Osmania University

GOVERNMENT DEGREE COLLEGE NARSAPUR, MEDAK.DIST
DEPT.OF MATHEMATICS

JIGNASA 2022-23
"APPLICATIONS OF TRIGONOMETRY''

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"APPLICATIONS OF TRIGONOMETRY''

DECLARATION

We hereby declare that the contents presented in the students study project entitled **"APPLICATIONS OF TRIGONOMETRY''**, is submitted to Government Degree College, Narsapur, Dist.Medak for the partial fulfilment of the requirements for the award of degree of Bachelor of Science under faculty of mathematics is the original research work carried out by us under the guidance of V.Hemanth Kumar Chary, Department of Mathematics, Government Degree College,Narsapur,Medak.

Further we hereby declare and inform that the contents presented in this project have not been submitted by us for the award of any other degree or diploma of this or any other University.

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CERTIFICATE

This is to certify that the dissertation entitled **"APPLICATIONS OF TRIGONOMETRY''**,is submitted to **Government Degree College, Narsapur,Dist.Medak** for the partial fulfilment of the requirements for the award of degree of Bachelor of Science under the guidance of **V.Hemanth Kumar Chary** at **Government Degree College, Narsapur,Medak**, and the contents of the dissertation do not form the basis for the award of any other degree or diploma of the candidate from this or any other University elsewhere.

Date: 15.04.2023

Dr.P.Damodar

PRINCIPAL

CERTIFICATE

This is to certify that the student study project titled **"APPLICATIONS OF TRIGONOMETRY"** a study of **Govt Degree College, Narsapur, is** an original research work carried out by Bachelor of Science students under my supervision to the best of knowledge and believe the contents of the project have not been submitted elsewhere.

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ACKNOWLEDGEMENT

We would like to express our thanks to our Lecturer **V.Hemanth Kumar Chary**, College Principal **Dr. P. Damodar** and **CCE**, Hyderabad for giving us a great opportunity to excel in our learning through this project.

We have achieved a good amount of knowledge through this Student Study Project, this practical experience, guidance and inputs that we got from our Project Lecturer **helped us to understand the subject in more effectively when compared to simply reading from books.**

Apart from this, we would like to express special thanks to our parents and friends who have supported us and helped us out in our Jignasa project.

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ABSTRACT

Trigonometry simply means calculations with triangles. It is a study in mathematics that involves the **lengths, heights and angles** of different triangles. The field emerged during the 2nd century Before the Common Era (BCE), from applications of geometry to astronomical studies. Apart from mathematics, Trigonometry has applications in the field of physics. If a student is able to grasp the various concepts of trigonometry in school, they are likely to score well in exams.

Trigonometry formulas have applications in various fields such as *construction, design, and other branches of engineering*. It is even applied to *crime scene investigations*. In this article, we have come up with detailed information on different real life applications of Trigonometry in various fields of our life.

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2. Introduction

3. Aims and Objectives

4. Research Methodology

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6. Findings

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"APPLICATIONS OF TRIGONOMETRY"

Introduction:

- Trigonometry the branch of mathematics concerned with Specific functions of angles and their applications to calculations.

- There are six functions of angle commonly used in trigonometry.

- Their names *sine,cosine,Tangent,cotangent,secant and cosecant*

- These functions are used in obtaining in unknown angles and distances from known or measured angles in geometric figures.

- Trigonometry developed from a need to compute angles and distance in such fields as astronomy, map making, surveying and large caliber guns (weapons) etc.....

