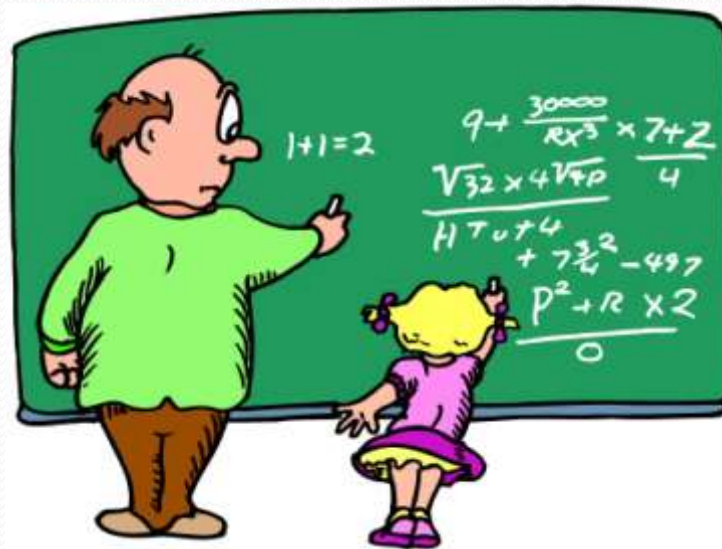


TRIGONOMETRY

By N.B mswane.



PREFACE

This project has been made with the aim of providing basic understanding on the subject – **MATHEMATICS** , in order to cover a part of NCERT syllabus as prescribed by **CBSE**. This presentation is titled as - **TRIGONOMETRY**. Sincere efforts have been made to make the presentation a unique experience to the viewer. Stress has been laid on the appearance, neatness and quality of the presentation. No effort has been spared to make the reading and understanding of the presentation complete and interesting. I have tried to do my best and hope that the project of mine would be appreciated by all.

One fine day I was relaxing on the beach where I saw a light house. I started wondering, what the height of the light house would be? I asked my mathematics teacher for suggestions and she taught me about the concept of trigonometry in finding the heights and distances of distant objects without actually measuring it. This provoked me to gather more information on this topic and to make a beautiful presentation on it.

Supervised by – *****

Created by – *****

CLEAN DESKTOP

ACKNOWLEDGEMENT

One cannot succeed alone no matter how great one's abilities are, without the cooperation of others. This project, too, is a result of efforts of many. I would like to thank all those who helped me in making this project a success.

I would like to express my deep sense of gratitude to my Maths Teacher, **Mrs. ******* who was taking keen interest in our lab activities and discussed various methods which could be employed towards this effect, and I really appreciate and acknowledge her pain taking efforts in this endeavour.

Supervised by – *****

Created by – *****

CONTENTS



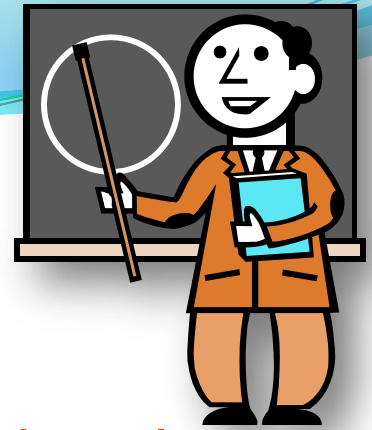
TOPIC	SLIDE NO.
Preface	2
Acknowledgement	3
Contents	4
Introduction	5
Invention	7
Trigonometric ratios	9
T. Values of some common angles	10
Trigonometric identities	11
Applications	12
Examples 1- 4	15-19
Clinometer	20
Conclusion	21



Introduction to Trigonometry

Right Triangle Trigonometry

TRIGONOMETRY



Q: What is trigonometry?

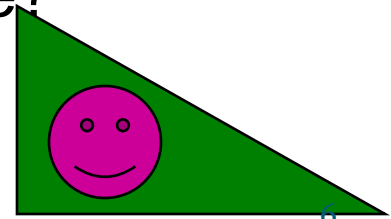
A: Trigonometry is the study of how the sides and angles of a triangle are related to each other.

Q: WHAT? That's all?

A: Yes, that's all. It's all about triangles, and you can't get much simpler than that.

Q: You mean trigonometry isn't some big, ugly monster that makes students turn green, scream, and die?

A: No. It's just triangles.



INVENTIO

Some historians say that trigonometry was invented by Hipparchus, a Greek mathematician. He also introduced the division of a circle into 360 degrees into Greece. Hipparchus is considered the greatest astronomical observer, and by some the greatest astronomer of antiquity. He was the first Greek to develop quantitative and accurate models for the motion of the Sun and Moon. With his solar and lunar theories and his numerical trigonometry, he was probably the first to develop a reliable method to predict solar eclipses.



WHAT IS TRIGONOMETRY AGAIN?

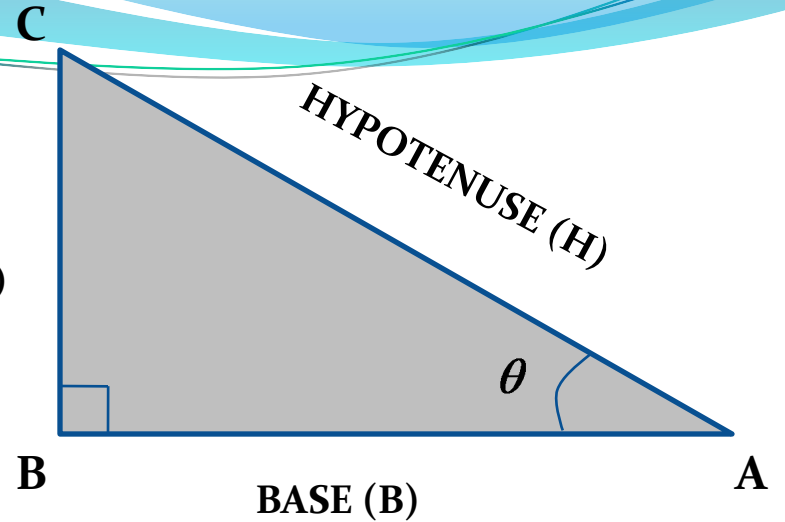
Trigonometry is a branch of Mathematics that deals with the distances or heights of objects which can be found using some mathematical techniques. The word 'trigonometry' is derived from the Greek words 'tri' (meaning three) , 'gon' (meaning sides) and 'metron' (meaning measure).

WHAT CAN YOU DO WITH TRIGONOMETRY?

Historically, it was developed for astronomy and geography, but scientists have been using it for centuries for other purposes, too. Besides other fields of mathematics, trigonometry is used in physics, engineering, and chemistry. Within mathematics, trigonometry is used primarily in calculus (which is perhaps its greatest application), linear algebra, and statistics. Since these fields are used throughout the natural and social sciences, trigonometry is a very useful subject to know.

TRIGONOMETRIC RATIOS

PERPENDICULAR (P)



$\sin \theta /$
 $\operatorname{Cosec} \theta$

P
(pandit)

H
(har)

$\cos \theta /$
 $\sec \theta$

B
(badri)

H
(har)

$\tan \theta /$
 $\cot \theta$

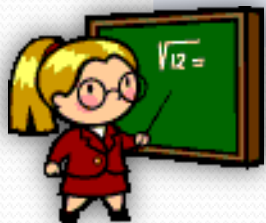
P
(prasad)

B
(bole)



TRIGONOMETRIC VALUES OF SOME COMMON ANGLES

$\angle A$	0°	30°	45°	60°	90°
Sin A	0	$\frac{1}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{\sqrt{3}}{2}$	1
Cos A	1	$\frac{\sqrt{3}}{2}$	$\frac{1}{\sqrt{2}}$	$\frac{1}{2}$	0
Tan A	0	$\frac{1}{\sqrt{3}}$	1	$\sqrt{3}$	Not Defined
Cosec A	Not Defined	2	$\sqrt{2}$	$\frac{2}{\sqrt{3}}$	1
Sec A	1	$\frac{2}{\sqrt{3}}$	$\sqrt{2}$	2	Not Defined
Cot A	Not Defined	$\sqrt{3}$	1	$\frac{1}{\sqrt{3}}$	0



TRIGONOMETRIC IDENTITIES

$$\sin^2 \theta + \cos^2 \theta = 1$$

- $1 - \cos^2 \theta = \sin^2 \theta$
- $1 - \sin^2 \theta = \cos^2 \theta$

$$\tan^2 \theta + 1 = \sec^2 \theta$$

- $\sec^2 \theta - \tan^2 \theta = 1$
- $\sec^2 \theta - 1 = \tan^2 \theta$

$$\cot^2 \theta + 1 = \operatorname{cosec}^2 \theta$$

- $\operatorname{cosec}^2 \theta - \cot^2 \theta = 1$
- $\operatorname{cosec}^2 \theta - 1 = \cot^2 \theta$



