of men.*

The light shines in the darkness, and the darkness has not overcome it.”
(John, 1:4-6)

This scriptural passage was so important to medieval believers that it had become standard practice to close every mass with its recitation by the 13th century.⁹

Stained glass windows also reinforced the image of Christ as the light that will guide mankind. Not only did the magnificent windows glisten and glow with color themselves, but they put on a beautiful display when sunlight streamed into the cathedral, pouring the colors of the glass on pews, floors and worshippers in bursts of brilliant hues. This created an otherworldly atmosphere within the cathedrals, elevating the believers to a higher level of spiritual experience.

9. Otto von Simpson, *The Gothic Cathedral*, (New York, NY: Harper Torchbooks, 1964), p. 55.

Slide

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**Stone Column: National Cathedral
Washington, D.C., 20th century**

In 1211 Abbot Suger was elected abbot of a French monastery called St. Denis, near Paris. Wanting to fill his church with a mystical radiance, Suger turned to the writings of a 5th-century mystic who identified light with the Divine Presence. This became the guiding force in the design of the new choir and series of chapels which Suger constructed at the Royal Abbey of St. Denis. Filled with stained glass windows and delicate arches and vaults, this new building set the standard for Gothic cathedral architecture.

The making of stained glass involved techniques that transform matter. Chemically, glass is made up of silicon and oxygen. Originally, it is not solid! It is a super-cooled liquid. Colors are created by adding metal oxides to melted glass. The deep ruby that is so popular in stained glass windows is created by adding pure gold to the glass. Cobalt produces blues and selenium creates different shades of orange. In Chartres Cathedral in France, the color blue was so popular that the cobalt used to produce it had to be mined all the way in Bohemia. The mines were exhausted by the 14th century, and this azure blue was never reproduced until the 20th century.¹⁰

Both Christian and Muslim mystics linked this transformation of matter into glass, with the transformation of the human soul. This philosophy has links all the way back to ancient Egypt and the art of alchemy. The basic materials are seen as the image of the human soul which would be transformed by the Holy Spirit. When transformed by the Divine Light, the soul would become radiant and peaceful.

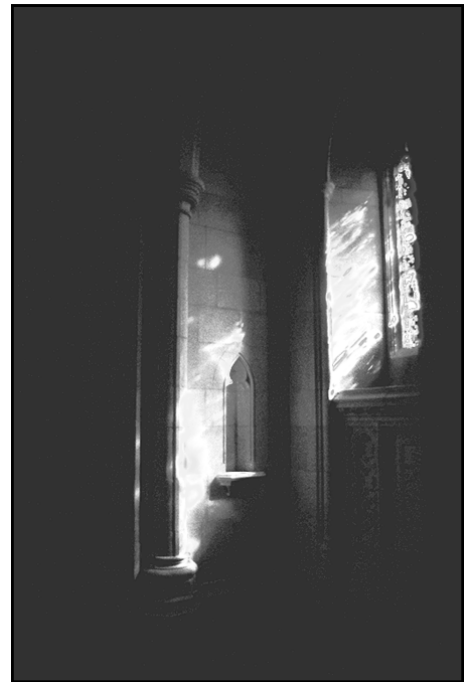
Because light was considered by Medieval theologians to be the purest physical creation, the refraction of light into a spectrum of colors was seen as the clearest symbol of the fact that the Divine Being, while undivided, is also made up of different characteristics and forms. God is seen as the Light, which brings beauty and grace to those upon whom His light shines. This link between mysticism and the physical realities of light was best expressed by the poet, Dante Alighieri who is thought by many to exemplify the Medieval European world view better than any other individual:

“Now both the mortal and immortal things
Are nothing but the splendor of the Word,
Which, in his love, our Father brings to birth.

*For the living Light which so streams
from its source, that nevermore it is detached therefrom,
nor from that love which, with the other two Forms the Trinity*

*that light, I say,
In nine substances combines its rays,
Itself eternally remaining one.¹¹”*

Medieval believers only had to see the many hues of refracted light shining down upon the cathedral to be reminded of their belief in the Trinity and in the guidance they sought from Christ—the Light of heaven on earth.



10. <http://www.pfg.co.za/stained.htm>

11. Dante Alighieri, *The Divine Comedy: Paradiso, Canto 13, lines 52-60.*

ZOOMING IN ON HISTORY

DOING THE “WORK OF GOD”: Creating a Stained Glass Window

It usually took the labors of hundreds of people to create a cathedral. Some were workers with a skilled trade such as stone masons, engineers and glass artisans. Many of them belonged to “guilds” which were somewhat like early trade unions. But the majority of the heavy labor was done by the average peasant. To them, the opportunity to assist with the construction of a sacred site was the opportunity of a lifetime. They cut large trees, carried enormous beams out of the forest and into the city and pulled carts filled with stones, wood and sand. People frequently worked in silence, or they sang devotional songs. In the words of the chronicler, Robert de Torigny:

“Throughout the whole of France, in Normandy and many other places, people humbled themselves, did penance with sorrow and contrition, and forgave their enemies. One saw men and women, sinking up to their knees, drag carts through quagmire. One saw how they laid themselves open to strokes of the discipline, how everywhere miracles occurred, and how God was praised for this with singing and rejoicing.”¹²

As difficult as this work seems, people actually had to go through several steps to be accepted even as volunteer laborers. They confessed and showed sorrow for their sins, took on an air of humility, and reached out to former enemies. Some of the writings of church leaders indicate that people who failed to forgive their enemies during the construction of the cathedral were cast out of the community in shame and disgrace.

Among the most difficult projects was the laying out of the design pattern for a large stained glass window. This process is described by the monk Theophilus in the 12th century:

“If you wish to assemble a stained glass window, first of all obtain a smooth wooden board on which you can measure twice over the surface of the window concerned. Take some chalk, scrape it into the whole board with a knife, sprinkle water over it, and rub it thoroughly with a cloth. When it is dry, mark the length and breadth of the window on the board with lead or zinc, using a ruler and a compass, and, if you wish a border, trace it also in the desired size and design. Once that is done, sketch out the pictures, firstly with lead or zinc, and then with red or black paint; the lines must be carefully traced for, when later you stain the glass, it is necessary to join on the board the lights and the darks. When you decide on the colours for the various garments and other items in the picture, mark the position of each colour with a letter. Then mix powdered chalk and water in a leaden vessel, and make two or three fine brushes of hair, either from the tail of a marten, a squirrel, or a cat, or from the mane of a donkey. Take a piece of glass, larger than the area into which it is to go, place it on this area and, with the chalk, mark on the glass all the designs which you see on the board underneath it.”¹³

Once a stained glass window was created, the entire frame, wood and all, needed to be raised to the top of the cathedral and set in its place. Sometimes they survived this grueling jolt, and sometimes they didn’t. After all their effort, some artisans saw their works of art shatter into thousands of pieces before being raised to its proper place in the cathedral. For this reason, strong metal bars eventually were added to the structure to secure the glass in place. While this added to the weight of the structure, it also increased its chance of surviving the rest of the construction process.

Many enormous windows have survived earthquakes, wars and the ravages of violent weather. Ironically, the one thing that is destroying them now is air pollution that eats away at the metal oxides used in the glass. Conservation efforts have begun to deal with this problem, but as long as we continue to use automobiles within our cities, the fate of these beautiful works of art does not look promising. ✨

12. Titus Burckhardt (Wm. Stoddart, transl.), *Chartres and the Birth of the Gothic Cathedral*, p.60.

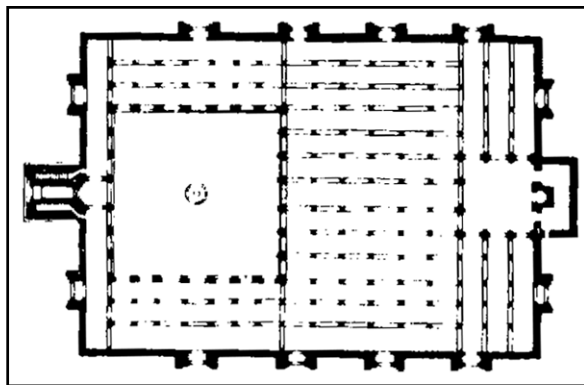
13. Burckhardt, p. 109.

MASJID ARCHITECTURE

The Islamic place of worship is called a *masjid*¹⁴, meaning a place for bowing down to the One God. Like other sacred architectures, the *masjid* reflects the belief system of those who created it. The central message that a *masjid* communicates is the Oneness and Unity of God, called *tawhid*. The *masjid* reflects the majesty of God by its simplicity, its use of space and lack of representation, except for the words of scripture. Inside a *masjid*, it is possible to find a sense of peace in this earthly world to inspire the Muslim to strive for the reward of paradise in the next world.

THE FIVE PILLARS OF ISLAM AND THEIR IMPACT ON ISLAMIC ARCHITECTURE

The Five Pillars of Islamic beliefs and worship require Muslims to proclaim their belief in only one God, to pray five times per day, to fast during the holy month of Ramadan, to give alms in order to purify wealth, and to strive to complete the pilgrimage to Makkah once in a lifetime. The five daily prayers are performed at specific times of the day, before sunrise, near noon, mid-afternoon, after sunset and after twilight. These prayer times are set according to the sun's movement. Because the earth rotates constantly, someone on earth is *always* praying in the direction of the Ka'bah (or House of God) in Makkah.



Bird's-eye-view of a hypostyle masjid.

Though Muslims are not required to go to the *masjid* for every prayer, they are encouraged to do so. The day of communal prayer for Muslims is Friday. **Each feature of the *masjid* has a purpose in some aspect of prayer.** As a result, most *masjids* have several things in common. The *qiblah* wall shows the direction of Makkah and the Ka'bah. The prayer leader stands in a *mihrab*, or niche, in the *qiblah* wall, and his voice reflects back to keep the movements of the worshippers synchronized. A *minaret* is a tower from where the *mu'adhin* makes the *adhan*, or Islamic "call to prayer", in tones that reach out over the streets and houses. Outside the prayer hall is an area for making the ritual ablutions, or cleansing with water before prayer. Inside the prayer hall and near the *mihrab* is the raised *minbar*, or pulpit from where the Friday sermon is given.