These six trigonometric functions In relation to right angled triangles are displayed in the figure
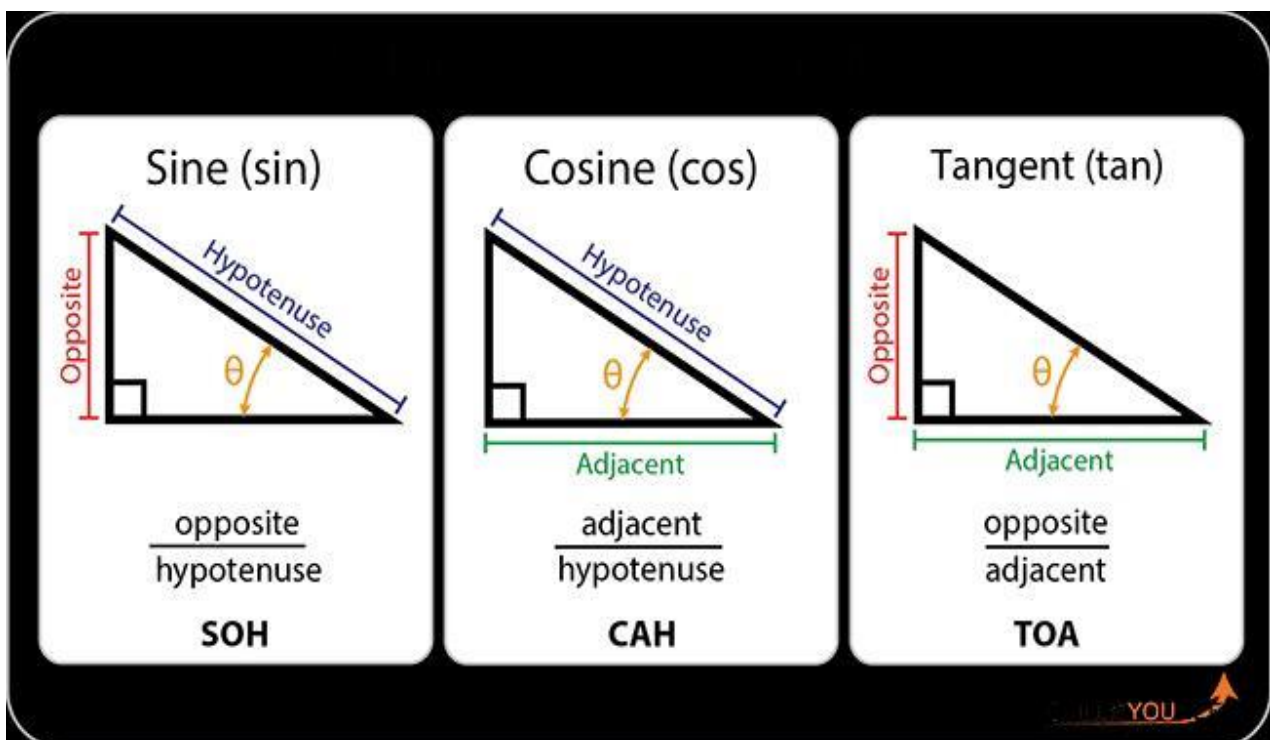
- From the Right angled triangles we are define the trigonometric functions as follows :

$$1. \ \text{Sin} \, \theta = \frac{Opposite}{Hypotense}$$

$$2. \ \text{Cos} \, \theta = \frac{Adjacent}{Hypotense}$$

$$3. \ \text{Tan} \, \theta = \frac{Opposite}{Adjacent}$$

$$4. \ \text{Cot} \, \theta = \frac{Adjacent}{Opposite}$$

$$5. \ \text{Sec} \, \theta = \frac{Hypotense}{Adjacent}$$

$$6. \ \text{Cosec} \, \theta = \frac{Hypotense}{Opposite}$$

Aims and Objectives:

- Identify the trigonometric formulas using in real life applications.
- Trigonometry is used in **measuring the height of a building or a mountain**. The distance of a building from the viewpoint and the elevation angle can easily determine the height of a building using the trigonometric functions.
- To Create and analyse trigonometric formulas using right angled triangle.

REASERCH METHODOLOGY

- We use the technique case study for collection of secondary data to analyse the Applications of Trigonometry.

Applications of Trigonometry

- Trigonometry has been used in a variety of fields throughout history, including architecture, theoretical physics, and surveying.

- It can be used for a variety of things, including: Oceanography, seismology, meteorology, physical sciences, astronomy, acoustics, navigation, electronics, and many other subjects are among them.

- It may also be used to determine the length of lengthy rivers, measure the height of a mountain, and so on.

