Geometry 8.4

Use right triangles to find trigonometric ratios

Use trig ratios to find angle measures in right triangles

opposite

adjacent

trigonometry

ratio

trig ratio

sine

cosine

tangent

inverse function (algebra 1)

SohCahToa

SohCahToa

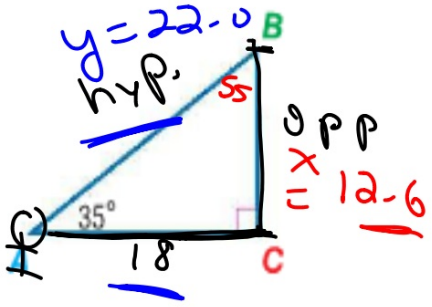
$\tan = \frac{opp}{adj}$

$\frac{\tan 35^\circ}{1} = \frac{x}{18}$

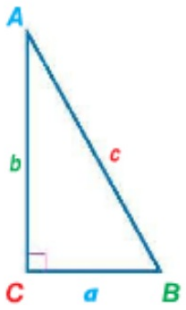
$x = \cos = \frac{adj}{hyp}$

$\frac{\cos 35^\circ}{1} = \frac{18}{y}$

$\frac{18}{0.8192} = \frac{y(0.8192)}{0.8192}$



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

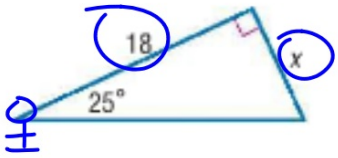
Make sure your calculator is set to DEGREES

Whiteboards

GuidedPractice SohCahToa cos = adj/hyp

Find x to the nearest hundredth.

3A.

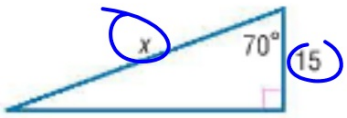


$\tan 25 = \frac{x}{18}$

$x = 18 \tan 25$

≈ 8.39

3B.



$\cos 70 = \frac{15}{x}$

$x(0.3420) = 15$

$x \approx 43.86$

sine=ratio
inverse sine=angle

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 $\tan^{-1} x = m\angle A$.

Find angle ( )$^{-1}$

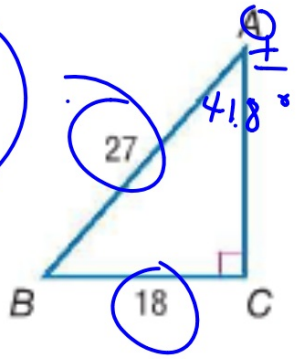
Example 4 Find Angle Measures Using Inverse Trigonometric Ratios

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.

$\cos^{-1}$

$\sin^{-1}\left(\frac{18}{27}\right)$



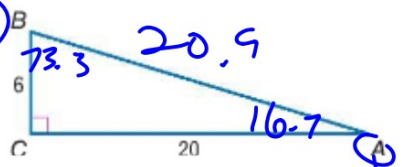
$\sin^{-1}\left(\frac{18}{27}\right)$

$\sin^{-1}\left(\frac{2}{3}\right)$

GuidedPractice Solve

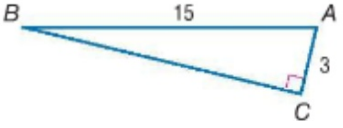
Use a calculator to find the ~~measure of $\angle A$~~ to the nearest tenth.

4A.



20.9
73.3
16.7

4B.



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

$6^2+20^2=h^2$

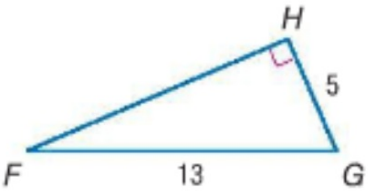
436

Solve the triangle: find all parts (6)

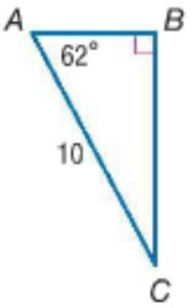
GuidedPractice

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

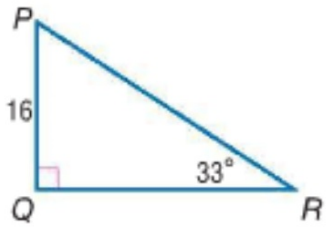
5A.



5B.



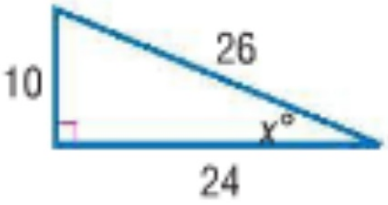
5C.



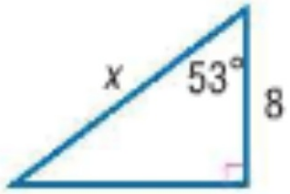
Find x. Round to the nearest tenth, if necessary.

(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)