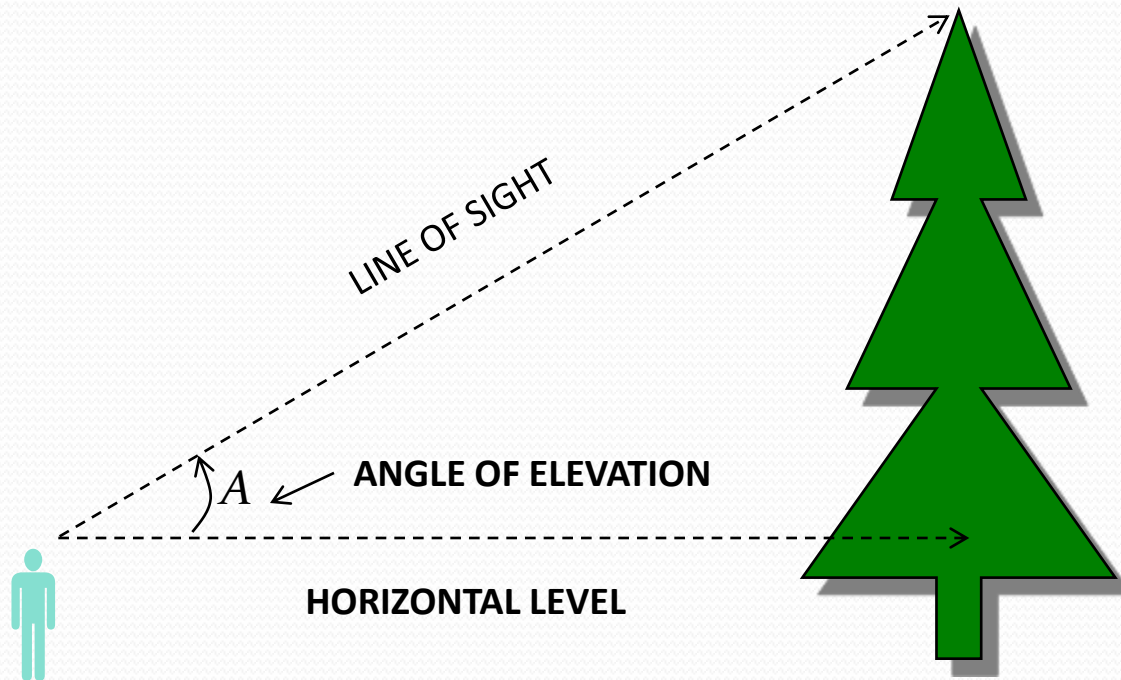
Applications

- Measuring inaccessible lengths
 - Height of a building (tree, tower, etc.)
 - Width of a river (canyon, etc.)



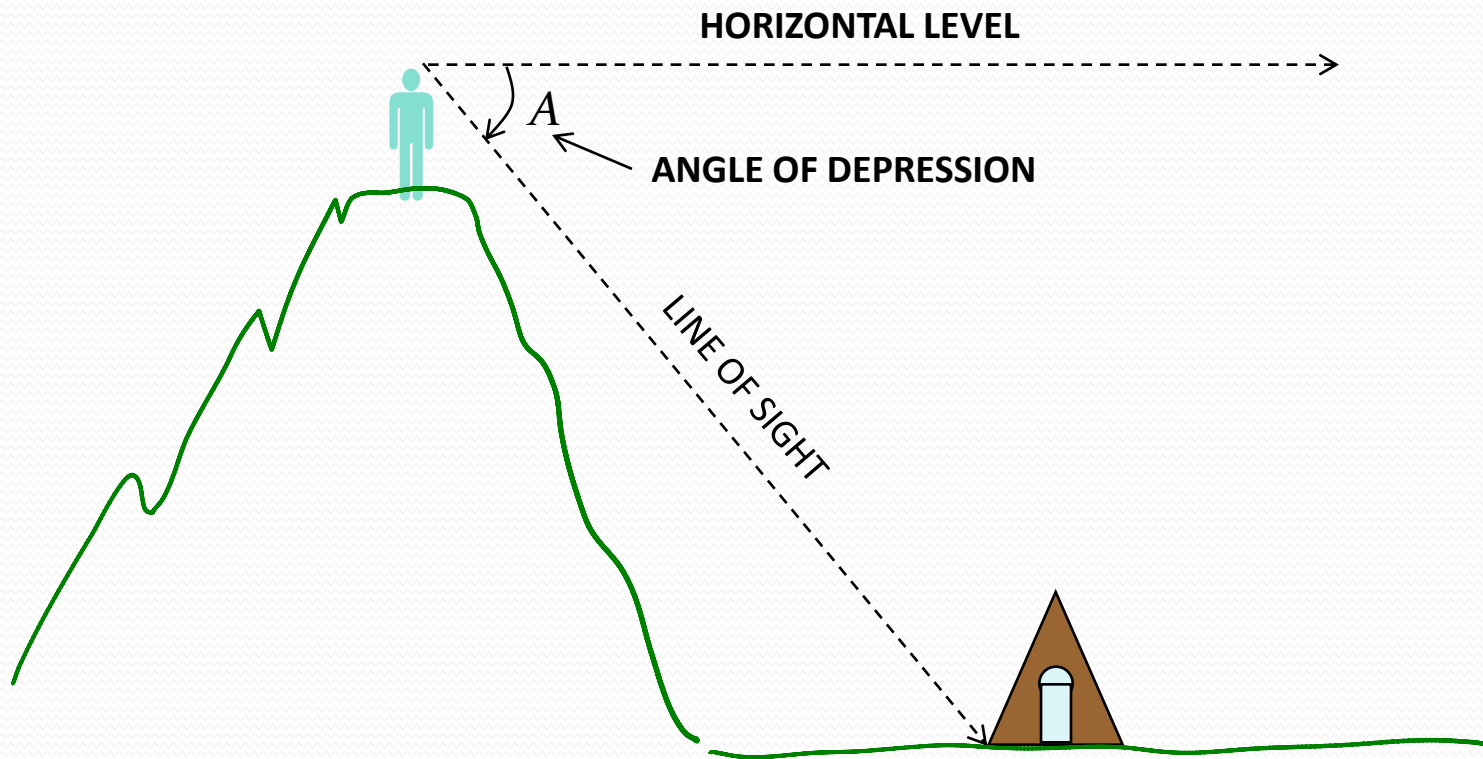
• Angle of Elevation –

It is the angle formed by the line of sight with the horizontal when it is above the horizontal level, i.e., the case when we raise our head to look at the object.



• Angle of Depression –

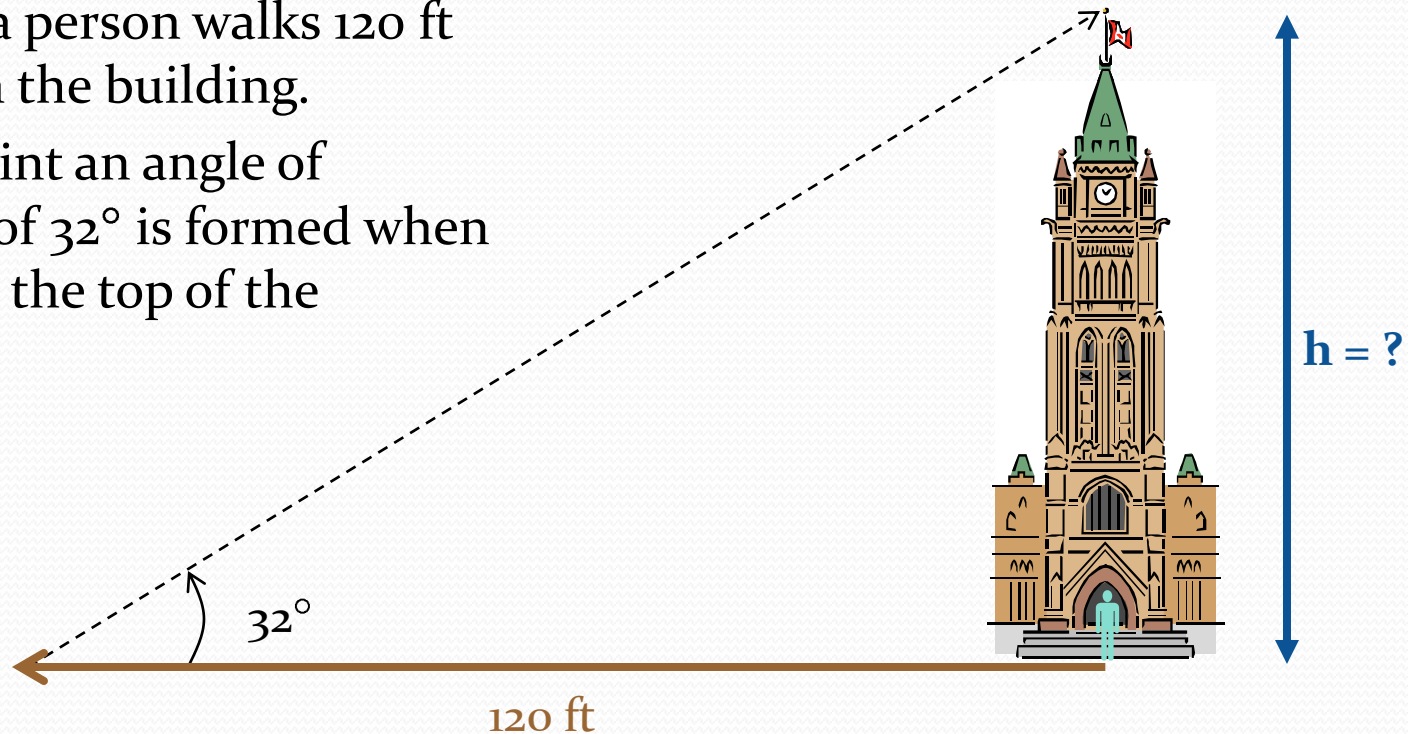
It is the angle formed by the line of sight with the horizontal when it is below the horizontal level, i.e., the case when we lower our head to look at the object.





