GEOMETRIC PATTERNS IN MUGHAL ARCHITECTURE

“Everything that is made beautiful and fair and lovely is made for the eye of one who sees.“

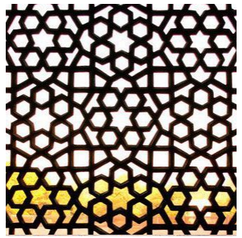
- Rumi, Mathnawi I:2383

Throughout the ages, mystics & theologians have used geometry as a contemplative focus, enabling the viewer a vision of the underlying order of both the cosmos and the natural world .
Geometric patterns comprise one among the three nonfigural types of decoration in Islamic art including calligraphy and vegetal patterns.
In Islamic geometric patterns, the circle is the ultimate base of all creation representing the symbol of unity. The expansion and natural division of a circle into regular divisions is the starting point for many patterns giving rise to the three most essential shapes, the triangle, the square and the hexagon. Most of the patterns are based on polygons and when the vertices of these constructive polygons are connected, they give birth to the fundamental patterns, the star-polygons.
With the passage of time the artisans have mastered the art of composing and tessellating the patterns with the use of materials and experimentation of different techniques such as girih strapwork, jali pierced stone screens, kilim rugs, metalwork, muqarnas vaulting, shakaba stained glass, woodwork, and zellige tiling. The dome, walls, floors, minarets, mihrabs, windows and balconies, all elements were used as the artisans’ canvas for ornamentation.

EXPANSE OF STUDY

Before delving into creation, the course commenced with an introduction of Geometric Patterns in Islamic Art and Architecture in terms of its history, significance and evolution. Earlier stages of the course involved practice of basic geometric applications fundamental in the genesis of the geometric patterns. Further, selected patterns involving different geometries such as the six-fold geometry, eight-fold geometry, etc. were demonstrated to deepen the understanding about the process. The final stages of the College Projects involved the students in decoding and exploring the geometry of one pattern each, selected from celebrated structures of Mughal architecture in India. The structures include **Humayun's Tomb, Fatehpur Sikri, Akbar's Tomb Itimad-ud-daulah's Tomb and Taj Mahal.**

The final culmination showcases geometric patterns and their intricacies explored by making an attempt to grasp the geometry.



1 | Humayun's Tomb

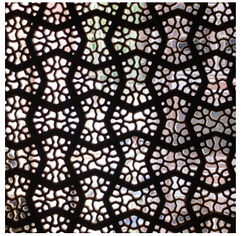
Humayun's Tomb was built in 1565 for the Mughal emperor Humayun, nine years after his death. It was built by his widow empress Hamida Bega Begum. The tomb is primarily built in red sandstone and white marble, the monument is a perfectly symmetrical structure. It has influences of Persian, Turkish and Indian styles. It is often regarded as the first mature example of Mughal architecture. The symmetrical and bold designs on the exterior are in sharp contrast with the complex interior floor plan and the intricate ceiling and jalis. Together with the arches and openings, this effect creates a varied and complex impression of depth at each facade. Some adorable samples of 6-point and 8-point geometrical patterns can be found through the marble flooring, window grills, balcony railings and the jaalis..

2 | Fatehpur Sikri

Fatehpur Sikri was founded in 1571 as the capital of Mughal Empire by Emperor Akbar, serving this role from 1571 to 1585.The city was built massively with red sandstone. The city's architecture reflects Indo-Saracenic form of architecture popular in India at the time.
Apart from structural elements, the use of niches and screens is significant in the complex. Most openings other than doors were screened with intricately-carved stone work using geometric and floral patterns. Apart from carvings, stone-inlay work is extensively used in Fatehpur Sikri. By the end of the 16th century Mughal architects began to use more 10-point geometrical patterns. Jama Masjid of Fatehpur-Sikri (1571-96) is an example of this era. Apart from various elegant types of 6,8 and 10-point patterns of this building, the example of 14-point geometrical pattern has been carved over the columns of its main dome.

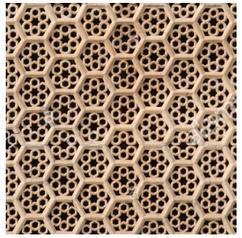
3 | Akbar’s Tomb

Akbar's tomb built in 1605–1613 is the tomb of the Mughal emperor Akbar. This tomb is an important Mughal architectural masterpiece built by his son Jahangir and is situated in 119 acres of grounds in Sikandra, Agra.
The tomb building is a four-tiered pyramid, surmounted by a marble pavilion containing the false tomb. The building is constructed mainly from a deep red sandstone, enriched with features in white marble. Decorated inlaid panels of these materials and a black slate adorn the tomb and the main gatehouse. Panel designs are geometric, floral and calligraphic, and prefigure the more complex and subtle designs later incorporated in Itmad-ud-Daulah's Tomb. A grid of octagons in contact has squares (of the same side as the octagons) as the residual spaces.



4 | Itimad-ud-Daulah's Tomb

Itimad-ud-Daulah's Tomb built in 1622-28 is a Mughal mausoleum in the city of Agra. Often described as a "jewel box", or the "Bachcha Taj". The tomb was commissioned by Nur Jahan, Jahangir's wife, for her father Mirza Ghiyas Beg, originally a Persian Amir in exile, who had been given the title of Itimad-ud-Daulah (pillar of the state). It is an example of the era when geometric ornamentation became an essential decorative element in Mughal architecture which made vegetal motifs as subsidiary decoratives in some cases. The edifice is completely covered with inlay marble and sandstone with 6, 8, 10 and 12-fold geometrical patterns. Mathematicians of the time had made a breakthrough in geometry that made it possible to create this extraordinary complex with patterns having a 12- fold rotational symmetry. A set of five tile types, called 'girih tiles', in any combination serve as templates for incorporating the existing decagonal geometry.



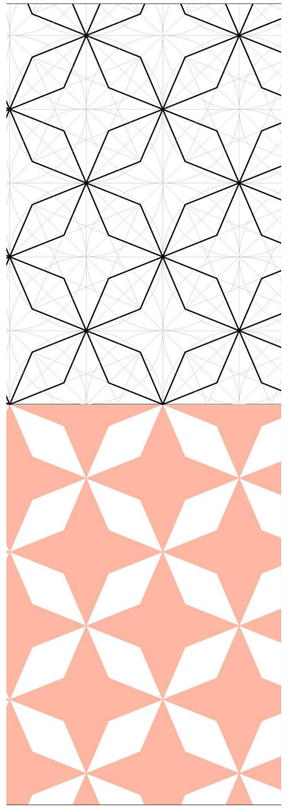
5 | Taj Mahal

Taj Mahal was built in 1632–53 and it represents the finest and most sophisticated example of Mughal architecture. Its origins lie in the moving circumstances of its commission and the culture and history of an Islamic Mughal empire's rule over large parts of India. The distraught Mughal Emperor Shah Jahan commissioned the tomb upon the death of his wife Mumtaz Mahal. Beautiful examples of geometric patterns are seen in the jalis of the Taj and the intriguing tiling patterns of the paving stones that cover the ground around the Taj Mahal. Next to the tomb, the stones lie in a distinctive pattern of four-pointed stars (red sandstone) and diamonds (marble). Reflecting symmetries characterize the pattern of paving stones surrounding the Taj Mahal. The 6-fold geometric patterns adorn the jalis. The drainage holes in some of the stones have a strikingly hexagonal pattern. In other locations, the tiling pattern combines regular hexagons with six-pointed stars.

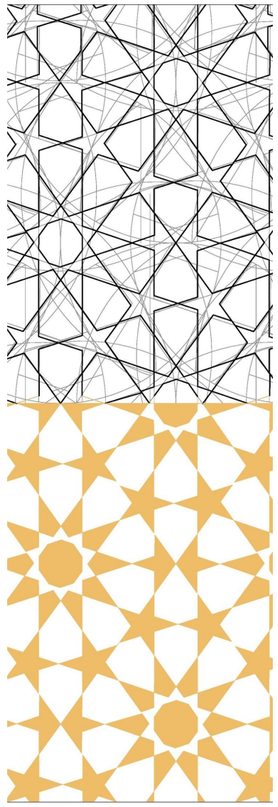
CHAPTERS

Geometric patterns in Mughal architecture provide a wide range of intricate geometries using shapes symbolising different principles of Islam which can be unfolded and decoded on the basis of the number of folds in which every pattern is derived.

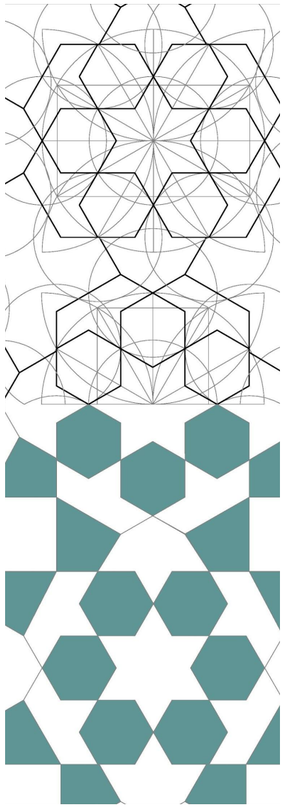
The classification of the chapters is done on the basis of the number of folds including patterns from four-fold, five-fold, and six-fold geometry. The last chapter is the addendum which explains the mathematical elegance of these designs and the intricate ways in which different geometric patterns provide a visual confirmation of the complexity and can be achieved with such simple tools.



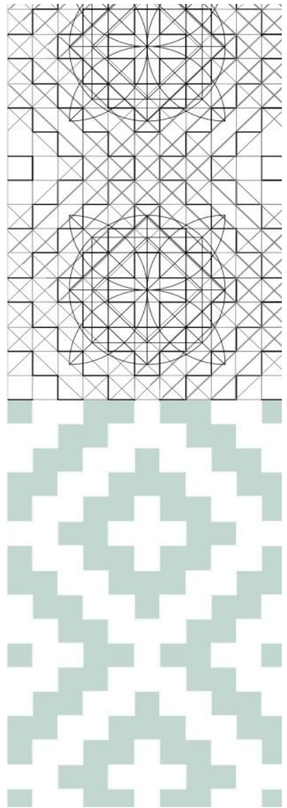
CHAPTER I
4 FOLD PATTERNS
14_55



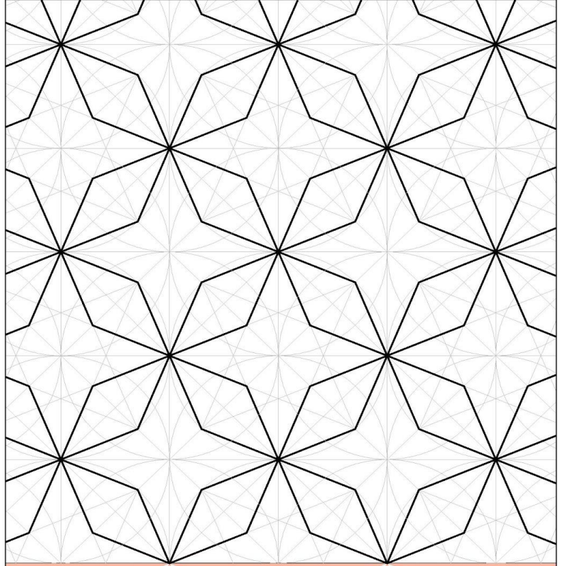
CHAPTER II
5 FOLD PATTERNS
58_61

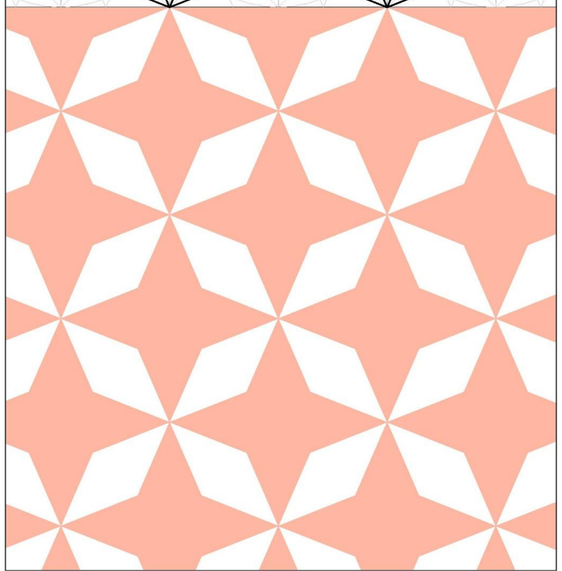


CHAPTER III
6 FOLD PATTERNS
64_95



CHAPTER IV
ADDENDUM
98_101





CHAPTER I

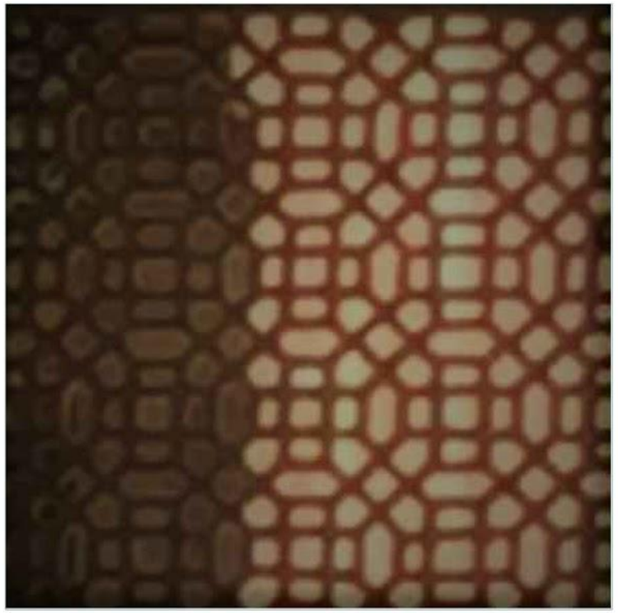
4 FOLD PATTERNS

The square is one of the primary shapes used for making the grid and it is associated with earth and the four-fold relationships found in the essential order of the natural environment. These include the four cardinal directions, the four seasons, the four elements, and their four qualities.

In Islamic architecture, through the use of a piece called squinch, an octagonal structure provides the transition between the earthly cubic form and the heavenly form of the domed roof. It is an important figure in composition of traditional art, the number eight representing a vital stage on man's spiritual journey and return to Unity.

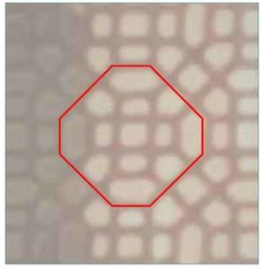
1.1

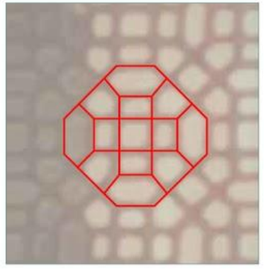
Aditi Naik

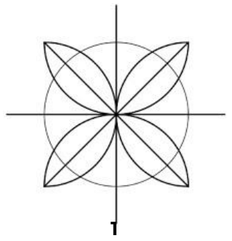


Credits: Richa Raut

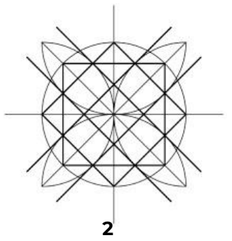
This pattern is found in Fatehpur sikri. It forms one of the of the Jali patterns of the structure. It is a four fold geometric pattern.



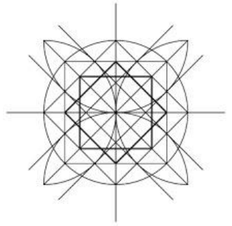




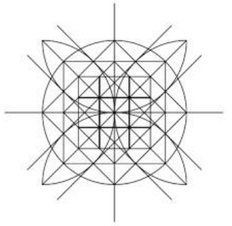
1



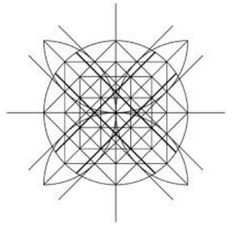
2



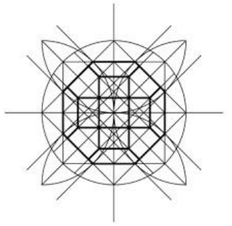
3



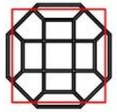
4



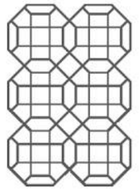
5



6



7



8

Divide mother circle into 4 parts. Draw vessicas and divide circle into 8 parts

Inscribe static and dynamic square in the circle

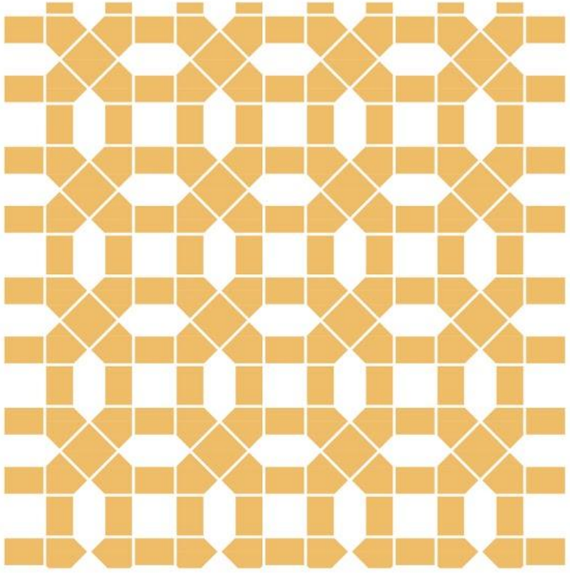
Draw 4 diagonals from one sector of circle to diagonally opposite sector

Inscribe smaller static and dynamic square using the points gained by perpendicular bisectors

Draw 4 perpendicular lines from the points of intersection of smaller static and dynamic square

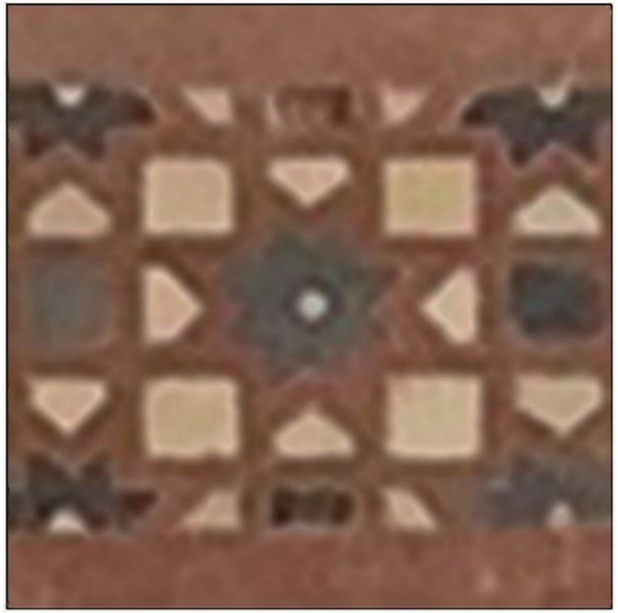
Draw parallel lines to the diagonals extending from one sector to other

Repeating the unit pattern is formed



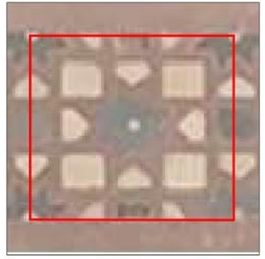
1.2

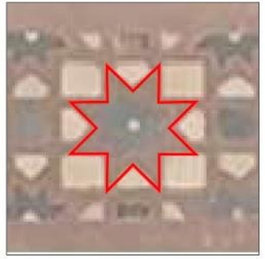
Aditya Vaidya

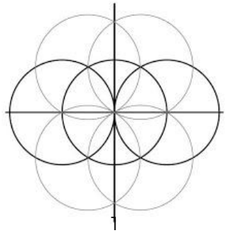


Credits: Richa Raut

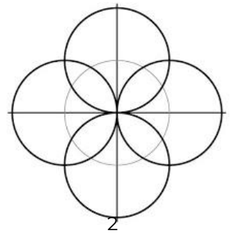
This pattern is found in Fatehpur Sikri. It forms on of the Inlay works of the structure. This Inlay pattern is known as ‘Pachchikari’ or ‘Parchinkari’. It is an eight fold geometric pattern.



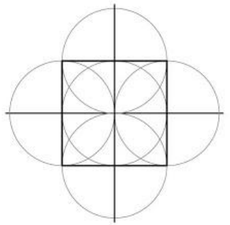




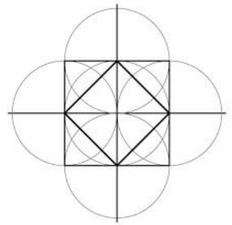
1



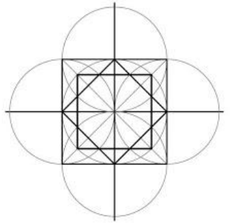
2



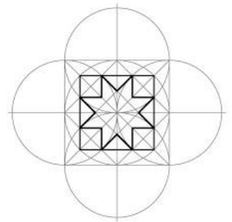
3



4

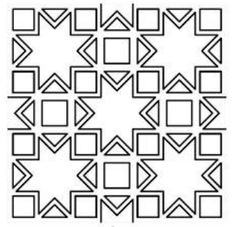


5



6

7



8

Draw horizontal line and draw mother circle of desired radius

Divide the circle vertically

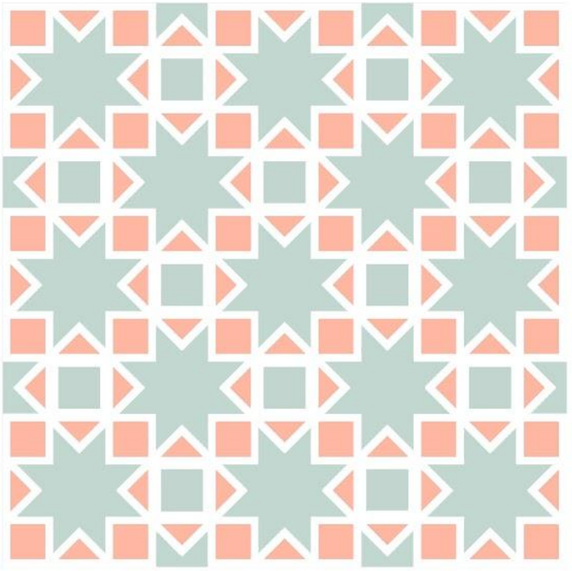
Draw static square around the mother circle

Draw dynamic square within the mother circle

Draw static square within the mother circle and draw lines parallel to the diagonal of square

Finalize the pattern and darken the required lines

Repeating the unit pattern is formed.

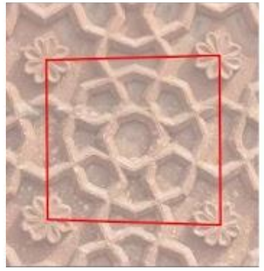


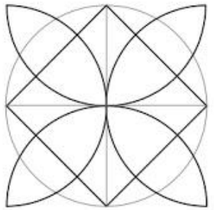
1.3

Aditi Wadate

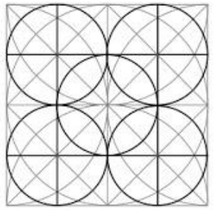
Credits: Manish Malli

This pattern is found in Fatehpur Sikri. It forms an engraved pattern found in the structure. It is an eight fold geometric pattern.

