The Math behind The Taj Mahal

BASED ON THE TOPIC ‘PLACES RELATED TO MATHS’
The 'Taj Mahal' 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 of large parts of India. The distraught Mughal Emperor Shah Jahan commissioned the tomb upon the death of his favourite wife Mumtaz Mahal.

Today it is one of the most famous and recognisable buildings in the world and while the tan-coloured enormous building in sight, domed marble tomb is the most familiar part of the monument, the Taj Mahal is an extensive complex of buildings and gardens that extends over 22.44 hectares (55.5 acres) and includes subsidiary tombs, waterworks and infrastructure of the small town of 'Taj Ganji' to the south and a 'moonlight garden' to the north of the river.

The construction began in 1632 AD, (1041 AH), on the south bank of the River Yamuna in Agra, and was substantially complete by 1648 AD (1058 AH). The design was conceived as both an earthly replica of the house of Mumtaz in paradise and an instrument of propaganda for the emperor.
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There are not many ways someone could specifically use the Taj Mahal for math. However the geometry used for making the Taj is used often, and frequently in all geometry classes. In the "real world" architects could use principles of the Taj to create a similar building.

However the myth is that Mughal cut off the hands of the men who built the Taj so that it would never be re-constructed.

The Taj Mahal was constructed using mathematics beyond its time, as mentioned before particularly geometry.

For instance the mathematical calculations for the minarets' weight, angles, and size, take into account the possibility of an earthquake.

Not only were they built to withstand, but in the event of a serious earthquake they were constructed leaning outward, so that the fall would not affect their neighbouring building.

*I think you will find that the mathematicians/architects behind the Taj Mahal knew something the Italians didn't.* ☺
The astounding symmetry of the building is another aspect worth mentioning. The equal distance of windows and doors from one another, the formations of the minarets, the proportions of the domes to the arch ways. When they calculated the area and volume for the building, they only needed to measure half the actual building due to the building’s mirror symmetry. The Taj Mahal is a world renowned monument to symmetry both inside, and out.

If an object is reflected in water many people believe that the image has a line symmetry. But it is really a “mirror image” in the case of Taj Mahal. Shah Jahan has built it with perfection to complete his love for Mumtaz.
Designing the Taj Mahal

The mausoleum and its associated structures were designed around principles of reflection and repetition. The tomb itself is essentially a cube with chamfered corners to give it an octagonal cross section. The four sides are identical, each on featuring a huge vaulted archway. Four minarets frame the tomb.

Reflection symmetries also bound in the decorations, made from precious and semiprecious stones inlaid on white, translucent marble.

But it’s also worth looking sown- at 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).

Reflection symmetries characterize the pattern of paving stones surrounding the Taj Mahal. Even 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.

And amid the symmetrical gardens in front of the Taj Mahal, walkaway stones are laid in a pattern that combines squares and elongated hexagons to create regular octagons.

All in all, The Taj Mahal is surely one of the world’s most impressive and beautiful examples of the use of symmetry in architecture and design.

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