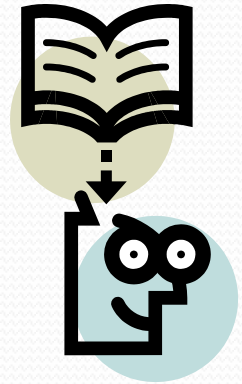
Application: Height

- To establish the height of a building, a person walks 120 ft away from the building.
- At that point an angle of elevation of 32° is formed when looking at the top of the building.

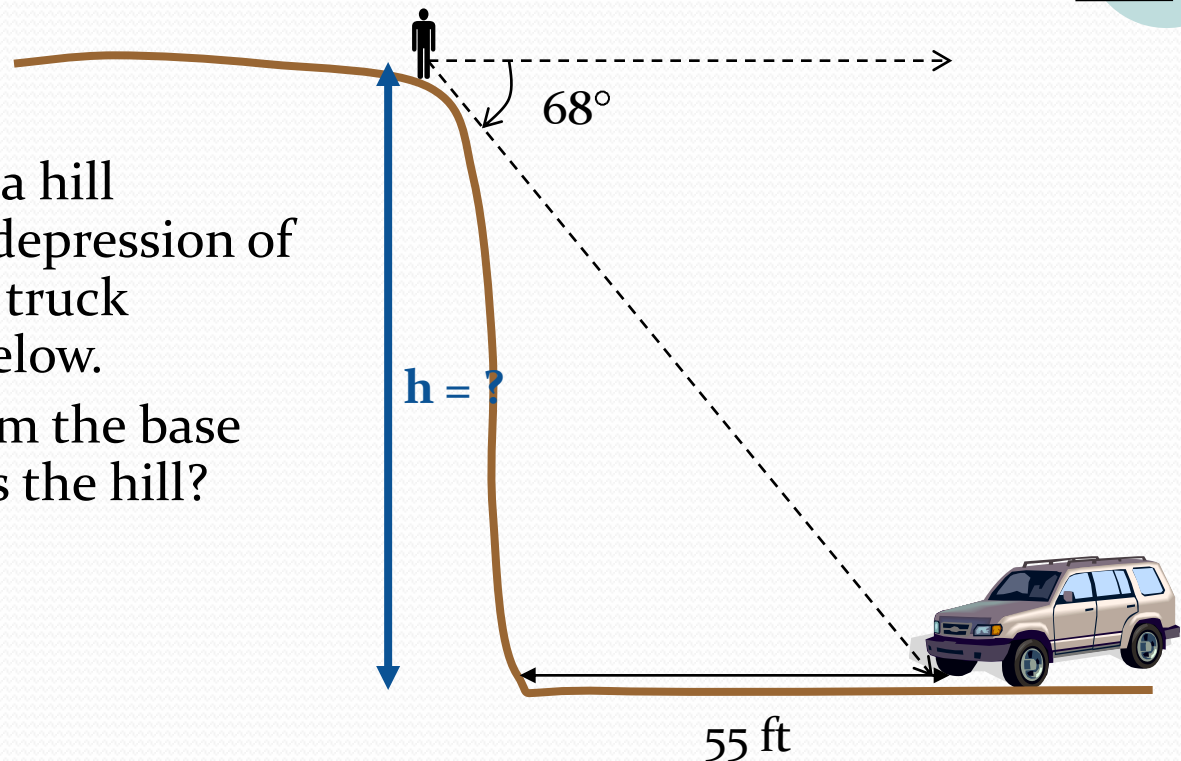


$$H = 74.98 \text{ ft}$$

Application: Height



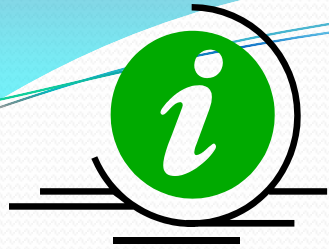
- An observer on top of a hill measures an angle of depression of 68° when looking at a truck parked in the valley below.
- If the truck is 55 ft from the base of the hill, how high is the hill?



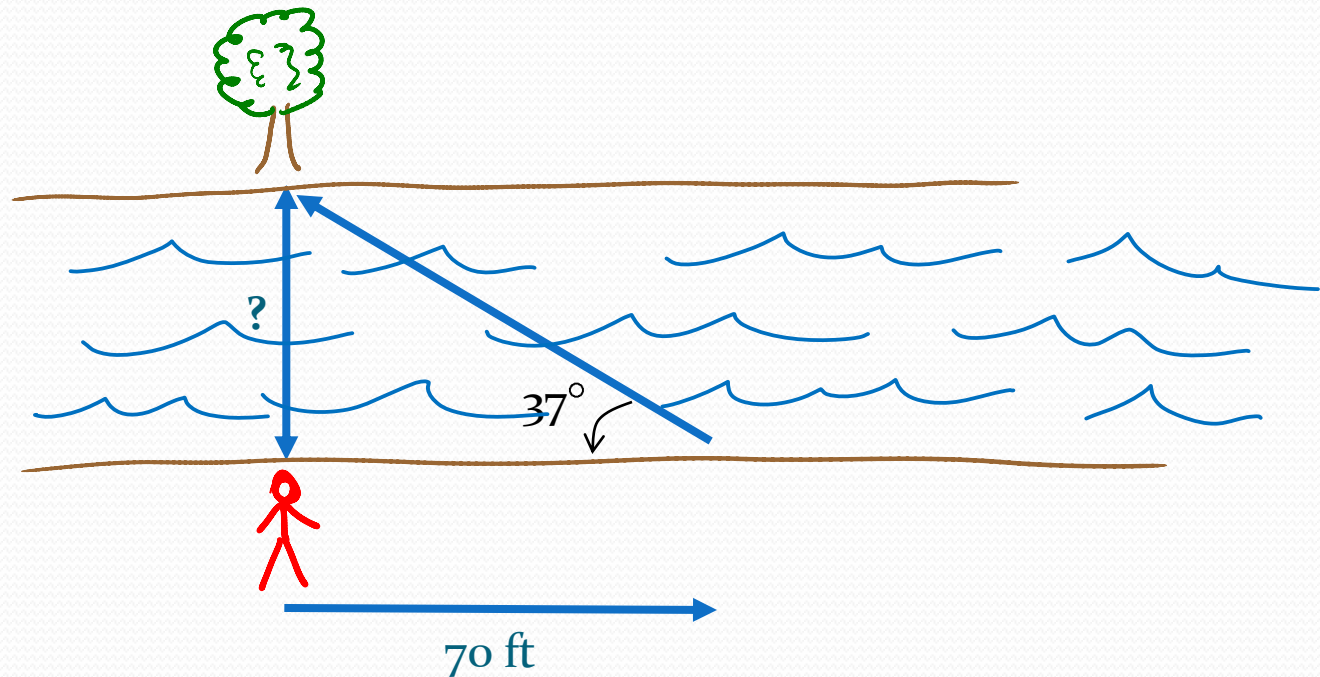
$$H = 136.1 \text{ ft}$$

SURVEYING

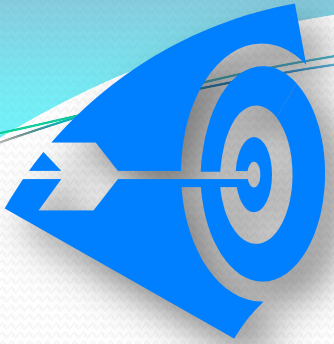




Application : Surveying

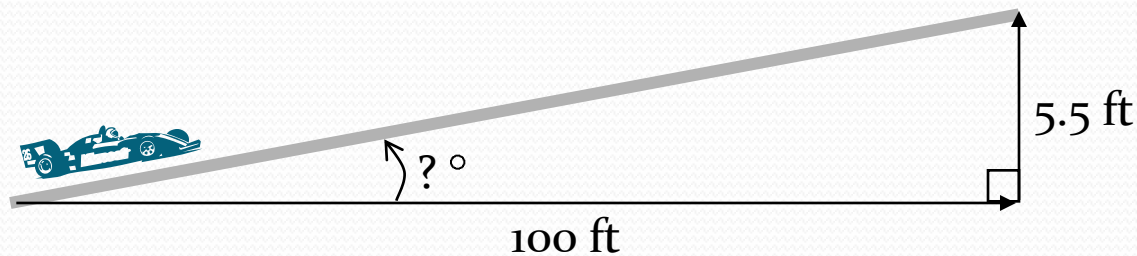


$$D = 52.7 \text{ ft}$$



Application : Surveying

- Road has a grade of 5.5%.
 - Convert this to an angle expressed in degrees.