Real-Life Applications of Trigonometry

- Many real-life examples are used frequently in trigonometry.
  Let's use an example to better understand trigonometry.
- A young boy stands beside a tree. "How tall is the tree?" he wonders as he looks up at it.
- The tree's height can be determined without having to measure it.
- A right-angled triangle, or one with one of the angles equal to 90 degrees, is what we have here.
- If the distance between the tree and the boy, as well as the angle produced when the tree is viewed from the ground, trigonometric formulas can be used to compute the tree's height.
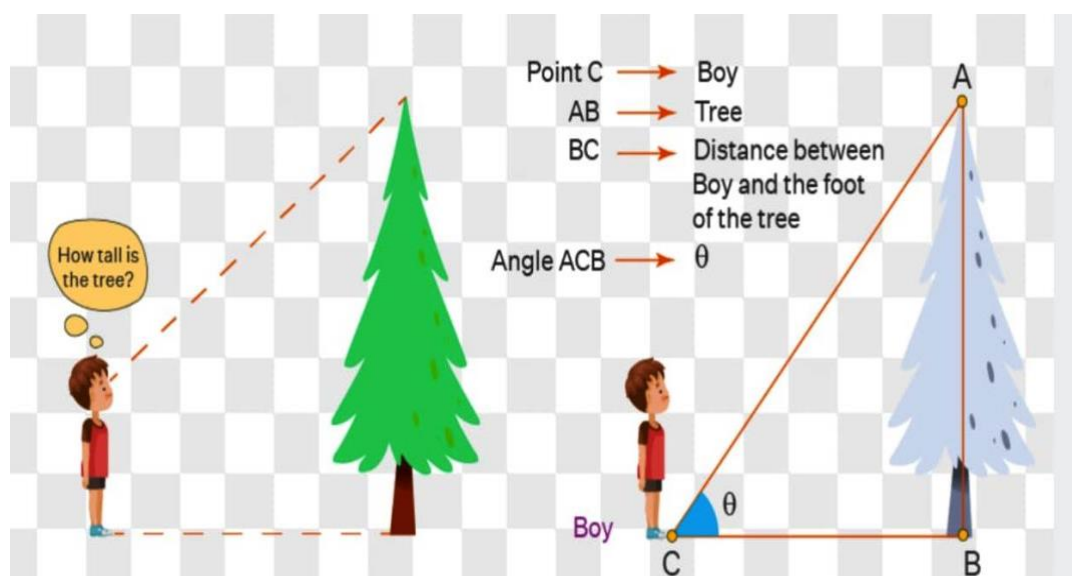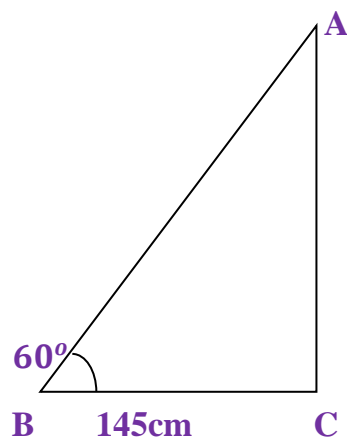
- **We use trigonometry to find Wally ball pole heights as follows:**

   1. Prashanthi obsverved the top of an Volleyball pole at an angle of elevation 60° when the observation point is 145cm away from the foot of the pole, then find height of the pole.

- Here we can draw a right angle triangle ΔABC

- From the figure, in triangle ΔABC ,

      BC = 145cm

      $\angle$ABC = 60°

Let the height of the pole AC = h cm

We know the adjacent side and we need to find the opposite side of Angle ABC in the triangle ΔABC. Hence we need to consider the trigonometric ratio **"tan"** to solve the problem

$$\tan 60^\circ = \frac{AC}{BC}$$

$$\sqrt{3} = \frac{h}{145}$$

$$h = 145\sqrt{3}$$

$$h = 251.14 \text{ cm}$$

Therefore height of the **Volleyball** pole is "251.14 cm"

Similarly, using trigonometry, we can find my individual heights as follows:

From above figure we can draw a triangle ΔABC
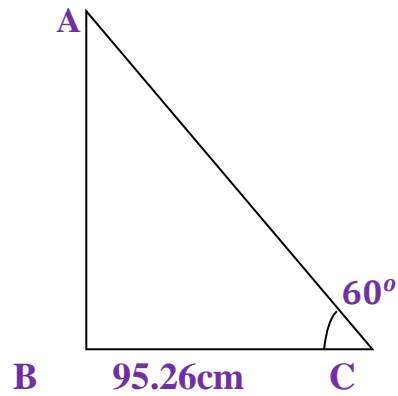
- From the figure, in triangle ΔABC ,