Though *masjids* vary in form, what is considered the traditional "classical" masjid style developed as a rectangular building with an open courtyard in the center that leads to the area where prayer is held. This style evolved as early as the 9th century CE in Iraq, and developed along the lines of the ancient Greco-Roman style of sacred sites. Masjid architecture borrowed a mixture of Byzantine and Persian architectural styles, but it was thoroughly infused with Islamic beliefs and uniquely Muslim artistic expressions. Variations on this typical form are found across the entire Islamic world, from Morocco to the borders of China.

14. The common word **mosque** derives from old French, and is a corruption of an old Spanish word, *mesquita*, which is in turn a corruption of the Arabic word *masjid*. "Masjid" derives from the Arabic root *sa-ja-da*, to bow down with the forehead, hands and knees touching the ground. *Sujud* is the name for that movement of utmost humility toward the Creator in Muslim prayer. A *masjid* is named for *the place* of this distinctive sign of submission to God in worship. The proper plural form of *masjid* is *masajid*, but "masjids" is used in the readings for simplicity.

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Courtyard: The Masjid of Ibn Tulun Cairo, Egypt, 876-879 CE

The first gathering place for communal prayer in Islam was the house of the Prophet Muhammad in Madinah. Like many mud-brick houses of the Middle East, the house consisted of a central courtyard with rooms extending to the sides. To shelter worshippers from the sun, the courtyard was partially roofed with palm fronds supported by palm trunks. In this modest beginning, one can find the roots of classical Islamic architecture which accompanied Islam's expansion beyond the confines of Arabia. The Ibn Tulun Masjid in Cairo offers a fine example of the **hypostyle structure** that is associated with

“classical” Islamic architecture—architecture that shows little regional influence from other cultures, and is considered “purely Islamic”. A building is called “hypostyle” if it has a roofed interior space supported by multiple columns. This *masjid* follows the traditional style of having the roofed area on the side of the building where the worshippers congregate for prayers. The other three sides of the building have double arcades supported by the columns you see in the slide.



Ahmad Ibn Tulun, the son of a Turkish slave to the Abbasid Caliph al-Ma'mun, showed promise at an early age. He eventually left Baghdad and became governor of Egypt. Later he declared his independence from the Caliph and founded the Tulunid dynasty. Ibn Tulun built this *masjid* following the same architectural style found in the area which had become the center of power for the Abbasid Dynasty—present-day Iraq. One can still find ruins of centuries-old *masjids* in the deserts of Iraq that have a remarkable similarity to this building.

Stucco ornaments were applied to both the interior and exterior of the *masjid* in the form of geometric bands filled with floral designs. The large ablutions fountain in the center is a later addition which replaced the original, simpler fountain. This structure is considered one of the finest early *masjids* due to its simplicity of design and its sense of mathematics and proportion which create an atmosphere of calm serenity in the midst of the hustle and bustle of modern Cairo.

THE IMPORTANCE OF THE KA'BAH AND ITS INFLUENCE ON ISLAMIC ARCHITECTURE

No matter where in the world it is located, all *masjids* are built to orient the worshippers to pray in the direction of the Ka'bah in Makkah. The Ka'bah, a large, simple cube of stone and mortar in an open space of the *Masjid al-Haram* (the sacred *masjid* in Makkah) is in the center of the sacred territory around Makkah. The Ka'bah is not an object of worship, but rather a house for the worship of God. The *Qur'an* teaches that it was built by Abraham, father of the Prophets, at the command of God. Because Abraham is regarded as the common ancestor of Jews, Christians and Muslims, and a Prophet with whom God spoke, the Ka'bah in Makkah has been revered for as long as anyone can remember.

Even before Muhammad's time, all but a few of the inhabitants of Makkah had reverted to worshipping idols, and had introduced statues and icons into the Ka'bah itself. The major focus of Islamic teachings, in the *Qur'an* and through the example of Prophet Muhammad, is that humankind must forever turn away from idols

and false gods, and purify themselves by worshipping the One God. Muhammad’s first act after the victory over the pagans of Makkah was to destroy all the idols in this House of God and leave an empty structure in its place. **This emptiness is very significant.** It reflects the monotheistic belief that the One God is not found within a building or idol, but He is “omnipresent”—present everywhere.

Within the *masjid*, the *mihrab*, or prayer niche, directs attention toward the Ka’bah as a reminder of the origins and beliefs of Islam and obedience to the commands of God in the *Qur’an*. Part of the experience of the *masjid* is also the harmony in the sounds and movements of the prayer being performed in perfect synchrony. An empty *masjid* is a beautiful space, but its meaning becomes clearer when it is filled with the sound of prayer being led by an *Imam*, or prayer leader. The inhabited *masjid* mirrors the unity of the Muslim community ordained by God in the *Qur’an*. The believers within the *masjid* are linked—through many features of worship—with Muslims in other places. The *qiblah* gives to all a common focus. The greeting, which is uttered after the prayer, is spoken first to the right, then to the left. This greeting is meant for fellow worshippers in the *masjid*, and for Muslims everywhere else in the world. It is likewise meant for the angels, whom Muslims believe are on either side of them. Facing the *qiblah* is also a reminder of Abraham’s “House of God” as the sacred goal of the *Hajj*, or pilgrimage to Makkah. This journey has traditionally linked the world community in faith in a very practical way, but it joins all Muslims in a shared spiritual bond as well. The lines of prayer in any *masjid* are like spokes in a wheel that includes *masjids* all over the world, with the Ka’bah in Makkah at the center.

“Behold! We appointed the site, to Abraham, of the (sacred) house, (saying) “Associate not anything (in worship) with Me; and sanctify My House for those who compass it round, or stand up, or bow, or prostrate themselves therein in prayer.” (Qur’an 22:26)

THE ABSENCE OF PICTORIAL ART IN THE MASJID

People who enter a *masjid* for the first time are often struck by the simplicity of the building and its lack of pictorial artwork. No scenes represent the Prophets and other figures whose histories are also related in the *Qur’an*. No representations of any human, animal, or divine beings affect the imagination of worshippers. Even plants are stylized, and the most common language of decoration is geometric shapes or soft arabesques in continuous flow of pattern. Islam forbids any sort of depiction that would violate the command against making any image or likeness of God or His Creation.

Islamic art is not “realistic” in the sense that Western art is. The *Qur’an* repeatedly stresses that humankind must guard against the tendency to fall back into the worship of idols instead of God, just as Moses’ people, in his absence, fashioned a likeness in the Golden Calf and began to worship it. This and other similar events are narrated in the *Qur’an* as a reminder of how tempting it was for early *Monotheists* to return to their pagan past.

In Islamic teachings, the greatest miracle is God’s creation of the universe. Muslim artists want to avoid the appearance of attempting to rival God by “creating” things in their work, especially those creatures endowed with a soul, like saints, angels, prophets, people, or even animals. In sacred art, however, natural creations such as leaves, trees, shells or flowers can be depicted. Muslim artists have excelled in abstract designs of all types and styles, and have usually depicted plants and other natural objects in a stylized manner, rather than with realism.

THE MASJID AS ALLEGORY

As in Christianity, allegory, or symbolism, reflects a higher spiritual reality in Islam. Symbolism is so important to the Islamic belief system, that everything on earth is seen as a manifestation of God’s mercy or majesty. In Islam, even the *Qur’an*, which is considered to be the literal, unaltered word of God, is seen as a “sign” to mankind, and is referred to by some as “The Book of Signs”. The *Qur’an* is replete with verses which state that God’s creations are a sign or symbol to mankind, and that people should think about the deeper meaning of the physical world which surrounds them:

“Verily, in the alternation of the Night and the Day, and in all that Allah hath created, in the heavens and the earth, are Signs.” (Qur’an 10: 6)

THE MASJID AS PARADISE ON EARTH

Symbolism is an important tool in Islamic architecture. By using symbolism, the *masjid* architects suggest a Divine Presence, which is everywhere, rather than attempting to depict it. This divine presence is indicated through the use of several devices:

1. geometric forms
2. the use of architectural space, such as a void
3. the use of light and color
4. *Qur’anic* verses which weave their way throughout the *masjid*
5. decorative art: the arabesque, and the use of stylized or abstract floral designs that bring to mind God’s creations in nature and *Qur’anic* descriptions of Paradise
6. the dome and the minaret as symbols

By using these devices, architects who built the great *masjids* of Islam, like their Christian counterparts who built the cathedrals, invested their work with elements of the sacred. While the Christian artisans were creating both a representation of the Divine Christ and the Heavenly City of Jerusalem, the Muslims were creating an earthly representation of peace and paradise. In both of these traditions, people who belong to the faith community represented by certain architectural monuments are able to “see” and experience—through intuition and religious understanding—the spiritual message of the builders. A successful architect can communicate a measure of this message even to a person outside the faith community. Sacred spaces are often capable of affecting all those who enter them. A Muslim entering the sacred space of a *masjid* would be reminded by the architecture of *Qur’anic* verses which describe paradise as a place with rivers flowing and gardens providing heavenly fruits to nourish believers.

“The truthful will profit from their truth: theirs are Gardens, with rivers flowing beneath their eternal home... (ch. 5, verse 119)

And he (the believer) will be in a life of Bliss, in a Garden on high.”
(ch. 69, verses 21-22)

With verses such as these in mind, the builders and artisans set their hands and hearts to work to prepare a metaphor for paradise on earth that can proclaim a sense of spiritual peace and longing for any human heart.

THE USE OF GEOMETRIC FORMS: THE DIVINE ORDER IN UNITY AND MULTIPLICITY

When entering a *masjid*, many people feel a sense of calm quietude that encourages reflection and prayer. This atmosphere is created in a very purposeful way through the use of subtle techniques found in *masjids* across the world. One effective way of creating harmony and balance is the use of repeating geometric patterns. The links between mathematics and the Divine are fundamental to Islamic belief and are mentioned repeatedly in the *Qur'an*.

