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Geometry

Trigonometric Ratios on the Coordinate Plane

Benchmarks

MA.912.T.1.1

Define trigonometric ratios for acute angles in right triangles.

MA.912.T.1.2

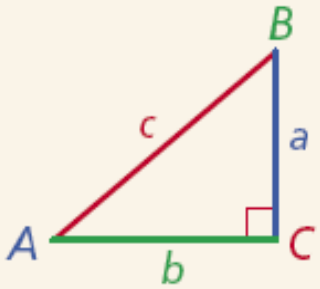
Solve mathematical and real-world problems involving right triangles using trigonometric ratios and the Pythagorean Theorem.

🎯 Learning Target

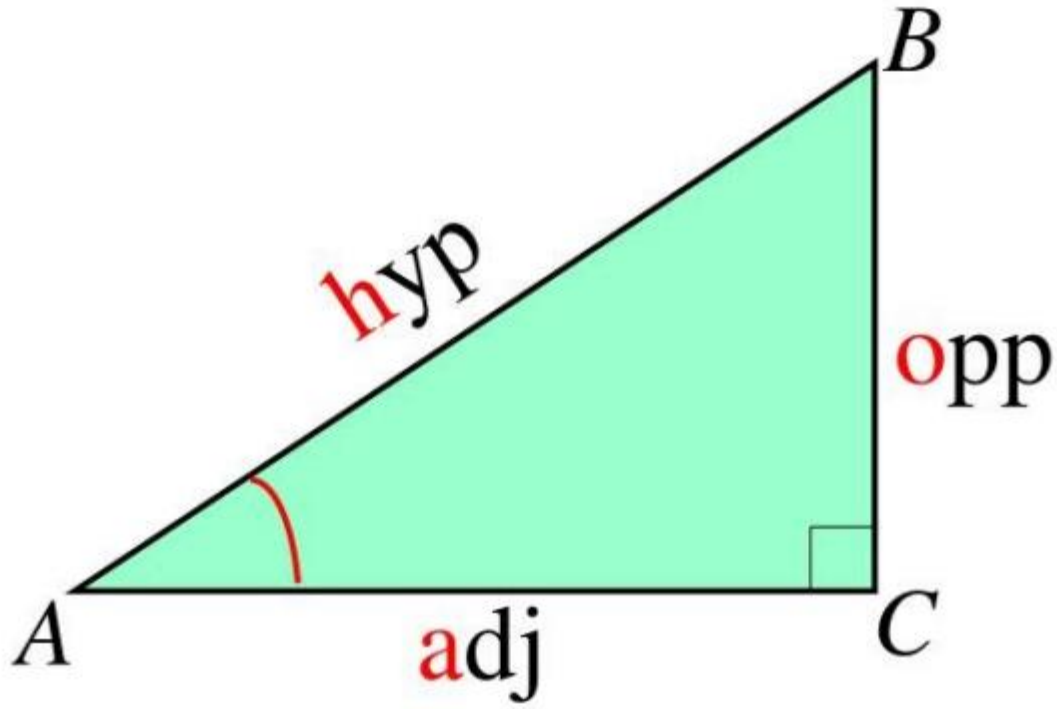
- ❑ I can determine trigonometric ratios using the coordinate plane.

Guided Instruction

Trigonometric Ratios

DEFINITION	SYMBOLS	DIAGRAM
The **sine** of an angle is the ratio of the length of the leg opposite the angle to the length of the hypotenuse.	$\sin A = \frac{\text{opposite leg}}{\text{hypotenuse}} = \frac{a}{c}$ $\sin B = \frac{\text{opposite leg}}{\text{hypotenuse}} = \frac{b}{c}$	
The **cosine** of an angle is the ratio of the length of the leg adjacent to the angle to the length of the hypotenuse.	$\cos A = \frac{\text{adjacent leg}}{\text{hypotenuse}} = \frac{b}{c}$ $\cos B = \frac{\text{adjacent leg}}{\text{hypotenuse}} = \frac{a}{c}$	
The **tangent** of an angle is the ratio of the length of the leg opposite the angle to the length of the leg adjacent to the angle.	$\tan A = \frac{\text{opposite leg}}{\text{adjacent leg}} = \frac{a}{b}$ $\tan B = \frac{\text{opposite leg}}{\text{adjacent leg}} = \frac{b}{a}$	