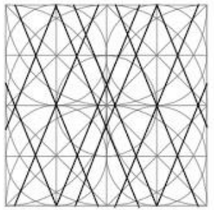




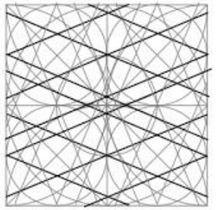
1



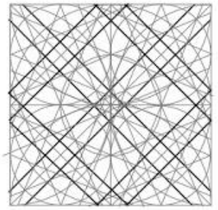
2



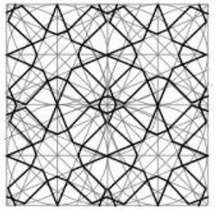
3



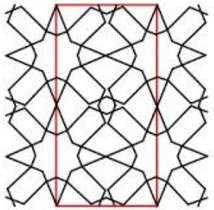
4



5



6



7

8

Divide mother circle into 4 parts, draw dynamic square and static square

Draw four circles each at intersection of diagonals of four parts and one at the centre of circle

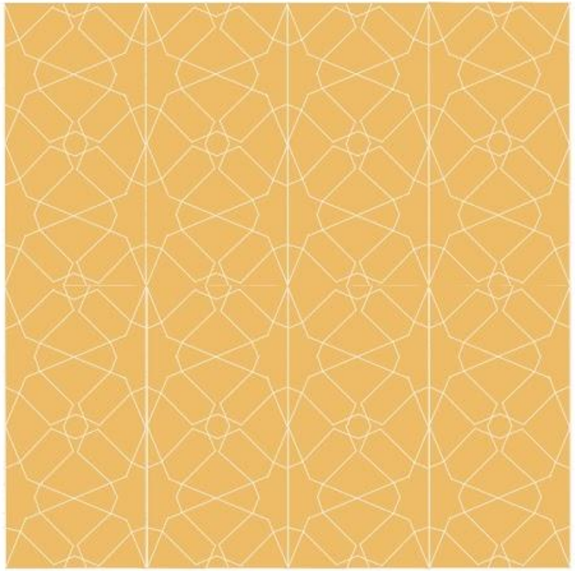
In that circle draw lines joining the points 1-4 and 1-6, extend parallels from these lines

In that circle draw lines joining the points 2-7 and 3-8, extend parallels from these lines

Draw intersecting lines to static square, also to the four small static squares

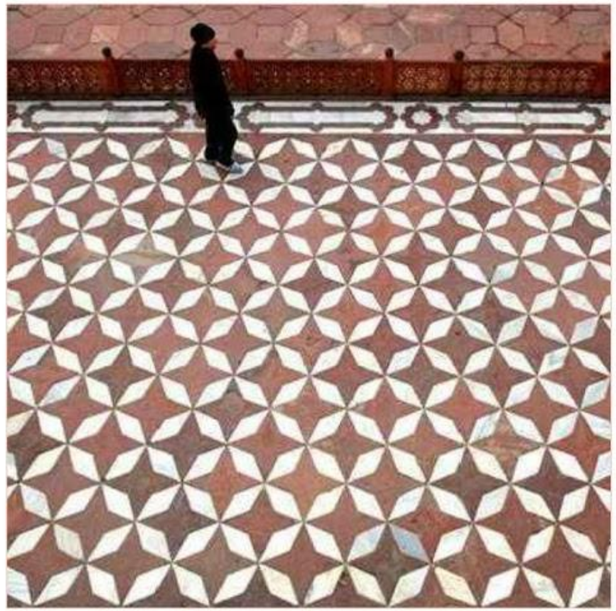
The pattern can be seen with all the construction lines

Repeating the unit pattern is formed



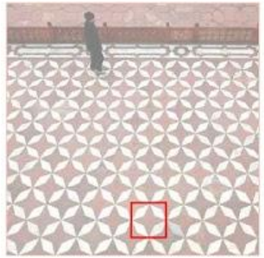
1.4

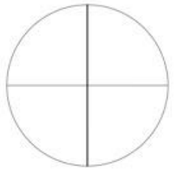
Palak Bhattad



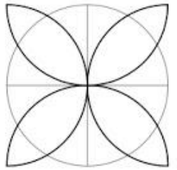
Credits: Rohit Karekar

This pattern is found in Taj Mahal. It forms the flooring patterns in the gardens of the structure. It is a four fold geometric pattern.

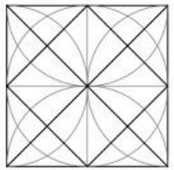




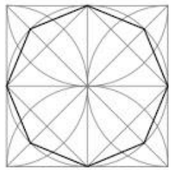
1



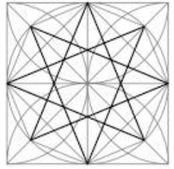
2



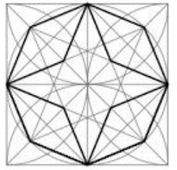
3



4

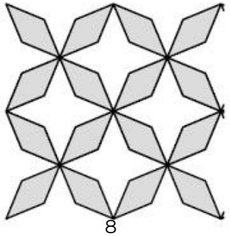


5



6

7



8

Dividing a mother circle in 4 equal parts.

Inscribing the circle in a square

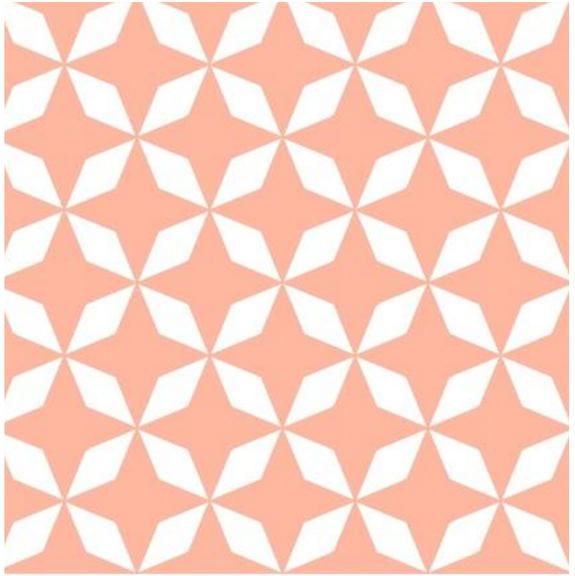
Drawing the diagonals

Drawing the dynamic square

Join to form the dynamic octagon.

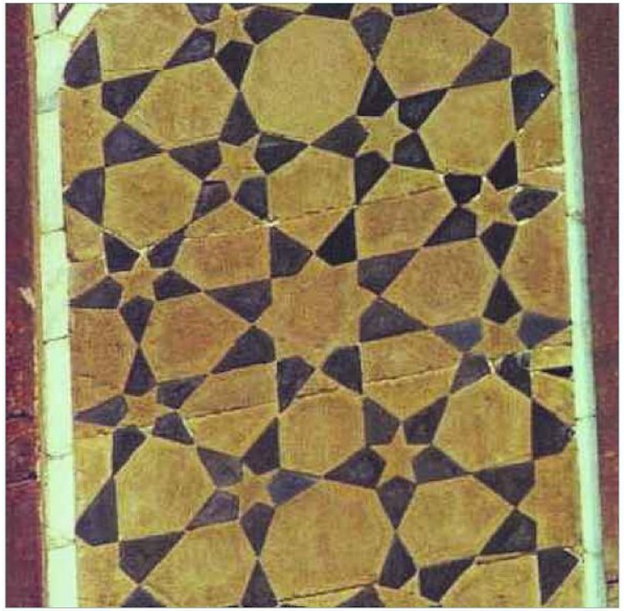
Finalising the pattern

Repeating the unit pattern is formed



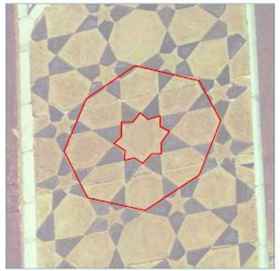
1.5

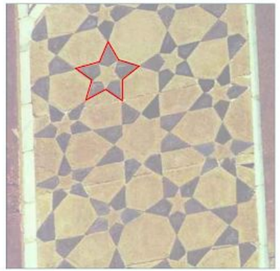
Ameya Thanawala

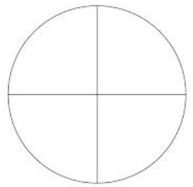


This pattern is found in Akbar's Tomb . It forms tone of the Inlay patterns of the structure. It is an eight fold geometric pattern. The pattern can also be called as an Eight fold Rosette.

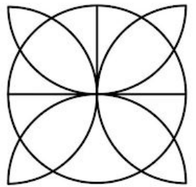
Credits: Richa Raut



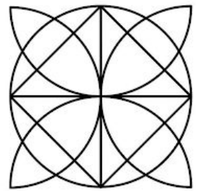




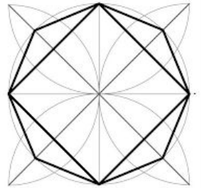
1



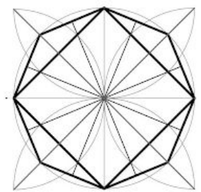
2



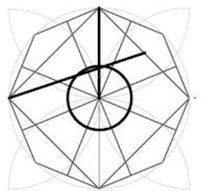
3



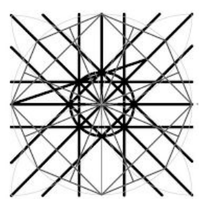
4



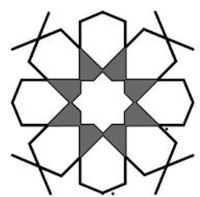
5



6



7



8

Divide mother circle in 4 equal parts

Draw dynamic square

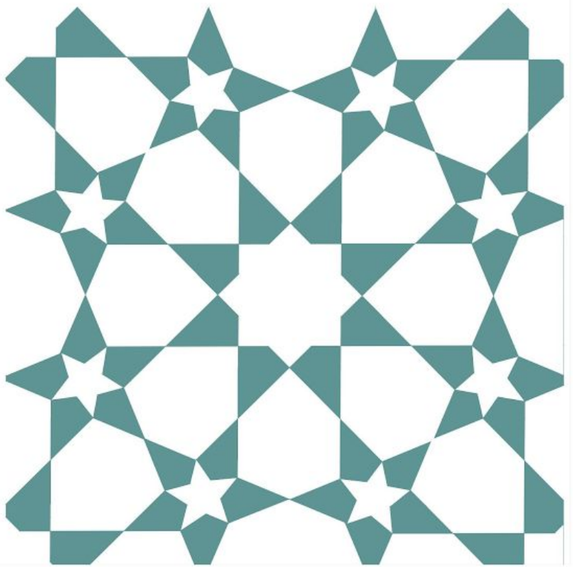
Draw diagonals and form dynamic octagon

Divide the circle in 16 parts further

Taking radius, where line intersects the vertical, draw a circle from the centre

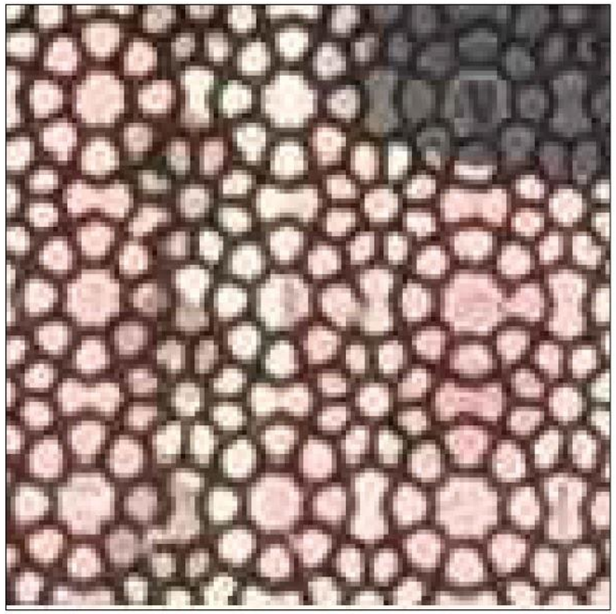
Draw 3 sets of vertical, horizontal, and diagonal lines to form the central khatam

Repeating the unit pattern is formed.

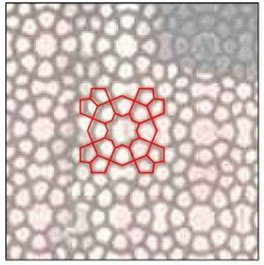


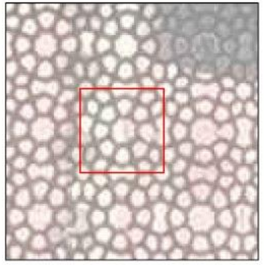
1.6

Amartya Sonaje

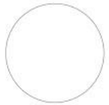


Credits: Richa Raut





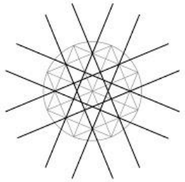
This pattern is found in Fatehpur Sikri . It forms an intricate Jali at the Jama Masjid of the structure. It is an eight fold geometric pattern.



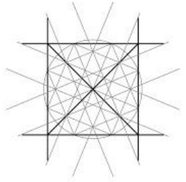
1

2

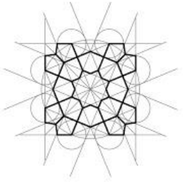
3



4

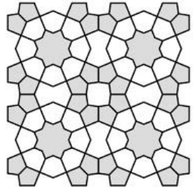


5



6

7



8

Draw mother circle of desired radius

Draw dynamic square and static square within the mother circle

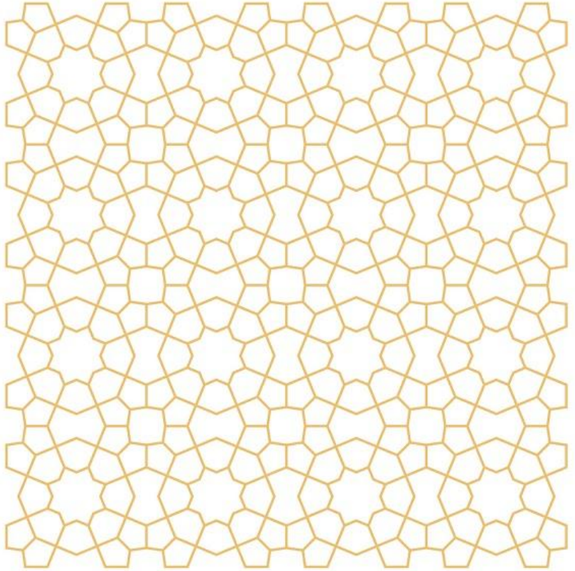
Draw diagonals of static and dynamic square

Join the intersecting points of static and dynamic square, extend them outside the circle

Form square outside the circle and draw diagonals

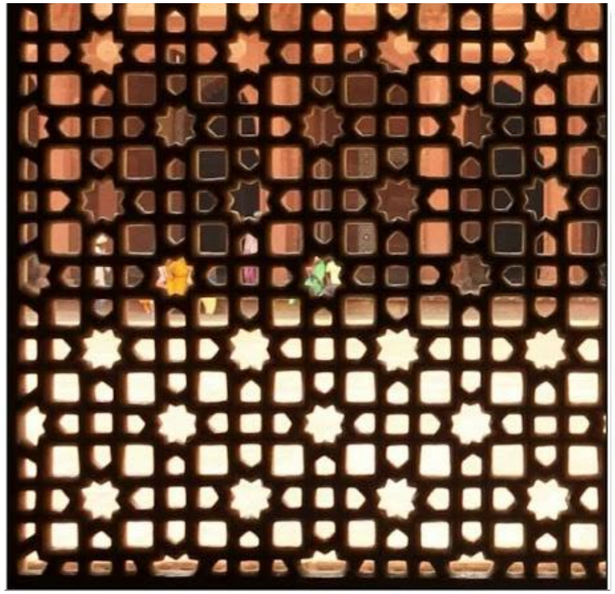
With the intersecting point of the larger square and mother circle, take radius from the intersecting point to the intersection of the static and dynamic squares and draw circles

Repeating the unit pattern is formed



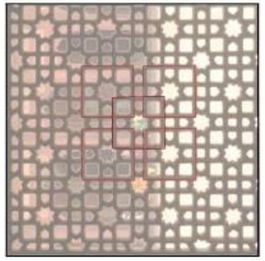
1.7

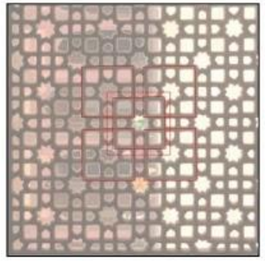
Anuja Makode

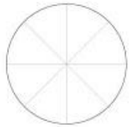


Credits: Manish Malli

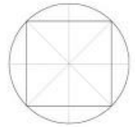
This pattern is found in Fatehpur Sikri. It forms the Jali pattern carved at the tomb of Salim Chisti . It is an eight fold geometric pattern.



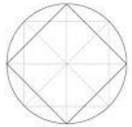




1

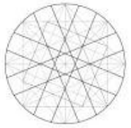


2

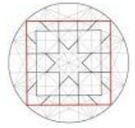


3

4

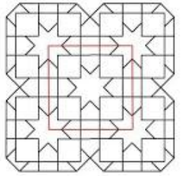


5



6

7



8

Draw mother circle and divide it into 8 equal parts

Draw static square

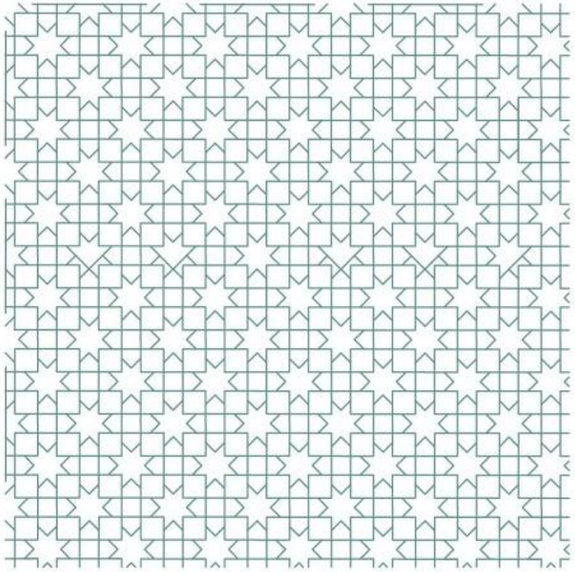
Draw dynamic square

Make dynamic octagram with 8 points of the circle

Identify the inner octagon and draw a dynamic octagram with 8 points of the octagon. Extend the lines of the new Octagram to meet the mother circle

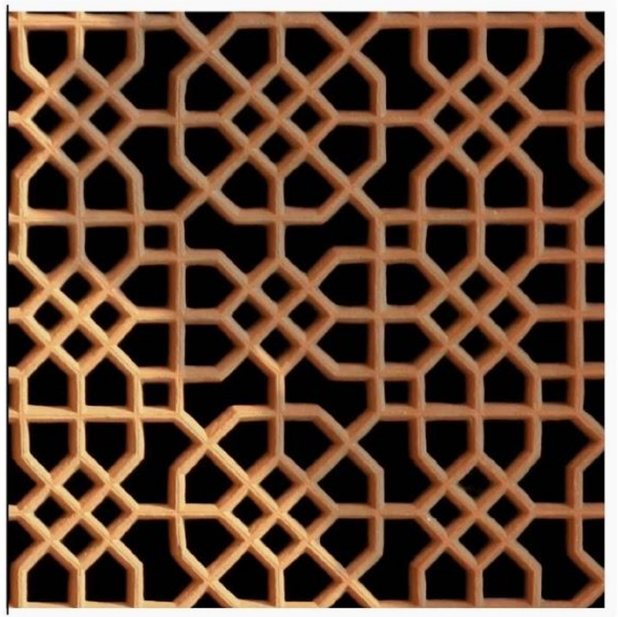
Finalising the pattern

Repeating the unit pattern is formed



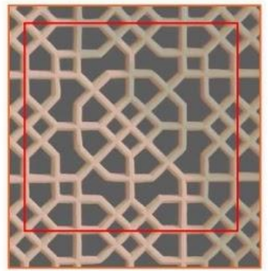
1.8

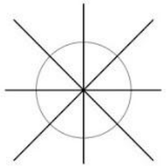
Cinthia Khobragade



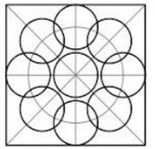
Credits: Manish Malli

This pattern is found in Fatehpur Sikri . It forms one of the Jalis of the structure. It is a eight fold geometric pattern.

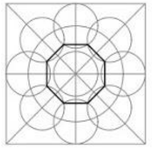




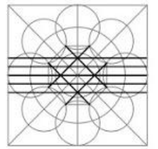
1



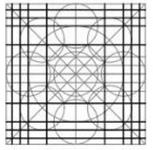
2



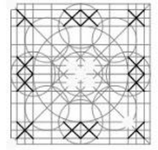
3



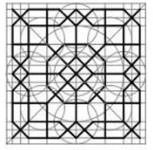
4



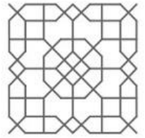
5



6



7



8

Draw mother circle and divide it into 8 parts

Take radius of circle from centre to other point and draw circles at all points where the circle is divided, draw an outer square

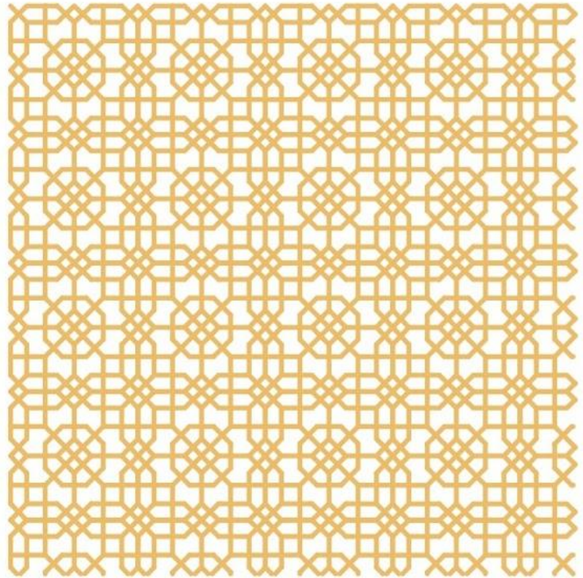
Draw octagon by joining the bottom lines of intersected circles

Draw lines parallel to octagon lines and draw horizontal lines where diagonal lines join with centre point and diagonal lines of square

Extend horizontal and vertical lines of the octagon, tangent to bigger circle and smaller circle

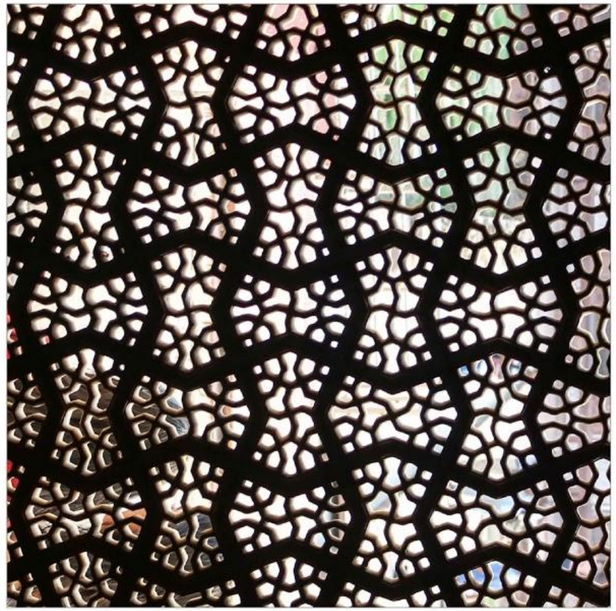
Draw diagonal in smaller upper centre of circles

Repeating the unit pattern is formed

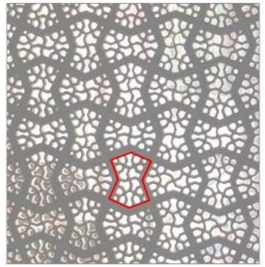


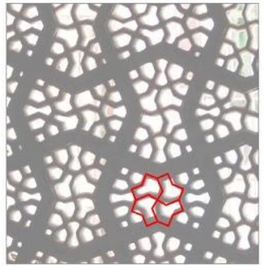
1.9

Apoorva Patil



Credits: Manish Malli

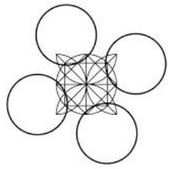




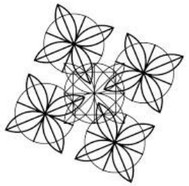
This pattern is found in Itmad-ud-daulah's Tomb. It forms one of the Jalis of the structure. It is an eight fold geometric pattern.

