Trigonometry

Monday, February 12, 2024 6:21 PM

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Lesson

Lesson 9.3/9.4
Trigonometry
Workbook pages 145-147 and 155-158

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

Content Objective
Students will solve real-world problems using the trigonometric ratios and their inverses.

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

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.

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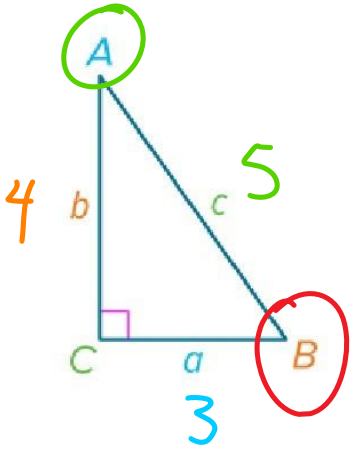
Trigonometry

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).

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



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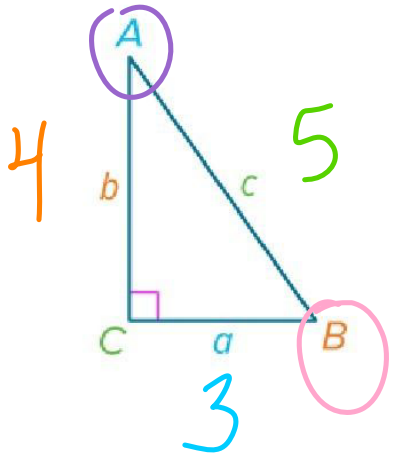
Cosine: If $\triangle ABC$ is a right triangle, then the cosine of each acute angle in $\triangle ABC$ is the ratio of the length of the leg adjacent to that angle (adj) to the length of the hypotenuse (hyp).



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

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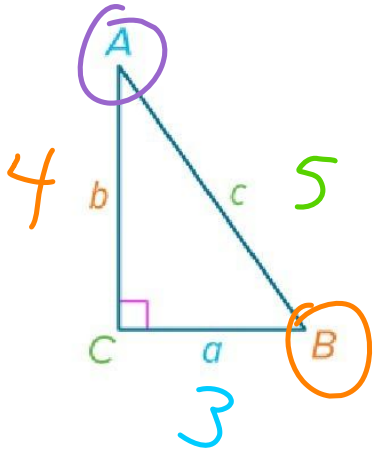
Tangent: If $\triangle ABC$ is a right triangle, then the tangent of each acute angle in $\triangle ABC$ is the ratio of the length of the leg opposite that angle (opp) to the length of the leg adjacent to that angle (adj).



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

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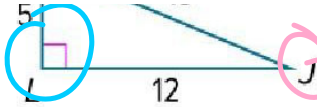
Example 1
Find Trigonometric Ratios

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.

Sin J = opp/hyp 5/13

Tan J Adj 5/12



Cos J = Adj 12 / Hyp 13

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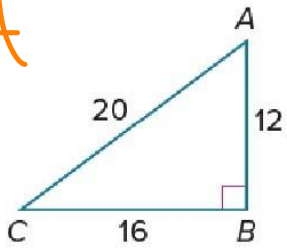
Example 1
Find Trigonometric Ratios

Check SOH CAH TOA

Find sin *A*, cos *A*, tan *A*, sin *C*, cos *C*, and tan *C*.

Express each ratio as a fraction and as a decimal to the nearest hundredth, if necessary.



Sin opp/hyp

Cos adj/hyp

Tan = opp/adj

Sin C = 12/20 6/10 3/5

Cos C = 16/20 8/10 = 4/5 = 0.8

Tan A = 16/12 C

4/3 = 1.3

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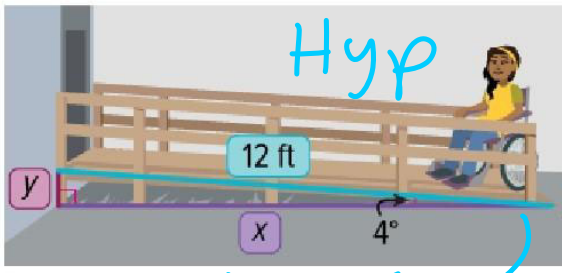
Tan C = 12/16 3/4 0.75

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?**



Adj CO

12 (Cos 4 = x/12) 12

11.7+ 12(cos 4) = x

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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 height of the ramp?

opp hyp

11.97

12(sin 4 = y/12)12

12(sin 4) = y

0.84

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Learn

Inverse Trigonometric Ratios

Key Concept: Inverse Trigonometric Ratios

Inverse Sine	Inverse Cosine	Inverse Tangent
	Words	
If $\angle A$ is an acute angle and the sine of A is x, then the **inverse sine** of x is the measure of $\angle A$.	If $\angle A$ is an acute angle and the cosine of A is x, then the **inverse cosine** of x is the measure of $\angle A$.	If $\angle A$ is an acute angle and the tangent of A is x, then the **inverse tangent** of x is the measure of $\angle A$.
	Symbols	
If $\sin A = x$, then $\sin^{-1} x = m\angle A$.	If $\cos A = x$, then $\cos^{-1} x = m\angle A$.	If $\tan A = x$, then $\tan^{-1} x = m\angle A$.

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Example 4