

GEMS Institute of Higher Education
Department of Mathematics



Geometrical interpretation of scalar product of two vectors

A project work submitted in the partial fulfillment for the degree of High School in Mathematics

Department of Mathematics
National Examination Board
GEMS Institute of Higher Education
Lalitpur, Nepal
2021

Submitted by:
Saimon Ghimire
XI 'D'
2021/19/05

Submitted to:
Ganesh Shiwakoti , Faculty of Mathematics
Dr. Jeevan Kafle , Faculty of Mathematics
Prakash Shrestha , HOD of Mathematics

Declaration

I am a student of GIHE Grade 11 'D'. I am glad to present this project entitled "Geometrical interpretation of scalar product of two vectors" in the partial fulfillment for the degree of High School in Mathematics for the academic year 2021. The following pages show the project in detail. Any literature data or work done by others are cited within the reports and enlisted in reference. I assure you that this work has not been published elsewhere.

Acknowledgment

Due to the currently ongoing condition of our country caused by the uproar of COVID-19, we are unable to hand in a physical project, we are compelled to work with digital sources for this coursework. Even in times like these, we have the opportunity to indulge ourselves in projects like these. For this, I express my sincere gratitude and appreciation to GEMS School of Higher Studies.

I would like to acknowledge our college head Mr. Ganesh Datt Bhatta, Science Coordinator Mr. Govinda Raj Sharma, Department Head of Department of Mathematics Mr. Prakash Shrestha along with the faculties of chemistry Mr. Ganesh Shiwakoti and Dr. Jeevan Kafle.

Finally, am thankful to my parents for their unconditional love and support and my friends for helping me through every step of the project.

Abstract

The following project is solely written regarding scalar (dot) product of vectors. It is the geometrical interpretation of the scalar product. The following also includes the special cases as well as the properties of dot product. Angle between the vectors, length of vector, its scalar projection, etc are also included along with their geometrical representation. References were taken from various websites and text book as cited below. The following pages mainly demonstrate how geometrical interpretation of dot product and its properties are carried out.

Content:

Declaration

Acknowledgment

Abstract

1) Vector and product of vectors

2) Scalar product of vectors

2.1) Geometrical interpretation

2.1.1) Case: Perpendicular vectors

2.1.2) Case: Co-directional vectors

2.1.3) Angle between two vectors

2.1.4) Length of a vector as scalar product

2.1.5) Properties of scalar product

Scalar projection

Associative law

Commutative law

Distributive law

3) Observation

4) Conclusion

5) Bibliography/References