1

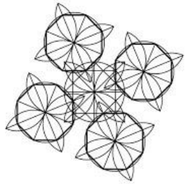
2



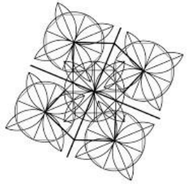
3



4



5



6

7

8

Divide mother circle in 8 equal parts

Draw static and dynamic squares, join the 8 points making a octagram

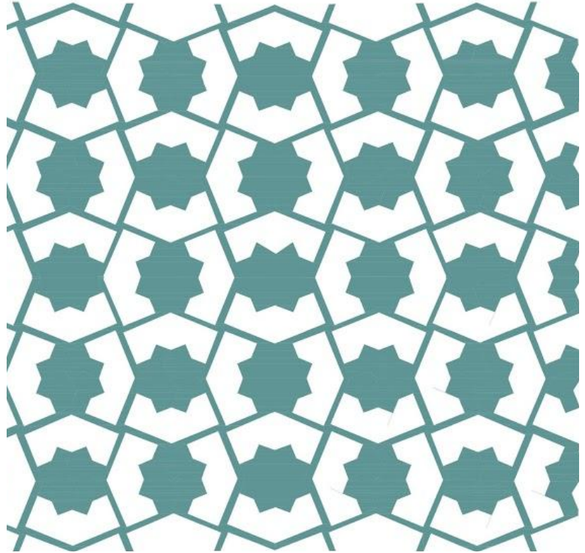
Draw 4 circles at the adjoining side of the octagram

Make an inscribed octagon in those 4 circles such that one side of the octagon is double the length of one side of octagram

Join the middle line passing between two octagon forming a tabal shaped unit

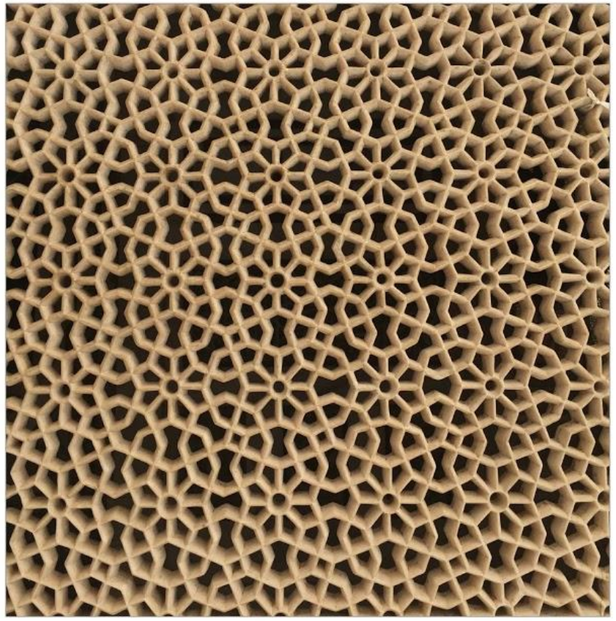
Finalising the pattern

Repeating the unit pattern is formed



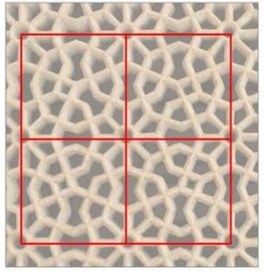
1.10

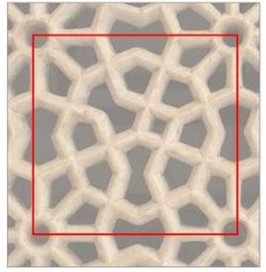
Disha Kolhe

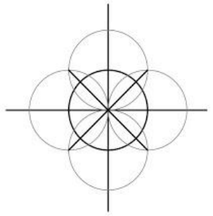


Credits: Richa Raut

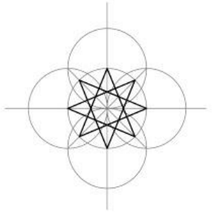
This pattern is found in Fatehpur Sikri. It forms one of the Jalis of the structure. It is a eight fold geometric pattern.



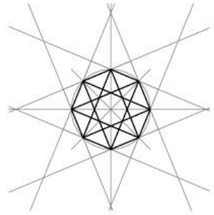




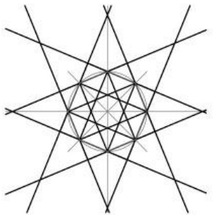
1



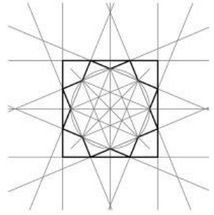
2



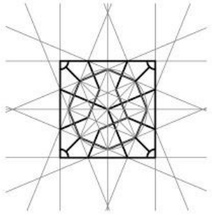
3



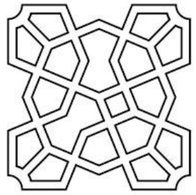
4



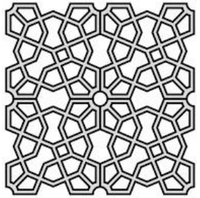
5



6



7



8

Divide mother circle in 8 equal parts

Draw unicursal star joining the 8 points of circle

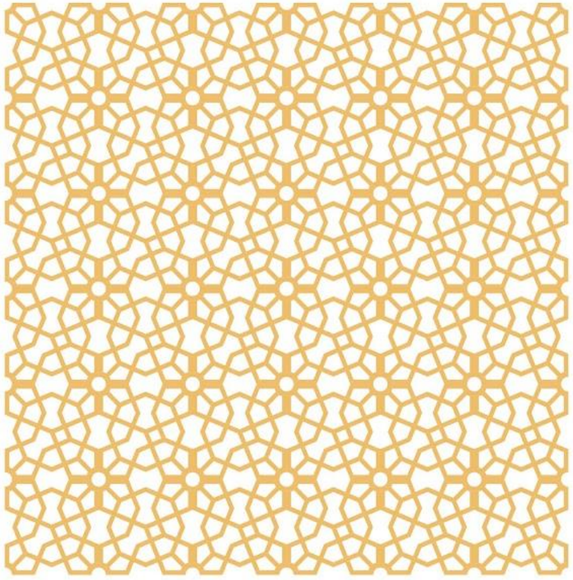
Draw dynamic octagram with the 8 points of circle

Making lines with every 2 adjacent points of a unicursal star

Draw the outer static square and draw circles at the corners

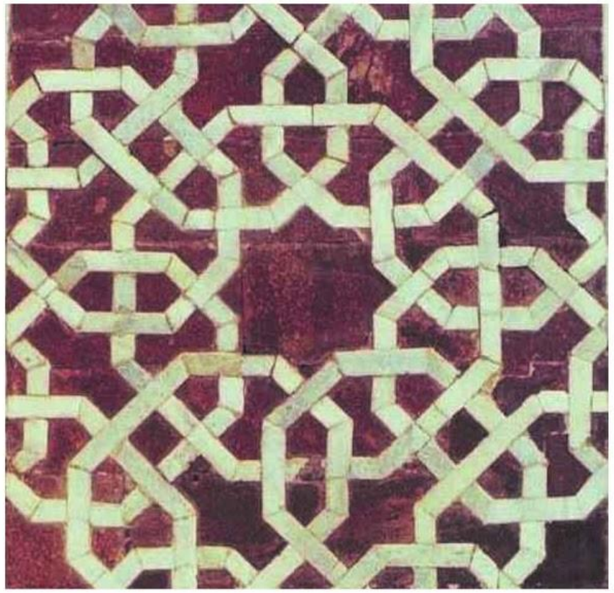
Finalising the pattern

Repeating the unit pattern is formed



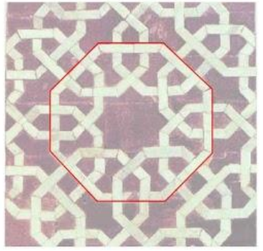
1.11

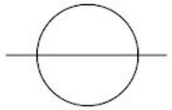
Jayraj Mistry



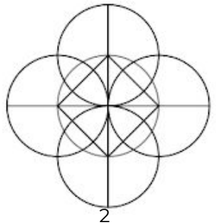
Credits: Yashwant Pitkar

This pattern is found in Fatehpur Sikri . It forms one of the Inlay works of the structure. It is an eight fold geometric pattern.

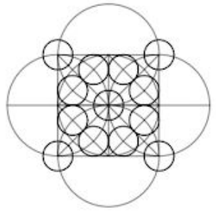




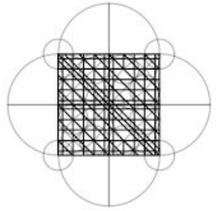
1



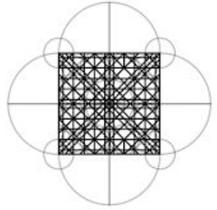
2



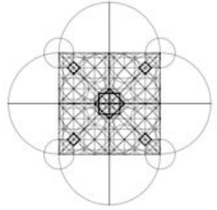
3



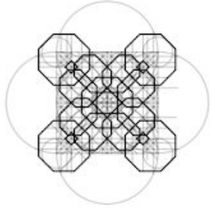
4



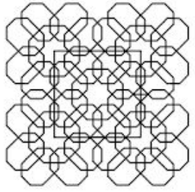
5



6



7



8

Draw mother circle

Taking same radius draw circles on all 4 vertices

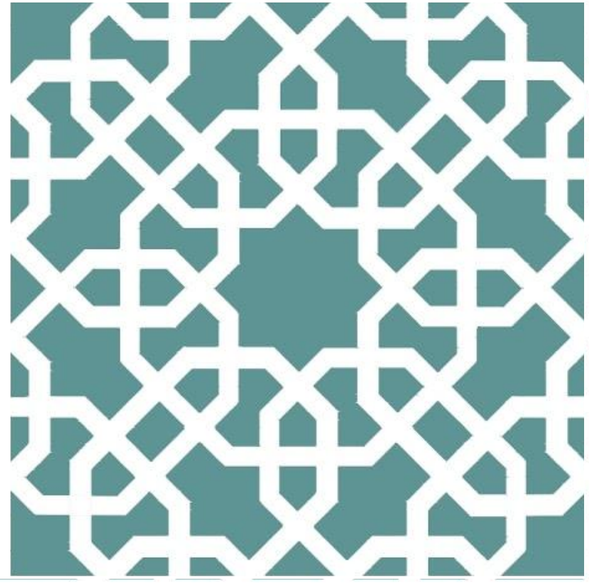
Draw a square and join diagonals, draw a circle between each cross and perpendicular diagonal

Divide each circle into 8 parts and extend the line up to outer square

Join all the adjoining cross diagonal parallel to each other

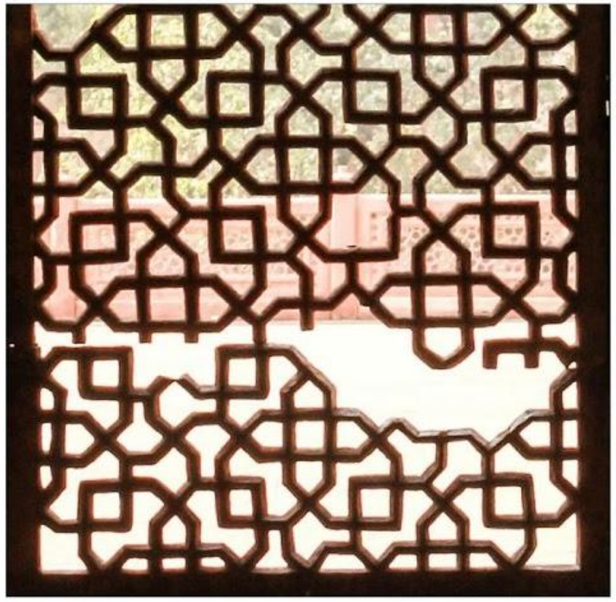
Extend the diagonals of the little square and make static and dynamic square in centre

Repeating the unit pattern is formed



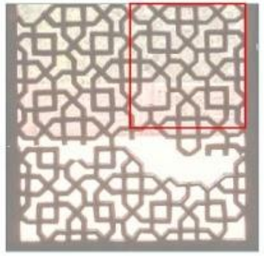
1.12

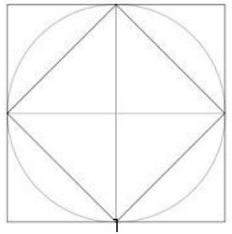
Harsh Tank



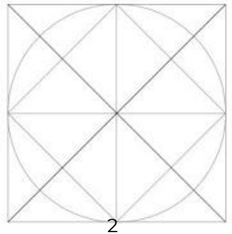
Credits: Manish Malli

This pattern is found in Humayun's Tomb. It forms one of the Jalis of the structure. It is a four fold geometric pattern.

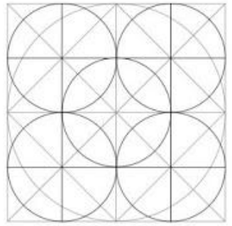




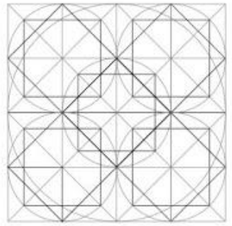
1



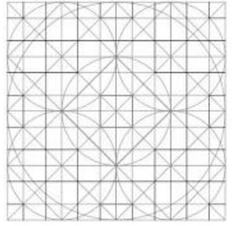
2



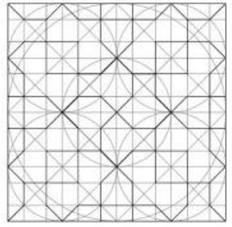
3



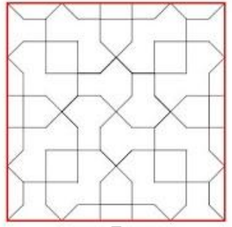
4



5



6



7

8

Divide mother circle into four parts and draw static and dynamic square .

Draw diagonals of static square

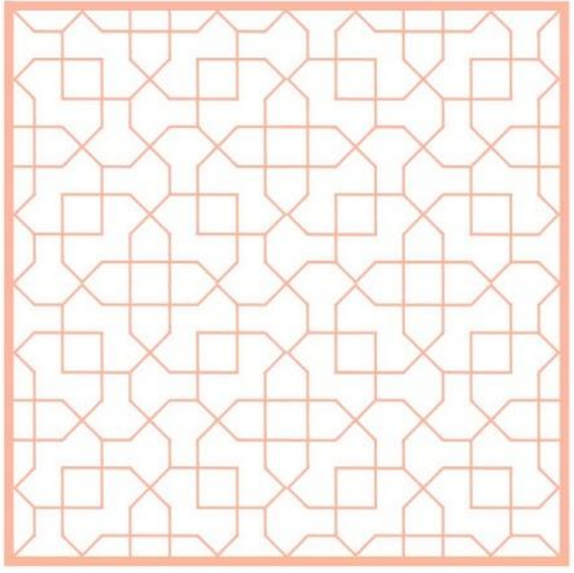
Draw 4 circles in each of the 4 quadrants formed and taking same radius draw one circle at centre of mother circle

Draw dynamic and static square inside each of the circle created

Draw the respective horizontal and vertical lines joining the squares vertices

The unit with all the construction lines

Repeating the unit pattern is formed

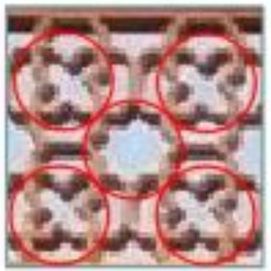


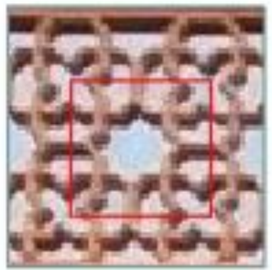
1.13

Neha Raut

Credits: Richa Raut

This pattern is found in Fatehpur Sikri . It forms the Jali for the parapet wall of the structure. It is a eight fold geometric pattern.

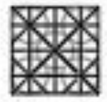




1

2

3



4

5

6

7

8

Draw mother circle.

Draw tangent to the circle to form square around it. Taking radius as half diagonal of square draw a circle

Draw tangent to the new circle to form square around it. Taking radius same as the mother circle draw 4 circles on vertex of the square.

Divide all circles in 8 parts

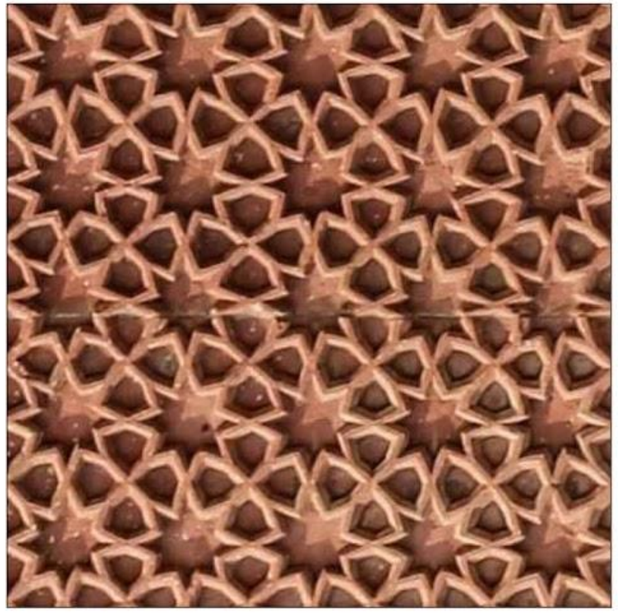
Draw static and dynamic square in each of the circle and extent the line

Draw line Joining the points of intersection of static and dynamic.

Repeating the unit pattern is formed

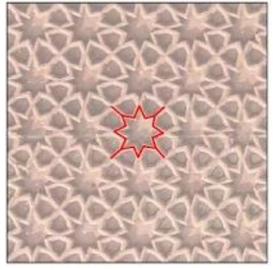
1.14

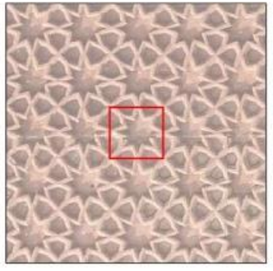
Pooja Tambe

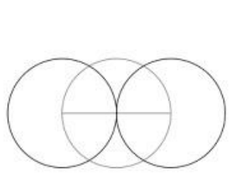


Credits: Manish Malli

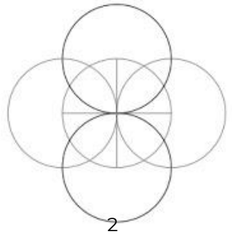
This pattern is found in Fatehpur Sikri. It forms one of the engraved patterns of the structure. It is an eight fold geometric pattern.



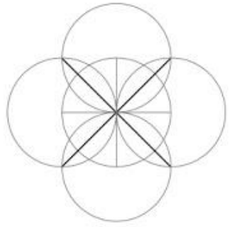




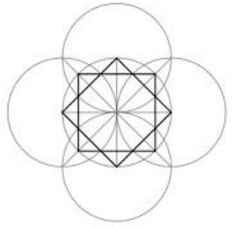
1



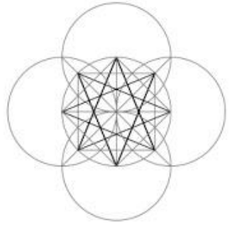
2



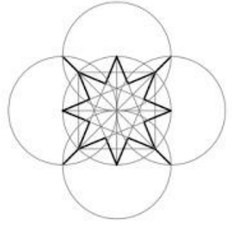
3



4



5



6

7

8

Divide mother circle into two parts by drawing two circles at the end of diameter of mother circle with the same radius

Draw vertical diameter of mother circle and draw two more circles to divide the circle into 8 parts

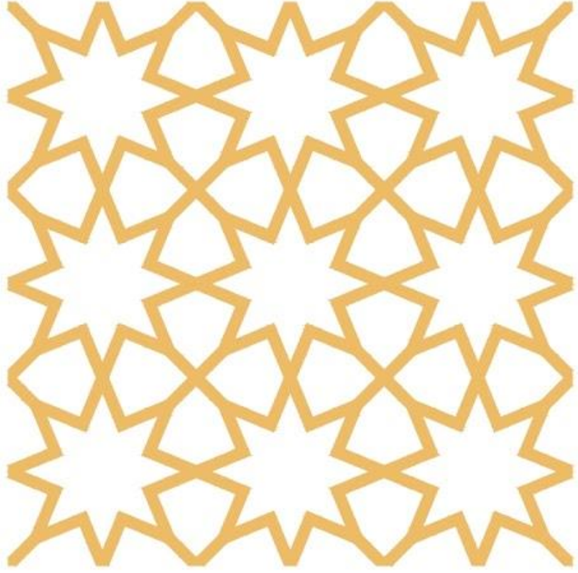
Draw static square inscribed in mother circle

Draw dynamic square inscribed in mother circle

Draw respective horizontal and vertical lines joining the squares vertices

The unit with all construction lines

Repeating the unit pattern is formed

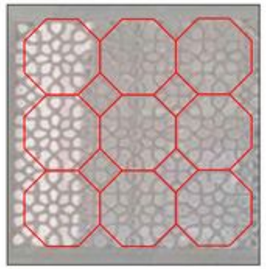


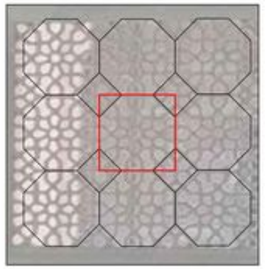
1.15

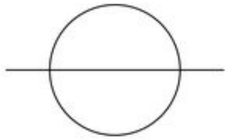
Pranav Chaubal

Credits: Richa Raut

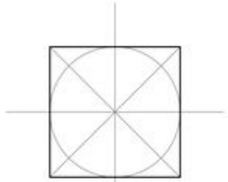
This pattern is found in Fatehpur Sikri. It forms one of the Jalis of the structure. It is an eight fold geometric pattern.