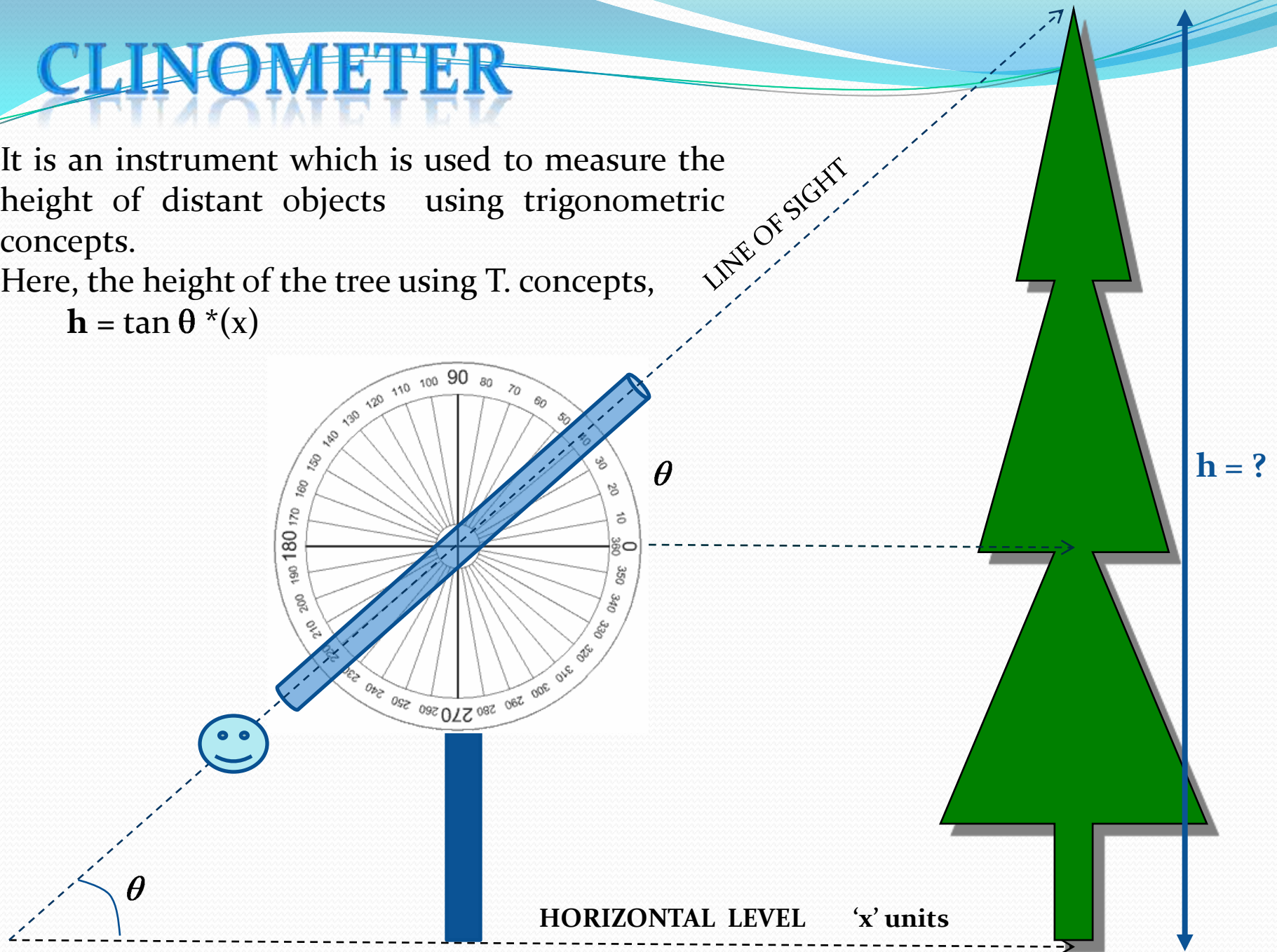
$$A = 3.1^\circ$$

CLINOMETER

It is an instrument which is used to measure the height of distant objects using trigonometric concepts.

Here, the height of the tree using T. concepts,

$$h = \tan \theta * (x)$$



CONCLUSION

Trigonometry begins in the right triangle, but it doesn't have to be restricted to triangles. The trigonometric functions carry the ideas of triangle trigonometry into a broader world of real-valued functions and wave forms. Trig functions are the relationships amongst various sides in right triangles. The enormous number of applications of trigonometry include astronomy, geography, optics, electronics, probability theory, statistics, biology, medical imaging (CAT scans and ultrasound), pharmacy, seismology, land surveying, architecture.





THANK YOU !

*Name : ******

Trig. In the Real World

Jason Yu – 6th Period – 12/02/2011



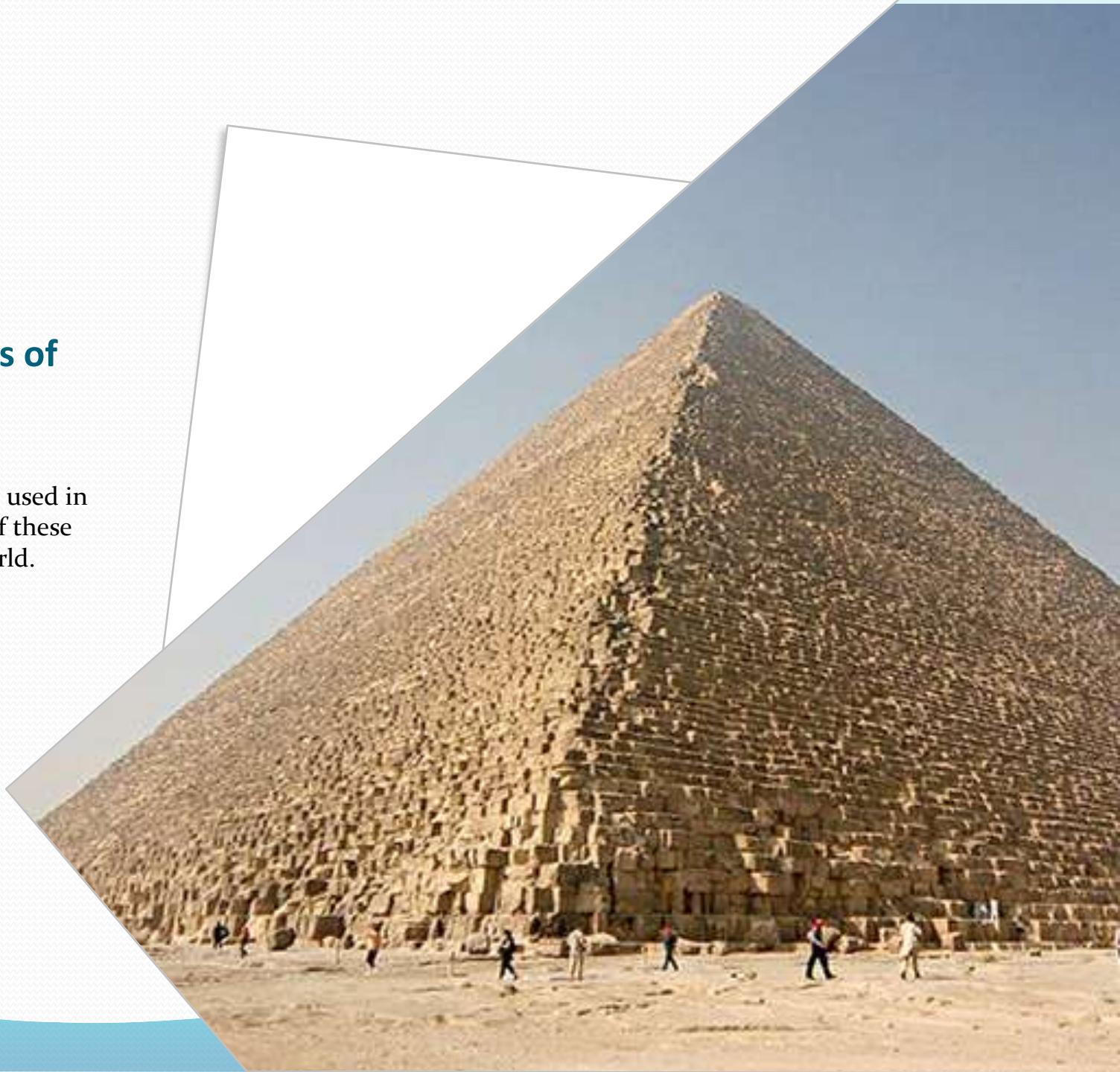
What is Trigonometry?

