



THE OXFORD SENIOR SECONDARY SCHOOL

I Phase, J P Nagar, Bengaluru-560078

MATHS ART INTEGRATED PROJECT

**TOPIC: Exploring Geometry in Ladakh's
Culture and Architecture**

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PGT - Mathematics

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Subject: Mathematics []

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CERTIFICATE



THE OXFORD SENIOR SECONDARY SCHOOL

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This is to certify that the project entitled '**Exploring Geometry in Ladakh's Culture and Architecture**' is a bonafide work done by Ritwik Chawda of Class XII 'A', Session 2024-25 as prescribed by CBSE 2025 and has been carried out under my supervision and guidance.

Roll Number	: 23
Date of the Examination	:
Signature of the Internal Examiner	:
Signature of the Principal	:

INTRODUCTION

Ladakh, often referred to as the "Land of High Passes," is not only known for its breathtaking landscapes but also for its rich cultural heritage and architectural marvels. The monasteries, stupas, and traditional art forms of Ladakh reflect a deep connection with mathematical principles, especially geometry.

Geometry plays a vital role in shaping the intricate designs and patterns found in Ladakhi architecture and art. From the symmetrical layout of monasteries like *Thiksey* and *Hemis* to the detailed geometric mandalas used in Buddhist practices, every element showcases a harmonious blend of mathematics and aesthetics. These structures are a testament to the precision and creativity of Ladakhi artisans who seamlessly integrated mathematical concepts into their cultural expressions.

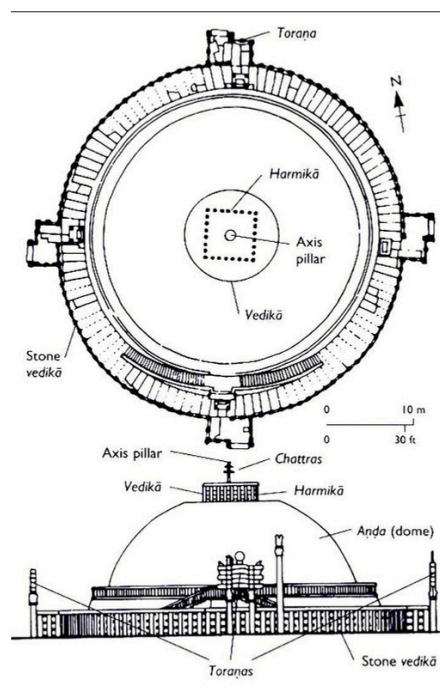
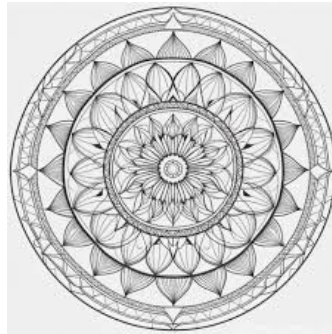
This project delves into the geometric aspects of Ladakh's architecture and cultural art, exploring the use of symmetry, tessellations, and proportionality in their creation. By analyzing these designs, we uncover how mathematics enhances the beauty and functionality of Ladakh's traditional structures, while preserving its cultural identity.

Through this study, we aim to appreciate the role of geometry in Ladakh's heritage and its significance in connecting mathematics with art and culture.

Geometry in Ladakh's Monasteries and Art

Ladakh's monasteries and art are rich with geometric principles like symmetry, tessellations, and proportionality, which reflect both cultural and spiritual significance. Structures like *Thiksey Monastery* are designed symmetrically to symbolize harmony, while stupas (*chortens*) incorporate shapes like circles, squares, and triangles, each with spiritual meaning.

Buddhist mandalas, used in meditation, exhibit radial symmetry with intricate, balanced patterns. The proportional layout of monasteries and the alignment of structures often follow celestial principles, blending geometry with astronomy. This integration of mathematics in Ladakh's art and architecture highlights the region's cultural sophistication and aesthetic brilliance.