    BC = 95.26cm

    $\angle ACB = 60^o$

    Let the height of the Sandhya AB = h cm

$$\tan 60^o = \frac{AB}{BC}$$

$$\sqrt{3} = \frac{h}{95.26}$$

$$h = 95.26\sqrt{3}$$

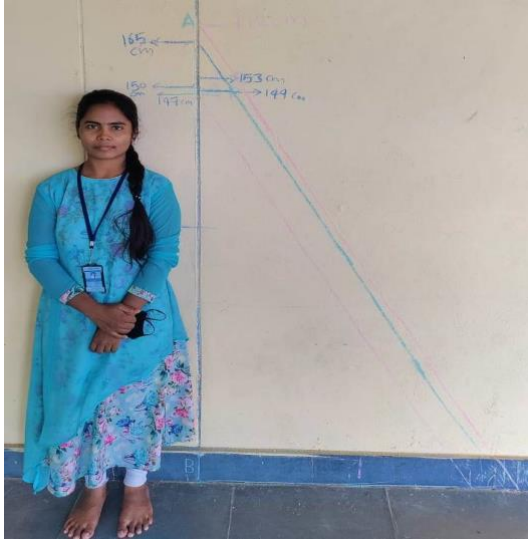$$h = 165cm$$

Therefore height of the Sandhya is " 165 cm"

And also we can find my heights
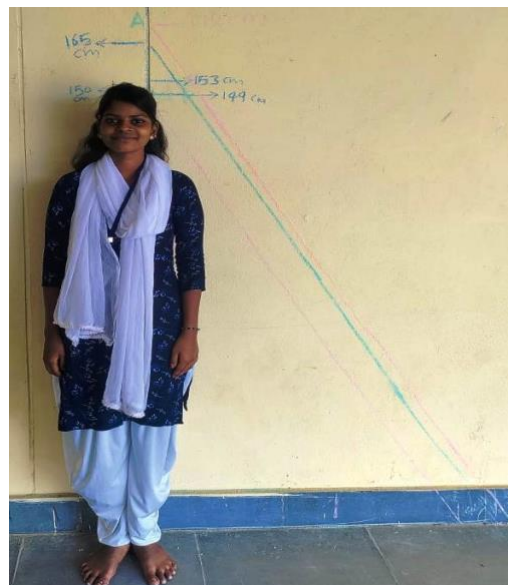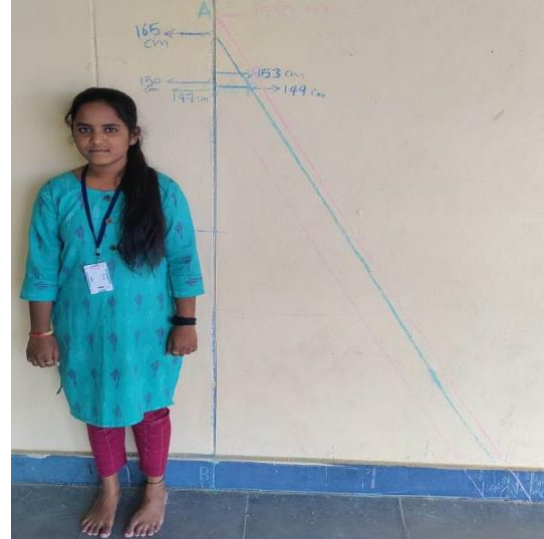
Name of the Students	Heights in Cm
B.RAJITHA	153 cm
Y.NAGALAKSHMI	150 cm
CH.PRASHANTHI	149 cm
K.SINDHU	147 cm

