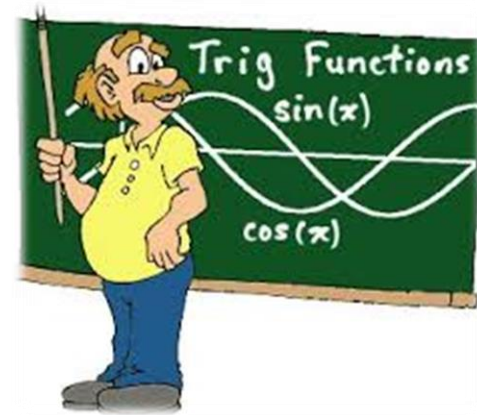# Trigonometry - II

**By SLIIT Mathematics Unit**
Faculty of Humanities and Sciences
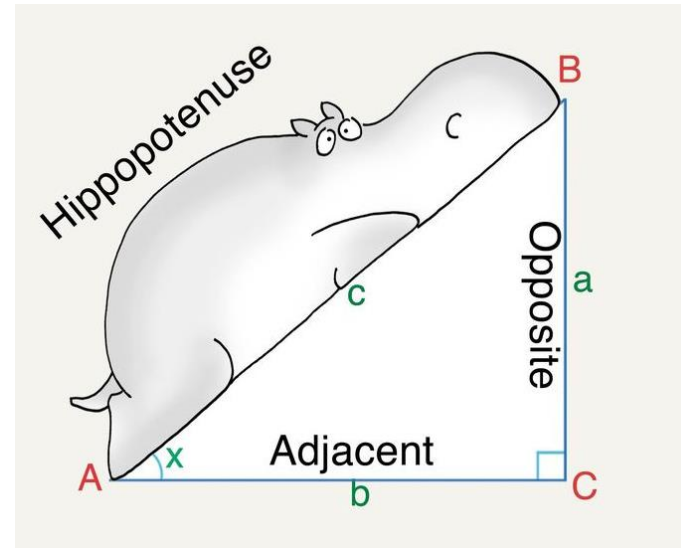
# Content

- Right Triangle Tigonomtery

- Fundamental Trigonometric Identitites

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# 1.

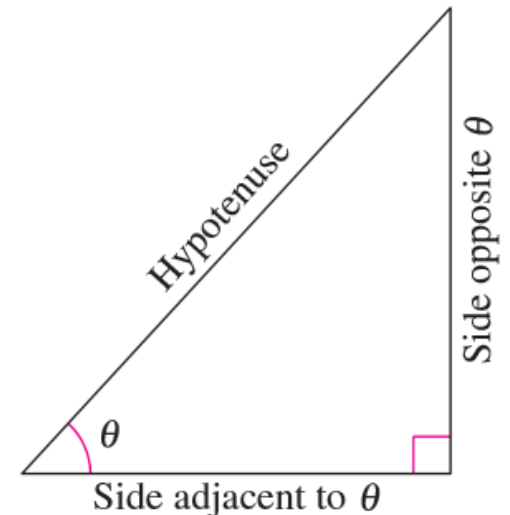# Right Triangle Tigonomtery

# Right Triangle Trigonomtery

- Trigonometric functions are introduced from a right triangle perspective

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# Right Triangle Trigonomtery

- Relative to the angle $\theta$ the three sides of the triangle are
  - the hypotenuse,
  - the opposite side (the side opposite the angle )
  - the adjacent side (the side adjacent to the angle )

# Right Triangle Definitions of Trigonometric Functions

- The six trigonometric functions of the angle are defined as follows.

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \qquad \cos \theta = \frac{\text{adj}}{\text{hyp}} \qquad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

$$\csc \theta = \frac{\text{hyp}}{\text{opp}} \qquad \sec \theta = \frac{\text{hyp}}{\text{adj}} \qquad \cot \theta = \frac{\text{adj}}{\text{opp}}$$

The abbreviations

opp, adj, and hyp

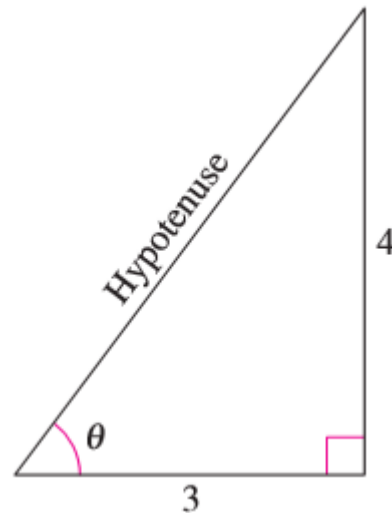represent the lengths of the three sides of a right triangle.

opp = the length of the side *opposite* $\theta$

adj = the length of the side *adjacent to* $\theta$

hyp = the length of the *hypotenuse*

# Evaluating Trigonometric Functions

- Use the triangle to find the values of the six trigonometric functions of $\theta$.

# 2.

# Fundamental Trigonometric Identitites

# Trigonometric Identities

**Reciprocal Identities**

$$\sin \theta = \frac{1}{\csc \theta} \qquad \cos \theta = \frac{1}{\sec \theta} \qquad \tan \theta = \frac{1}{\cot \theta}$$

$$\csc \theta = \frac{1}{\sin \theta} \qquad \sec \theta = \frac{1}{\cos \theta} \qquad \cot \theta = \frac{1}{\tan \theta}$$

**Quotient Identities**

$$\tan \theta = \frac{\sin \theta}{\cos \theta} \qquad \cot \theta = \frac{\cos \theta}{\sin \theta}$$

**Pythagorean Identities**

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

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

$$1 + \cot^2 \theta = \csc^2 \theta$$

$$\frac{SIN(GERINE)}{COS(GERINE)} =$$

# Exercises

- Use trigonometric identities to transform the left side of the equation into the right side.

**a.** $\sin \theta \csc \theta = 1$      **b.** $(\csc \theta + \cot \theta)(\csc \theta - \cot \theta) = 1$

# Exercises

- Factorize the trigonometric identities

**a.** $\sec^2 \theta - 1$      **b.** $4 \tan^2 \theta + \tan \theta - 3$

# Exercises

Perform the addition $\dfrac{\sin \theta}{1 + \cos \theta} + \dfrac{\cos \theta}{\sin \theta}$ and simplify.

# Exercises

▪ Verify the following trigonometric identities.

$$\frac{\cos \theta \cot \theta}{1 - \sin \theta} - 1 = \csc \theta$$

$$\frac{1}{\cos x + 1} + \frac{1}{\cos x - 1} = -2 \csc x \cot x$$

$$\cos x - \frac{\cos x}{1 - \tan x} = \frac{\sin x \cos x}{\sin x - \cos x}$$

# Thanks!

## Any questions?