SOH
CAH
TOA

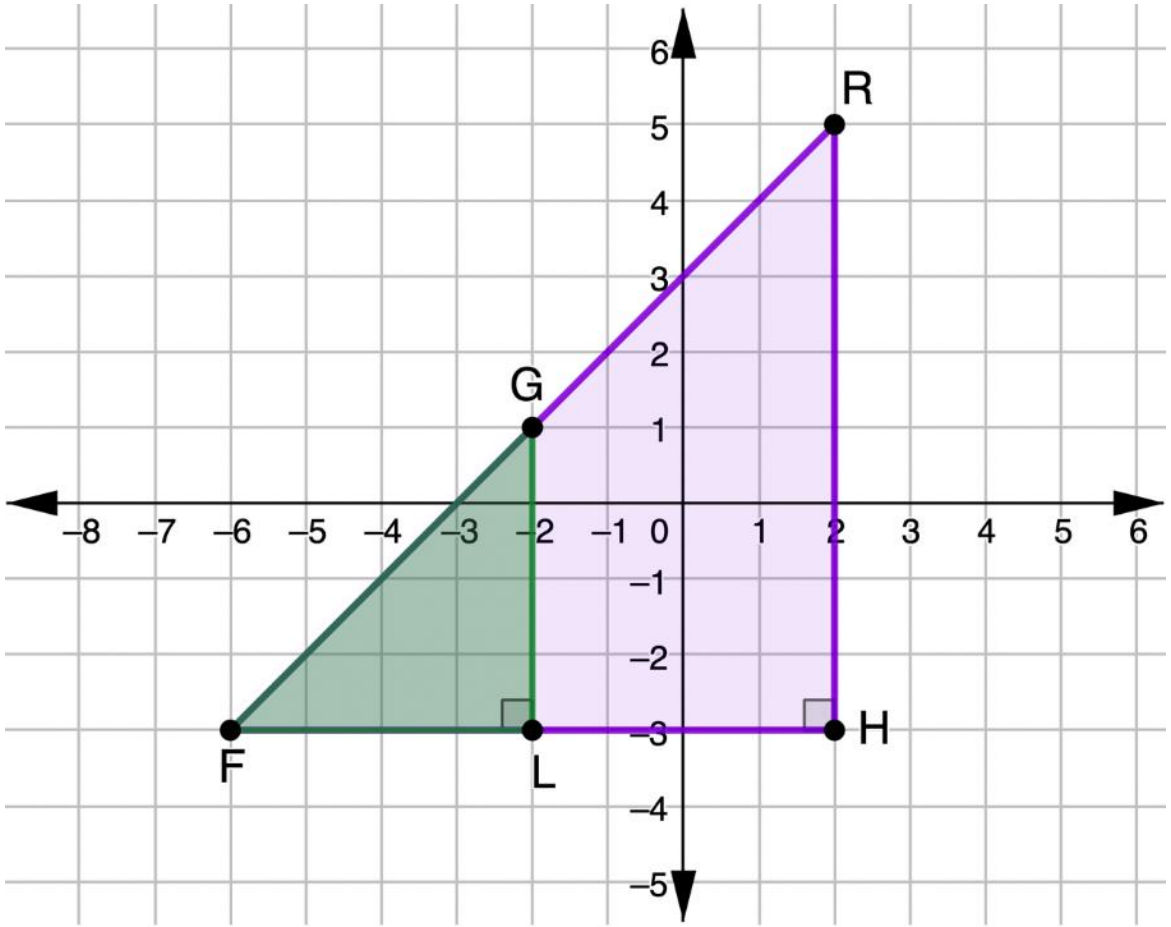


$$\sin A = \frac{\text{opp}}{\text{hyp}} \qquad \cos A = \frac{\text{adj}}{\text{hyp}} \qquad \tan A = \frac{\text{opp}}{\text{adj}}$$

$$A = \sin^{-1}\left(\frac{\text{opp}}{\text{hyp}}\right) \qquad A = \cos^{-1}\left(\frac{\text{adj}}{\text{hyp}}\right) \qquad A = \tan^{-1}\left(\frac{\text{opp}}{\text{adj}}\right)$$

Guided Instruction: Using Trigonometric Ratios

1. ΔFLG and ΔFHR shown on the coordinate grid are isosceles right triangles.



a. Determine the measure of each angle.

Angle	Measure
$\angle LFG$	
$\angle FGL$	
$\angle FRH$	

b. Using $\angle F$ as the reference angle, find the three ratios for each triangle.

Triangle	Cosine	Sine	Tangent
ΔFLG			
ΔFHR			

c. Use your calculator to find each. Round to the nearest thousandth, if necessary.

Angle	Cosine	Sine	Tangent
$45°$			

d. How are the ratios you found using $\angle F$ as the reference angle related to the values you found for the ratios of a $45°$ angle?

Geogebra Example

Try It Problems