Trigonometry and Mountains

Height of Ladakh's Peaks

Let's assume the observer is **5 km away from the base of Stok Kangri**, and the **angle of elevation remains 30°**. Additionally, we'll account for Stok Kangri's known height of **6,153 meters** by comparing the calculated vertical rise to the sea-level height.

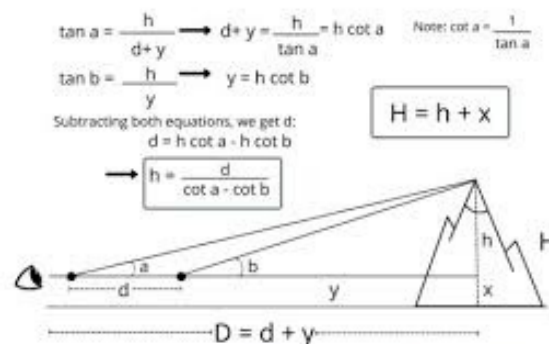
With the observer located 5 km away from the base of Stok Kangri and using an angle of elevation of 30°, the calculated height above the observer's eye level is approximately **2,887 meters**.

However, if the observer is at a significant altitude (e.g., in Ladakh at 3,500 meters above sea level), this height should be **added to the observer's altitude** to approach Stok Kangri's actual height of 6,153 meters.

By factoring in the observer's altitude of **3,500 meters above sea level**, the total estimated height of Stok Kangri becomes approximately **6,387 meters**. This is close to the actual known height of **6,153 meters**, with minor differences due to rounding and assumptions in the calculation.

This method demonstrates how trigonometry helps estimate mountain heights effectively.

This is just an easy method, actual calculations require a lot more realistic data and information.