A closer look at the structure of the *masjid* reveals that it is divided into clearly stated geometrical segments that are built in precise mathematical proportions to each other and to the rest of the structure. In some *masjids*, each segment is almost completely covered with small, ceramic tiles in rhythmic geometric patterns. These elaborate patterns evoke a sense of Divine Order in a complex world. Multiplication and repetition, as seen within *masjid* decoration speaks to the Muslim at the same time, of the multiplicity of the created world and the Oneness of God. These designs also serve as a reminder of the beauty of God's creations and the belief that all things eventually return to the center, or to the creator.

One interesting fact to note is that many of the Islamic architectural geometric patterns designed centuries ago mimic exactly some of the complex, microscopic or macroscopic patterns in nature that have only recently been discovered with the aid of the electron microscope and powerful telescopes. For example, the pattern covering a dome may be an exact depiction of the molecular make-up of a mineral, or the microscopic building blocks of the maple leaf, etc. These discoveries reinforce the Muslim belief in mathematics as a Divine Science and a reflection of the majesty of the universe created by God.

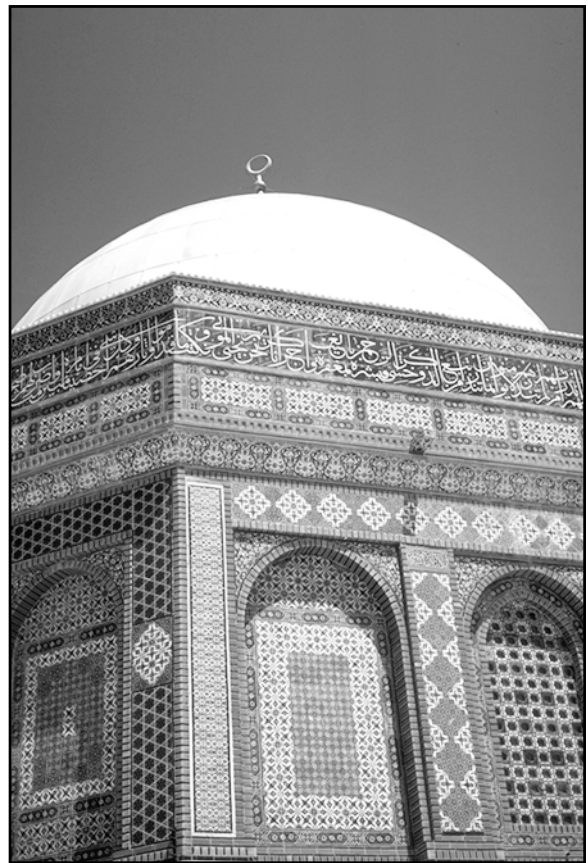
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Dome of the Rock Jerusalem, 690-692 CE

The Dome of the Rock, situated in Jerusalem, is one of the most sacred sites of Islam. It is believed that the Prophet Muhammad's Night Journey to Heaven began from the rock at this site. During the Night Journey, the Prophet ascended to Heaven and was joined by many Biblical prophets who are revered by Jews, Christians and Muslims alike. This event was commemorated by the construction of a sacred building in the form of an octagon which encircles the rock itself. Like many Islamic sacred buildings, the Dome of the Rock makes heavy use of geometric patterns both in the architectural form of the building itself, as well as in the ornamentation of the structure. Due to its location, the Dome of the Rock reflects strong influence from early Christian and Byzantine art. This is particularly obvious in the shape of the structure, which breaks away from the traditional Islamic concept of an open courtyard surrounded by columned aisles. It turns instead to an octagonal shape which reflects strong influence from the beautiful 6th-century church of San Vitale in Ravenna.

This slide shows two different aspects of the same building—the squared off (or here, octagonal) base of the building, topped by a round dome. The lower half of the building is symbolic of the weighty or earthly realm, whereas the circular segment is symbolic of the heavenly realm. The use of colored tiles to cover the brick core of a building goes all the way back to Roman times and reached its peak in the Islamic architecture of 17th-



century Persia. The tiles on this building cover the upper half of the structure with repeated geometric designs and delicate calligraphy which quotes the verses in the *Qur'an* that describe the Night Journey. While some Islamic architecture uses geometric designs to conceal the structural elements of the building, the Dome of the Rock uses design patterns to clarify the different parts of the structure. The windows, the niches, the walls and the roof are all visually distinct from each other. Yet because of the continuous friezes of geometric patterns and *Qur'anic* calligraphy at the top, it all flows together into a unified whole. Some buildings create these designs using ceramic tiles the size of a thumbnail. Imagine what tremendous mathematical skills were needed to measure each piece so precisely that when the end of a continuous pattern met with the *beginning* of the pattern, they had to be a perfect match—all without the aid of a computer!

THE USE OF SPACE, OR VOID

The void, or the open courtyard in the typical *masjid* is as symbolic as the structure surrounding it. The Islamic concept of the Divine is the understanding that it is all-encompassing and unlimited. Thus the architectural void represents infinity—the limitless bounty of God’s presence, guidance and mercy. The open space seems to place believers in the presence of the Divine by completely engulfing them in quiet sacred space.

The open space is surrounded by other architectural features that symbolize different aspects of Islamic beliefs. In addition, because the form of the typical *masjid* developed in the same geographic region where Islam first arose, the dry, arid climate makes a courtyard that is open to the heavens a practical and attractive architectural feature. Many *masjids* have a central courtyard which is open to the heavens. Both the glimmering sunshine and the evening stars offer remembrance of God’s presence and grandeur. The architecture simply allows them to penetrate the inner space.

GOD AS DIVINE LIGHT

As within Christianity, one of the most central ideas to Islamic thought is the concept of God as the Light which guides mankind on the path to heaven. A unique school of Islamic philosophy called the “School of Illumination” focuses on this concept. It developed in Persia, and then spread elsewhere. Followers of this school of thought point to the seemingly endless references to light in the *Qur'an*, some of which are stated clearly, and some which can be seen as hidden, symbolic references of a deeper philosophical nature. One of the best known verses in the *Qur'an* is the “Verse of Light”, which begins:

“God is the Light of the heavens and the earth...Light upon Light!
God doth guide whom He will to His Light.” (ch. 24, verse 35)

Light is a symbol of the Word of God—the Revelation of guidance repeated and developed for humankind since the creation of Adam. As such, light is the divine source of inspiration sent to mankind from God. The fact that sunlight comes down from the heavens to lighten the earthly realm of humanity is a fact that is not lost to the philosopher. Many *masjids* therefore make full use of the sparkling sunlight which enters through the open court yard and plays on the colorfully glazed mosaics that cover much of the surface of the structure. The *masjids* of Central Asia and Isfahan, Iran, for instance, are considered to be some of the most beautiful examples of Islamic architecture in the world. This is because of their ingenious use of the refraction of light and color. Through the use of white, brilliant blue and a touch of green and gold, these buildings literally shimmer with light which brightens the sacred space.



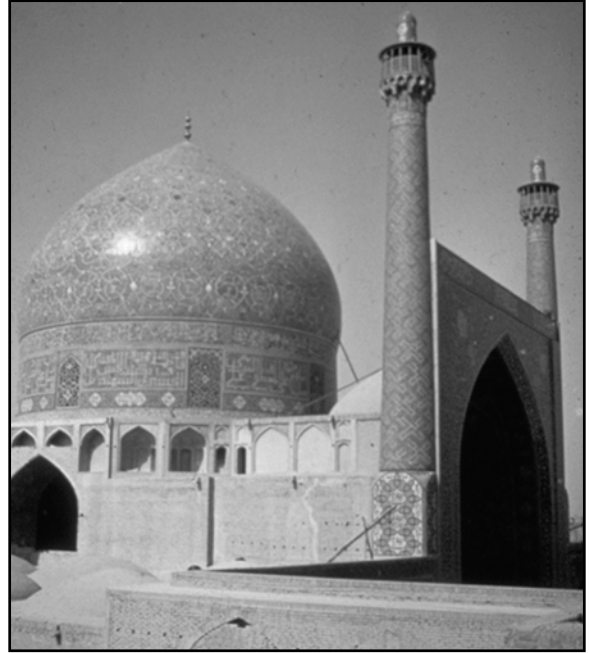
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**Masjid Imam:
Main entrance and dome
Isfahan, Iran, 1611-1629 CE**

This *masjid* was erected by Shah Abbas I, one of the great rulers of the 17th-century Safavid Dynasty in Persia (Iran). The central courtyard of the Masjid Imam has four large entrances (or *iwans*) heading in each direction. This is actually an enormous complex made of several buildings. You can get to the bazaar—which is still thriving *today*—from this courtyard. You can also gain access to schools and government offices by passing through these *iwans*.

The largest, most elaborate *iwan* is flanked by two minarets and has a large dome behind it. This gateway is designed to attract the attention of the worshipper and guide him or her toward the entrance that leads to the *mihrab*, or prayer niche that indicates the direction of Makkah. The four magnificent *iwans* face on to an open, central square. This open courtyard shimmers with light not only because of the bright sunlight one finds in that part of the world, but also because of a large, centrally located reflecting pool. Light is refracted off of the pool's water and shimmers on to the millions of tile mosaics which completely cover the four entrances.