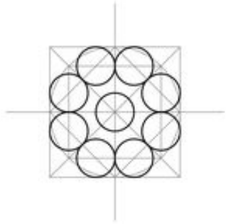




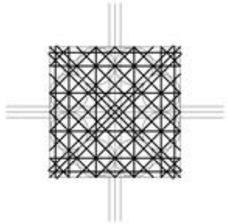
1



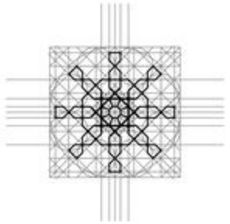
2



3



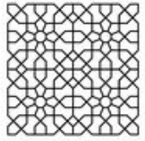
4



5

6

7



8

Draw mother circle and divide it horizontally

Draw static square around circle, make diagonals in square

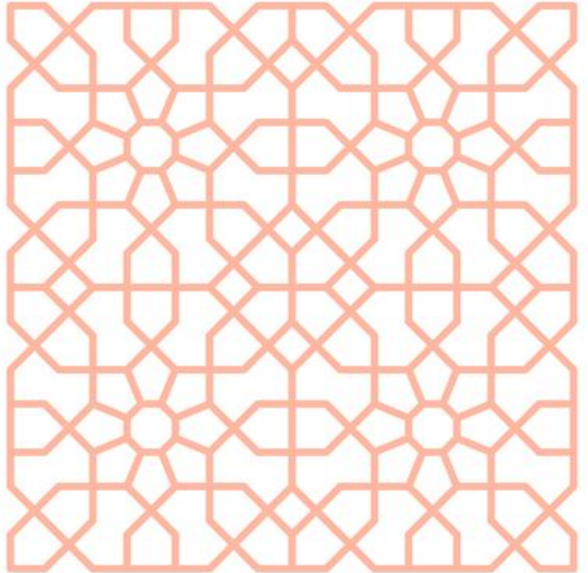
Inscribe static and dynamic square within the circle. Inscribe multiple circles with square intersections as centres

Draw static and dynamic lines passing through circle centres, circle to circle tangent points, circle horizontal and circle vertical intersections

Identifying the central octagon forming the basic unit of the pattern

Pattern is finalised as 8 pointed star at centre

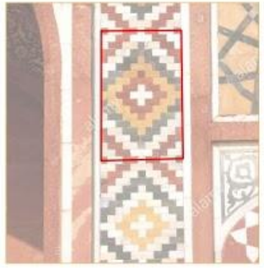
Repeating the unit pattern is formed



1.16

Puneet Maru

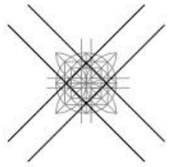
Credits: Yashwant Pitkar



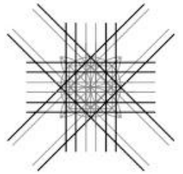
This pattern is found in Akbar's Tomb . It forms the border of the Southern gateway of the structure. It is an eight fold geometric pattern.

1

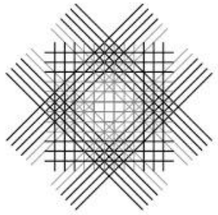
2



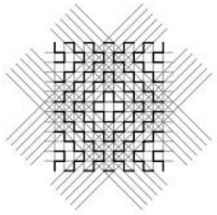
3



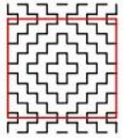
4



5



6



7

8

Divide mother circle in 8 equal parts

Making static and dynamic squares, dividing the inner static square into 9 equal squares

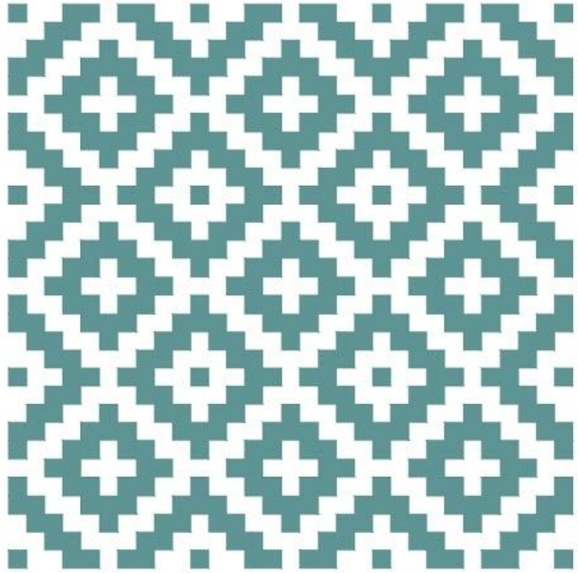
Making diagonals of the squares in the 4 corners

Using the diagonals to make additional vertical and horizontal lines

Subsequently extending the grid

Finalising the pattern

Repeating the unit pattern is formed

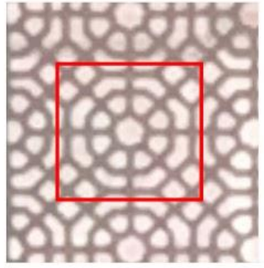


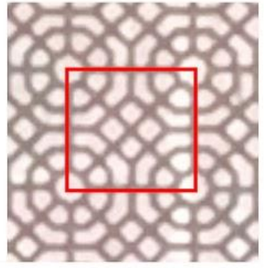
1.17

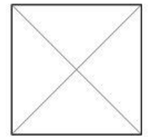
Siddhanti Shende

Credits: Richa Raut

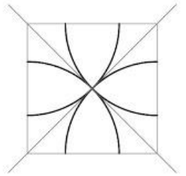
This pattern is found in Fatehpur Sikri. It forms one of the Jalis of the structure. It is an eight fold geometric pattern.



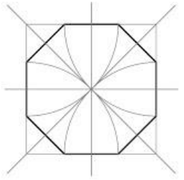




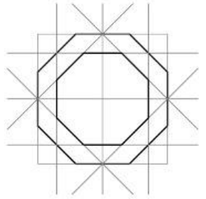
1



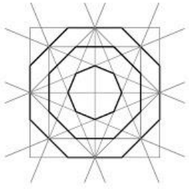
2



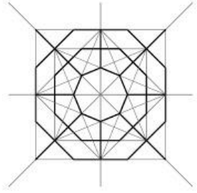
3



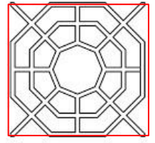
4



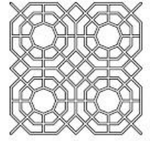
5



6



7



8

Draw a square and join the diagonals to get the centre point

Taking the radius from one vertex to the centre , draw an arc. Repeat on all four vertices

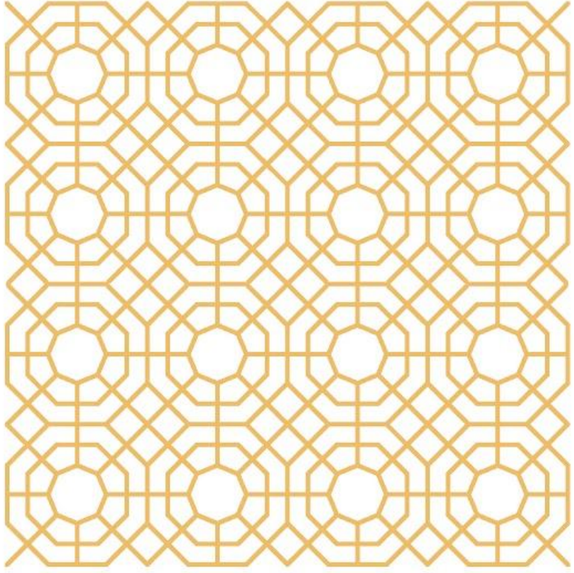
Join points where the arcs intersect the sides of square, forming an octagon

Join midpoints of alternate sides of the octagon, it forms a smaller octagon inside

Join midpoints, leaving two sides in between. Repeat in all directions we get a rotated octagon

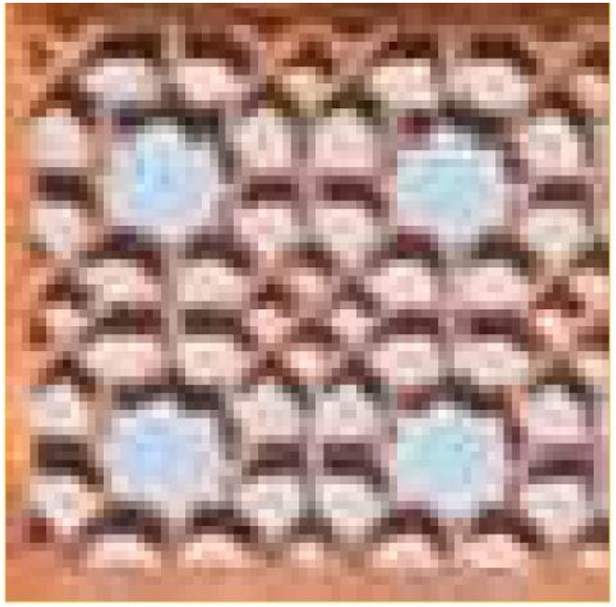
Draw straight lines connecting vertices of innermost octagon to midpoints of the outermost octagon

Repeating the unit pattern is formed



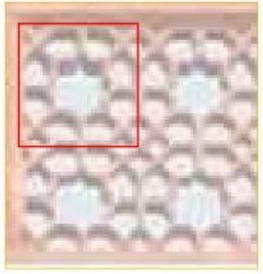
1.18

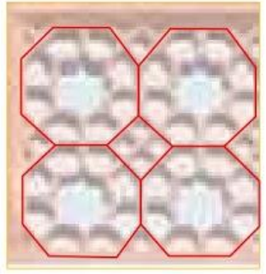
Sanchita Tandel

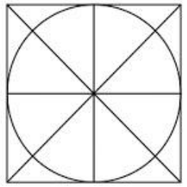


Credits: Richa Raut

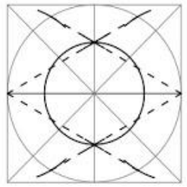
This pattern is found in Fatehpur Sikri. It forms the Jali for the parapet wall of the structure. It is an eight fold geometric pattern.



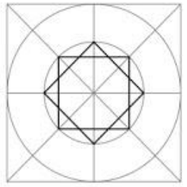




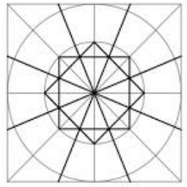
1



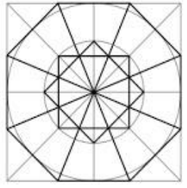
2



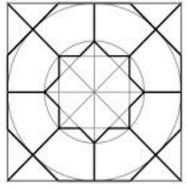
3



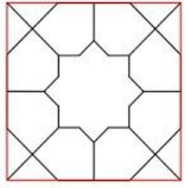
4



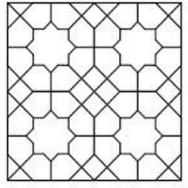
5



6



7



8

Draw mother circle inscribed in a square and divide it into 4 parts.

Draw arcs and join diagonal lines to obtain the radius of smaller circle

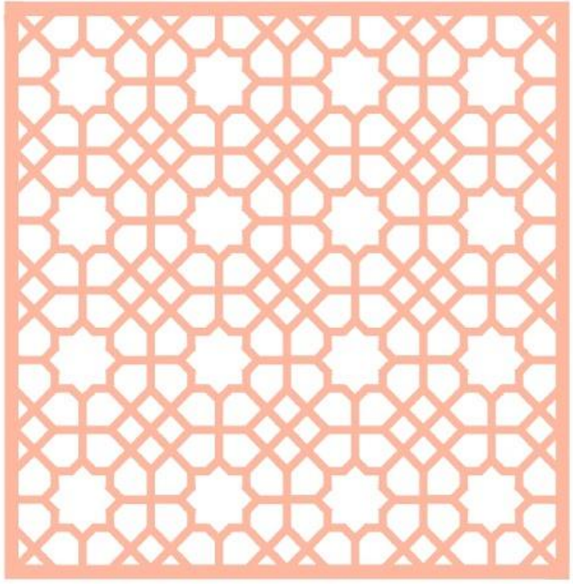
Draw smaller circle passing through the intersections

Draw static and dynamic square inside the circle

Extend the lines passing through the opposite intersection points of the two squares

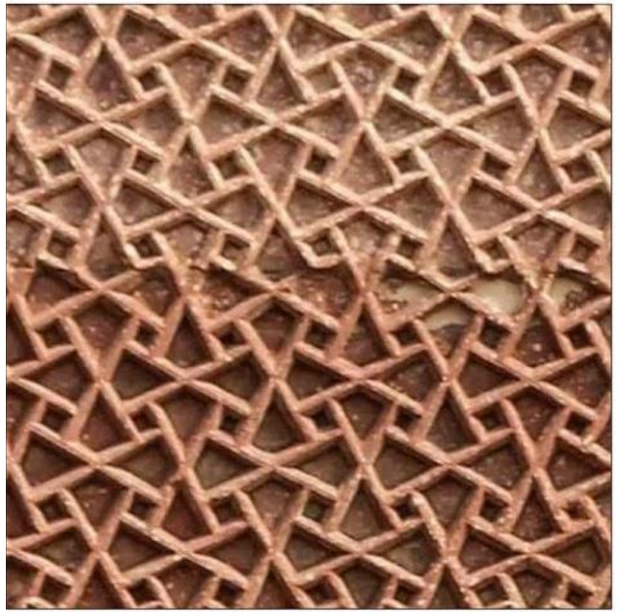
Draw the static hexagon

Repeating the unit pattern is formed



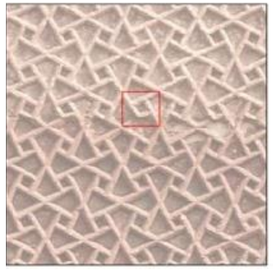
1.19

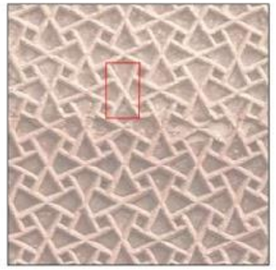
Vaishnavi Gurnalkar

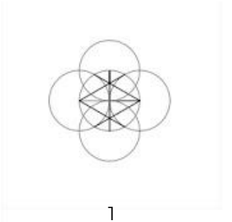


Credits: Manish Malli

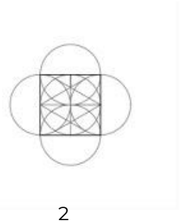
This pattern is found in Fatehpur Sikri. It forms one of the carved patterns of the tomb of Salim Chisti. It is a four fold geometric pattern.



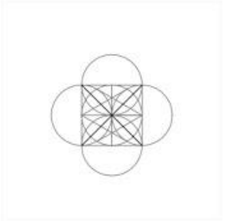




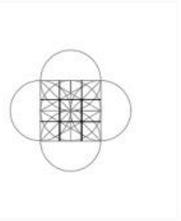
1



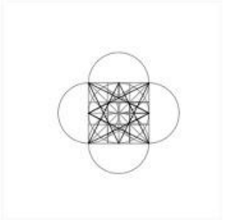
2



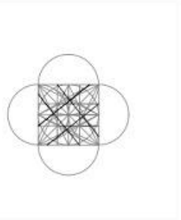
3



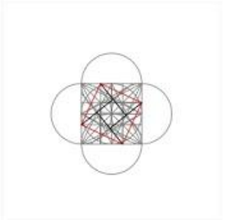
4



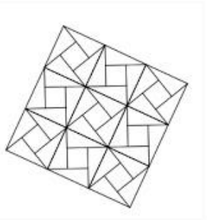
5



6



7



8

Draw two circles on left and right side of mother circle and draw diagonals from east and west to tangent at top and bottom of mother circle. Draw perpendiculars

Draw circle from perpendiculars on both sides. Connect the points to make circumscribed square

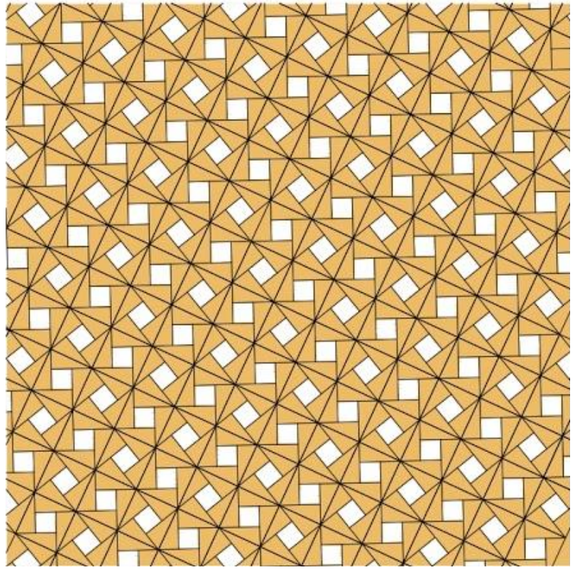
Draw diagonals

Connect the horizontals and verticals through points which intersect each other at diagonal lines of circle on left and right and diagonal lines of square.

Draw unicursal star

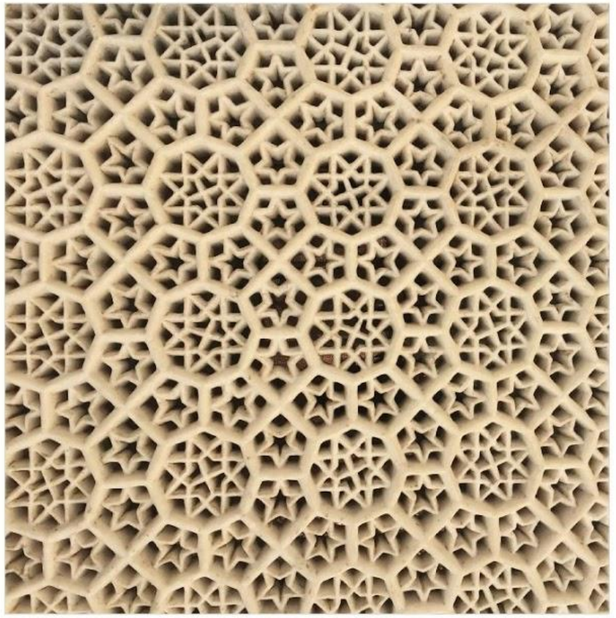
Draw the line passing through intersection points of star finalising the pattern.

Repeating the unit pattern is formed



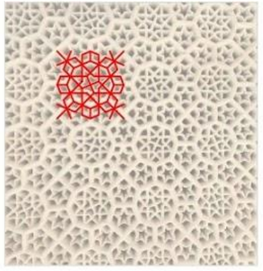
1.20

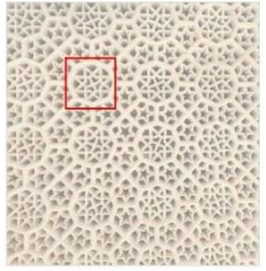
Manasi Thukrul

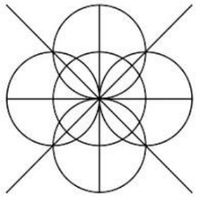


Credits: Richa Raut

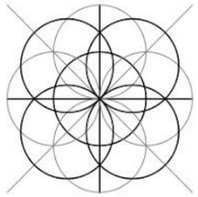
This pattern is found in Fatehpur Sikri. It forms one of the Jalis of the structure. It is an eight fold geometric pattern.



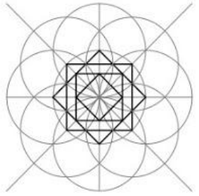




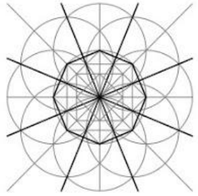
1



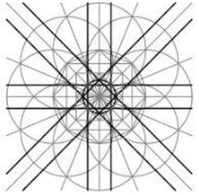
2



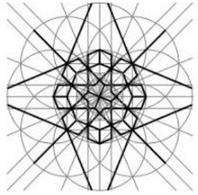
3



4



5



6

7

8

Divide mother circle in 8 parts

Draw circles from all 8 points obtained on the mother circle

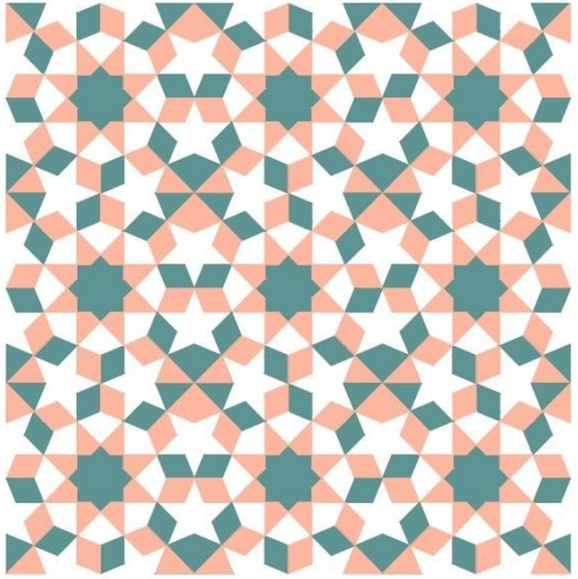
Draw static and dynamic squares inside the mother circle

Make an octagon in the circle by joining all the points. Further divide the circle into 16 parts

Draw a circle inscribed in the 2nd static square. Draw lines parallel to the construction lines wherever the horizontal and vertical lines meet the circle

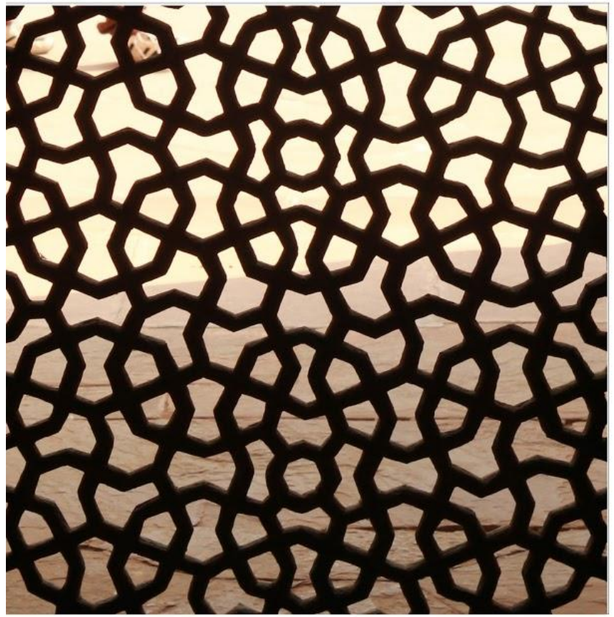
Finalise the pattern

Repeating the unit pattern is formed



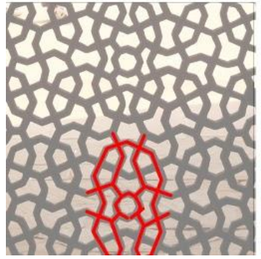
1.21

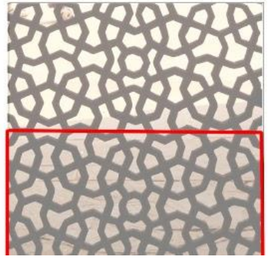
Viresh Desai



Credits: Manish Malli

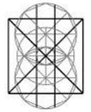
This pattern is found in Humayun's . It forms one of the Jalis of the structure. It is an eight fold geometric pattern.