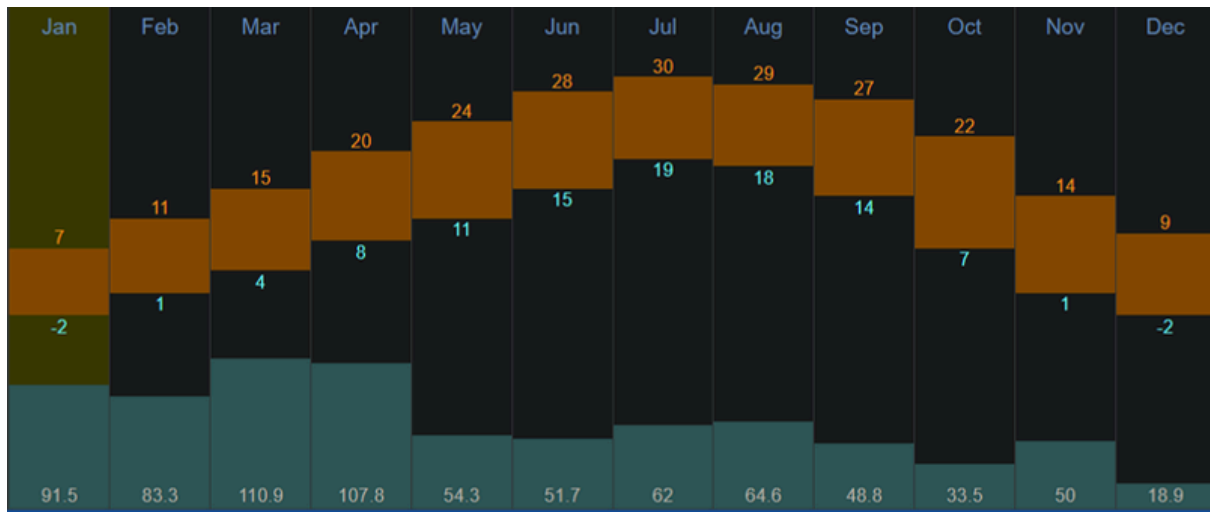


Weather and Tourism Analysis

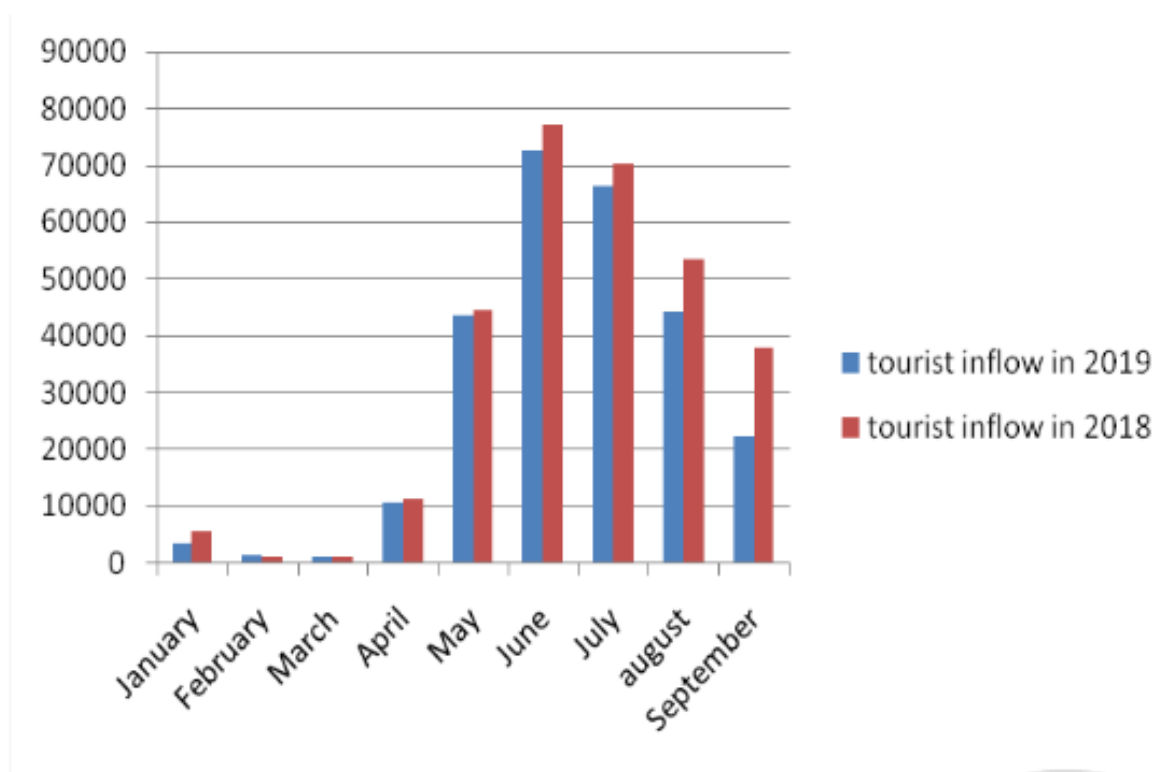
Ladakh's unique climate and tourism trends can be explored through statistical data. The region experiences extreme weather, with average temperatures ranging from -20°C in winter

to 25°C in summer. Collecting data on temperature variations, snowfall, and tourist influx during different months reveals clear patterns.

For instance, peak tourism is observed between May and September, aligning with favorable weather conditions. Representing this data using bar graphs, line charts, or pie charts to showcase seasonal trends and their impact on tourism.



*blue bars show precipitation in mm.



CONCLUSION

This project on *Exploring Geometry in Ladakh's Culture and Architecture* demonstrated how mathematics, especially geometry and trigonometry, is deeply intertwined with Ladakh's cultural and architectural heritage. The region's monasteries and art showcase symmetrical designs, proportional structures, and patterns used in *mandalas* and stupas, blending geometry with spirituality.

Additionally, statistical analysis of Ladakh's weather and tourism data highlighted seasonal trends, demonstrating how mathematics can aid in understanding environmental and economic patterns. This integrated approach reinforces the significance of mathematics in both the cultural and natural landscapes of Ladakh, offering a broader perspective on the region's unique beauty and its relationship with numbers.

BIBLIOGRAPHY

- <https://www.ijser.org>
- <https://www.timeanddate.com>
- <https://www.wikipedia.org>