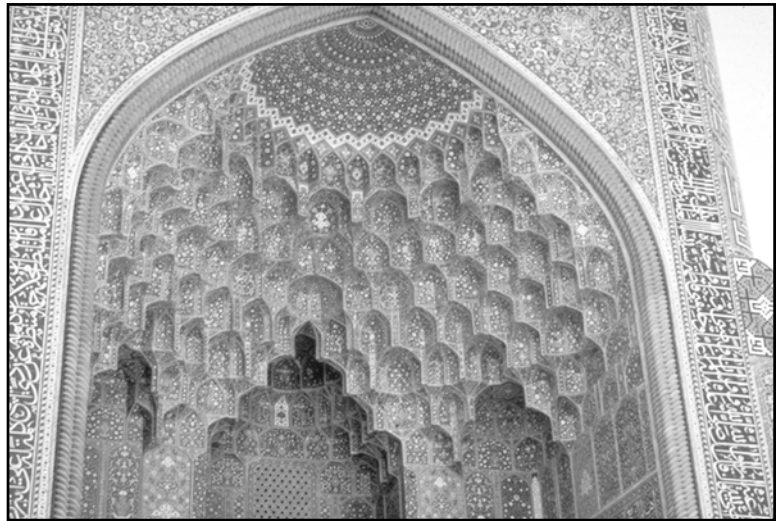


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**Masjid Lotfollah: detail of an entrance gate or Iwan
Isfahan, Iran 1611-1629 CE**

This slide shows a small segment of one of the *iwans*. As the worshippers enter one of these gates they are reminded of the majesty of the natural world and the beauty of God's creations. One can see a "honey-comb" pattern in the ceiling which symbolizes the idea of the multiplicity and the oneness of the Creator and the Created World. If the light is shimmering just right, one is also led to contemplate the stars and other heavenly bodies. The front of the gateway is surrounded by *Qur'anic* verses and floral motifs which bring to mind the verses of the holy book which point to God's creations as signs of his mercy toward mankind.



THE ART OF ARABIC CALLIGRAPHY AND THE DIVINE WORD

Islam is based entirely upon revelation. Prophet Muhammad is considered by Muslims to be the last in a long line of prophets who all received and tried to relay a message of guidance for humanity from God. Reverence for this long line of prophets is clearly stated in the *Qur'an*. Jesus, Abraham, Noah, Job, Solomon and David are among the many names which are mentioned as those who received divine revelation and inspiration. Within the Islamic world, Arabic calligraphy is the most highly revered of all the arts because it is the visual representation of the Word of God, sent to mankind in Arabic. The most natural way to decorate the Islamic sacred space is with beautifully rendered scripture. Most *masjids* have *Qur'anic* verses weaving their way through the building, in carved wood, in tiles, in stone, in brick or in tens of thousands of tiny pieces of glazed ceramic. The *Qur'an* transmits the Revelation to mankind in a highly refined form of Arabic language. An underlying current of rhythm and rhyme gives *Qur'anic* oral recitation an otherworldly sense of sacred song, even though it is not a song at all, but unembellished recitation of a sacred text. As these words of scripture weave their way across the walls and domes of *masjids*, they create a rhythmic pattern in their written and graphic form just as they do in their oral form. The undulating contrast of vertical lines symbolizes steadfastness and permanence, while their horizontal lines represent the connectedness of all created things. Whether the Muslim or any other visitor can read the Arabic scripture or not, it is possible to draw inspiration simply from the beauty and dignity of this cherished art form.

THE ARABESQUE AND SYMBOLS OF NATURE REFLECT ISLAMIC BELIEFS

The arabesque is an ingenious mingling of artistic expression, mathematics and religious belief. It is an interlacing plant, leaf, or vine motif which repeatedly turns back upon itself, bringing to mind the beauty of God's earthly creations and *Qur'anic* descriptions of a paradise abundant in plant life. This line, which constantly returns to its origins, also suggests the underlying divine guidance which humanity must continuously return to in their quest for spiritual enlightenment.

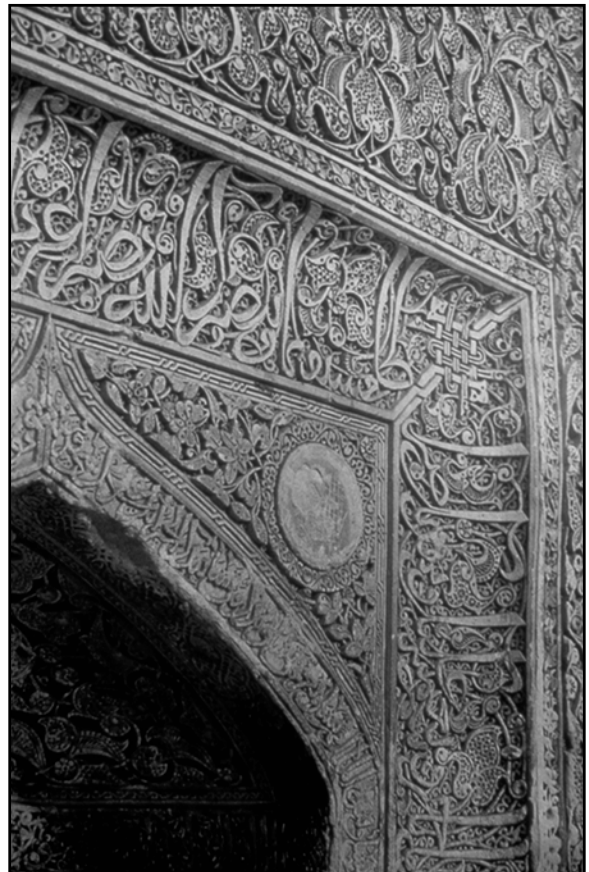
Slide

29

Masjid-i Kali Turbat-I-Shaykh, 14th century

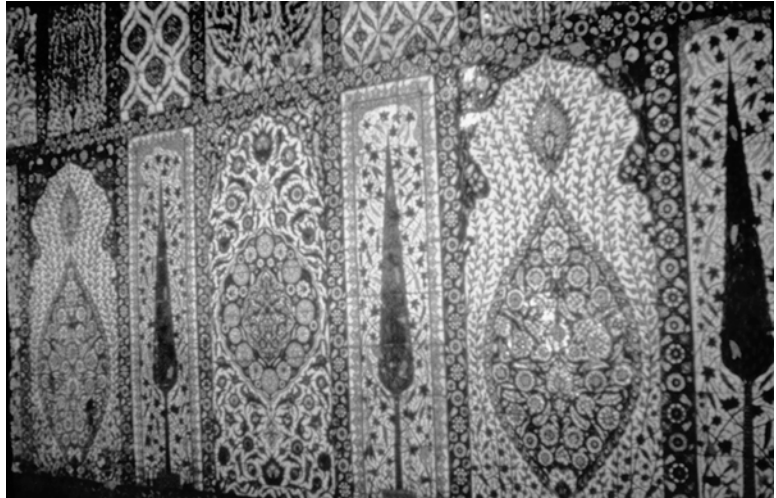
Stucco offered the perfect medium for creating elaborate and delicate tracery throughout *masjids*. This is a stucco mihrab (prayer niche) covered with stylized representations of nature and arabesque patterns. To the believer, these arabesques make one more aware, through symbols of the natural world, of the creative process of God. The rhythms of life—seasons, birth, growth, death—are all displayed in the swirling repetition of flowers, vines and abstract designs that elegantly grace this prayer niche.

At times these vine-like designs can be so ornate that upon looking at them more closely, one sees that the thousands of tiny lines carved within the leaves actually form the letters A-l-l-a-h, the name of God. These thin, vertical letters give a lacy appearance to the leaves, bringing an air of lightness and delicacy to the art.



Slide
30

**Ceramic tiles:
Sultanahmet
Masjid
Istanbul, Turkey,
1616 CE**



Besides the leafy arabesque, some *masjids* also have stylized, abstract depictions of trees and flowers which bring to mind the sacredness of nature and the gardens of paradise which are promised to people of deep faith. The use of ceramic tiles enables these floral designs to become magnificent scenes which burst forth with radiant colors. The use of such bright tiles and the depictions of trees—although in a stylized form—indicate the confidence of the architects of 17th-century Turkey. The great Ottoman Empire was one of the most brilliant and powerful forces of their time. By constructing magnificent *masjids* in honor of their Sultans (rulers) they illustrated their political, economic, military, religious and artistic supremacy to the rest of the world.

THE SYMBOLISM OF THE ARCHITECTURAL DOME AND THE MINARET

Slide
31

**Interior of Dome:
Dome of the Rock
Jerusalem,
690-692 CE**



With the influence of Byzantine Christian art, Muslim artisans quickly learned to create ornately decorated domes within the *masjid* which serve as a reminder of the connections between the heavenly realm and the earthly realm. Both the exterior and the interior of some domes are elaborately adorned with arabesques, which are complex, flowing geometric patterns that accentuate the divine nature of heaven and its dominion over the material world. The square room underneath the dome symbolizes the earthly realm of humanity, and the octagonal belt that unites the dome and the base represents the angelic world, that place of linkage between the spiritual and the physical. These structures are then topped by domes such as this one, built in 691. A series of windows circling the base of the dome remind one of the Divine Light of God. The rest of the decoration represents the heavens with intricate geometric patterns swirling toward the center, like stars in the night sky. Each geometric unit gets smaller and smaller, and more concentrated as it converges toward the locus. This whirling, tightening “heavenly cosmos” depicted on the dome finally leads the eye to the focal point in the center, representing Allah. Through this ingenious use of mathematics, geometric pattern, and light, the dome sends the message that those who search for the Truth will eventually find it in God.

Slide

32

**Minaret: Masjid Imam
Isfahan, Iran, 1616 CE**

In contrast to the rounded dome, the minaret of the *masjid* reaches toward heaven. This structure, from which the *mu'adhin* makes the call to prayer is probably the most familiar element of Islamic architecture to the westerner. This is the place from which the call to prayer is sent out to the entire community. It is no coincidence that the Arabic word for minaret, *al-manarah*, literally means the “place of light”, when one considers how many *Qur'anic* passages equate light with Divine Revelation.

This minaret uses many architectural devices which are found in classical Islamic architecture; geometric patterns, the color blue (which symbolizes paradise), ceramic tiles which make the fullest use of Iran's brilliant sunshine, and a vertical line which takes the eyes of the viewer toward heaven. Different styles of calligraphy are also displayed here. Below is a softer, more fluent style accompanied by flowing arabesques along the border of the *masjid* itself. It is contrasted by the more static, geometric style circling the minaret. Those who read Arabic soon see that what looks like a simple four-part geometric design on the minaret is actually a repetition of the name Muhammad, circling and rising upward along the minaret!