And how is it used?

- Trigonometry is the branch of mathematics that studies triangles and their relationships.

The Pyramids of Giza

Primitive forms of trigonometry were used in the construction of these wonders of the world.



Architecture

- ✧ In architecture, trigonometry plays a massive role in the compilation of building plans.
- ✧ For example, architects would have to calculate exact angles of intersection for components of their structure to ensure stability and safety.
- ✧ Some instances of trigonometric use in architecture include arches, domes, support beams, and suspension bridges.
- ✧ Architecture remains one of the most important sectors of our society as they plan the design of buildings and ensure that they are able to withstand pressures from inside.

How do I get involved in Architecture?

Classes to TAke

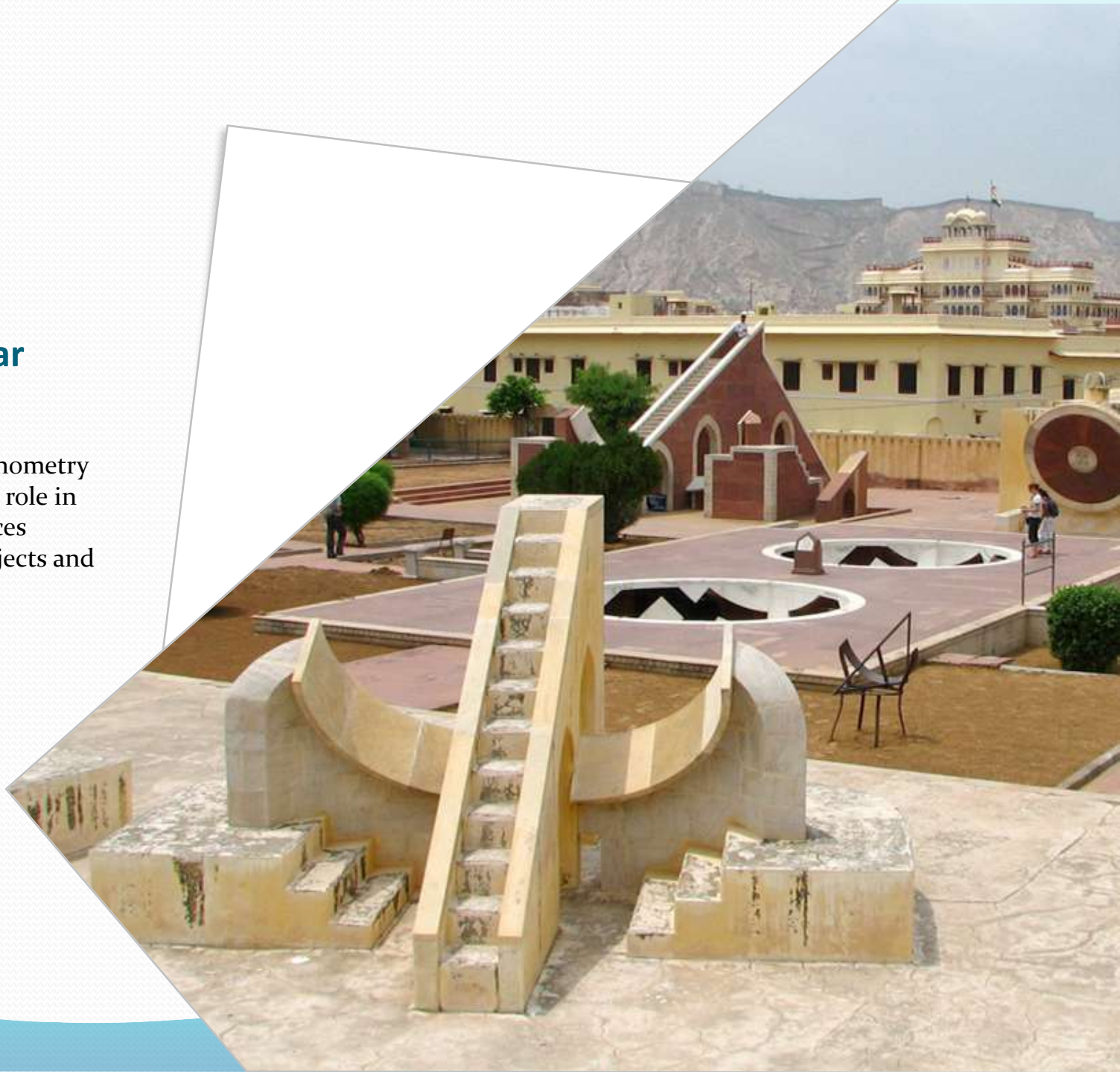
- Physics
 - Geometry
 - Trigonometry
 - Pre-Calculus and Calculus
 - Engineering
 - 3-D Design
 - Drawing
-
- * Art classes will assist you in being able to conceptualize objects!

Salary and Benefits

- Most architects start out with a salary of \$50,000+, and through experience, may earn up to \$140,000+
- Becoming an architect will open you to many more careers, including interior design and building design!

Jantar Mantar observatory

For millenia, trigonometry has played a major role in calculating distances between stellar objects and their paths.



Astronomy

- ✧ Astronomy has been studied for millennia by civilizations in all regions of the world.
- ✧ In our modern age, being able to apply Astronomy helps us to calculate distances between stars and learn more about the universe.
- ✧ Astronomers use the method of parallax, or the movement of the star against the background as we orbit the sun, to discover new information about galaxies.
- ✧ Menelaus' Theorem helps astronomers gather information by providing a backdrop in spherical triangle calculation.

How do I get involved in Astronomy?

Classes to take

- Physics
- Electronics
- Advanced Math
- Geometry
- Precalculus and Calculus
- Astrophysics

Salary and Benefits

- The median salary for Astronomers is \$97,270 a year, with most entry level jobs amounting to around \$50,000 a year.
- As an aside to being an astronomer, one can also acquire a teaching position at a research university!

Grand Canyon Skywalk

Geologists had to measure the amount of pressure that surrounding rocks could withstand before constructing the skywalk.



Geology

- ✧ Trigonometry is used in geology to estimate the true dip of bedding angles. Calculating the true dip allows geologists to determine the slope stability.
- ✧ Although not often regarded as an integral profession, geologists contribute to the safety of many building foundations.
- ✧ Any adverse bedding conditions can result in slope failure and the entire collapse of a structure.

How do I get involved in Geology?

Classes to take

- Physics
- Chemistry
- Precalculus and Calculus
- Geometry
- Geochemistry
- Seismology

Salary and Benefits

- Median wages for Geologists are around \$70,000. However, if involved in oil extraction, earnings could increase to over \$130,000 a year.
- Geologists can be very flexible in what they decide to do. There are a multitude of job options ranging from agriculture to tourism that require the work of a geologist.

