# Lesson 9.3/9.4 Trigonometry

Tuesday, April 11, 2023 10:58 PM

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## Lesson 9.3/9.4 Trigonometry

## Pages 143-147 and Pages 155-158

**Content Objective**

Students will solve problems using the trigonometric ratios and inverse trigonometric ratios for acute angles.



## Florida's B.E.S.T. Standards for Mathematics

**MA.912.T.1.1**

**MA.912.T.1.1**

Define trigonometric ratios for acute angles in right triangles.

**MA.912.T.1.2**

Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem.





## Learn

### Trigonometry

The word **trigonometry** comes from the Greek terms *trigon*, meaning triangle, and *metron*, meaning measure. So the study of trigonometry involves triangle measurement. A **trigonometric ratio** is a ratio of the lengths of two sides of a right triangle.

The names of the three most common trigonometric ratios are given on the next few slides.

McGraw Hill | Trigonometry

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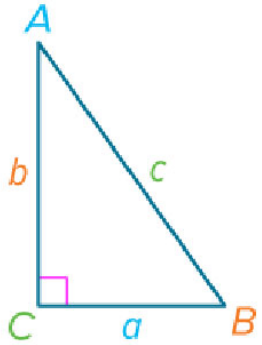
## Learn
Trigonometry

### Key Concept: Trigonometric Ratios

**Sine:** If $\triangle ABC$ is a right triangle, then the sine of each acute angle in $\triangle ABC$ is the ratio of the length of the leg opposite that angle (opp) to the length of the hypotenuse (hyp).



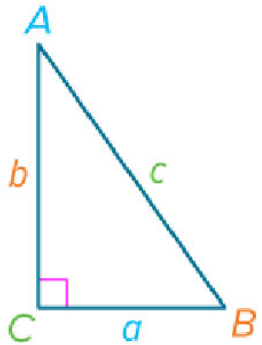

$$\sin A = \frac{\text{opp}}{\text{hyp}} \text{ or } \frac{a}{c}; \quad \sin B = \frac{\text{opp}}{\text{hyp}} \text{ or } \frac{b}{c}$$





## Learn
Trigonometry

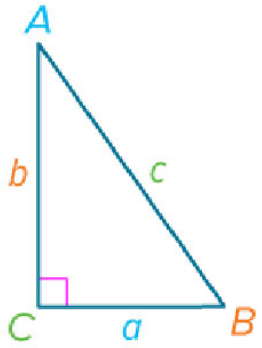
**Cosine:** If $\triangle ABC$ is a right triangle, then the cosine of each acute angle in $\triangle ABC$ is the ratio of the length of the leg adjacent to that angle (adj) to the length of the hypotenuse (hyp).




$$\cos A = \frac{\text{adj}}{\text{hyp}} \text{ or } \frac{b}{c}; \cos B = \frac{\text{adj}}{\text{hyp}} \text{ or } \frac{a}{c}$$

## Learn
Trigonometry

**Tangent:** If $\triangle ABC$ is a right triangle, then the tangent of each acute angle in $\triangle ABC$ is the ratio of the length of the leg opposite that angle (opp) to the length of the leg adjacent to that angle (adj).




$$\tan A = \frac{\text{opp}}{\text{adj}} \text{ or } \frac{a}{b}; \tan B = \frac{\text{opp}}{\text{adj}} \text{ or } \frac{b}{a}$$

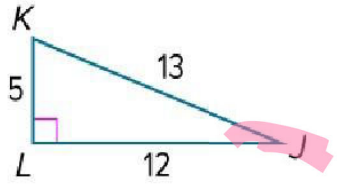




## Example 1
Find Trigonometric Ratios

**Find sin *J*, cos *J*, tan *J*, sin *K*, cos *K*, and tan *K*. Express each ratio as a fraction and as a decimal to the nearest hundredth.**

SOH CAH TOA




$\sin J = \frac{5}{13} = 0.38$

$\cos J = \frac{12}{13} = 0.92$

$\tan J = \frac{5}{12} = 0.42$

Students, draw anywhere on this slide!

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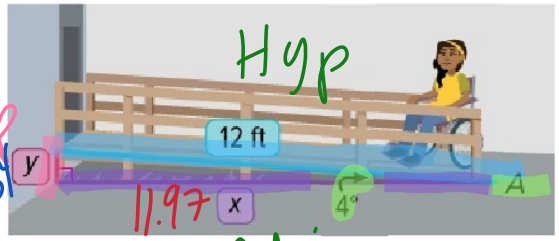
## Example 3
Estimate Measures by Using Trigonometry

**ACCESSIBILITY** Mathias builds a ramp so his sister can access the back door of their house. The 12-foot ramp to the house slopes upward from the ground at a 4° angle. What is the horizontal distance between the foot of the ramp and the house? What is the height of the ramp?




Hyp
opp
0.84
11.97
adj

$\cos 4 = \frac{x}{12}$ (12)

$12(\cos 4) = x$

$11.97 = x$

$\sin 4 = \frac{y}{12}$ (12)

$12(\sin 4) = y$

$\frac{\text{opp}}{\text{hyp}}$

$0.84 = y$

Students, draw anywhere on this slide!

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## Example 4
Find Angle Measures by Using Inverse Trigonometric Ratios

**Use a calculator to find $m\angle A$ to the nearest tenth.**