In the mind of the Muslim believer, this minaret makes a final, bold statement about the links between the Prophet Muhammad, Divine Revelation, the *Qur'an* as the word of God, and light as a sacred symbol.

Since Muhammad is the one who received the Divine Revelation of the Islamic faith, it is appropriate that his name circles the minaret, or the “place of light”.

The *masjid* is a reminder of the Divine Presence. All the architectural features of the *masjid* serve as symbols of Islamic beliefs concerning the unending presence of God and humanity's relationship with the Divine. Through the use of architectural design elements Islamic sacred space succeeds brilliantly at reminding the believers of the *primary* message of the *Qur'an*;

“To God belong the East and the West: whithersoever Ye turn, there is Allah's Face.
For Allah is All-Embracing, All-Knowing.” (Qur'an 2:115)





SUMMARIZING IDEAS

SEGMENT 4: THE VISUAL ARTS

In addition to the effect of expanding trade within and beyond Europe on the growth of cities and scholarship, commerce stimulated developments in the visual arts. While the construction of cathedrals and their decoration during the High Middle Ages was part of this growth, the visual arts—architecture, painting and drawing and sculpture, and decorative arts—underwent profound changes during the Renaissance. Part of this development was related to prosperity and new, more worldly attitudes, part to new knowledge in mathematics, physics and architectural engineering from cultures of the East and from recovered Roman and Greek knowledge, and part was the result of stimulation from humanism in literature and scholarship.

As in any civilization, the pre-condition for major developments in the arts was prosperity. People could afford to purchase objects of beauty for their homes, their clothing, their places of worship and their urban spaces. European rulers and merchants joined the trend of the wealthy in eastern civilizations in competition to display their knowledge and taste along with their ability to purchase goods and build homes for their display. Objects of everyday use were also beautified with decoration and skilled design. European artisans enhanced their skills with the growth in local demand for their goods, as well as through the lure of regional and export markets. Textiles of all kinds—silks, carpets, and materials from thinnest gauze to heavy brocades—from the Muslim world were a prized import.

European textiles were also becoming a particularly important export item, offering an exchange for luxuries instead of gold. Textiles were the first example of European manufactured goods that found regional markets in Europe and long-distance export markets in the Middle East. Using home-grown linen and wool from Northern Europe, and later imported cotton and silk, a textile industry apprenticed to the skill of Chinese, Islamic and Byzantine artisans and designers developed. Countries facing the North Sea and those adjoining the Mediterranean copied styles, designs and weaving techniques, or attuned their indigenous products to eastern Mediterranean markets. Europe's textile apprenticeship to other cultures in the Eastern Hemisphere would prove very productive and profitable. Textile trade with eastern Mediterranean ports would remain important over the coming centuries, and by the 1500s, the direct link with the Indian Ocean brought European merchants and artisans in touch with yet another source of textile design and technique in India, Africa and Southeast Asia.

The homes and personal appearance of the new middle classes reflected the opening of Europe to luxury goods previously affordable only by the nobility and the Church. Ceramics, glassware, jewelry, furs, carpets, brocades, spices, perfumes, medicines and wall decorations are just a few of the items for which the newly wealthy acquired tastes. Even some in the lower classes might be able to buy a small imported trinket or household items of better quality.

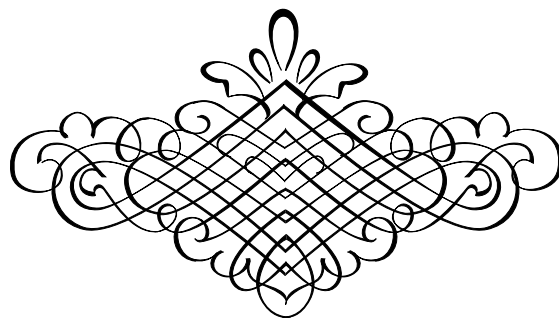
Even the measured pace of life was brought into step with a more accurately tuned calendar, based on astronomical measurement. Astrolabes, compasses, hourglasses, weapons and instruments of all kinds were artistically embellished with improved techniques in metalworking and engraving. Cartography became both more scientific and more artistic as geographic data, skill in astronomy and mathematical geography and the incentive of increased demand were enhanced. The art of the book flourished with the adoption of printing and paper technology, and markets for reading matter spread with literacy.

The most significant scholarly impulse in European Renaissance art was the humanist movement. Greek and Roman civilizations were perhaps paramount in their minds, but the overarching idea of ancient wisdom included awareness of the contribution of Arabic learning and arts as well. Not just the transfer of Greek philosophy, liberal arts and natural science from the Muslim world, but also original Arabic contributions in

mathematics, engineering, physics and architecture stimulated the visual and expressive arts. Humanists sought to capture not only the themes and quotations from classical sources, but their meaning, wisdom, spirit and creative capacities as well.

The wedding of science, literature, scholarship and art can perhaps best be seen in Renaissance painting and architecture. Since the age of the cathedrals, Europe had benefited from architectural developments in the Muslim and Byzantine worlds, especially in building vaulted ceilings, a variety of arches, domes and decorative elements. The application of physics and geometry in perspective drawing combined with the mathematical proportioning of architectural works to create a stage for realistic expression in painting, and a setting for a sophisticated urban social life. Advances in anatomy and natural science combined with classical sculpture to fill the artistic stage with believable human figures in painting and sculpture. Literature and classical scholarship supplied artists with themes from the Bible, from Greek and Roman mythology and history, as well as styles and forms gathered from contact with Byzantium, Muslim Spain and the Levant.

Projection of worldly power and influence brought forth many splendid works of art, as Italian rulers and their courts competed as patrons of the arts. Not just any artwork would do; patrons wanted the very latest in ideas, techniques and fashions. Patronage of the arts by the rich and powerful was so important during the Renaissance that some historians refer to the Renaissance city-state as a “Republic of Letters.” This phrase does not just express the idea of patronage of scholarship and literature, but of the arts and artists who drew inspiration from literary and scholarly efforts and transformed these ideas into Renaissance art. Interestingly, patronage of the arts by rulers was a characteristic of numerous cultures during the period between the 15th and 16th centuries, including several groups in the Muslim world. The list is long: Timurids in Central Asia, Ottoman Turks in Asia Minor, Mamluks in Egypt, Mughals of India and Safavids in Persia. In West Africa, the Muslim civilization of Mali, with its center of learning at Timbuktu, was at the peak of its prosperity, supplying Europe with most of its gold. The Ming dynasty in China is known for patronage of the arts and architecture, overseas trade and exploration. It was the Ming who sponsored Cheng Ho’s extensive westward voyages. In other words, the period called the Renaissance in Europe was a very active time in the entire Eastern Hemisphere, in which trade, communication and transfer of many areas of knowledge—military, technological, geographic, artistic, and literary—took place. With increased hemispheric contacts, scholars, artisans and artists gained international reputations, and the ruling courts competed for their services with offers of wealth or other forms of encouragement. Thus the European Renaissance can be viewed as part of a broader, hemispheric burst of cultural activity and interaction. It remained only for the Age of Exploration—also an expression of the Renaissance, to complete the circle. With that, the global age was born.



The Visual Arts



CONSUMERS, SCIENTISTS AND THE VISUAL ARTS IN THE RENAISSANCE

Imagine wearing lush velvets and brocades, sparkling jewels, golden trinkets and soft furs to keep you warm during Europe's cold winters. You enjoy fragrant spices, luxuries like rice and pasta, and juicy new kinds of fruit and vegetables. Your home is decorated with fine paintings, fancy carved furniture and deep, colorful carpets handmade in faraway lands. Today, consumers in the industrialized countries of the world have access to more kinds of goods and gadgets than anyone in history. Such a range of choices in style, materials, and origin is available nowadays, that people hardly know how to choose what they want to buy. To people in the 20th century, this situation is commonplace. To many people in Renaissance Europe, however, the idea of being consumers was still quite new. Choice and luxury had been only for the aristocrats in medieval times. Now, trade with the world brought things into the lives of business people that were the stuff of legends a short time ago.

During the Renaissance, newly wealthy business families in the growing cities began to have access to the exotic goods described above. Even hard-working members of the lower classes might be able to afford an occasional trinket or silk ribbon bought from a traveling peddler. The world of trade had opened up to Europe, and unimagined new wealth poured into the pockets of the clever and the fortunate. Much of this new wealth was spent on consumer goods, and especially on displays of wealth and enjoyment. Money was spent on paintings, furniture, clothing and fine articles for use in the home. Wealthy nobles donated their decorations and furniture to churches and built well-appointed palaces. This spending in the cities of Europe raised the profession of artists to a new level. Instead of being an anonymous worker or a craftsman, the artist became an individual who expressed special ideas and visions. The creativity of some great artists—like Leonardo da Vinci and Michelangelo brought a whole new way of thinking about art in Europe. The visual arts—architecture, painting, drawing and sculpture, and decorative techniques—underwent great changes during the Renaissance. Some of these changes came with the entry of new knowledge in mathematics, physics and architectural engineering that entered Europe from the East. Some of the change resulted from fashion. Nearly everyone tried to bring Greek and Roman styles and artistic skills back to life during the Renaissance. This fashion had spilled over into the visual arts from study of classical literature.

