Geometry 8.4

Use right triangles to find trigonometric ratios

Use trig ratios to find angle measures in right triangles

opposite

adjacent

trigonometry $\tan(47)$

ratio

trig ratio

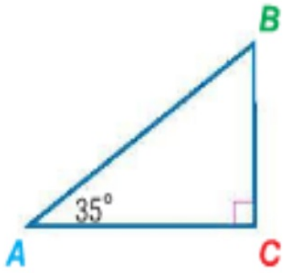
sine $\frac{o}{h}$ $\sin^{-1}$

cosine $\frac{a}{h}$ $\cos^{-1}$ } What is angle?

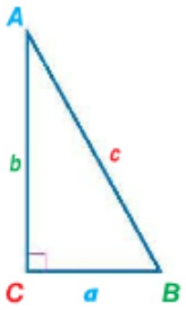
tangent $\frac{o}{a}$ $\tan^{-1}$

inverse function (algebra 1)

SohCahToa



KeyConcept Trigonometric Ratios

Words	Symbols	
If $\triangle ABC$ is a right triangle with acute $\angle A$, then the **sine** of $\angle A$ (written sin A) is the ratio of the length of the leg opposite $\angle A$ (opp) to the length of the hypotenuse (hyp).	$\sin A = \frac{\text{opp}}{\text{hyp}}$ or $\frac{a}{c}$ $\sin B = \frac{\text{opp}}{\text{hyp}}$ or $\frac{b}{c}$	
If $\triangle ABC$ is a right triangle with acute $\angle A$, then the **cosine** of $\angle A$ (written cos A) is the ratio of the length of the leg adjacent $\angle A$ (adj) to the length of the hypotenuse (hyp).	$\cos A = \frac{\text{adj}}{\text{hyp}}$ or $\frac{b}{c}$ $\cos B = \frac{\text{adj}}{\text{hyp}}$ or $\frac{a}{c}$	
If $\triangle ABC$ is a right triangle with acute $\angle A$, then the **tangent** of $\angle A$ (written tan A) is the ratio of the length of the leg opposite $\angle A$ (opp) to the length of the leg adjacent $\angle A$ (adj).	$\tan A = \frac{\text{opp}}{\text{adj}}$ or $\frac{a}{b}$ $\tan B = \frac{\text{opp}}{\text{adj}}$ or $\frac{b}{a}$	

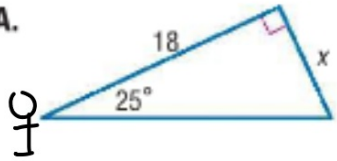
SohCahToa

Make sure your calculator is set to DEGREES

GuidedPractice

Find x to the nearest hundredth.

3A.



3B.

Inverse functions (algebra 1)

ReadingMath

Inverse Trigonometric Ratios

The expression $\sin^{-1} x$ is read *the inverse sine of x* and is interpreted as the angle with sine x. Be careful not to confuse this notation with the notation for negative exponents—

$\sin^{-1} x \neq \frac{1}{\sin x}$.

Instead, this notation is similar to the notation for an inverse function, $f^{-1}(x)$.

$\sin^{-1}(.5) = 30^\circ$

$\sin^{-1}(0.73) \approx 47^\circ$

$\cos^{-1}(0.16) \approx 81^\circ$

2nd (inverse...)

Sin, Cos, tan } ratio

$\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$ } angle

sine=ratio
inverse sine=angle

p. 571

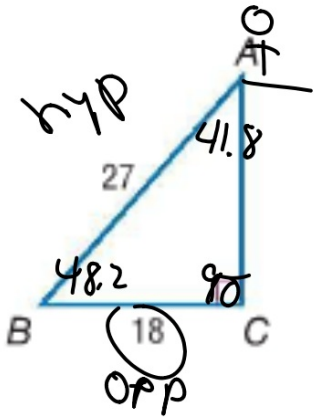
KeyConcept Inverse Trigonometric Ratios

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

Example 4 Find Angle Measures Using Inverse Trigonometric Ratios

Use a calculator to find the measure of $\angle A$ to the nearest tenth.

= Where are you?
= What trig function applies?
= Use inverse to find angles.



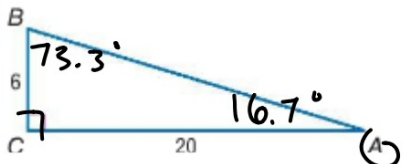
$\sin ? = \frac{18}{27}$

$\sin^{-1}(0.6667) = 41.8^\circ$

GuidedPractice

Use a calculator to find the measure of $\angle A$ to the nearest tenth.

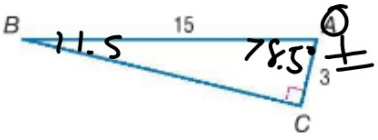
4A.



$\tan ? = \frac{6}{20}$

$\tan^{-1}\left(\frac{6}{20}\right) =$

4B.



$\cos ? = \frac{3}{15}$

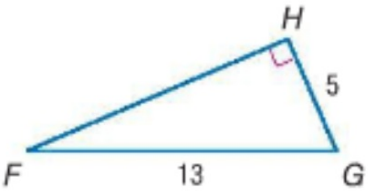
$\cos^{-1}\left(\frac{3}{15}\right)$

Solve the triangle: find all parts (6)

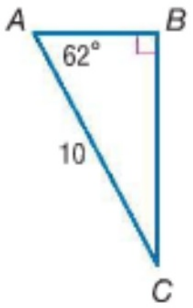
GuidedPractice

Solve each right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.

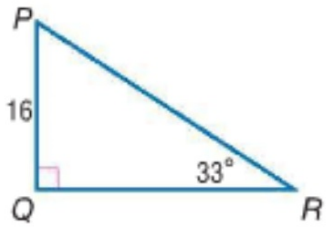
5A.



5B.



5C.



FH =

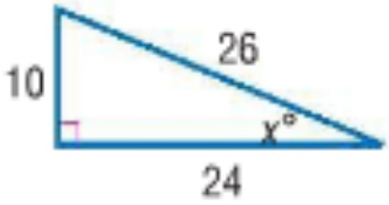
∠F =

∠G =

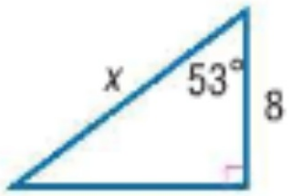
Find x. Round to the nearest tenth, if necessary.

(Lesson 8-4)

13.



14.



15. SKATEBOARDING Lindsey is bui ding a skateboard ramp. She wants tl e ramp to be 1 foot tall at the end and she w ants it to make a 15° angle with the ground. W hat length of board should she buy for the r mp itself? Round to the nearest foot. (Les on 8-4)