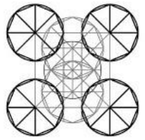


1

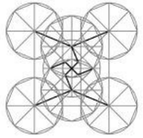
2



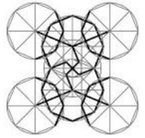
3



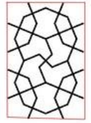
4



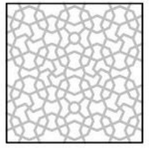
5



6



7



8

Draw mother circle

Draw additional 2 intersecting circles of same radii

Draw diagonals of static square passing through the center of the mother circle and the sides passing through half the radii of additional circle

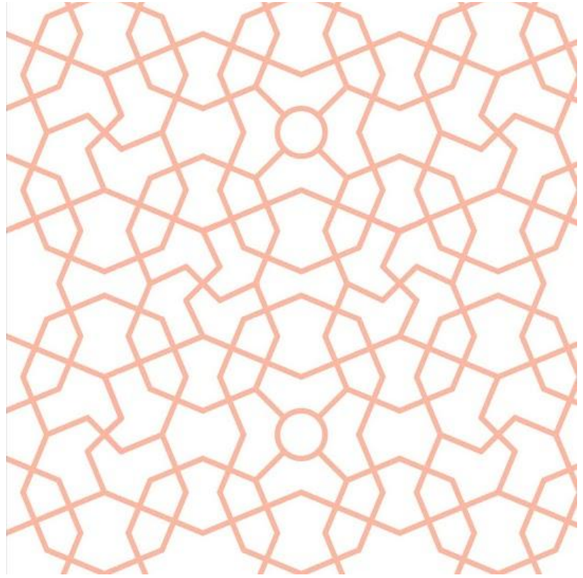
Construct octagons inscribed in the circles having center at corners of the square

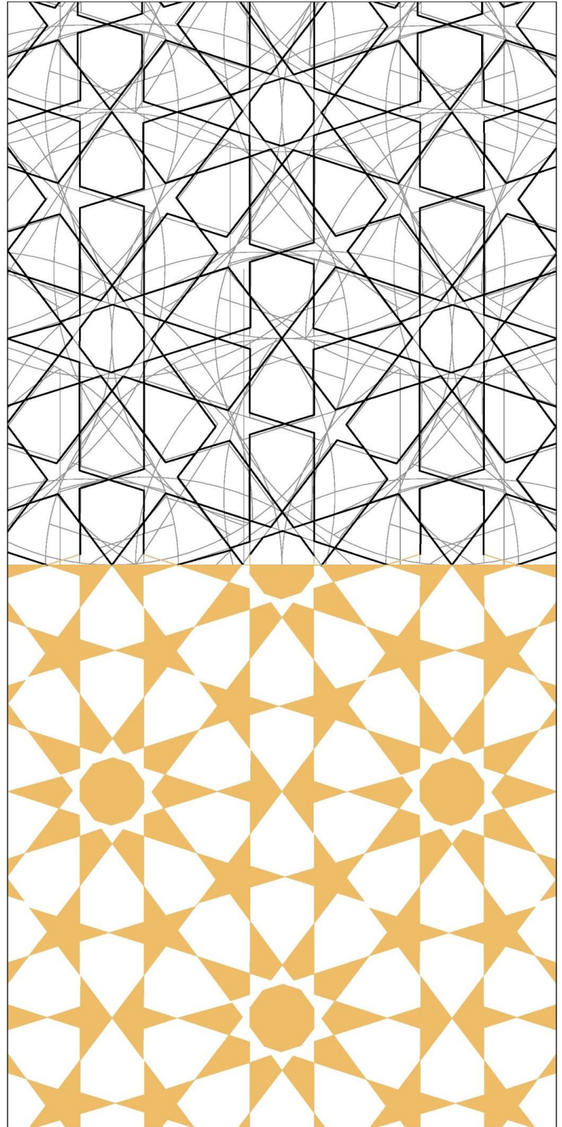
Draw additional lines

Finalising the pattern

Identifying the unit

Repeating the unit jaali is formed





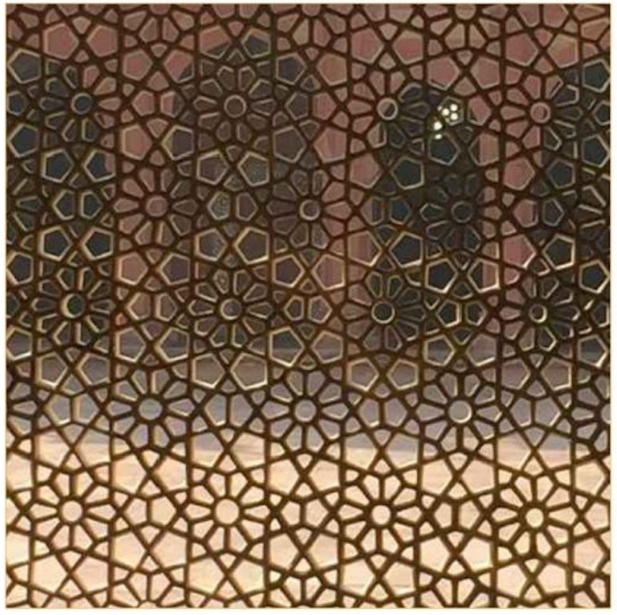
CHAPTER II

5 FOLD PATTERNS

The proportion for dividing the circle is similar to the geometry derived from the Golden Section, having proportions between the minor and major chords of the five points circumscribed by a circle, of 1:1.618. From the five-point geometry, ten-point geometries are easily developed and form the basis for many of the more attractive patterns in Islamic decoration.

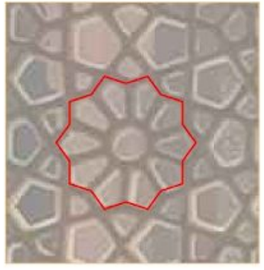
2.1

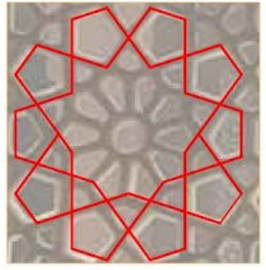
Muskaan Ranwaka

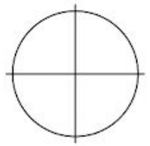


Credits: Richa Raut

This pattern is found in Fatehpur Sikri. It forms one of the Jali patterns at the Tomb of Salim Chisti. It is a five fold geometric pattern.

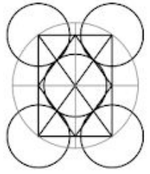




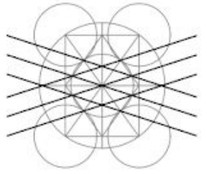


1

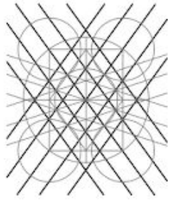
2



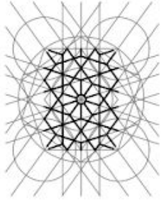
3



4



5



6

7

8

Divide the circle in 4 parts

Draw the dynamic and static pentagon

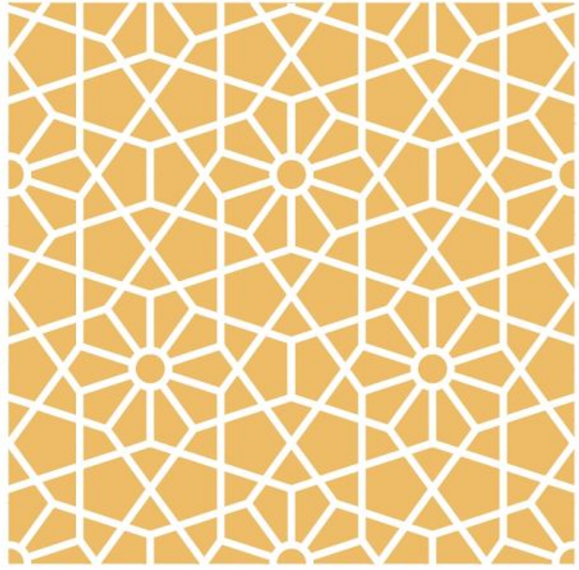
Draw rectangle using the four points of the pentagon and make circles using the radii of the diagonal

Reflect the points of the outer circle on the inner circle and join the opposite points

Mark the points of the intersection between the rectangle and the circles

Join the midpoints of the rectangle and finalise the points to draw the pattern

Repeating the unit pattern is formed

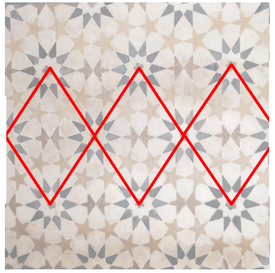


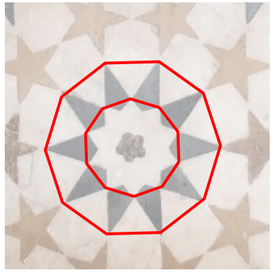
2.2

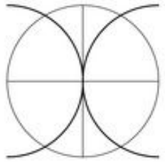
Apoorva Patil

Credits: Rohit Karekar

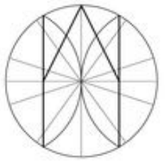
This pattern is found in Itmad ud Daulah's tomb. It forms the inlay pattern which is used of coloured marble in the background and contrasted with white marble as an inlay of the structure. It is a five fold geometric pattern.







1

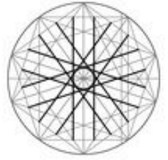


2

3

4

5



6

7

8

Construct the mother circle

Divide the mother circle that divide in 10 equal parts

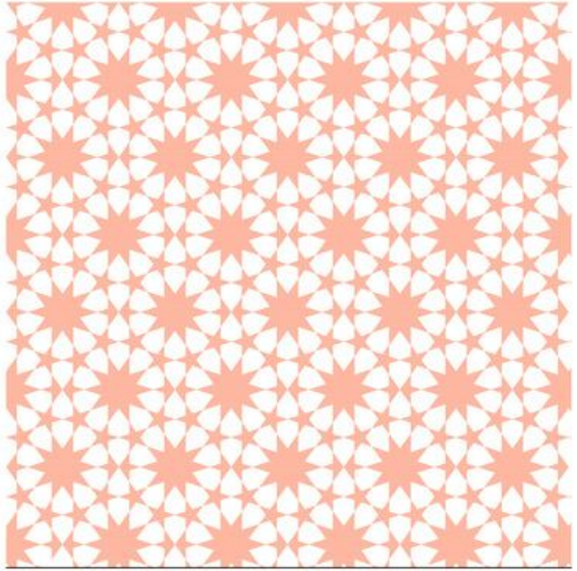
Inscribe the dynamic pentagon and static pentagon inside the mother circle

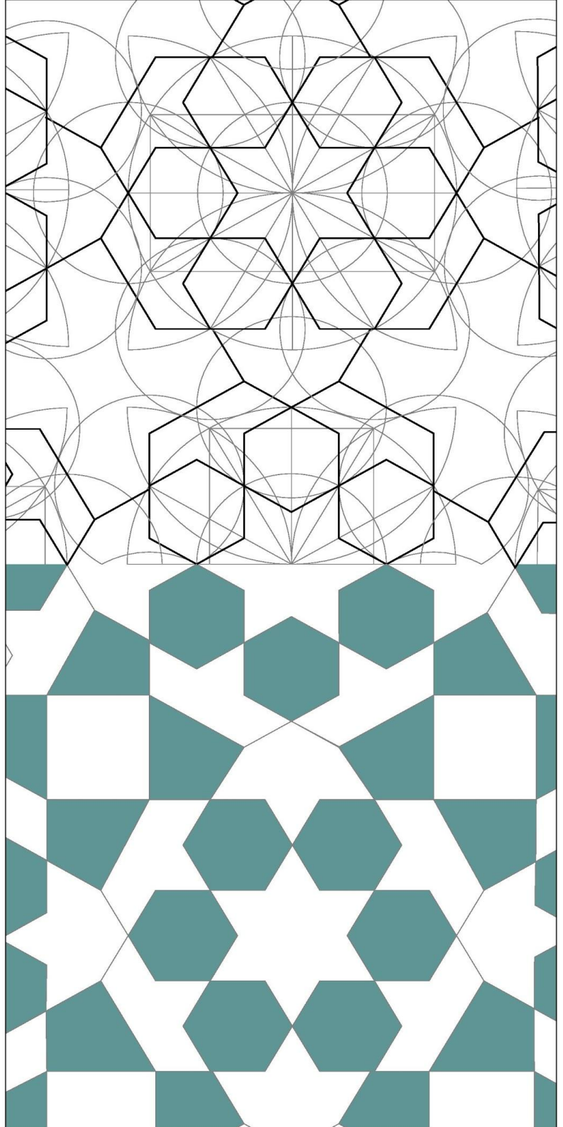
Making lines with every 2 adjacent points of a unicursal star

Draw the parallel lines and extend to the circumference of the mother circle

Finalising the pattern

Repeating the unit pattern is formed





CHAPTER III

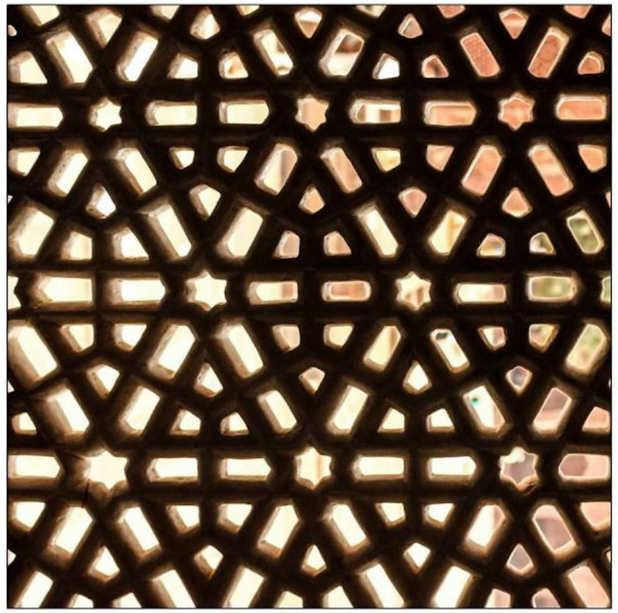
6 FOLD PATTERNS

In the tradition of perennial philosophy, six is regarded as the number of perfection and the symbol of heaven, perhaps because its qualities are so closely tied to the circle. Both of these polygons can be combined with squares and equilateral triangles to make underlying sub grids for producing a variety of Islamic patterns.

The 5-fold pattern starts with a creation diagram; six circles encircling a central circle and dividing the circle into twelve parts and the basic pattern lines evolve. Also, the addition of lines joining the intersections of the surrounding circles with the basic circle creates a regular hexagon.

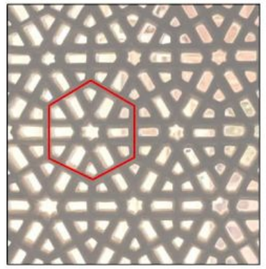
3.1

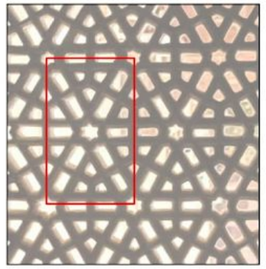
Aakanksha Nikale

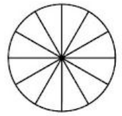


Credits: Manish Malli

This pattern is found in Fatehpur Sikri . It forms one of the Jali patterns of the structure. It is a sixfold geometric pattern.





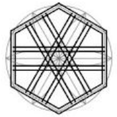


1

2

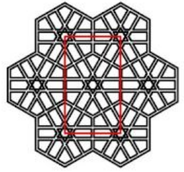
3

4

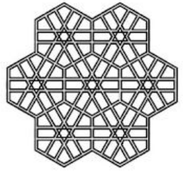


5

6



7



8

Divide circle into 12 equal parts

Inscribe static hexagon in to the mother circles

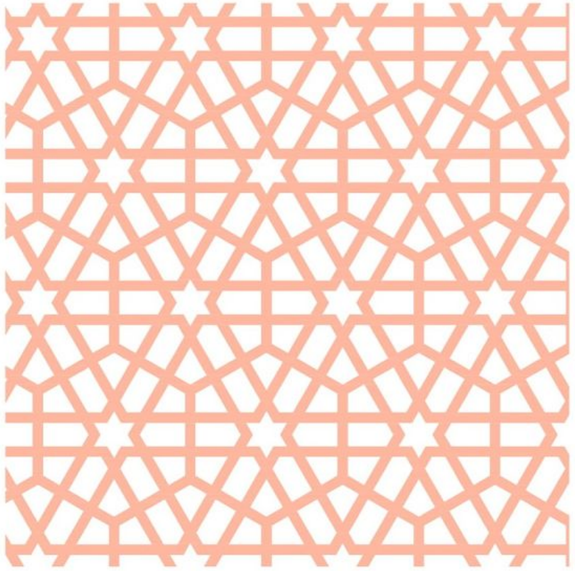
Draw petals to the line passing through the centre of the mother circle and each side of hexagon

Draw tangent to the both side of petals

Draw an offset of 5 mm to each tangent

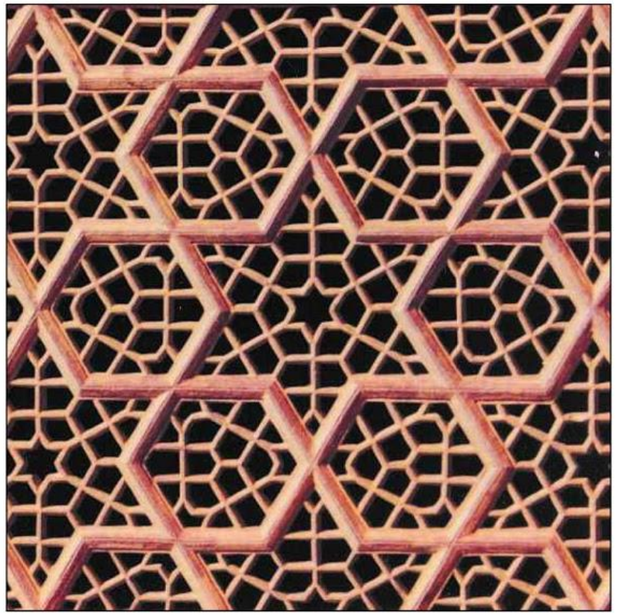
Finalising the pattern

Repeating the unit pattern is formed.



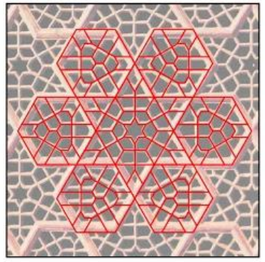
3.2

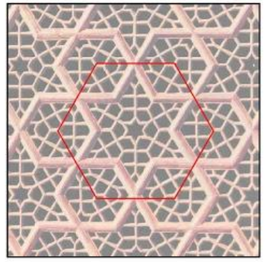
Aryan D'abreo

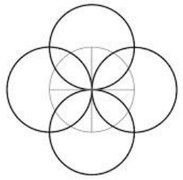


Credits: Yashwant Pitkar

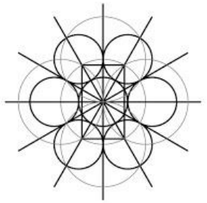
This pattern is found in Humayun's tomb. It forms one of the Jali patterns of the structure. It is a six fold geometric pattern.



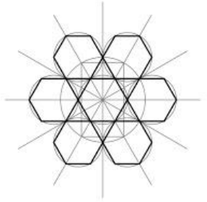




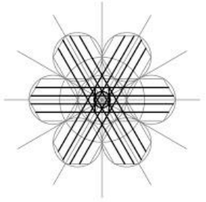
1



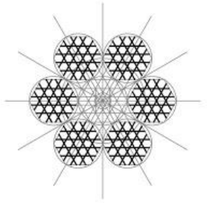
2



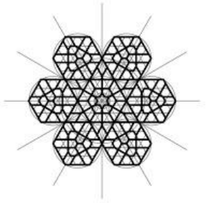
3



4

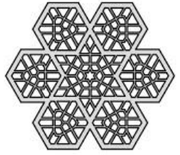


5



6

7



8

Divide the mother circle into 12 equal parts and join the lines passing through the centre

Connect inner points to form rectangle and draw a circle at the centre and 6 more circles encircling it

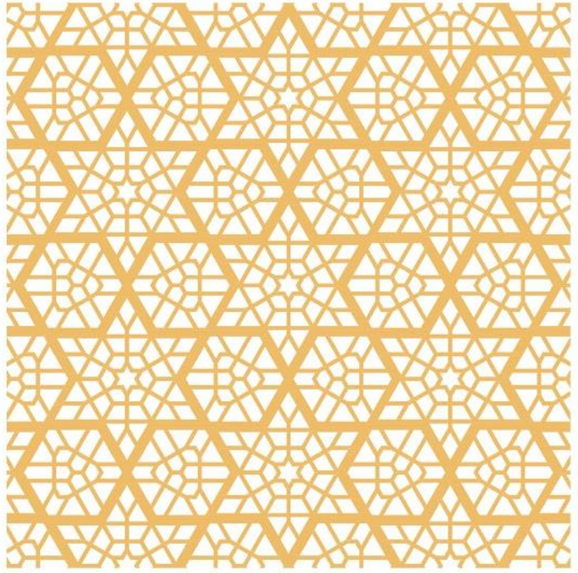
Draw a hexagram in mother circle and extend lines to form hexagon in the outer circles

Construct a hexagon and a hexagram in inner circle and extend the lines into the outer circles

Project the hexagram lines from the surrounding circles

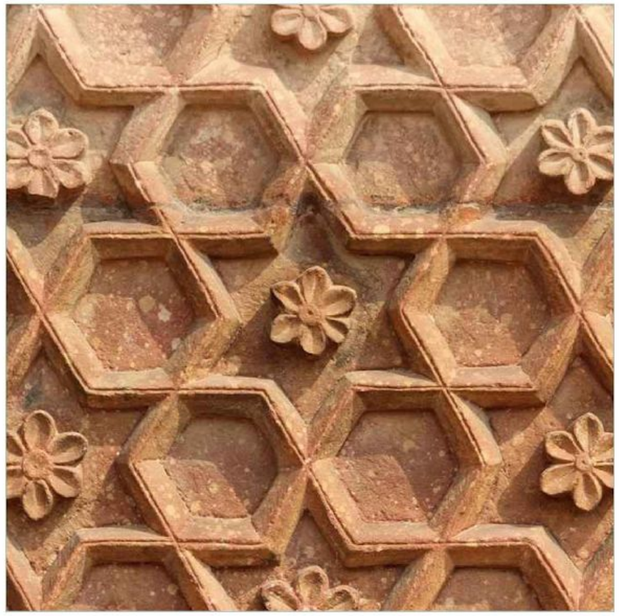
Start darkening the hexagram and hexagons surrounding it, identify the internal intersecting lines

Repeating the unit pattern is formed.