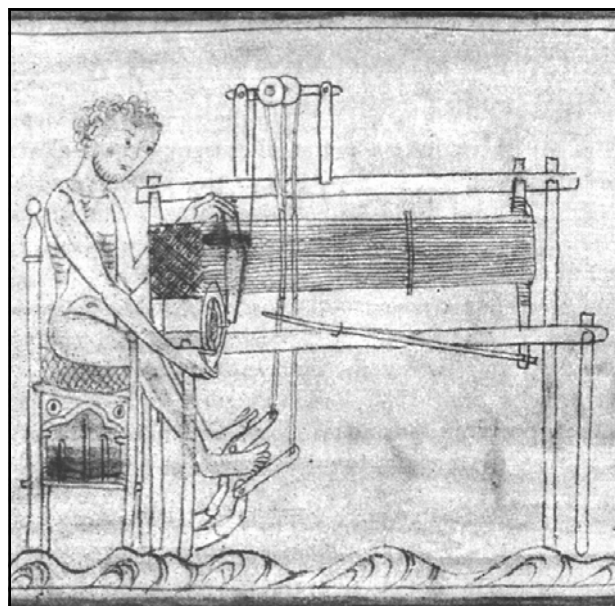
Kings, nobles, merchants and Churchmen all participated in beautifying the spaces where they lived with “things.” Clothing, places of worship, homes, and public spaces in the cities

showed signs of a rise in the standard of living. Among the most treasured goods were things from far away—that meant from somewhere else in the Eastern Hemisphere. As Europe’s artisans increased production, they copied styles and methods of making that they learned from imported goods. In time, they transformed these things to their own taste and needs.

PRECIOUS AND COMMON FABRICS BRING WEALTH TO EUROPE

Textiles of all kinds—silks, carpets, and materials from thinnest veils to heavy brocades—from the Muslim lands had long been a prized import. Paintings of kings and queens and their courts show their richly colored and decorated garments, made of yards and yards of precious fabric. This was “power dressing”—as important to royal authority and prestige as crown, throne and scepter. Many of the jewels these contained were also imports from Asia and Africa—rubies from Serendib [Sri Lanka], emeralds from Southeast Asia, pearls from Arabian waters, diamonds from India, all set in gold from Mali. Cloth of silk, with gold and silver embroidery or woven designs were an important part of Church rituals. They demonstrated the preciousness of the spiritual message, and added dignity to worship. Purchase of these items also gave wealthy Church members a chance to show their devotion and generosity. Display in Churches brought rare goods before the eyes of common people, too. Many precious fabrics used in Churches had symbols from other cultures. For example, Islamic fabrics with Arabic writings were sometimes used in Spanish and Italian churches, or worn by the clergy. Some were embroidered over, or cut apart and used as appliqués, or decorative patches. In time, the techniques for making brocades were learned and adapted to European and Latin Christian styles.

Europe’s own textiles—especially wool and linen—became an important source of wealth. Instead of trading gold or silver coins for imports, merchants from Northern Europe—England, Belgium and Germany—



Late medieval European weaver working on Chinese-type pedal loom.

could trade sturdy woolen cloth. They could offer good quality and abundant supplies from the sheep who grazed the rich meadows of rainy northern Europe. Linen cloth and laces from the Low Countries also sold well. Italian shops imported silk, cotton and precious threads, and even dyes to make their own brocades. The treadle looms European weavers used had been a Chinese invention passed to western Europe by Muslim artisans. Spinning wheels that made thread much faster than hand spinning were first used in Central Asia. This invention also came through Muslim lands during the late Middle Ages. Textiles were the first European manufactured goods that found markets at home and in eastern Mediterranean ports. This trade was centered on Mediterranean ports. After the Age of Exploration, this trade expanded to include the fantastic fabrics of India and Africa, cultures from whom Europe's artisans picked up new styles and methods.

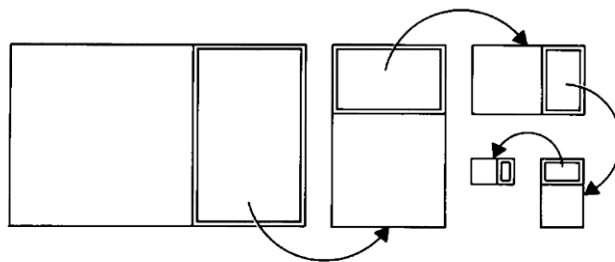
A NEW LOOK FOR HOMES AND CITY SPACES

As soon as people have money to spend, they seem to like to bring beauty to themselves and their surroundings. The homes and personal look of the rich and the new middle classes reflected growing wealth. Ceramics, glassware, jewelry, furs, carpets, brocades, spices, perfumes, medicines and wall decorations are just a few items that graced homes and palaces. Even weapons like swords, and the newly invented guns were highly decorated with arabesque designs, carving, gold and jewels. New ways of making glass, ceramics and metal objects came to Europe's workshops from other cultures, and became more affordable. Showing off learning and education became a part of home decoration, too. Libraries appeared in wealthy homes, with gold-tooled leather books, and decorations of scientific instruments new to Europe, like astrolabes, compasses, hourglasses, maps and globes. Cartography became both more scientific and more artistic as geographic data, skill in astronomy and mathematical geography improved. Even the pace of life was measured with a more accurate calendar, based on better astronomical measurements. Paper and printing technology caused the art of bookmaking to flourish, as markets grew with expanding literacy. A man or woman of the world would, of course, want to have a portrait painted with these possessions on display.

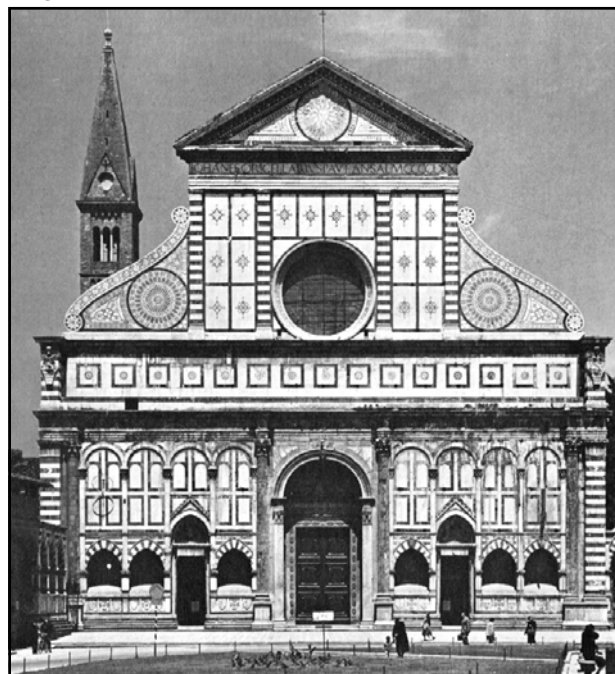
Humanism was one of the most important influences on the arts. It was born out of the growing awareness of classical Greek, Roman and Arabic learning. Humanists tried to bring to life the glories of ancient Greece and Rome. Great cities with imposing buildings, columns and sculptures were in demand.



Other influences were also at work, like new ways of building domes, and designs with a smaller, more human scale. They built spaces with repeating patterns that drew the eye of visitors to dramatic vistas. They built arches and decorations using harmonious proportions. The Golden Rectangle and the Golden Section were measurements that people seem to find pleasing. These measurements are found everywhere in nature, and people of many cultures have used them in art. Physics, mathematics and engineering knowledge helped in designing cityscapes for movement and for organizing the people who lived there. A city might be laid out in the shape of a perfect star, for example. In other places and cultures, too, like Ming China, Mughal India, Persian, Central Asian and Ottoman lands, wealthy rulers competed to design fabulous cities, palaces and places of worship. They designed city squares with groups of beautiful buildings that worked together. Timur built Registan Square in Samarkand, with its turquoise tiled domes, as one of the first examples in the world. **The famous Turkish architect Sinan was another. Brunelleschi worked in Florence, Italy.**



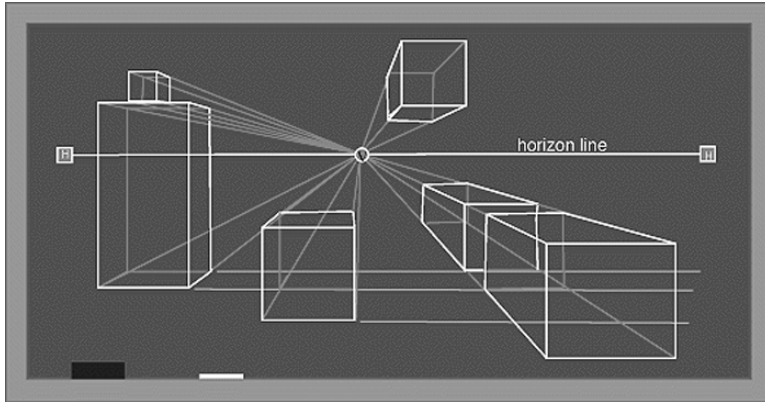
Nested Golden Rectangles.



Alberti's Church of St. Maria Novella, Florence, with Golden Section.

SCIENCE MEETS ART IN RENAISSANCE PAINTING

The wedding of science, literature, and scholarship brought fresh ideas to Renaissance painting, too. Surprisingly, a development in physics brought a new understanding of vision. The ancient Greek thinker Aristotle had taught that the eye sends out light in order to see things. Working in Cairo, mathematician and physicist Ibn Haytham discovered how the eye absorbs and refracts, or bends light from objects in the path of vision. He made mathematical formulas and geometric diagrams of the way light works on the human eye. He discovered that we see objects around us as a visual pyramid. Ibn Haytham's book was studied in Italian universities. Toscanelli combined these ideas with mathematical geography used in mapmaking to invent scientific drawing. A painter can lay out on the paper a framework of what we see, using geometric lines. The system is called perspective drawing, using a horizon line and sight lines. The painter no longer just painted what he SAW, he painted what he KNEW that the VIEWER WOULD SEE. The painter's canvas became a little stage on which the painter told a dramatic story, showed a

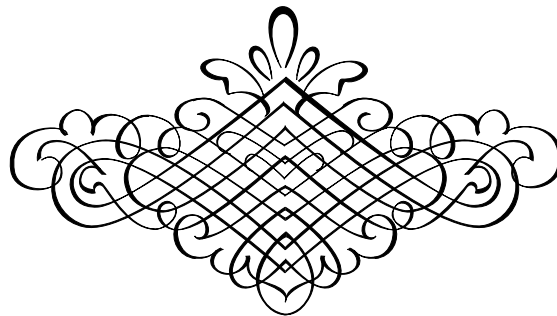


An artist's perspective framework.