And also we find my college building height

From the above we can draw a figure right angle triangle ΔABC

A

h mt

60°

B ———— **3mt** ———— **C**
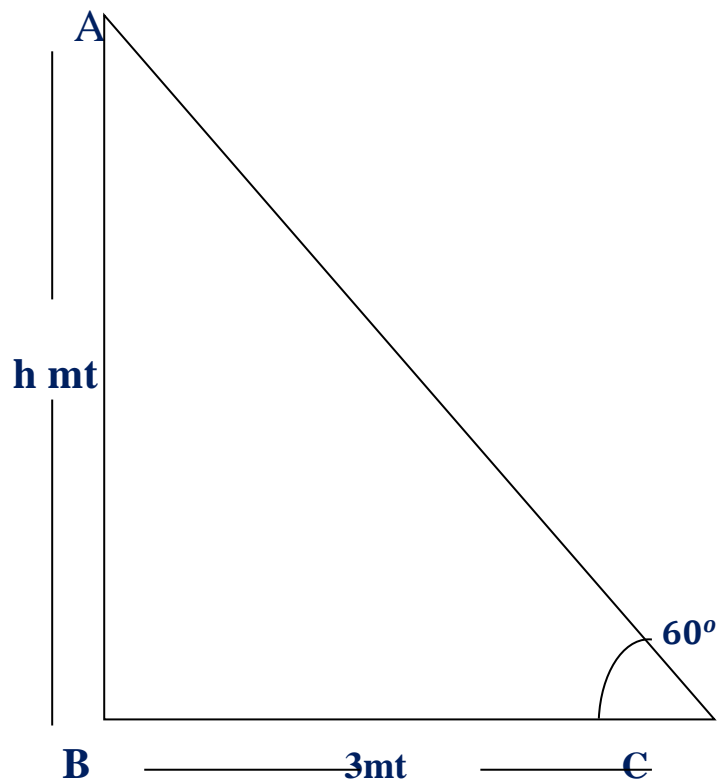
- From the figure, in triangle ΔABC ,

  BC = 3mt

  $\angle$ACB = 60°

  Let the height of the College Building, AB = h mt

  $$\tan 60° = \frac{AB}{BC}$$

  $$\sqrt{3} = \frac{h}{3\,mt}$$

  $$h = 3\,\sqrt{3}$$

  $$h = 5.19\,mt$$
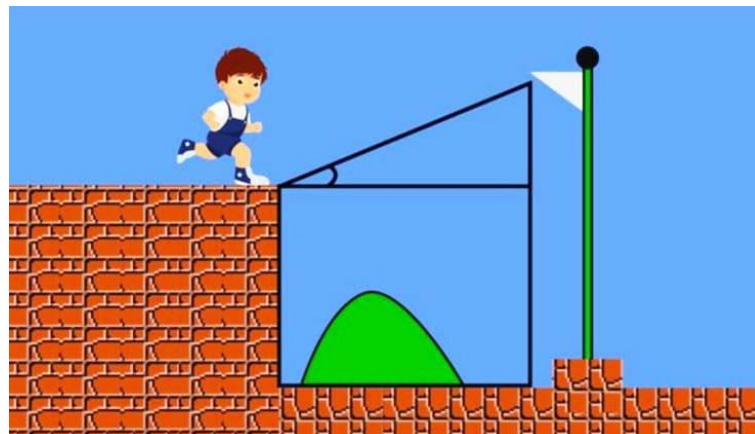
Therefore height of the College Building is " 5.19 mts"
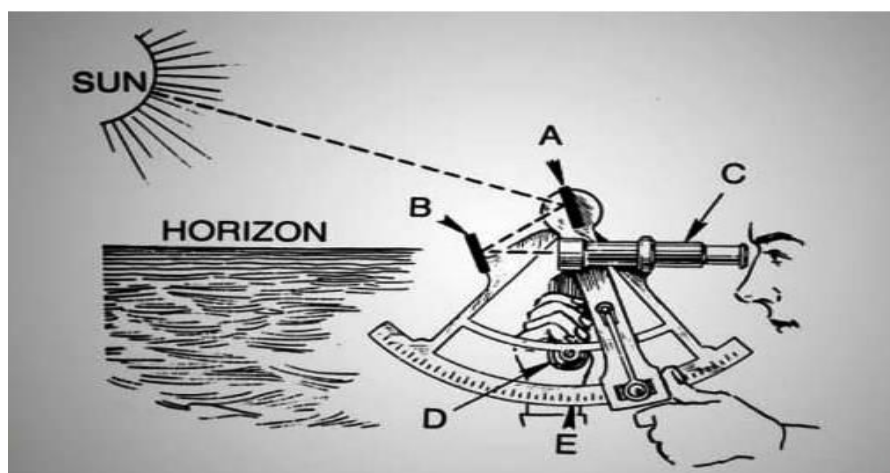
Other Applications include:

- Trigonometry is used in construction

- Trigonometry can be used to measure the height of a building or mountains.
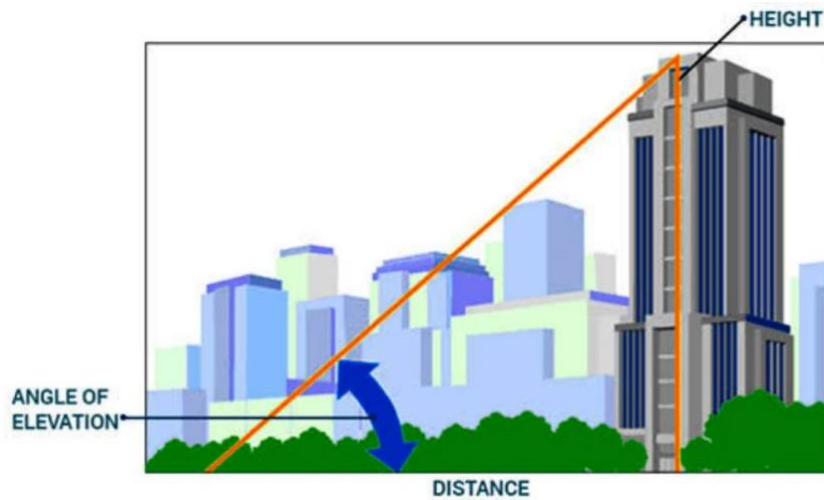
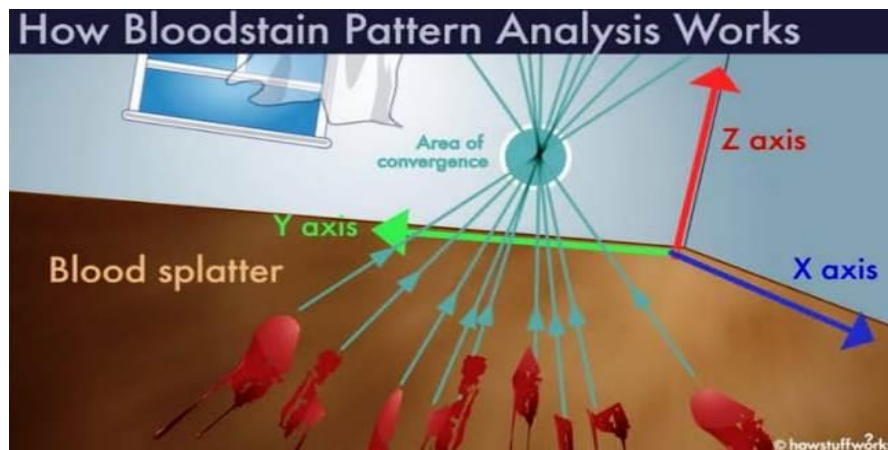- **Trigonometry is used video games.**

- **Trigonometry is used in physics**

- **Archaeologists use trigonometry**

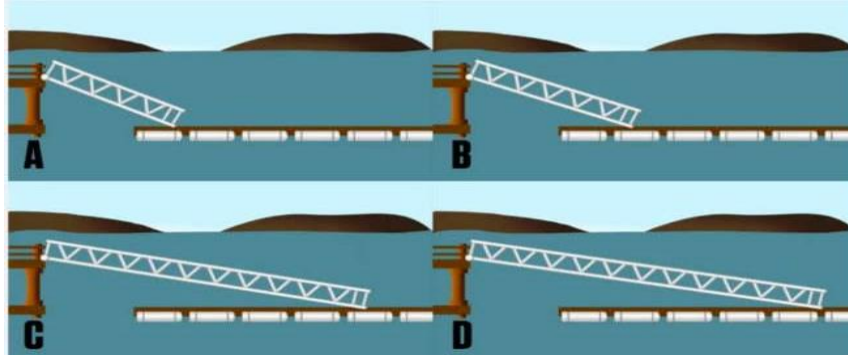- **Trigonometry is used in criminology**

- Trigonometry is even used in the investigation of crime scene.

- The Functions of trigonometry are helpful to calculate a trajectory of a projectile and estimate the causes of collision in car accident.