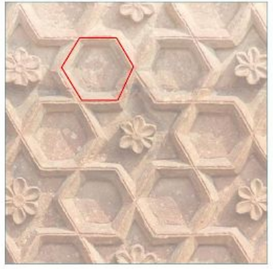
3.3

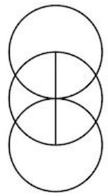
Ameya Thanawala



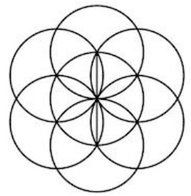
Credits: Manish Malli

This pattern is found in Fatehpur Sikri. It forms a classical engraved pattern of the structure. It is a six fold geometric pattern.

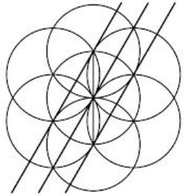




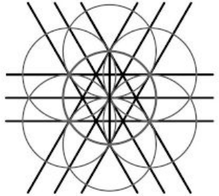
1



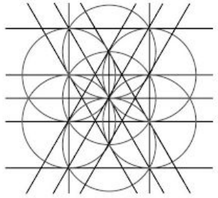
2



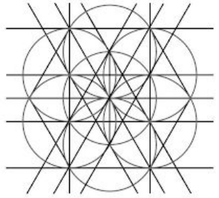
3



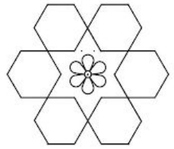
4



5



6



7

8

Divide the circle in six equal parts

From each point draw a circle with the same radius as the centre one

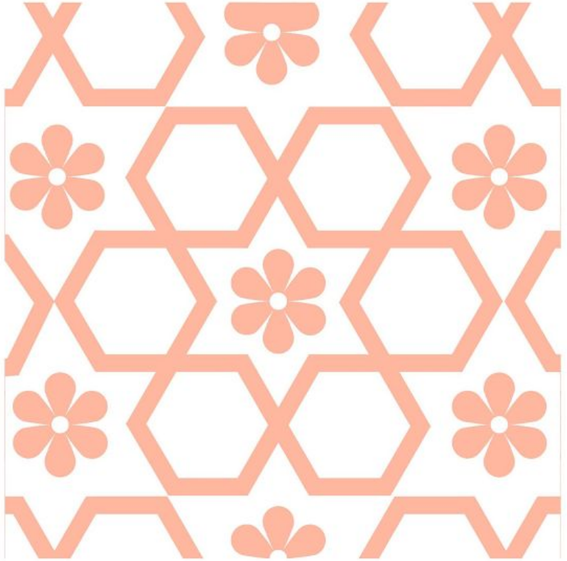
Draw 3 diagonal lines parallel to each other as shown in the figure

Draw the other two sets of parallel lines. (Note: The lines must pass through the point of intersection of either a circle and circle or a circle and a line)

Draw the verticals and the horizontals

Draw the inclined lines to complete the sides of a hexagon

Repeating the unit pattern is formed.

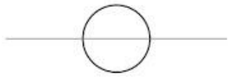


3.4

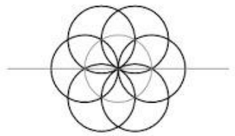
Shakti Jadhav

Credits: Manish Malli

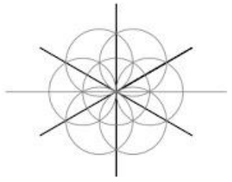
This pattern is found in Itimad-ud-Daulah's tomb. It forms one of the inlay works of the structure. It is a six fold geometric pattern.



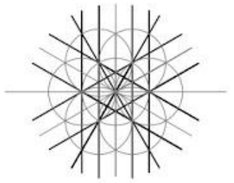
1



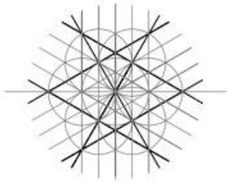
2



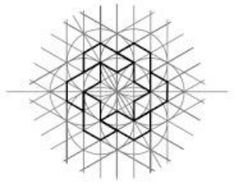
3



4



5



6

7

8

Draw a mother circle

Divide other circles that divide this mother circle in 6 equal parts

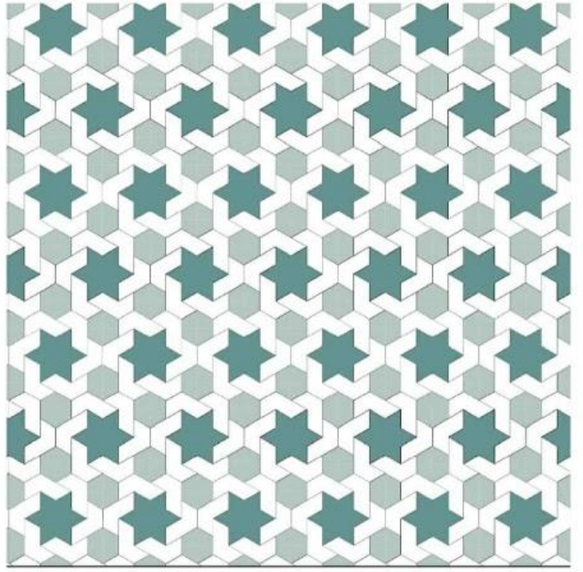
Connect the intersection points of this circles and the centre of the mother circle

Make the grid connecting the tips of opposite vesicas

Connect the tip of vesicas with points at intersection of circles.

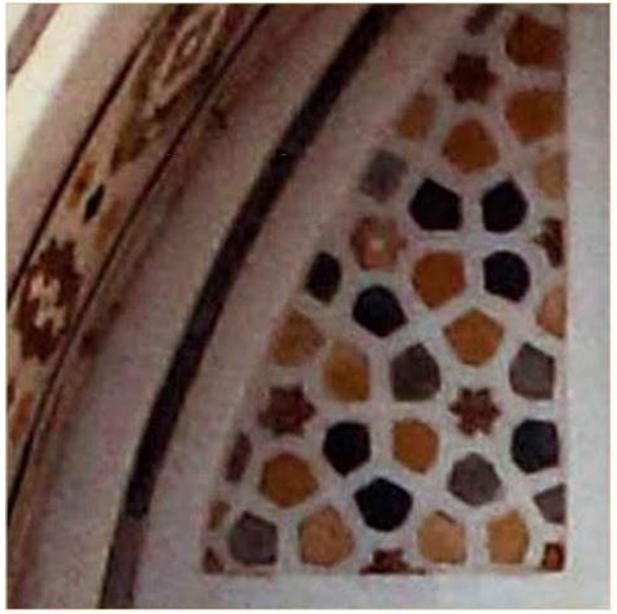
Connect the points of intersection of the larger vesicas formed by the intersection of circles

Repeating the unit pattern is formed



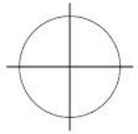
3.5

Karishma Kaur Hooda

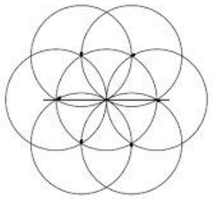


Credits: Manish Malli

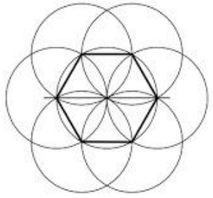
This pattern is found in Itimad-ud-Daulah's tomb. It forms one of the inlay works found in an arch of the structure. It is a six fold geometric pattern.



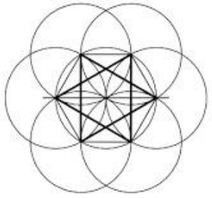
1



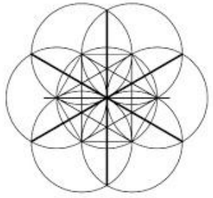
2



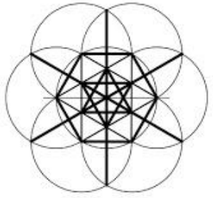
3



4



5



6

7

8

Construct the mother circle

Divide the circumference into six equal parts using the same radius

Join the points to create a hexagon in the interior

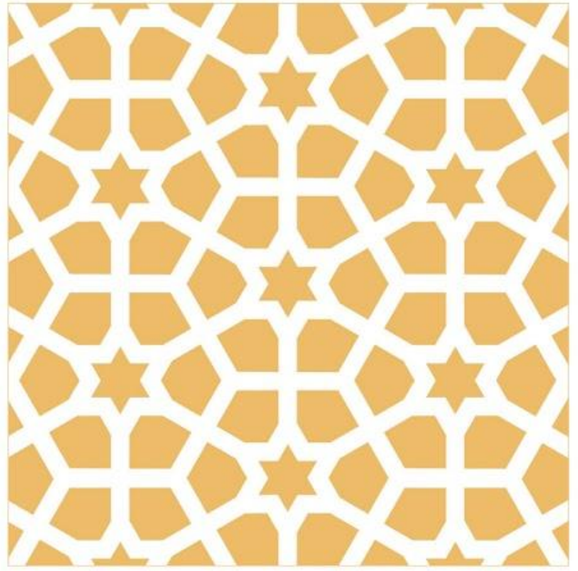
Join alternate vertices of the hexagon formed to create a hexagram. This hexagram closes another hexagon in it

Join the diagonals of the enclosed smaller hexagon

Repeat the step to form another hexagram

Repeating the unit pattern is formed

.

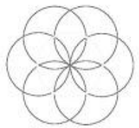


3.6

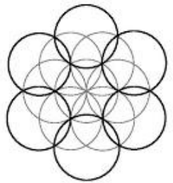
Shivani Baderao

Credits: Manish Malli

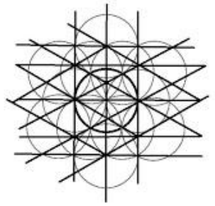
This pattern is found in Fatehpur Sikri. It forms one of the engraved works of the structure. It is a six fold geometric pattern.



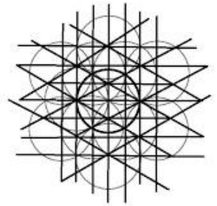
1



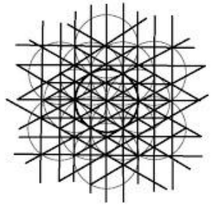
2



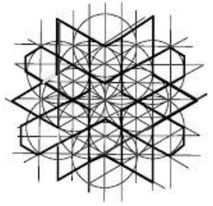
3



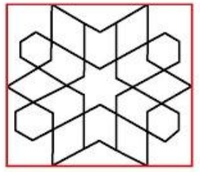
4



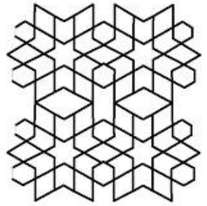
5



6



7



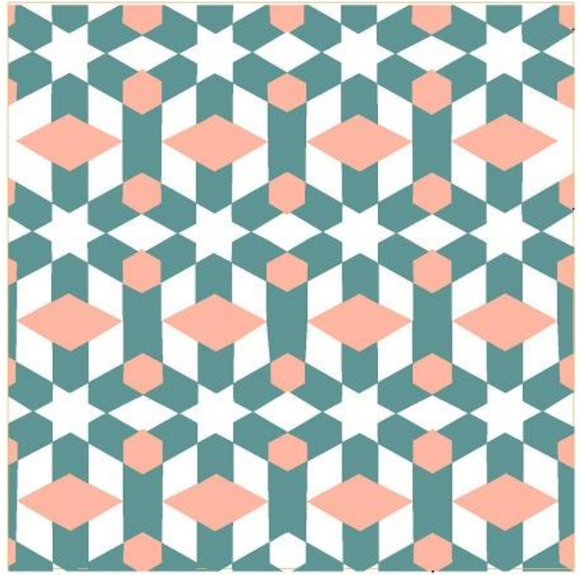
8

Divide the mother circle in 6 parts, keeping the 6 points as centre draw 6 circles and passing their circumference from the centre of mother circle.Name these centres as the 6 directions namely North,South,East,West,North-East,North West,South East,South west for reference

All the lines we need are ready.Trace the star pattern in the mother circle by darkening the lines which connects the west and north east point ;east and North west point,repeat it in the semicircular part below and the vertical lines connecting the north east and south east;north west and southwest points to get a 6 pointed star

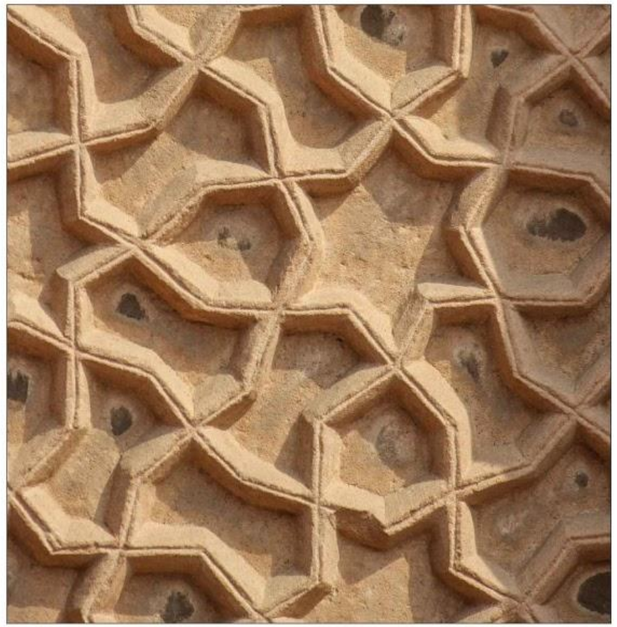
Darken the diamonds and the arrows formed alternately around the star

Repeating the unit pattern is formed



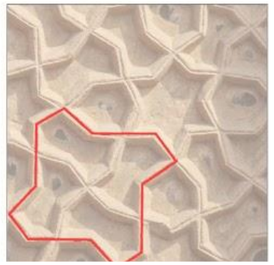
3.7

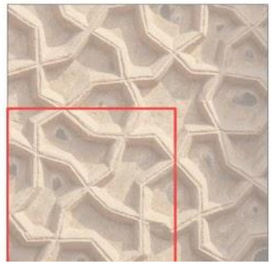
Krishna Khurusane



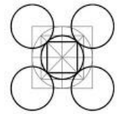
Credits: Manish Malli

This pattern is found in Akbar's Tomb. It forms one of the engraved works of the structure. It is a six fold geometric pattern.

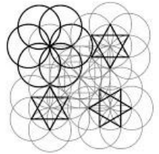




1

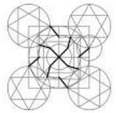


2



3

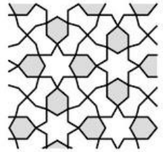
4



5

6

7



8

Divide circle into 8 parts, circumscribed and inscribed one static square each, inside and outside mother circle

Inscribe a circle inside smaller square and keeping same radius draw four circles on the 4 corners of the larger square. Draw the 4 hexagrams. Keep in mind to rotate the axis

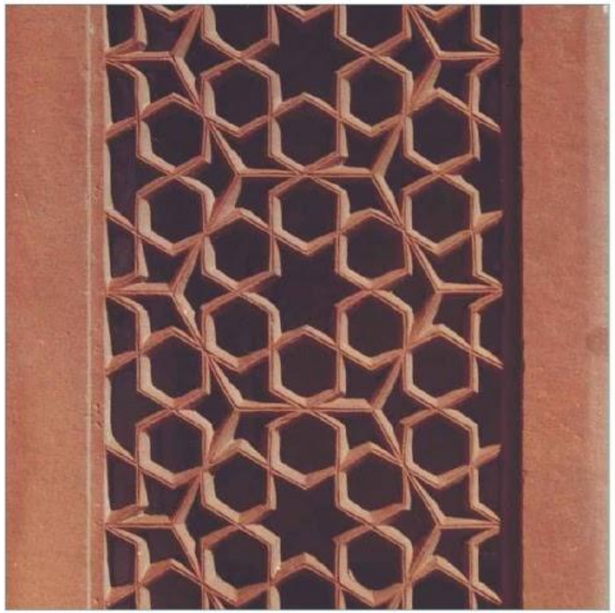
Extend sides of Hexagrams till bisectors of mother circle. Taking side of hexagram as radius, draw a circle from centre of mother circle

Connect edges of hexagram to extended it's sides . Trace over diagonal bisectors of mother circle inside smallest circle. Connect ends of these lines to edges of Hexagram

Finalising the pattern

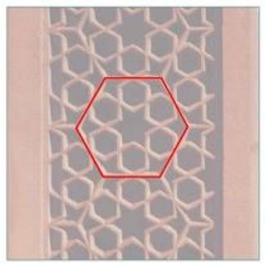
3.8

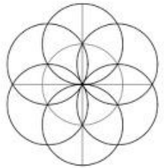
Palak Bhattad



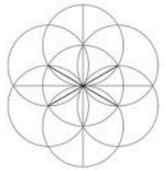
Credits: Yashwant Pitkar

This pattern is found in Humayun's Tomb It forms one of the Jali patterns of the structure. It is a six fold geometric pattern.

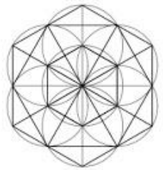




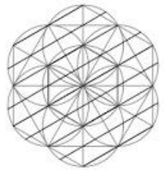
1



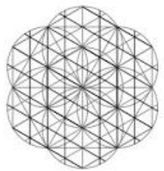
2



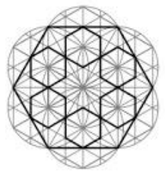
3



4



5



6

7

8

Dividing a circle in 4 equal parts.

Drawing circles to form the rosette. (floral pattern)

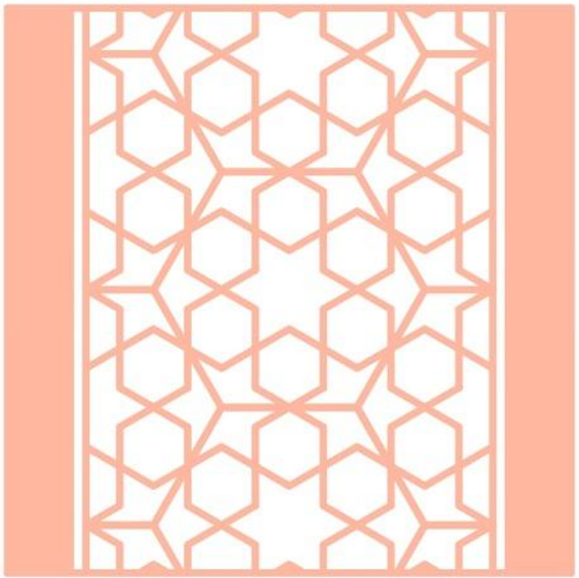
Drawing the static and the dynamic hexagons formed by the intersection of these circles

Drawing the diagonally intersecting lines formed by the circle and the hexagons

Drawing the diagonally intersecting lines from the opposite end. Also vertical lines from the intersection points.

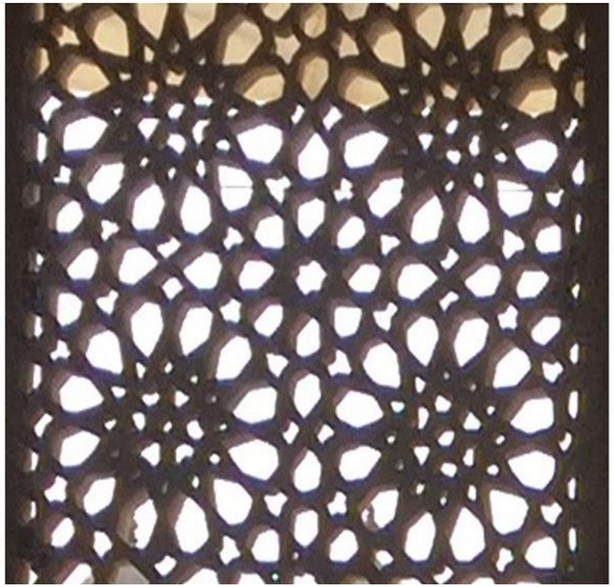
Finalising the pattern

Repeating the unit pattern is formed



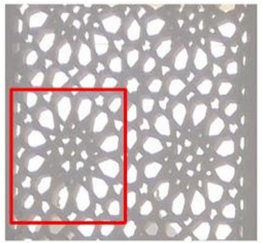
3.9

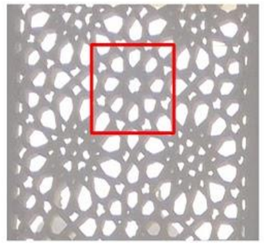
Mohit Harisangam

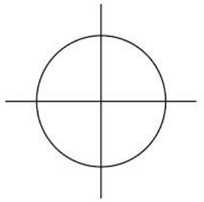


Credits: Richa Raut

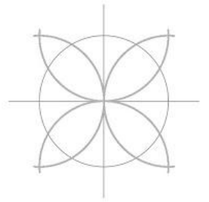
The pattern is found at the tomb of Salim Chisti, Fatehpur Sikri. It forms the jali of the mosque. It is a classic 12 rosette pattern having 12 petals with every four pattern creating a pattern in the center.



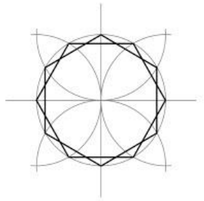




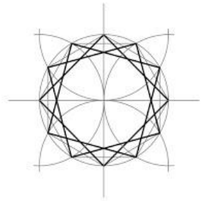
1



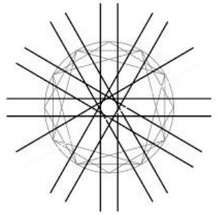
2



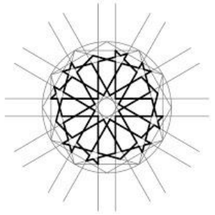
3



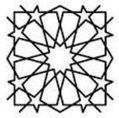
4



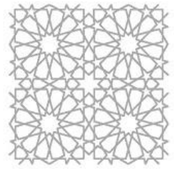
5



6



7



8

Divide Circle in 12 equal parts

Draw a dynamic and static hexagon with these 12 points. Also, draw squares joining the remaining points

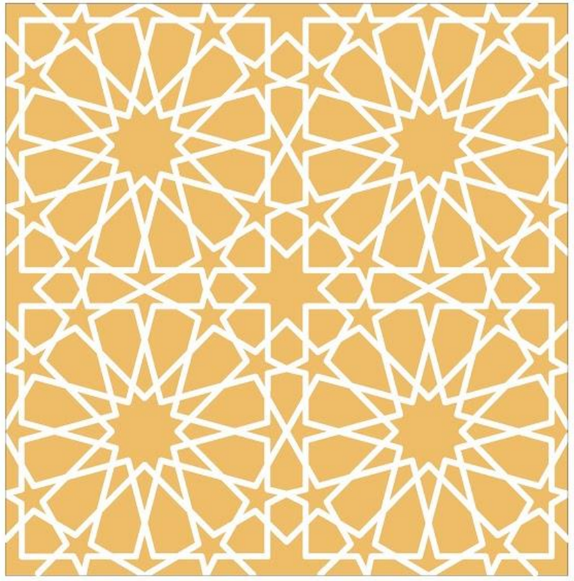
Draw parallel lines where the hexagon and squares intersect

Draw the 12 petals which are formed at the centre

Draw the outer star at every petal to complete the unit

Identify the unit along the edges of each of the stars

Repeating the unit pattern is formed

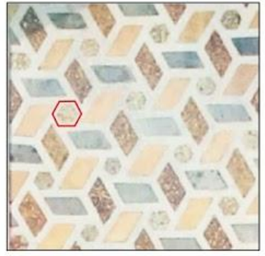


3.10

Poorva Belnekar

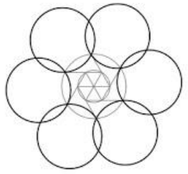
Credits: Manish Malli

This pattern is found in Itimad-ud-daulah's Tomb. It forms a beautiful flooring inlay of the structure. It is a six fold geometric pattern.

