**" TO STUDY ABOUT THE SINE AND COSINE FUNCTION "**

**A PROJECT WORK SUBMITTED FOR THE PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE GRADE 11 SCIENCE IN MATHS**

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**CERTIFICATE OF APPROVAL**

The project work entitled "TO STUDY ABOUT THE SINE AND COSINE FUNCTION " by Mr.Parshab kunwar under the supervision of Mr. Khem raj pandey of NAST,Nepal, is hereby submitted for the partial fulfillment of requirement of Maths in Grade 11. This project work has not been submitted in any other school or institution previously for the award of Grade 11.

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**DECLARATION**

I, ­­­­­­­­­­­­Parshab hereby declare that the project work entitled,"TO STUDY ABOUT THE SINE AND COSINE FUNCTION" under the supervision of Mr.Khem Raj Pandey Of NAST , Nepal, presented herein is genuine work done originally by me and has not been published or submitted elsewhere for the requirement of any degree program. Any literature, data or works done by others and cited in this project work has been given due acknowledgement and listed in the reference section.

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# INTRODUCTION

The sine function and cosine function are two of the most important functions in mathematics. They are used extensively in physics, engineering, and many other fields. The sine function represents the y-coordinate of a point on the unit circle, while the cosine function represents the x-coordinate. In this project, we will explore the values of these functions for angles that are multiples of π/2 and π.

# METHODOLOGY

To generate the values for the sine and cosine functions, we used a table that lists the angles in radians and degrees, as well as the corresponding values for sin(angle) and cos(angle). We then plotted these values on a graph, with the angle in degrees on the x-axis and the value of the function on the y-axis.

# RESULTS

The sine and cosine functions are periodic functions with a period of 2π, meaning that they repeat every 2π radians or 360 degrees. Additionally, their values can be described using the unit circle, which is a circle with a radius of 1 centered at the origin of the Cartesian coordinate system. Here is a table that shows the values of the sine and cosine functions for different angles that are multiples of π/2 and π:

| **Angle (in radians)** | **Angle (in degrees)** | **sin(angle)** | **cos(angle)** |
| --- | --- | --- | --- |
| 0 | 0 | 0 | 1 |
| π/6 | 30 | 1/2 | √3/2 |
| π/4 | 45 | √2/2 | √2/2 |
| π/3 | 60 | √3/2 | 1/2 |
| π/2 | 90 | 1 | 0 |
| 2π/3 | 120 | √3/2 | -1/2 |
| 3π/4 | 135 | √2/2 | -√2/2 |
| 5π/6 | 150 | 1/2 | -√3/2 |
| π | 180 | 0 | -1 |
| 7π/6 | 210 | -1/2 | -√3/2 |
| 5π/4 | 225 | -√2/2 | -√2/2 |
| 4π/3 | 240 | -√3/2 | -1/2 |
| 3π/2 | 270 | -1 | 0 |
| 5π/3 | 300 | -√3/2 | 1/2 |
| 7π/4 | 315 | -√2/2 | √2/2 |
| 11π/6 | 330 | -1/2 | √3/2 |
| 2π | 360 | 0 | 1 |

The graph also shows that the sine and cosine functions are 90 degrees out of phase, meaning that when the sine function is at a maximum, the cosine function is at a minimum, and vice versa.

# RECOMMENDATION

This project can be extended by exploring the applications of the sine and cosine functions in various fields such as physics, engineering, and signal processing. Additionally, you can investigate the relationships between the sine and cosine functions, such as their sum and difference formulas, which can be useful in solving complex mathematical problems. Finally, you can also explore the values of these functions for angles outside the range of 0 to 2π, such as negative angles or angles greater than 2π, to gain a deeper understanding of their periodic nature.

# CONCLUSION

The results of this project demonstrate the periodic nature of the sine and cosine functions and how their values change for angles that are multiples of π/2 and π. These functions are used extensively in many fields, including physics and engineering, and are essential tools for solving many mathematical problems. By understanding the values of these functions for different angles, we can better understand the world around us and the mathematical relationships that govern it.

# REFERENCES

[1]<https://chat.openai.com/chat>

[2]<https://en.wikipedia.org/wiki/Mathematics>

[3]Books,Youtube,etc.