This Renaissance woodcut shows use of a perspective framework by the artist.

slice of someone's life, or captured an image—all in a very realistic way. The painters' knowledge of natural science and anatomy (study of the body) helped them make the picture almost seem to glow with light and life. Themes from religion, from classical mythology, landscapes, portraits and still lifes hung in the homes of wealthy patrons (people who pay artists for their work). Today the best Renaissance paintings are purchased for millions of dollars, and many are shared with the public in museums.

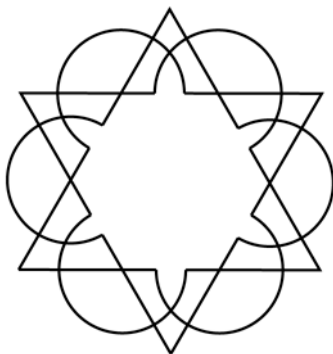




CONCLUSION

THE RENAISSANCE WAS A PRODUCT OF MANY CULTURES

The period called the Renaissance in Europe was part of a very active time in the entire Eastern Hemisphere. It was a time when trade, communication and transfer of many kinds of knowledge spread and combined in surprising ways. With increased contacts across the hemisphere, monarchs, scholars, writers, scientists and artists gained international reputations. Fabulously wealthy people in ruling and business circles competed for their services, offering wealth, fame and comfort. New kinds of goods, new styles and new ways of doing things reached into many areas of life. Ambition and opportunity began to move people out of rigid classes and created new wealth for middle class and city folk. The European Renaissance was part of a broad, hemispheric burst of activity and contact to which many cultures contributed. It remained only for the Age of Exploration—also an expression of the Renaissance, to complete the circle. With that, the global age was born.



EXPLORING VALUES ACROSS CULTURES AND IN OUR TIME

SEGMENT 4: THE VISUAL ARTS

What are values? The dictionary defines *values* as “principles, standards, or qualities considered worthwhile or desirable”. Use the list below and fill in additional values discussed in Segment 1 of this unit. Investigate the cultural values discussed in this segment from the following points of view:

- ✿ How were these values expressed in European Renaissance society? What events, cultural products and personal stories (biographies) are related to these values? What is the relationship between these values and religious beliefs and ideas in Renaissance Europe?
- ✿ How were these values expressed in Muslim society? What events, cultural products and personal stories (biographies) are related to these values? What is the relationship between these values and religious beliefs and ideas in the Muslim world?
- ✿ Do these values find expression in 20th-century society? If so, what recent events, cultural products and personal stories (biographies) are related to these values? What is the relationship between these values and religious beliefs and ideas in modern life?

List some of the cultural values discussed in Segment 4. Here’s a list to help get you started:

1. creating a fruitful relationship between scholarship, wealth and the arts
2. the importance of trade in cultural styles and tastes
3. respecting the learning of other, and of ancient cultures
4. the importance of individual initiative in discovering and applying new techniques; great personalities in the service of human civilization
5. public respect and recognition of individual effort
6. the arts as an expression of religious belief and spirituality
7. respect for religious guidelines in artistic expression
8. the arts as an expression of worldly power and patriotism
9. acceptability of spending and displaying wealth in luxuries for living

■ Identify other values discussed in the segment and write them below.

10. _____
11. _____
12. _____
13. _____
14. _____
15. _____



SUGGESTED COMPREHENSIVE ACTIVITIES AND SAMPLE TEST QUESTIONS

OPINION ESSAYS

1. Consider the proximity to Europe of the large territory ruled by Muslim groups over the centuries from the European Middle Ages to the Renaissance, from the 8th through the 16th centuries. Is it likely that the two cultures could have remained isolated strangers? Is it likely that no peaceful exchange took place, but only conflict? What do you think, and what historical evidence can you find to support your view?
2. Consider the points of geographic, economic, political and intellectual contact between Muslim and European civilizations that you have studied in these materials. Does there seem to be sufficient reason to revise the standard textbook view that Muslims' influence on the Renaissance was limited to the 12th-century Arabic-to-Latin translation of Greek works?
3. Define the words "secular" and "religious" as these terms relate to cultural activities or products. How are these terms related to cultural values? On balance, do you think that the Renaissance in Europe was secular, or did religious impulses dominate the lives and motivation of important figures? What judgment would you make about the secular or religious motivation of similar periods of cultural awakening in the Muslim world or elsewhere?

CHART AND ORGANIZER ACTIVITIES

1. Make a chart or other graphic organizer to analyze categories of historical contacts between Europe and the Muslim world that are related to the Renaissance. Each type of contact will become the heading of one column (ex.: trade, scholarship, etc.). In rows under each heading, write specific events, cultural activities, or various types of cultural products that provide evidence of these contacts.
2. Make a double spoke diagram illustrating the effect of values on the various cultures discussed in these materials. Select as column headings of a chart or hubs of separate spoke diagrams important civilizational values (importance of learning and education, trade and prosperity, scientific development to improve standards of living, spiritual development and obedience to religious law, respect for individual achievement, etc.). As the first level of spokes in the diagram, arrange the names of various world cultures. As the second level of spokes, illustrate or name specific cultural activities or products of each culture you named that are related to these values.
3. Complete an additional chart for contacts and influences from other cultures in the Eastern Hemisphere, and following the Age of Exploration, for influences from the Western Hemisphere.

CHANGING HISTORY, TAKING A DIFFERENT VIEW

The humanists handed down to Western civilization their understanding of historical divisions in time. The humanists' division of history into an Ancient Age, a Middle Age and a Modern Age is still with us. As we have learned, their view was a generalization based on their experience and the mission they saw for themselves as intellectuals. The humanists saw their own time as dark and insignificant, but they also felt they were helping to lead their society toward the light. The fact that the roots of so many intellectual, scientific and artistic developments in European civilization can be traced to the Renaissance awakening has reinforced the humanists' original view.

Historical divisions, of course, do not apply to any culture without exception. However, the humanists' view, or perception, that their own lives closed a chapter in European history that came to be called the "Middle Ages," or "medieval" period, had great staying power. Because the Renaissance was followed by a period of European global expansion, scientific and industrial development, and cultural dominance, the term "Middle Ages" seemed to Europeans to be valid for the whole world. In other words, the Middle Ages have been viewed not only as a time when Europe lay in darkness and inactivity, but by extension, the whole world must have done so. For this reason, all other cultures existing during the same period have been termed "medieval"—between ancient and modern—as well. Can this generalization still be accepted as "true"?

Before something can be called "middle," it must have two opposite ends; it must be enclosed by something. A "middle" might also be thought of as the interim, or space between a beginning and an end. This is in fact the meaning that historians of Europe have given to the word "medieval." It was an interim between the ancient period and the modern period. They came to apply this view of history, based on their own experience, to the entire history of the world. Your own textbook is probably based on this model, or way of viewing the development of humanity.

Views of history, including the way the medieval and the Renaissance periods are understood, continue to change today. First, many historians of Europe no longer use the label "Dark Ages," or even "Medieval" period, especially for the time from the 10th century on in Europe. Research has revealed many rays of light in "medieval" European life; the beginnings of trade, transfer of learning and technology to Europe, as well as home-grown inventions that raised the standard of living. In the arts, too, the seeds of later achievements are found in earlier periods of European history.

Second, improved knowledge of other world civilizations has clearly revealed that Europe suffered decline and backwardness in the early Middle Ages, while other civilizations around the world showed evidence of flourishing science, technology, arts and government. It no longer seems fair to view them as just filling a gap of darkness—even a promising one—between ancient glory and modern enlightenment. Lumping all of the cultures that existed in the world or the Eastern Hemisphere between that fall of Rome and the rise of Europe into a category called "medieval" made it difficult to fully appreciate their contributions to world civilization, or to understand how their achievements led to modern science and technology.

Third, historians' perception of world history itself is changing. It is moving away from a view that was centered upon a story of how Western civilization's ancient classical and Biblical roots toward a view that is more broadly based upon human history as a whole. When human history is studied on a global basis through the eras, Western civilization, while important, no longer takes center stage. Instead, Western civilization is viewed as one culture region among many that were active during a certain period. The stories of various civilizations are now seen to be intertwined, and the boundaries between culture regions are blurred. Trade and other types of contact and influence among regions are viewed as important influences in the development of Western culture and all others. Transitions from one period to another no longer seem so sharp since evidence about complex interactions within and among cultures has come to light. The Renaissance, too, is put in the perspective of comparisons among cultural flowerings in China, India, Central Asia and various Muslim regions of the Eastern Hemisphere.

Essay Question: Having read from the materials in this resource collection, what do you think about the views stated in the paragraphs above? What position on the ancient-medieval-modern divisions of time does your classroom textbook represent? Describe your view of the Renaissance from a global perspective.

RESPONDING TO HISTORIANS' VOICES:

WHAT ROLE DID MUSLIM CIVILIZATION PLAY IN EUROPE'S URBAN DEVELOPMENT AND THE EMERGENCE OF RENAISSANCE?

Were the luxuries and refinements of urban culture and learning stimulated by contact with the Muslim world before they flowered in the West? Or did the presence of Islam form a barrier that isolated Europe and forced European culture to develop on its own? The French historian, Jacques LeGoff, writing in the 1990s, thinks that the demand created by people in the major Muslim cities spurred the growth of towns in Europe, and its intellectual heritage helped to develop the European intellectual tradition. Henri Pirenne, another French historian, from a well-known book of 1925, thinks that at the end of the Roman Empire, a series of invaders—Muslims, Vikings and Magyars—put out the lights in Europe and ushered in the Dark Ages. He then argues, however, that Europe again revived under the influence of trade and other types of contact with the East, becoming even greater than it had been in Roman times. Marshall Hodgson, an American historian who was a pioneer in developing a global view of world history. The quotation is from an essay published posthumously in 1993. Hodgson wrote about the origins of “the great Western Transmutation,” meaning the series of changes that led to its industrial and economic power. He compares it with periods of innovation and achievement in other cultures, and explains the period of growth associated with the European Renaissance as the product of historical processes in the hemisphere as a whole.