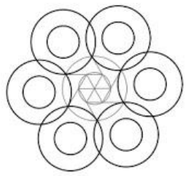


1

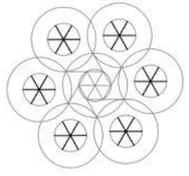
2



3

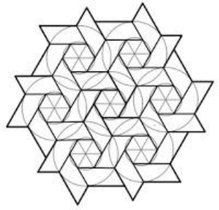


4



5

6



7

8

Divide the mother Circle in 12 equal parts and make a dynamic hexagon

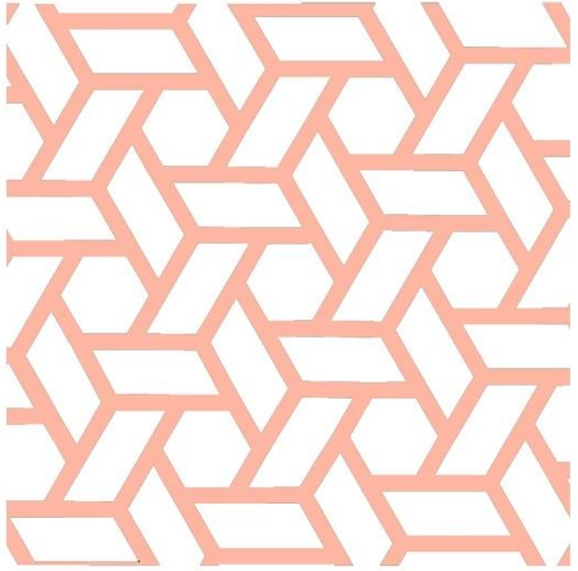
Connect points 2,6,8,12 to form a rectangle and draw 6 circles taking radius equal to the distance between the centre of mother circle to point where rectangle bisects the E-W line

Draw parallels on either side of the construction lines of hexagon

The pattern appears amidst the const lines and darken the hexagons

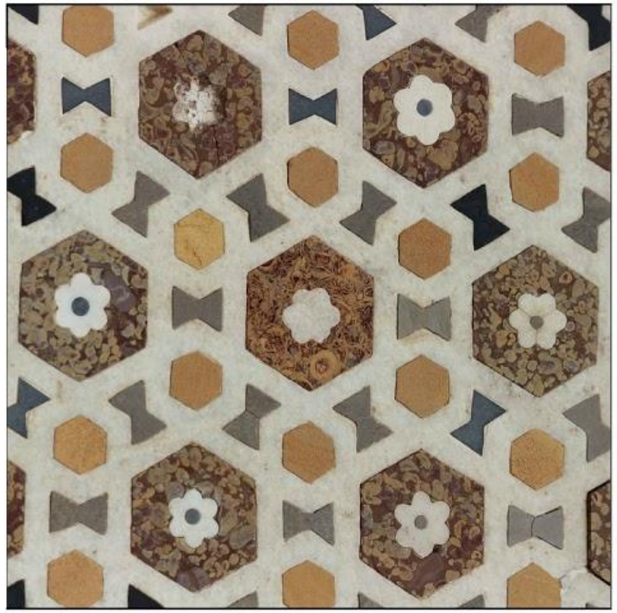
Take suitable offset distance and offset the edges accordingly

Erase the reference offset lines to finalise the pattern



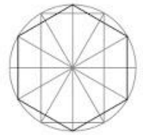
3.11

Shruti Yelane

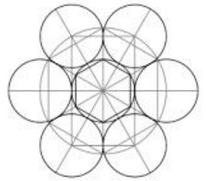


Credits: Manish Malli

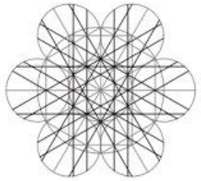
This pattern is found in Itmad-ud-Daulah's Tomb. It forms the intricate flooring inlay work of the structure. It is a six fold geometric pattern.



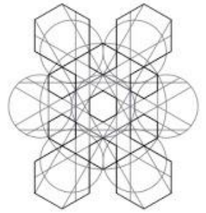
1



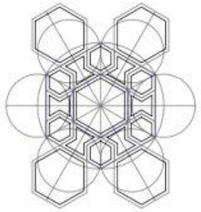
2



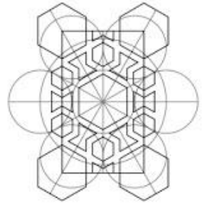
3



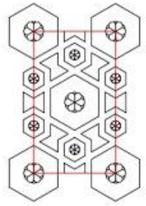
4



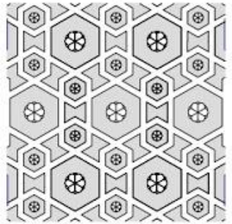
5



6



7



8

Divide the mothers Circle in 12 equal parts and make a dynamic hexagon

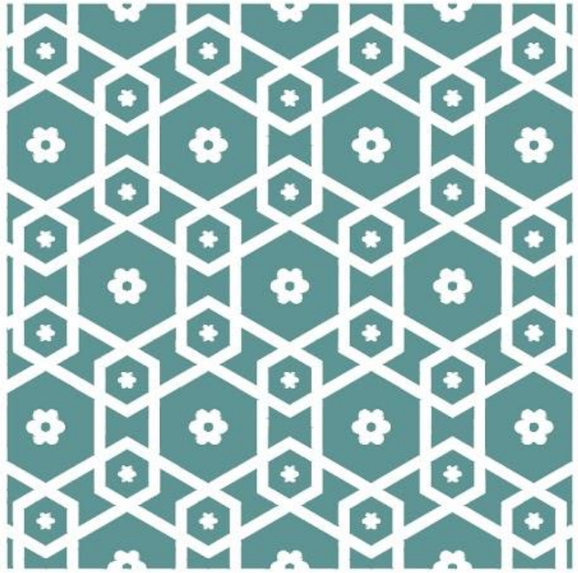
Connect points 2, 6, 8, 12 to form a rectangle and draw 6 circles taking radius equal to the distance between the centre of mother circle to point where rectangle bisects the E-W line

Draw parallels on either side of the construction lines of hexagon

The pattern appears amidst the const lines and darken the hexagons

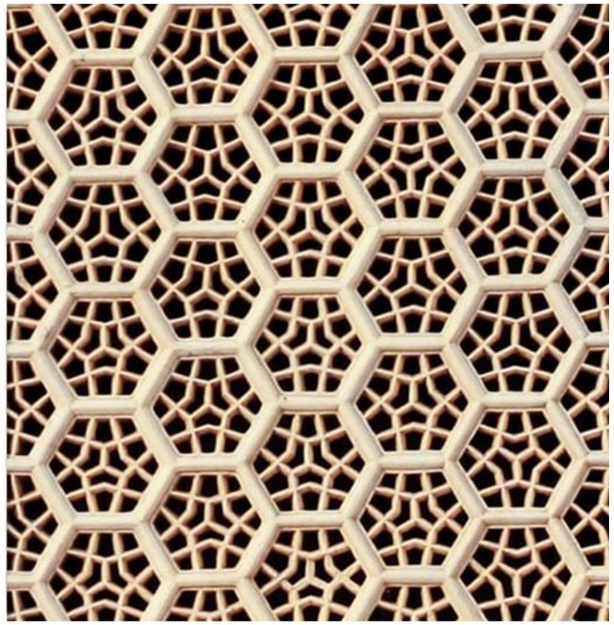
Take suitable offset distance and offset the edges accordingly

Erase the reference offset lines to finalise the pattern



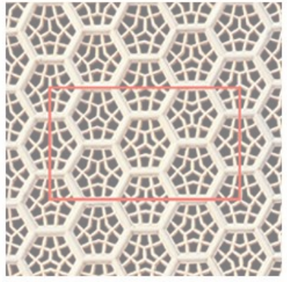
3.12

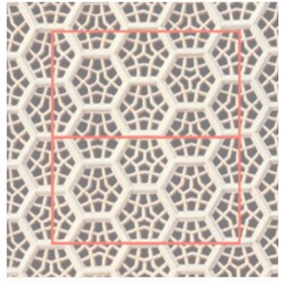
Prajakta Gosavi

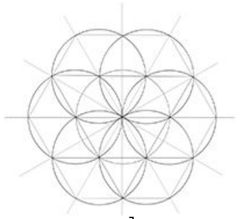


Credits: Manish Malli

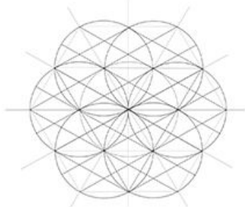
This pattern is found in Fatehpur Sikri It forms one of the Jali patterns of the structure. It is a twelve fold geometric pattern.



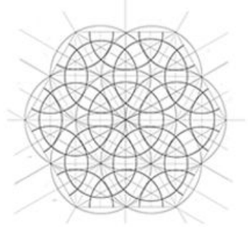




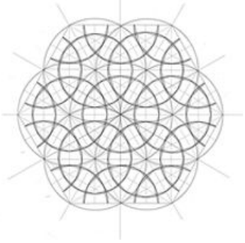
1



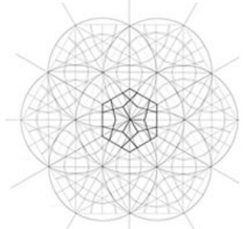
2



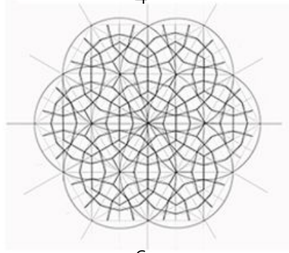
3



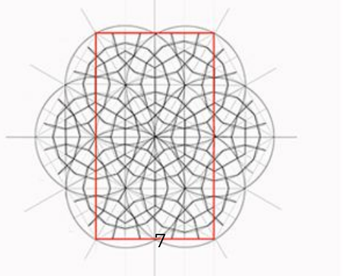
4



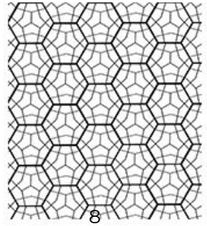
5



6



7



8

Draw a mother circle and divide it into 16 parts

Draw a 4 outer circle of same radius having centre on circumference

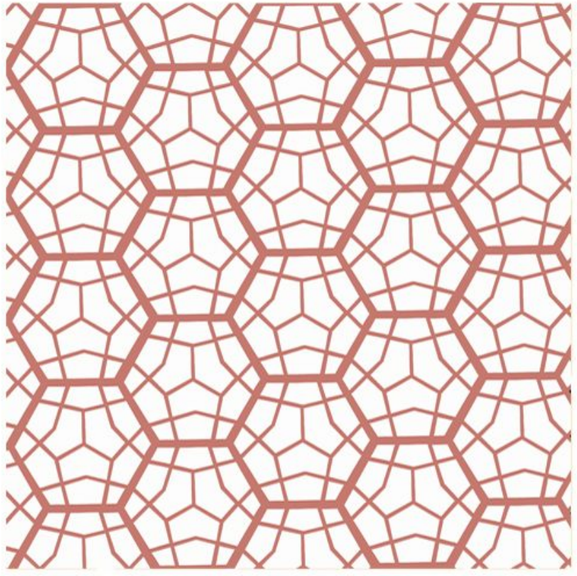
Connect the point to form dynamic squares

Draw the diagonal lines.then you get the inner hexagon

Draw the triangles inside the inner hexagon.and then extend out the line of that triangles

Draw the circles inside the circle by taking proper radius. then you get the 12 lines which are interesting the circles and mark those points and connect them

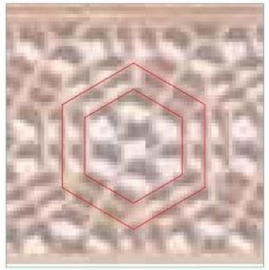
Repeating the unit pattern is formed

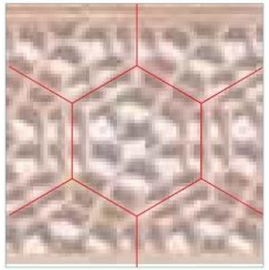


3.13

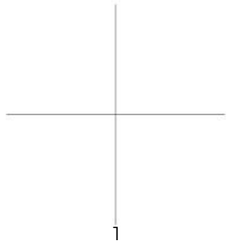
Ruchira Rathod

Credits: Richa Raut

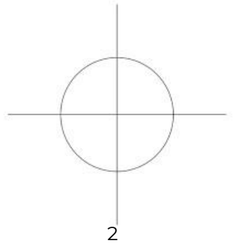




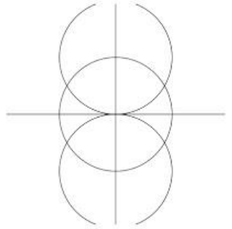
This pattern is found in Humayun's Tomb. It forms one of the Jali Patterns of the structure. It is a six fold geometric pattern.



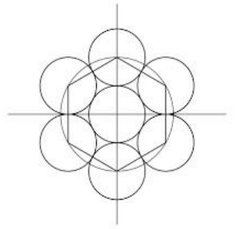
1



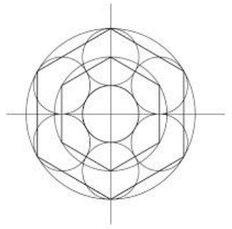
2



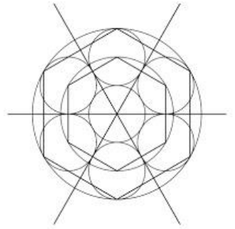
3



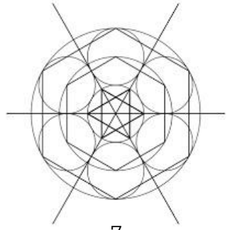
4



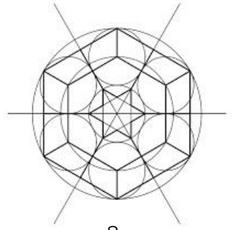
5



6



7



8

Draw horizontal and vertical lines perpendicular to each other bisecting through centre

Draw a circle of desired radius through the intersection

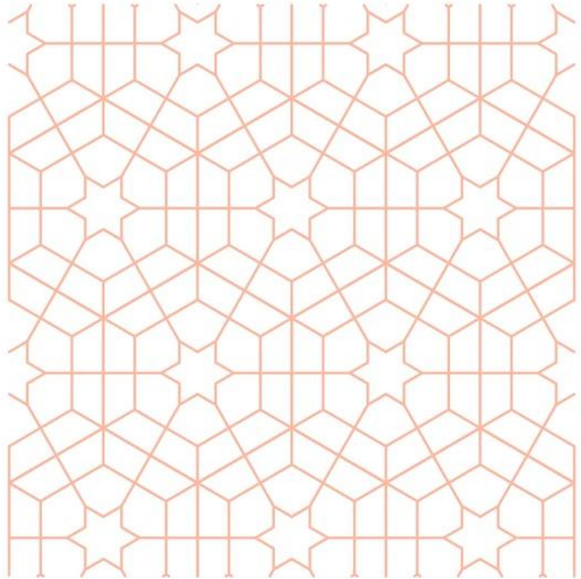
Keeping radius same draw two arcs on top and bottom of the circle on points intersecting with vertical lines

Draw circles with half the radius of mother circle on the Intersections and draw a hexagon

Draw another circle of radius from centre of mother circle to outermost circle and repeat process

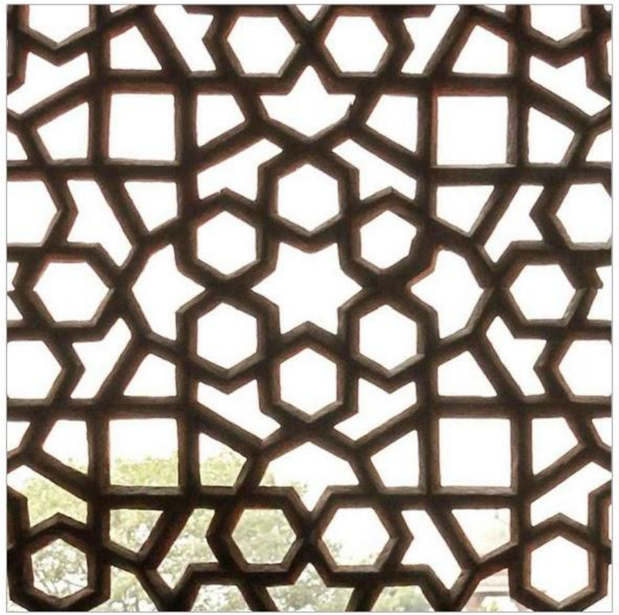
Divide the mother circle into 6 equal parts

Repeating the unit pattern is formed



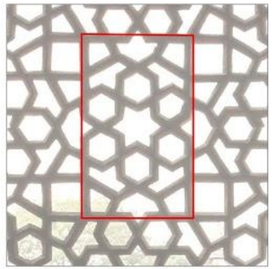
3.14

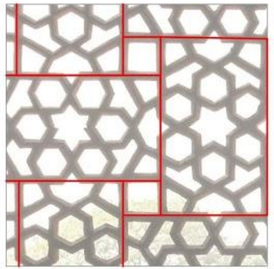
Tarika Deshpande

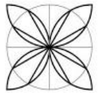


Credits: Manish Malli

This pattern is found in Humayun's Tomb It forms the Jali pattern of the windows of the structure. It is a six fold geometric pattern.

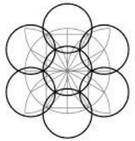




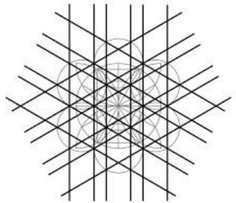


1

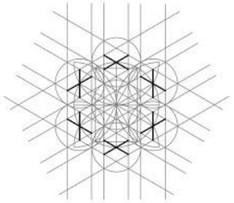
2



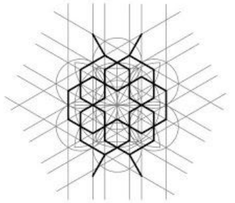
3



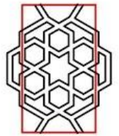
4



5



6



7

8

Divide the mother circle into 12 equal parts

Join pts 2, 6,8,12 to form a rectangle

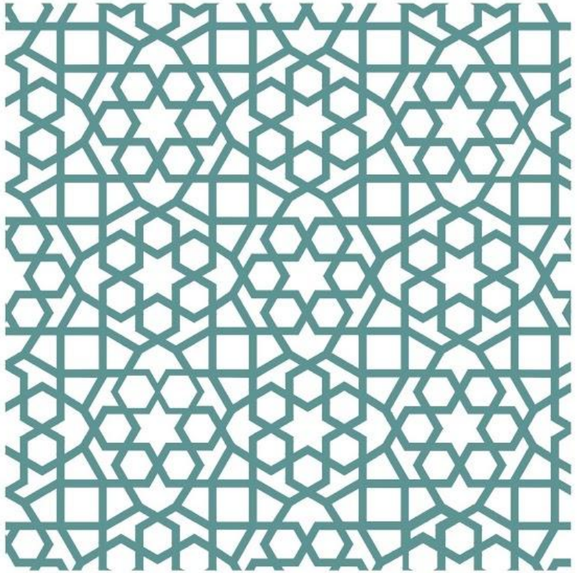
Taking radius equal to the distance between the centre of mother circle to point where rectangle bisects the E-W line draw 7 circles.

Draw tangent to both the sides of the petals formed due to intersection of circles.

Join the intersections inside the outer circles to form 'x' in each outer circle.

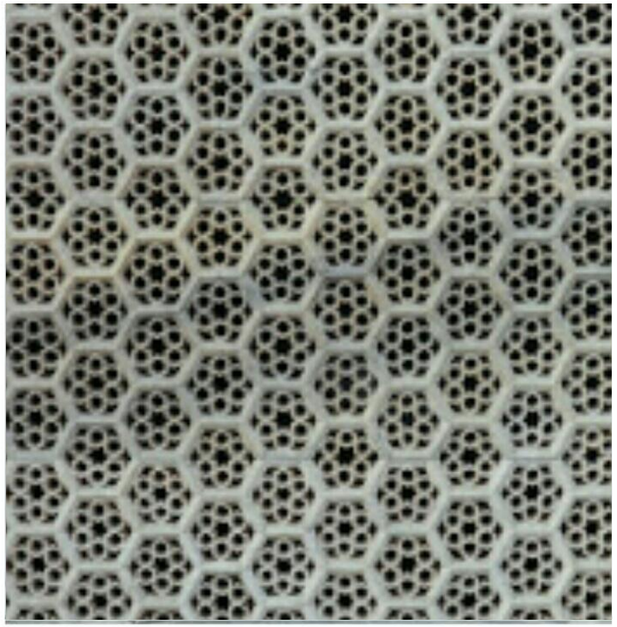
Take suitable offset distance and offset the edges accordingly.

Erase the reference offset lines to finalise the pattern



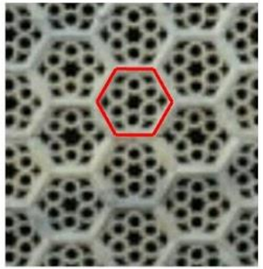
3.15

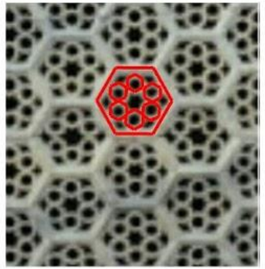
Saloni Pawar

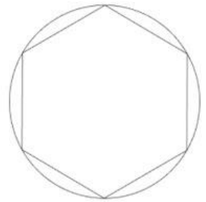


Credits: Manish Malli

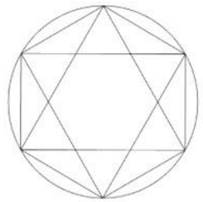
This pattern is found in Fatehpur Sikri. It forms the Jali Pattern at the tomb of Salim Chisti. It is a six fold geometric pattern.