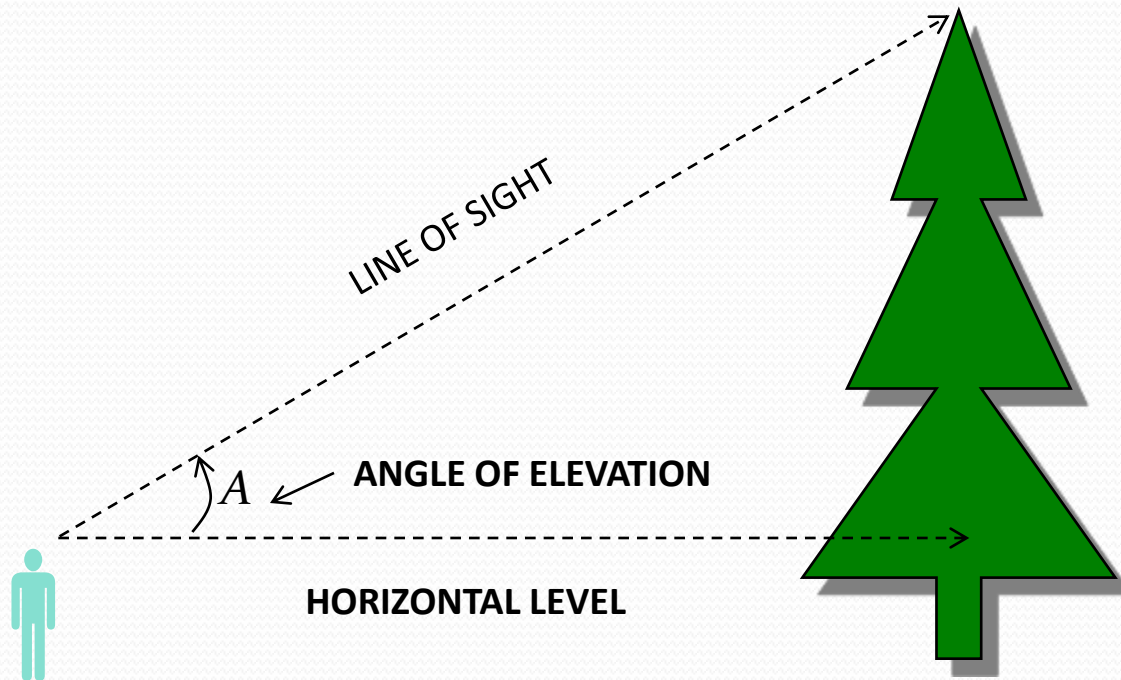
Applications

- Measuring inaccessible lengths
 - Height of a building (tree, tower, etc.)
 - Width of a river (canyon, etc.)



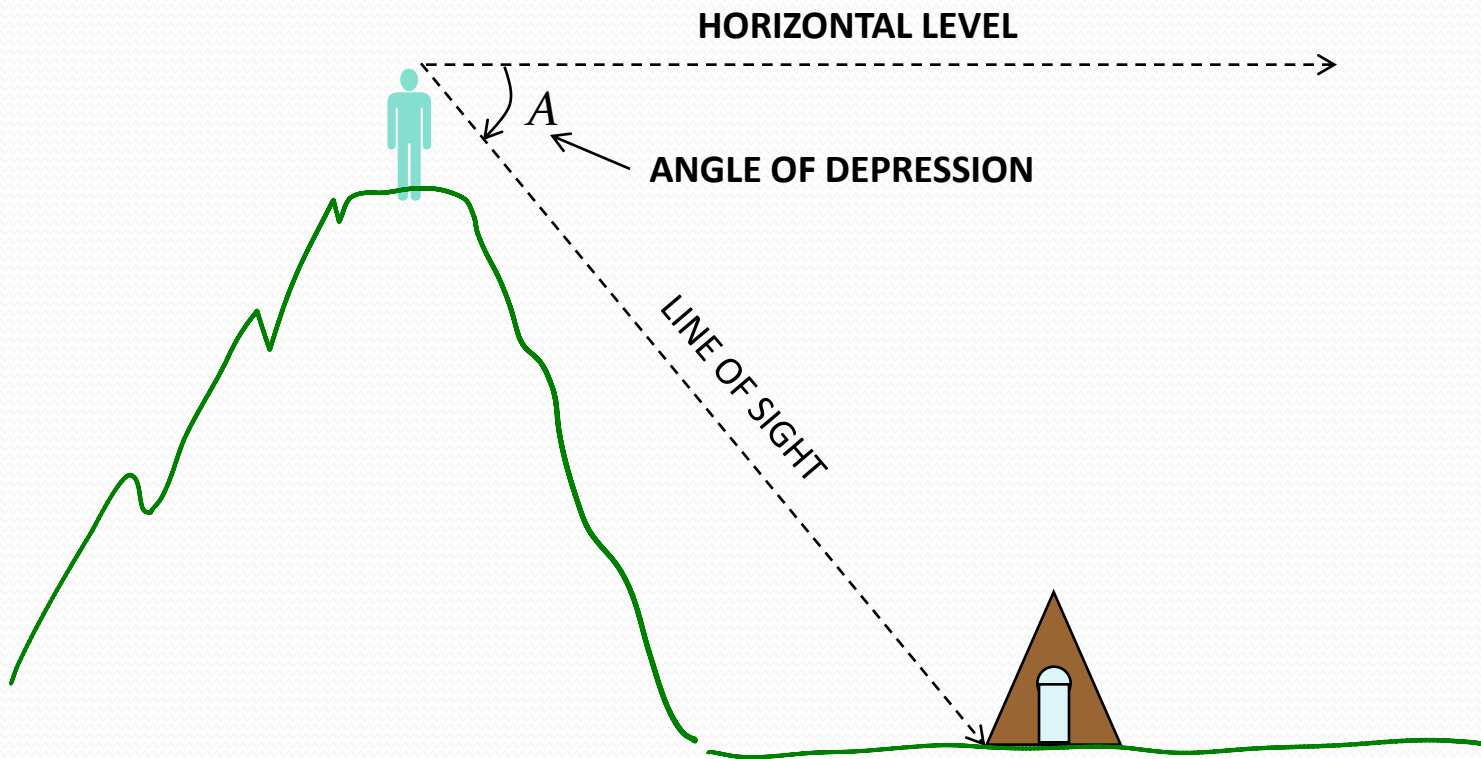
• Angle of Elevation –

It is the angle formed by the line of sight with the horizontal when it is above the horizontal level, i.e., the case when we raise our head to look at the object.



• Angle of Depression –

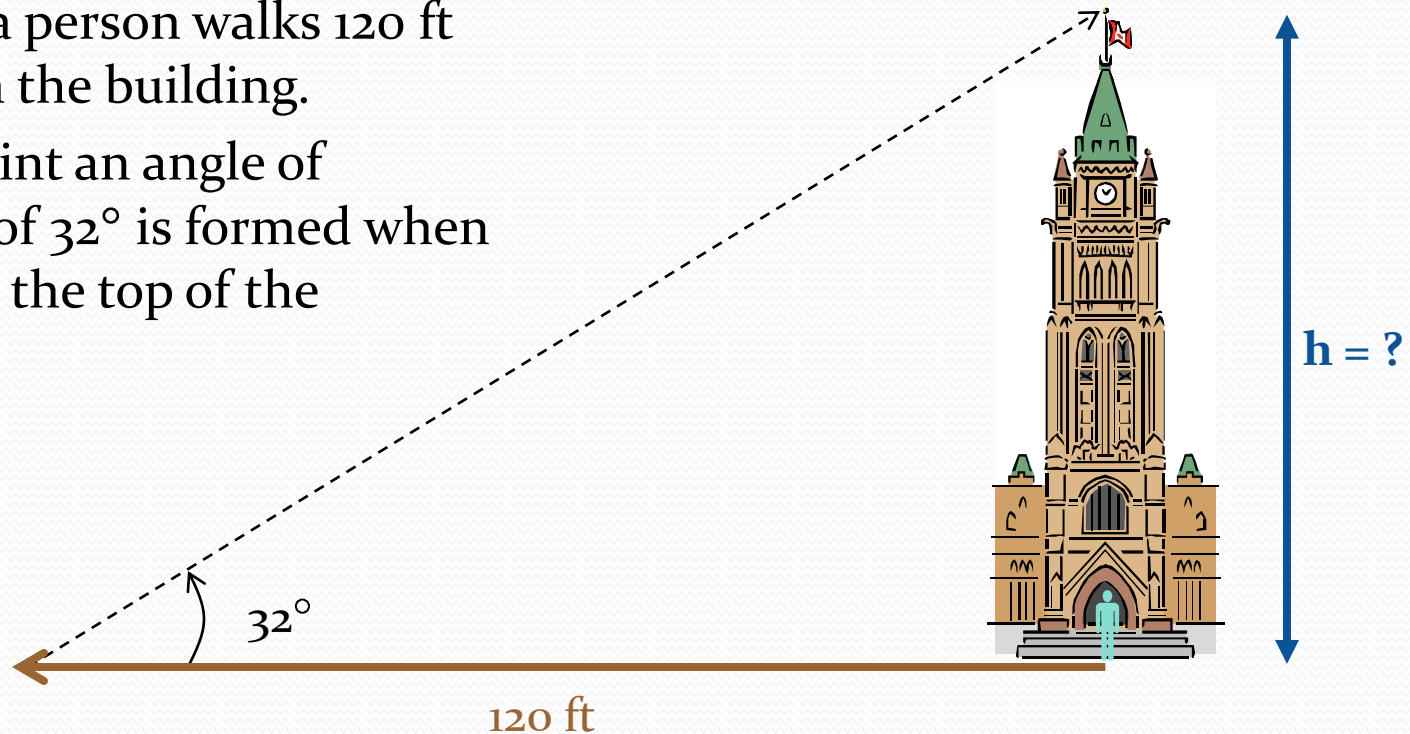
It is the angle formed by the line of sight with the horizontal when it is below the horizontal level, i.e., the case when we lower our head to look at the object.