Read the three passages below. Compare and contrast these historians' ideas. What attitudes toward Europe, Islam and other cultures do the writers display? Debate the points in each passage that seem to be valid arguments. Write an essay, or hold a discussion to elaborate on your views. You may want to include the following questions in your discussion:

- Contrast Pirenne's, LeGoff's, and Hodgson's views of the impact of Muslim civilization on Europe's development.
- How did the Crusades affect the growth of trade and cities in Western Europe?
- What role did cities play in the rise of Western European learning?
- Compare and contrast the three historians' views of the significance of the Renaissance in world and European history. What role do cities and trade play in each historian's explanation?
- Why does Hodgson think that the Great Transmutation was the product of gradual growth in civilization in the Eastern Hemisphere? How is this growth related to trade and cities?

■ Quotation #1: Henri Pirenne, from *Medieval Cities*, 1925

“The world order which had survived the Germanic invasions was not able to survive the invasion of Islam. It is thrown across the path of history with the elemental force of a cosmic cataclysm. Even in the lifetime of Mahomet (571-632)[Muhammad], no one could have imagined the consequences or prepared for them. Yet the movement took no more than fifty years to spread from the China Sea to the Atlantic Ocean. Nothing was able to withstand it...The restless expansion was not to slow down until the start of the eighth century...But if its force of expansion was exhausted, it had none the less changed the face of the world. Its sudden thrust had destroyed ancient Europe. It had put an end to the Mediterranean commonwealth in which it had gathered its strength. The familiar and almost “family” sea...was to become a barrier...On all its shores, for centuries, social life...had been the same; religion the same....The invasion of the barbarians from the North had modified nothing essential in that situation.

But now, all of a sudden, the very lands where civilization had been born were torn away; the Cult of the Prophet was substituted for the Christian Faith, Moslem law for Roman law, the Arab tongue for Greek and Latin.

The Mediterranean had been a Roman lake, it now became, for the most part, a Moslem lake. From this time on it separated, instead of uniting, the East and the West of Europe. (pp. 15,16)

...It is easy to see how Venice profited by her alliance with a world so different from the European west. To it she owed not only the prosperity of her commerce, but from it she learned those higher forms of civilization, that perfected technique, that business enterprise, and that political administrative organization which gave her a place apart in the Europe of the Middle Ages....It mattered little to them that the Moslems were the enemies of Christ, if business with them was profitable. After the ninth century they began more and more to frequent Aleppo, Cairo, Damascus, Kairawan, Palermo. Treaties of commerce assured their merchants a privileged status in the markets of Islam. (p. 61)

...Starting at the beginning of the tenth century, [the Scandanavians] turned away from war to devote themselves to trade...since they alone...were navigators....Thanks to them, the current of trade, which starting from Byzantium and Baghdad crossed Russia...was extended up to the shores of the North Sea and there made felt its beneficent influence. In all history there is hardly a more curious phenomenon than that effect wrought on Northern Europe by the superior civilizations of the Greek and Arab Empires, and of which the Scandanavians were intermediaries.

Finally, the extension of economic development of medieval Europe went well beyond the limits it had reached in Roman Europe (p. 68).

...As in antiquity, the country oriented itself afresh on the city. Under the influence of trade the old Roman cities took on new life...along sea coasts, on river banks...at the junction points of the natural routes of communication.(p. 72)

...Thus the commercial expansion which first made its appearance at the two points at which Europe made contact with it—by Venice, with the world of the east, by Flanders with the Russo-Scandanavian world—spread like a beneficent epidemic over the whole Continent.(p. 74)¹⁵

15. Henri Pirenne, *Medieval Cities*, (Princeton: Princeton University Press, 1925).

■ Quotation #2: Jacques LeGoff, *Intellectuals in the Middle Ages*, 1993:

“A man whose profession it was to write or to teach—and usually both at the same time—a man who, professionally, acted as professor and scholar, in short—an intellectual—that man appeared [in Europe] only with the towns.

He truly became identifiable only in the twelfth century. Certainly the medieval town at that time did not sprout forth in Western Europe like a mushroom.... There have undeniably always been towns in Western Europe, but the ‘corpses’ of Roman towns of the Byzantine Empire enclosed only a handful of inhabitants within their walls, and at their center was a military, administrative or religious leader. As episcopal cities above all, they contained only a small population living among a slightly more numerous clergy, with no other economic life than a small local market serving the daily needs of the inhabitants.

Undoubtedly, in response to the Muslim world, which for its enormous urban clientele [customers]—in Damascus,... Cairo, Tunis, Baghdad, and Cordoba—required essential materials from the barbarous West—wood, swords, furs, slaves—there developed embryonic towns, portus, either autonomous [independent] or built on the flanks of episcopal cities or military bourgs beginning in the tenth, or perhaps even in the ninth century. But this phenomenon became truly significant only in the twelfth century. It then profoundly changed the economic and social structures of Western Europe and began...to disrupt its political structures as well. Another revolution—this time cultural—joined the others. To these births or rebirths there was joined another—an intellectual rebirth.

...Indeed, Arab culture was initially influential as an intermediary. In the Orient the works of Aristotle, Euclid, Ptolemy, Hippocrates and Galen followed the Christian heretics—Monophysites and Nestorians—and the Jews persecuted in Byzantium. They were relegated to Muslim libraries and schools which by and large welcomed them. They then appeared on a return trip, disembarking on the shores of western Christian Europe. The role of the Christian fringe of the Latin [Crusader] states was quite marginal. This meeting ground between the West and Islam was above all military, one of armed opposition, the battleground of the Crusades. It was an exchange of blows, not of books and ideas. There were very few written works which filtered through the combat lines. Two principal zones of contact accepted Oriental manuscripts: Italy and primarily Spain. In those places neither the temporary installations of the Muslims in Sicily and Calabria nor the waves of the Christian Reconquista ever prevented peaceful exchanges.”¹⁶

16. Jacques LeGoff, *Intellectuals in the Middle Ages*, (Cambridge, MA: Blackwell, 1993), p. 6, 14.

■ **Quotation #3: Marshall G.S. Hodgson (Edmund Burke III, ed.), “Modernity and the Islamic Heritage,” in *Rethinking World History: Essays on Europe, Islam and World History*, 1993:**

“Seen in a wider setting, the historical career of the West-Europeans was eccentric but not remarkably outstanding until quite modern times. Above all, it was integral with the whole wider Afro-Eurasian historical life. There was a continual accumulation of technique and of knowledge, a continual expansion of the geographical limits of urban, literate society in most part of the zone of Afro-Eurasian civilizations for some several millenniums. This was not peculiar to Western Europe – in fact, until recently the main centers of this growth were elsewhere: in China, in India, in the Middle East, in Eastern Europe. Moreover, this cumulative growth was everywhere, on the whole, accelerating. In the later millenniums the rate of historical changes for the Afro-Eurasian civilized zone as a whole, in particular the rate of technique and knowledge, was distinctly more rapid than in the earlier millenniums. It must be added that, partly as a result of continuous interchange and interaction, the level of growth remained approximately constant throughout the civilized zone. Give or take five hundred years, the various civilizations kept roughly abreast: the Medieval Chinese and the Medieval Byzantines were about equidistant from the ancient Sumerians. In these respects, Western Europe simply formed a part of a wider historical complex and shared its most generalized characteristics.

There were two ways in which Western Europe, before about 1600, appears as atypical. Cultural and territorial growth was more rapid than in the more centralized areas; and notably in the Italian Renaissance, there were outbursts of high creativity of an excellence unusual in Afro-Eurasian history. But on investigation it can be shown that these two traits do not, of themselves, separate Western Europe from the main lines of historical development of the rest of the Afro-Eurasian historical complex. On the one hand, the relatively rapid growth was in large part that of a frontier – for Western Europe formed, in effect, one of the zones of frontier growth of the Afro-Eurasian complex. It can be compared in certain key points to the rapid growth of civilized culture in the Sudanic lands or Malaysia in the same period; or, in even more interesting ways, to that in Korea and Japan. In each case there was a relatively late and relatively rapid increase in urbanization, along with a rapid rise in the sophistication of cultural activity. In each case, the new cultural ideas were largely borrowed from earlier centers, and creativity was often a matter of adaptation to local conditions and assimilation with older local traditions, rather than a major contribution to human life as such. ...the degree in which Medieval West-European growth borrowed from Arabic and Greek centers, and even indirectly from so far afield as the Chinese, is one of the most intriguing fields of recent research...

On the other hand, though the bursts of cultural creativity of late Medieval and Renaissance Western Europe were unusual, they were by no means unparalleled in Afro-Eurasian history. Even apart from the great classical flowerings of the ages of Confucius, Buddha, Isaiah, and Socrates, there appear other major cultural renovations from time to time, such as those of Gupta India, with its distant repercussions, and that of classical Islam, which ultimately transformed the face of half mankind. Even the sixteenth century West-European domination of the ocean trade-routes, replacing in part an Islamic domination, was scarcely a more astonishing achievement than the late Medieval expansion of the Dar-al-Islam [Muslim lands] over half Europe and most of India and throughout the Southern Seas. In the sixteenth century the West-Europeans still dealt on essentially equal terms with the other peoples of the Afro-Eurasian historical complex. These atypical traits in West-European history do indeed bear closely on the fact that the great modern transformations occurred in precisely the West-European area. But taken in themselves, they are insufficient grounds for making the pre-Modern acceleration of the pace of history a peculiarly West-European or Occidental [Western] trait. The acceleration within Western Europe was clearly a part of a much wider picture, and cannot soundly be understood except in that wider context.”¹⁷

17. Marshall G.S. Hodgson, *Rethinking World History* (Edmund Burke III, ed.) (Cambridge: Cambridge University Press, 1993), p. 210-211.