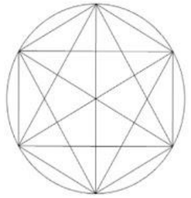




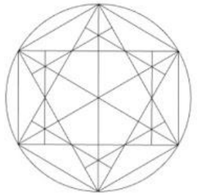
1



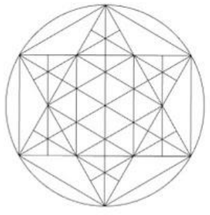
2



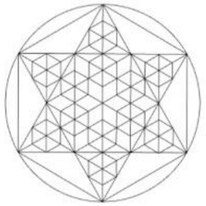
3



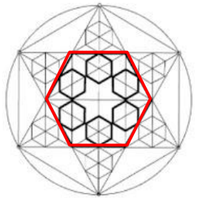
4



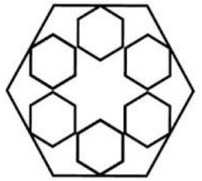
5



6



7



8

Dividing circle into six equal parts

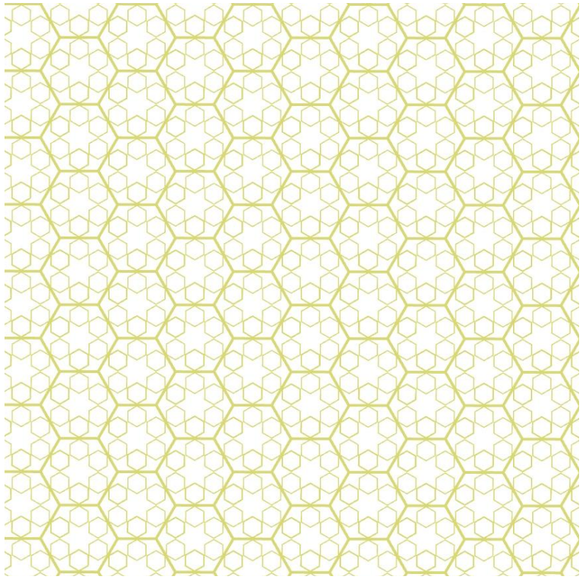
Making static and dynamic triangles

Making static and dynamic triangles in the central hexagon

Drawing hexagon in the triangles

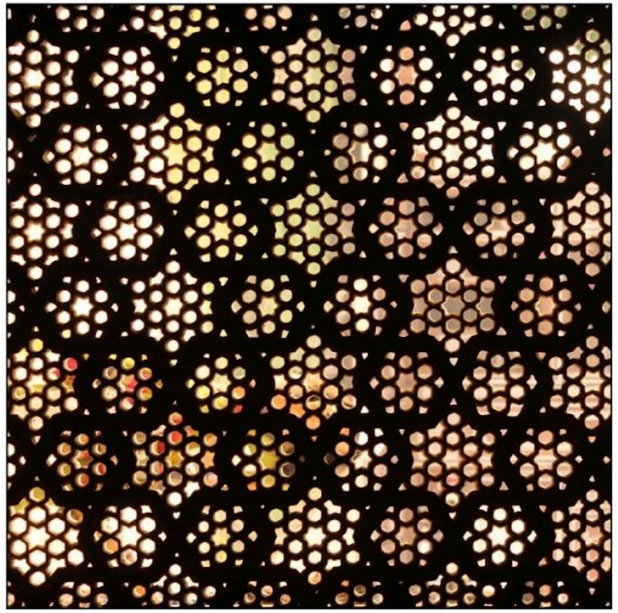
Finalising the pattern

Repeating the unit pattern is formed



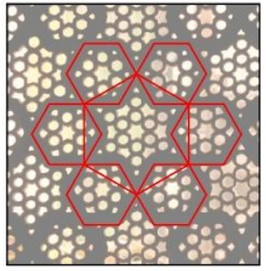
3.16

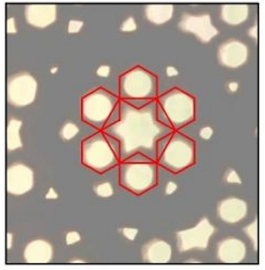
Vedant Baheti

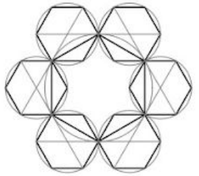


Credits: Manish Malli

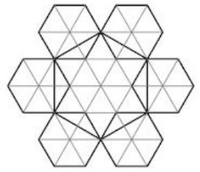
This pattern is found in Fatehpur Sikri.. It forms one of the intricate Jali patterns of the structure. It is a six fold geometric pattern.



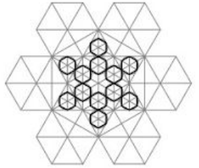




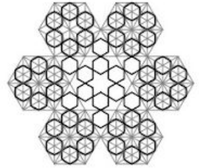
1



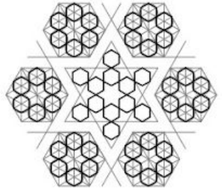
2



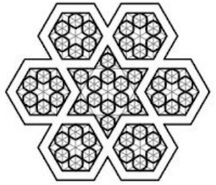
3



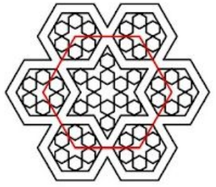
4



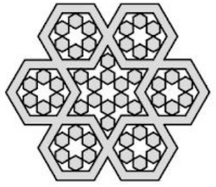
5



6



7



8

Draw 6 small hexagons around Central hexagon such that distance between 2 alternate points is the side of central hexagon.

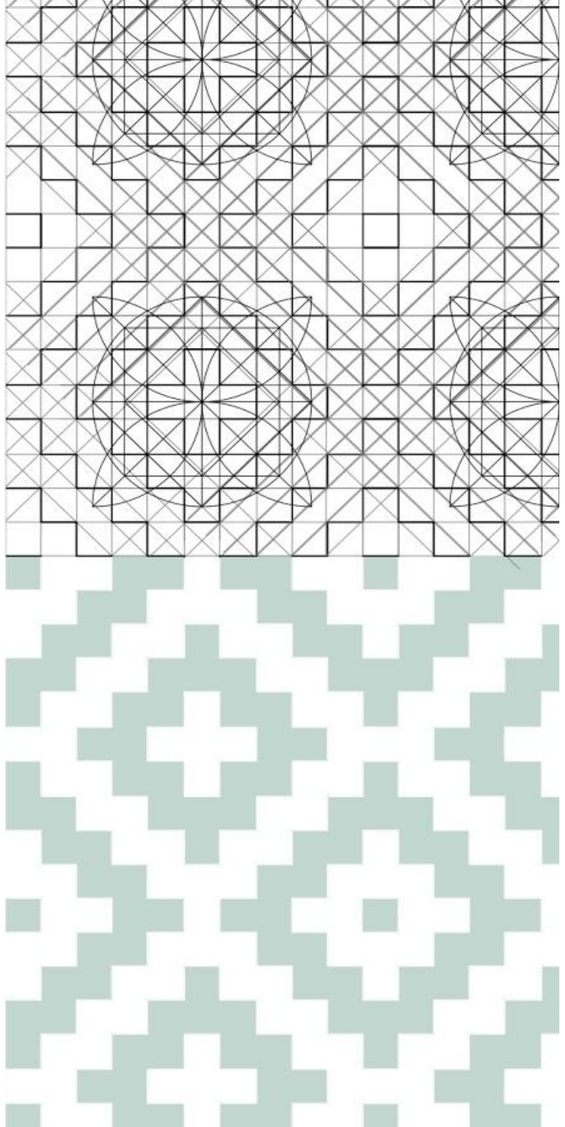
Break down Outer hexagons in equilateral triangles and extend lines through the central hexagon.

Inscribe dynamic hexagons in 12 equilateral triangles of Central hexagon

Inscribe 6 dynamic hexagons in each of 6 outer hexagons

Separate the Outer hexagons from the Central hexagon to form bands using desired width of band

Repeating the unit pattern is formed



CHAPTER IV
ADDENDUM

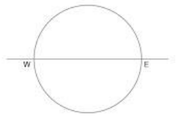
The following section explains the division of the mothercircle in equal parts of 4, 5, 6 etc. The mathematical elegance of these designs is that no matter how elaborate they are, they are always based on grids constructed using only a ruler and a pair of compasses. These patterns provide a visual confirmation of the complexity that can be achieved with such simple tools. The section covers the construction of the following basic geometric shapes:

1. Dividing a circle in 4 and 8 equal parts.
Octagram: 8 angled star-polygon

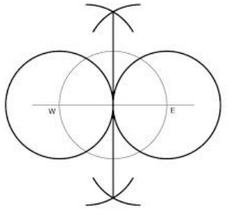
2. Dividing a circle in 5 and 10 equal parts.
Decagram: 10 angled star-polygon

3. Dividing a circle in 6 equal parts.
Hexagram: 6 angled star-polygon

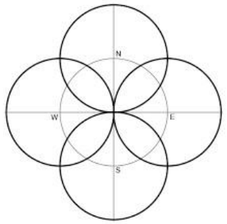
4. Dividing a circle in 6 equal parts.
Dodecagram: 12 angled star-polygon



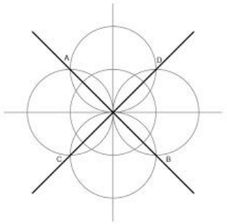
1



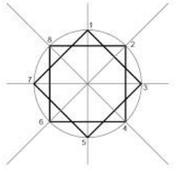
2



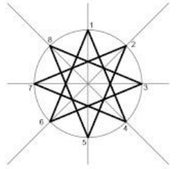
3



4



5



6

7

8

Draw a horizontal line with a circle of specific radius keeping the centre on the line.

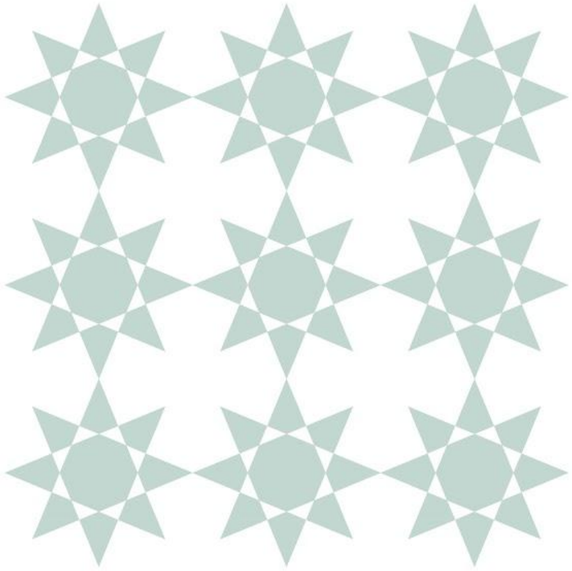
Draw perpendicular bisector of EW

Draw four circles of same radius at points E,W,N,S.

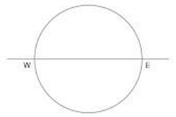
Join AB and CD to obtain 8 points on the circle

Join 2-4-6-8 and 1-3-5-7 to form static and dynamic squares in the circle

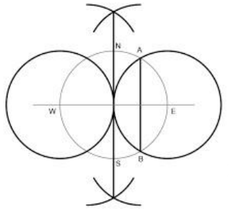
Draw the unicursal star or octagram by joining points: 1-4-7-2-5-8-3-6-1



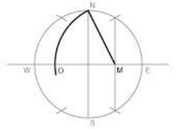
4.1 Octagram



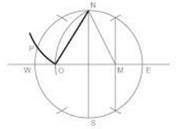
1



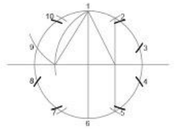
2



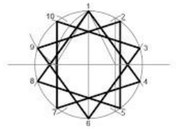
3



4



5



6

7

8

Make the mother circle

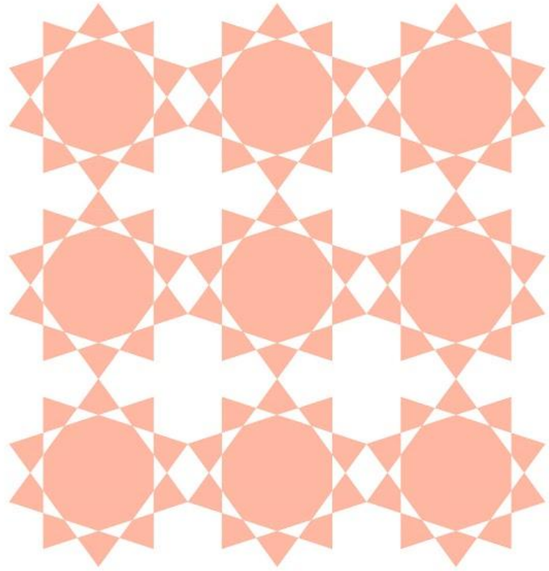
Bisect EW and join points A and B

Take N as centre and radius NM and draw an arc till point O

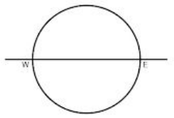
Take N as centre and radius NO and make an arc till point P. NP is one side of the pentagon.

Using the same radius cut arcs to divide the cirlce into 10 equal parts

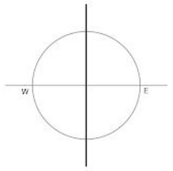
Draw the unicursal star by joining points: 1-4-7-10-3-6-9-2-5-8-1.



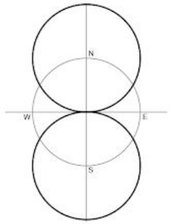
4.2 Decagram



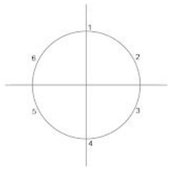
1



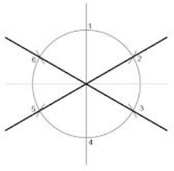
2



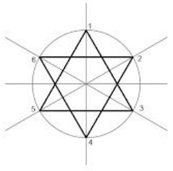
3



4



5



6

7

8

Draw a horizontal line with a circle of specific radius keeping the centre on the line.

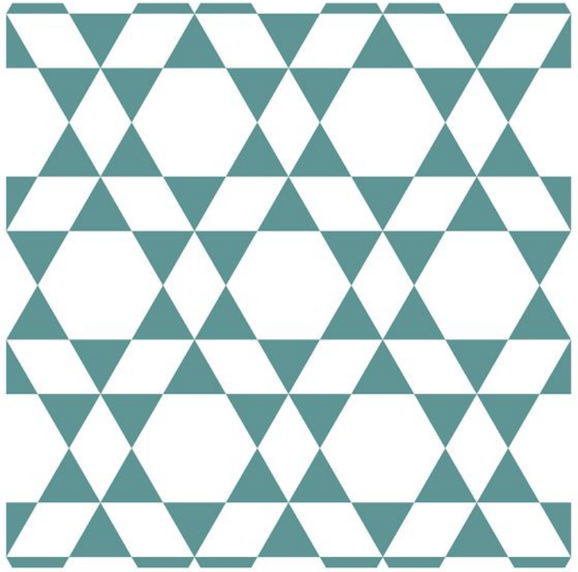
Draw perpendicular bisector of EW

Draw two circles of same radius at points N,S

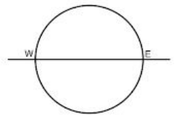
Label the points where circles intersect the mother circle

Join 2-5 and 3-6 to divide circle into 6 equal parts

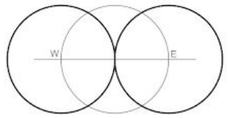
Draw the hexagram by joining points 1-3-5 and 2-4-6



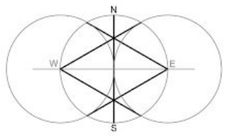
4.3 Hexagram



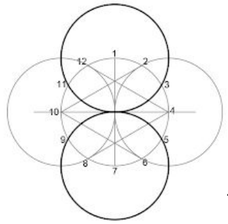
1



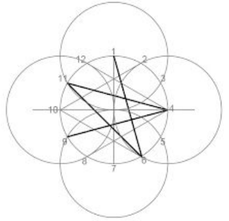
2



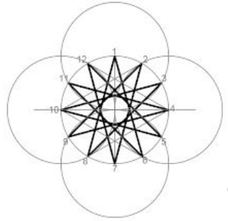
3



4



5



6

7

8

Draw a horizontal line with a circle of specific radius keeping the centre on the line.

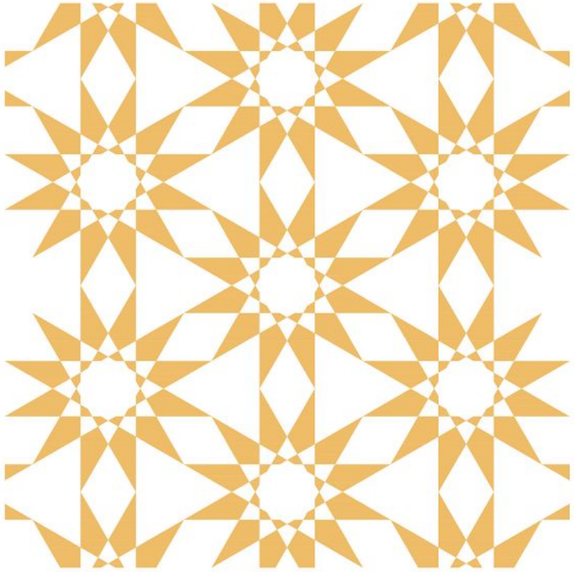
Draw two more circles from the points where the line meets the circle – point east and west.

Join the intersecting points to the points E and W. And draw the perpendicular by joining the 3 points and extend it till the circle as north and south point.

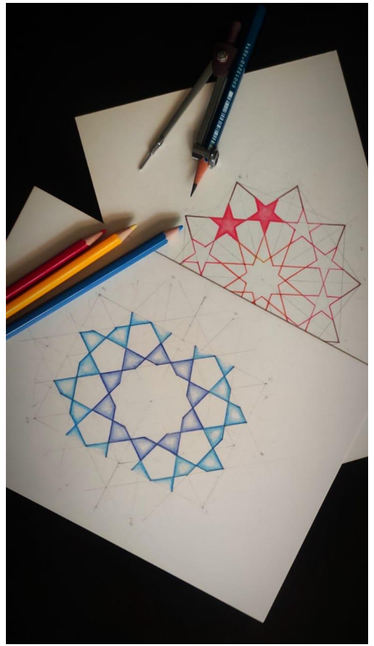
Draw two more circles from the intersecting points – N and S and marks the points from 1-12.

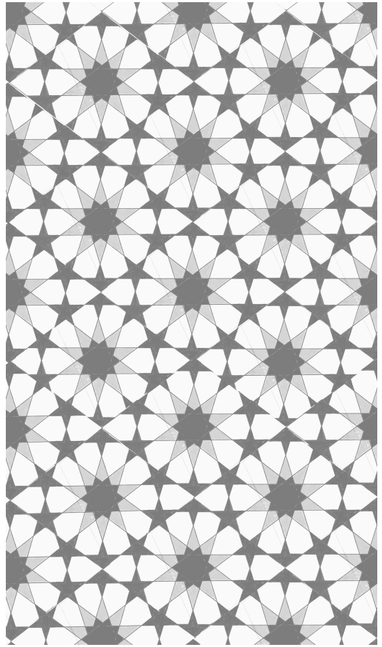
Draw the unicursal star by joining the points 1-6-11-4-9-2-7-12-5-10-3-8-1. (Joining the points after skipping 4 points)

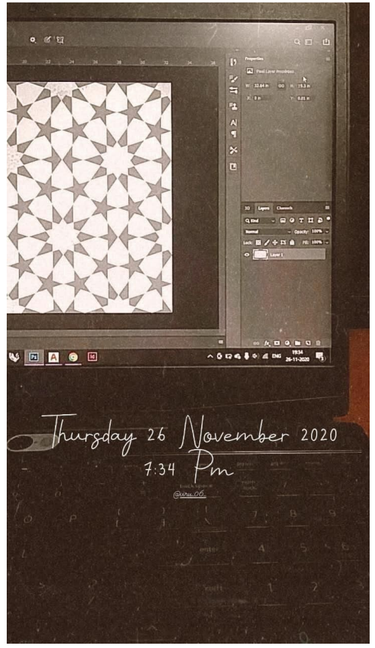
And finally a dodecagram is formed by darkening the pattern lines.

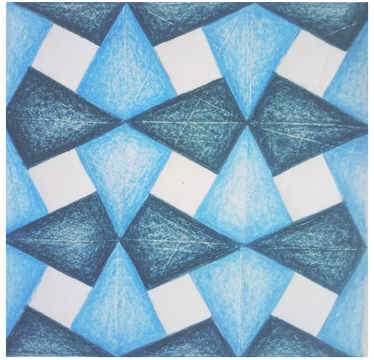


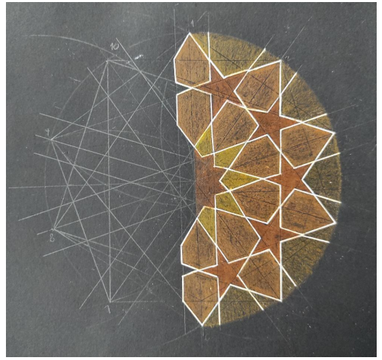
4.4 Dodecagram











EXPERIENCES

The entire project was a lively and engaging conversation with geometrical understanding and decoding various patterns. The entire process was fun to do and very relaxing and soothing and great break filling the weekends with geometry.

We got to explore a new face of geometry with a whole new perspective. We also learned different ratios and scales in which a singular module can be repeated to form the entire pattern which was very amusing.

It was a very interesting and beautiful way of expressing one's love for geometry. It helped me understand the beauty of complex patterns which can be formed with a simple circle. It made me curious about the culture which led to the formation of such beautiful intricate patterns.

The patterns were very interesting to resolve and the process of learning then was also very enjoyable. learning different patterns and how one can distinguish between them and how one can represent it in various colors and ways . overall CP was very amazing and the process of learning too.

With the motive of exploring geometric patterns in Mughal architecture, we looked into the patterns as simple forms derived from circles and squares, these geometric patterns were combined, tessellated, interlaced, and arranged in intricate combinations, thus becoming one of the most distinguishing features of Islamic art.

The first step is always the creation of the corresponding circular guidelines for generating the patterns. These grids of interlocking circles serve as guidelines for preserving the symmetry and can easily be drawn and it is interesting to watch how beautifully the pattern evolves on these grids. This entire project thus was a lively and engaging conversation for all interested in art, history, geometry, and even further, computer-based database management and digital visualization.

The significance of Islamic art is not just covering the surfaces with geometric patterns but the use of this geometry is thought to reflect the language of the universe and help the believer to reflect on life and the greatness of creation. It is always believed that the geometric patterns have a profound meaning, and the Islamic patterns at the mosques depicted the unity of the Universe's creation.

"The era of great bejeweled palaces may be behind us. Thus, we have to re-engineer the original design techniques and invent systems to create designs similar to theirs and revel in their exploration."

- Kaplan

Studio Conductors

Richa Raut

Rohit Karekar

Editorial Team

Palak Bhattad

Aryan D'abreo

Pooja Tambe

Shruti Yelane

Ruchira Rathod

Vaishnavi Gurnalkar

Vedant Baheti

Tarika Deshpande

Krishna Khurusane

Puneet Maru

Harsh Tank

Pranav Chaubal

Studio Team

Tarika Deshpande

Harsh Tank

Viresh Desai

Isha Patil

Saloni Pawar

Shivani Baderao

Krishna Khurusane

Roshani Chabare

Pooja Tambe

Vaishnavi Gurnalkar

Aditya Kanade

Ameya Thanawala

Sakshee Gothankar

Aditi Wadate

Shakti Jadhav

Prajakta Gosavi

Puneet Maru

Palak Bhattad

Sanchita Tandel

Karishma Hooda

Apoorva Patil

Shruti Yelane

Anuja Makode

Aakanksha Nikale

Aryan D'abreo

Cinthia Khobragade

Neha Raut

Vedant Baheti

Poorva Belnekar

Jayraj Mistry

Ruchira Rathore

Pranav Chaubal

Aditya Vaidya

Mohit Harisangam

Muskan Ranwaka

Manasi Thukrul

Amartya Sonaje

Disha Kolhe

Siddhanti Shende

Aditi Naik

GEOMETRIC PATTERNS
IN MUGHAL ARCHITECTURE

COLLEGE PROJECT 2020-21

a|a
MUMBAI

@igp_mughal_architecture