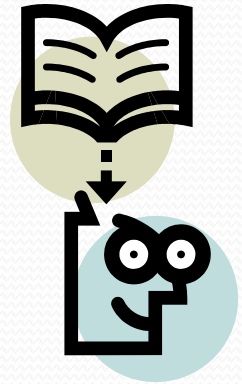
Application: Height

- To establish the height of a building, a person walks 120 ft away from the building.
- At that point an angle of elevation of 32° is formed when looking at the top of the building.

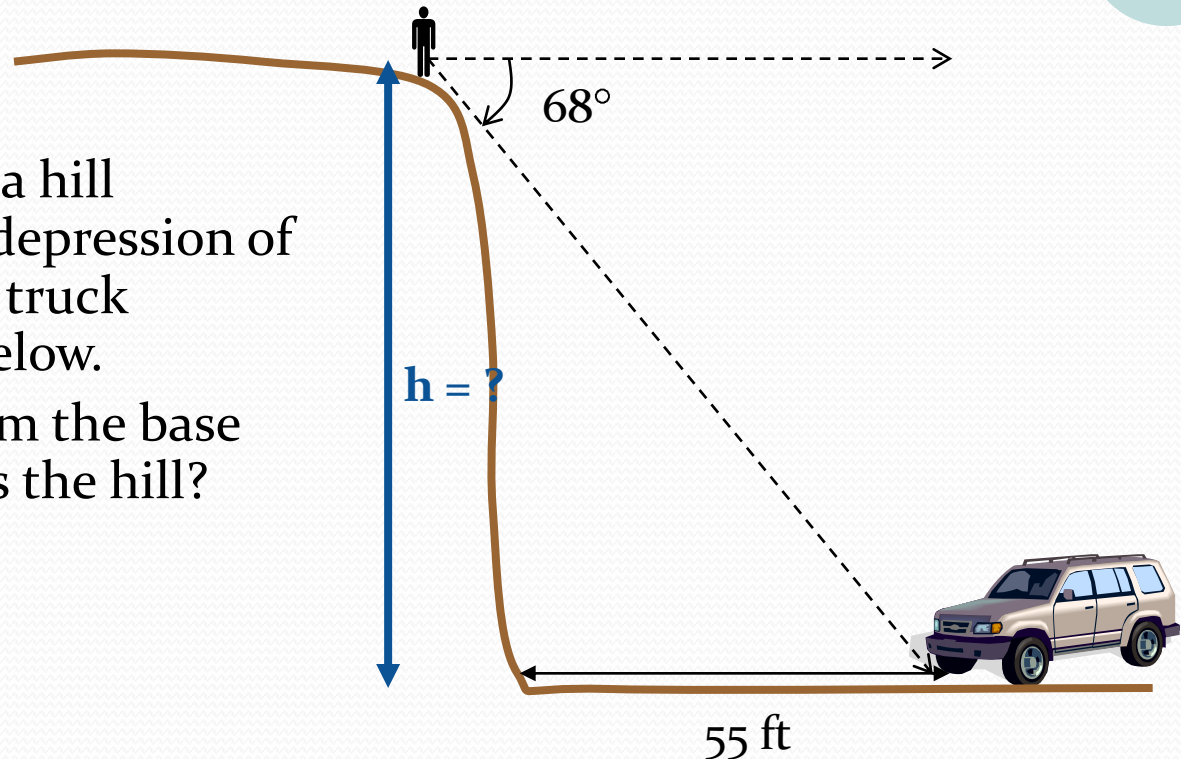


$$H = 74.98 \text{ ft}$$

Application: Height



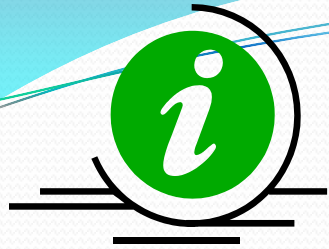
- An observer on top of a hill measures an angle of depression of 68° when looking at a truck parked in the valley below.
- If the truck is 55 ft from the base of the hill, how high is the hill?



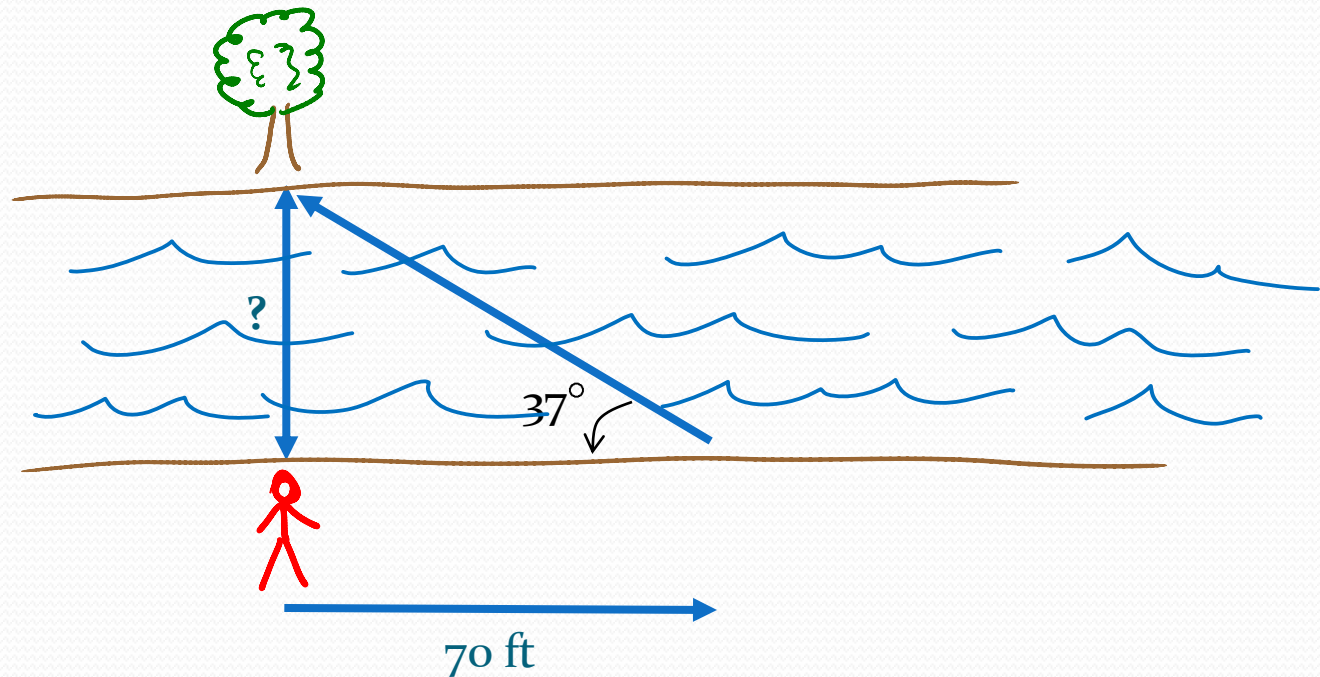
$$H = 136.1 \text{ ft}$$

SURVEYING

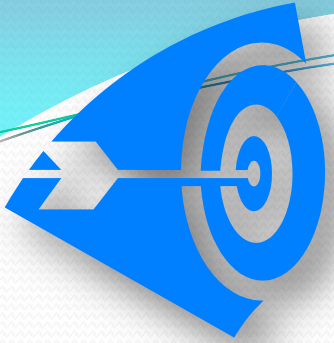




Application : Surveying

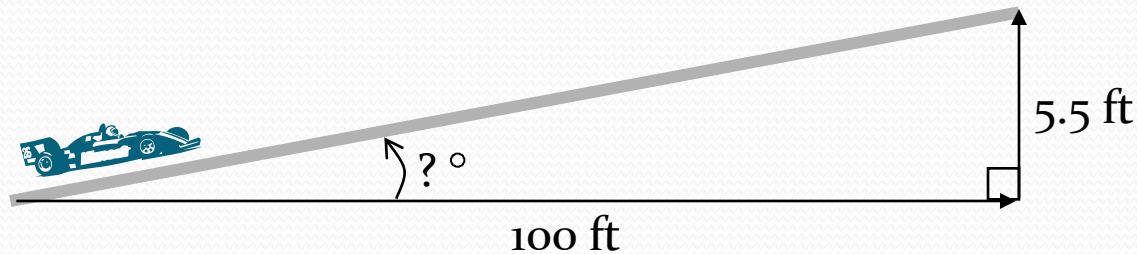


$$D = 52.7 \text{ ft}$$



Application : Surveying

- Road has a grade of 5.5%.
- Convert this to an angle expressed in degrees.