- Further it is used to identify how an object falls or at what angle the gun is shoot.
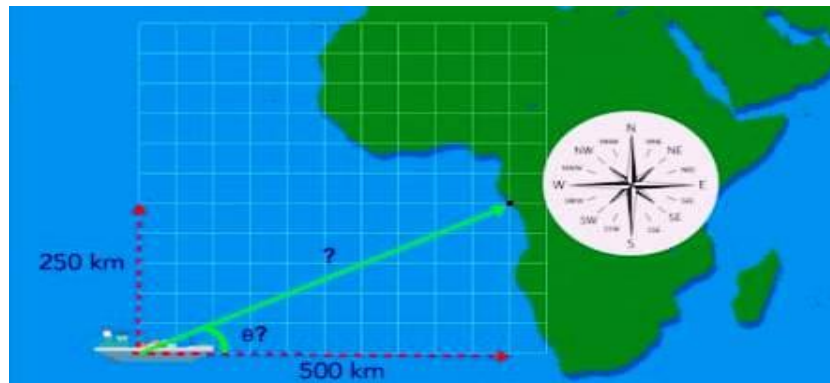
- **Trigonometry in aviation**
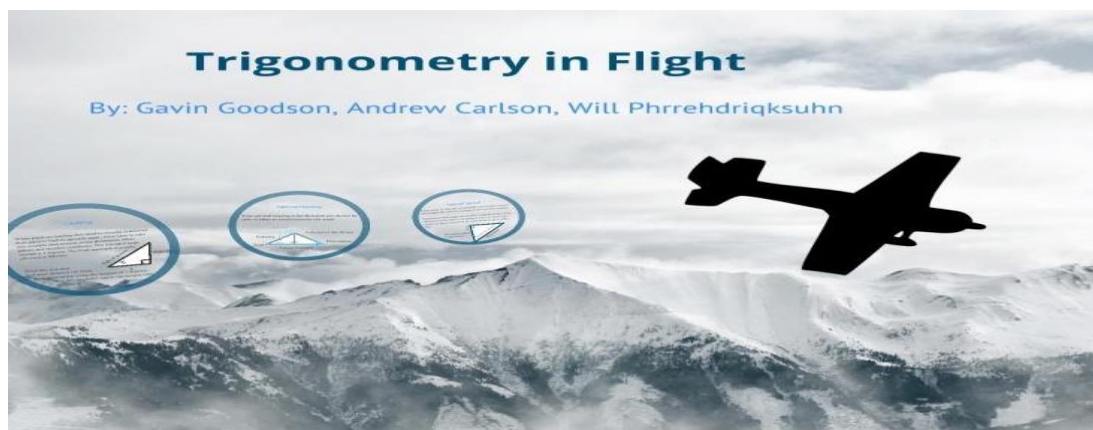
- Aviation technology has evolved with many upgrades in the last few years.

- It has taken into account the speed, direction and distance as well as the speed and direction of the wind.

- The wind plays a vital role in when and a flight should fly.

- **Trigonometry is used in marine engineering**

- **Trigonometry is used in navigation**

- Trigonometry is used in navigating directions.

- It estimates in what direction to place the compass to get a straight direction.

- With the help of compass and trigonometric functions in navigation. it will be easy to pinpoint a location And also to find distance as well to see the horizon.

Other uses of trigonometry

- The calculus is based on trigonometry and algebra.

- The fundamental trigonometric functions like sine and cosine are used to describe the sound and light waves.

- Trigonometry is used in oceanography to calculate the height of waves and tides in ocean.

- It is used in creation of maps and also used in satellite systems.

Findings:

- Trigonometry is a very important part of Mathematics that is used in different fields of our life.
- To name a few, trigonometry formula helps in construction, marine navigation and archaeology.
- We can conclude that without trigonometry, life would be much more difficult.
- Without going through the troubles you can easily find something so we think that it was a good invention by Archimedes and thanks to these many architects need not go through the trouble to calculate things, so it really helps in real life applications not only in our tests and exams.

References:

- **SSC Text Book**
- **mathnasium.com/blog/real-life-applications-of-trigonometry**
- **https://www.vedantu.com/maths/application-of-trigonometry**

-: Thank you:-