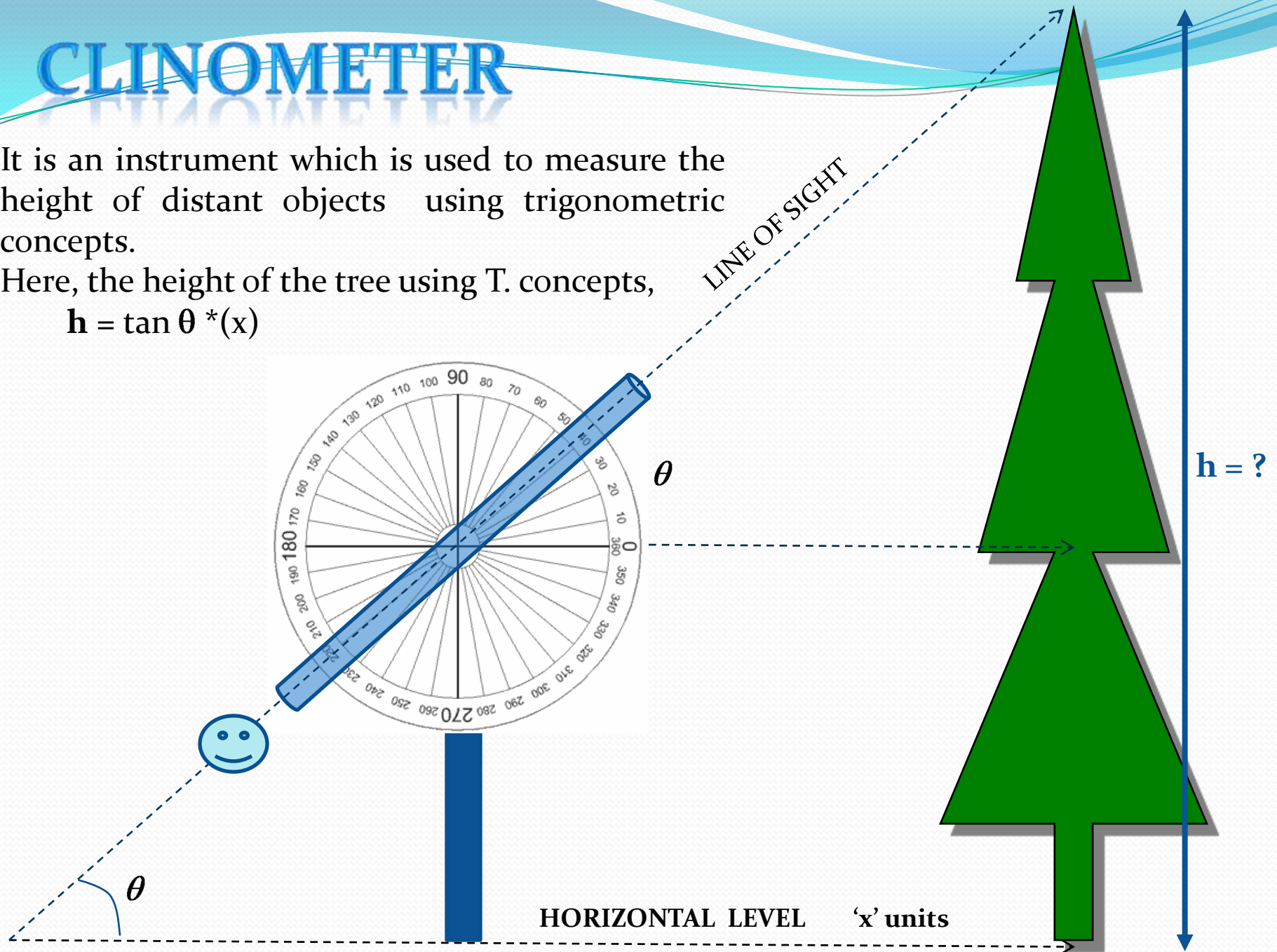
$$A = 3.1^\circ$$

CLINOMETER

It is an instrument which is used to measure the height of distant objects using trigonometric concepts.

Here, the height of the tree using T. concepts,

$$h = \tan \theta * (x)$$



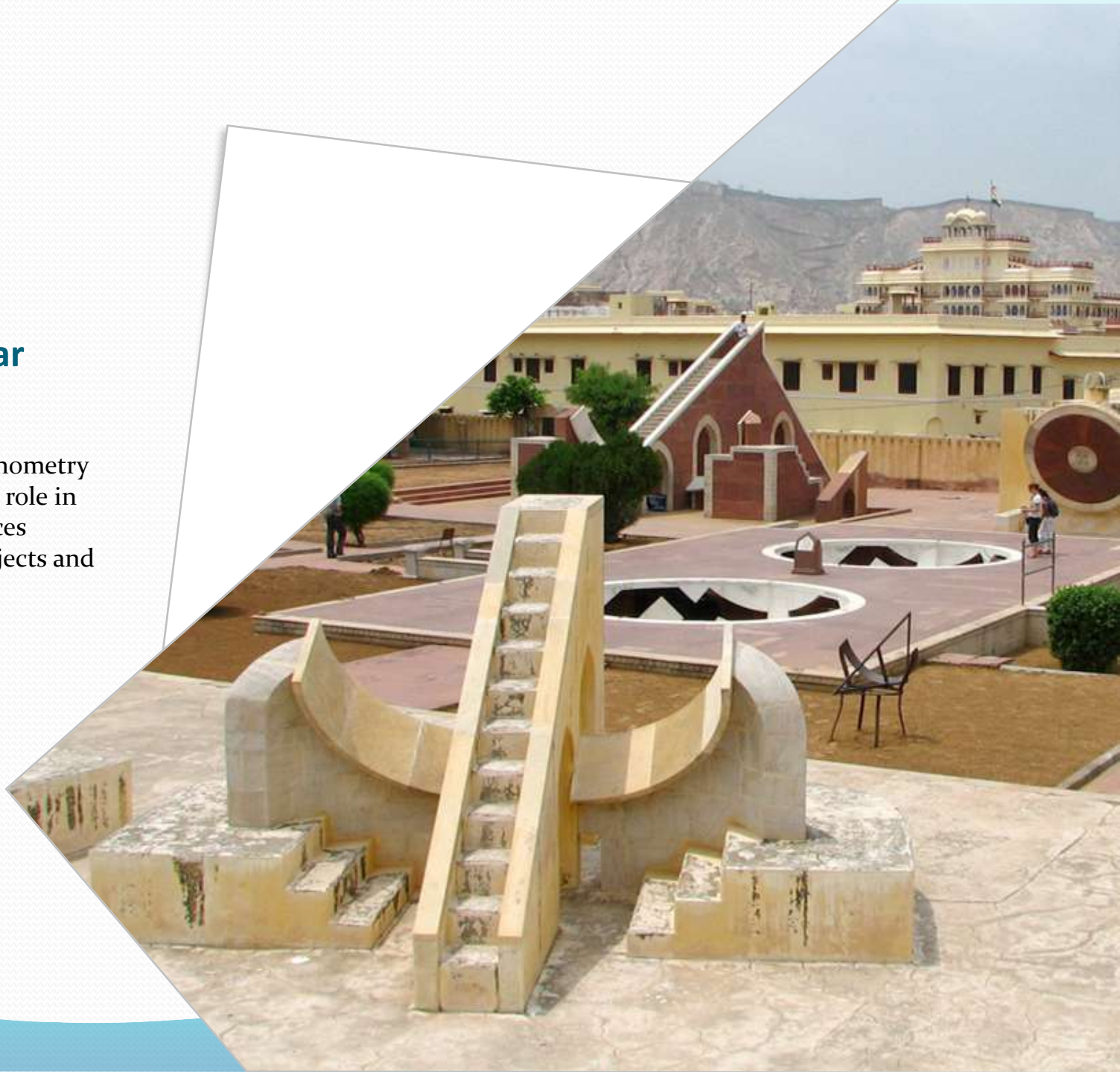
CONCLUSION

Trigonometry begins in the right triangle, but it doesn't have to be restricted to triangles. The trigonometric functions carry the ideas of triangle trigonometry into a broader world of real-valued functions and wave forms. Trig functions are the relationships amongst various sides in right triangles. The enormous number of applications of trigonometry include astronomy, geography, optics, electronics, probability theory, statistics, biology, medical imaging (CAT scans and ultrasound), pharmacy, seismology, land surveying, architecture.



Jantar Mantar observatory

For millenia, trigonometry has played a major role in calculating distances between stellar objects and their paths.



This is a combination of five trigonometry slides from different authors.

- Trig. In the Real World. Jason Yu – 6th Period – 12/02/2011
- What is Trigonometry? Basic Concepts that will give you a better idea of Trigonometry. What can you do with Trigonometry. by peteo13
- Cosine Rule by westley
- TRIGONOMETRY done by Sahana And Priya
- Maths ppt on some applications of trigonometry by Harsh Mahajan