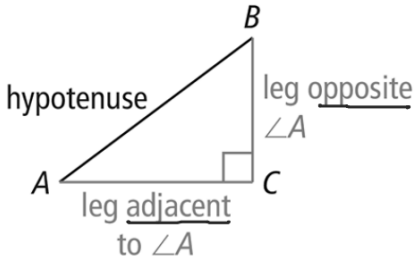
Trignometric Ratios



Sine = $\frac{\text{opposite}}{\text{Hypotenuse}}$

sin

$\sin A = \frac{BC}{AB}$

Cosine = $\frac{\text{Adjacent}}{\text{Hypotenuse}}$

cos

$\cos A = \frac{AC}{AB}$

Tangent = $\frac{\text{opposite}}{\text{Adjacent}}$

tan

$\tan A = \frac{BC}{AC}$

SOH-CAH-TOA

Sin Opp Hypot — Cos Adj Hypot — Tan Opp Adj

What are the sine, cosine, and tangent ratios for $\angle H$?

SOLUTION

$\sin H = \frac{12}{15} = \frac{4}{5}$

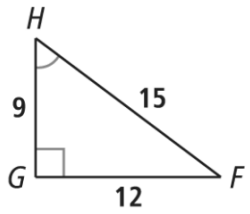
$\cos H = \frac{9}{15} = \frac{3}{5}$

$\tan H = \frac{12}{9} = \frac{4}{3}$

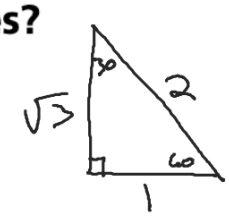
$\sin F = \frac{9}{15}$

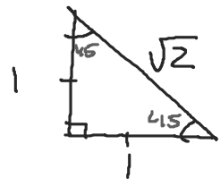
$\cos F = \frac{12}{15}$

$\tan F = \frac{9}{12}$



A. What are the sine, cosine, and tangent ratios for 30°, 45°, and 60° angles?





$\sin 30° = \frac{1}{2}$

$\cos 30° = \frac{\sqrt{3}}{2}$

$\tan 30° = \frac{1}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

$\sin 60° = \frac{\sqrt{3}}{2}$

$\cos 60° = \frac{1}{2}$

$\tan 60° = \sqrt{3}$

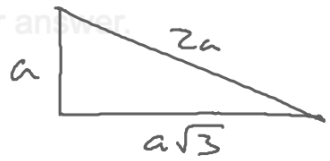
$\sin 45° = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\cos 45° = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\tan 45° = \frac{1}{1} = 1$

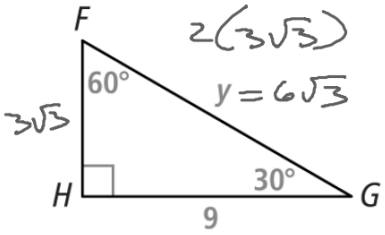
How are the sine and cosine of complementary angles related?

In $\triangle FGH$, what is the value of y?



$FH = \frac{9}{\sqrt{3}} = \frac{9\sqrt{3}}{3}$

$= 3\sqrt{3}$



$y(\sin 60^\circ) = \left(\frac{9}{y}\right)y$

$y\frac{\sin 60^\circ}{\sin 60^\circ} = \frac{9}{\sin 60^\circ}$

$y = \frac{9}{\sin 60^\circ}$

3. b. How can you write an equivalent expression for cos 70° using sine? An equivalent expression for sin 34° using cosine?

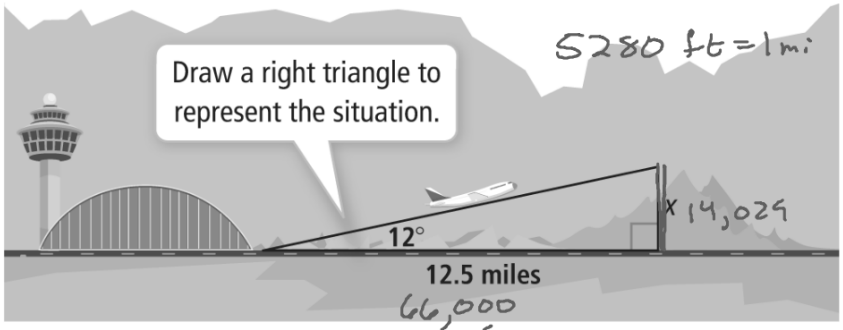
$\cos 70^\circ = \sin 20^\circ$

~~.633 = .633~~

.34

$\sin 34^\circ = \cos 56^\circ$

A plane takes off and climbs at a 12° angle. Is that angle sufficient enough to fly over an 11,088-foot mountain that is 12.5 miles from the runway or does the plane need to increase its angle of ascent?



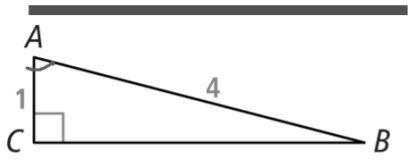
$(66{,}000)(\tan 12^\circ) = \left(\frac{x}{66{,}000}\right)(66{,}000)$

$66{,}000 \tan 12 = x$

$x = 14{,}029$

Yes 12° is a sufficient angle

What are $m\angle A$ and $m\angle B$?



SOLUTION

$\cos A = \frac{1}{4}$

$\cos^{-1}\left(\frac{1}{4}\right) = m\angle A$

$m\angle A = 75.5^\circ$

$\sin B = \frac{1}{4}$

$\sin^{-1}\left(\frac{1}{4}\right) = m\angle B$

$m\angle B = 14.5^\circ$

Use Inverse Sin Cos Tan to find angle measure

$\sin^{-1}$ → Inverse Sine

$\cos^{-1}$ → Inverse cosine

$\tan^{-1}$ → Inverse tangent

5. a. What is $m\angle P$?

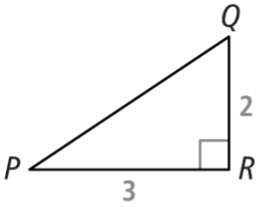
Enter your answer

$\tan P = \frac{2}{3}$

$\tan^{-1} \frac{2}{3} = m\angle P$

$m\angle P = 33.7^\circ$

CHECK ANSWER



$\tan^{-1} \frac{3}{2} = m\angle Q$

b. What is $m\angle Q$?

$90 - 33.7 = 56.3^\circ$

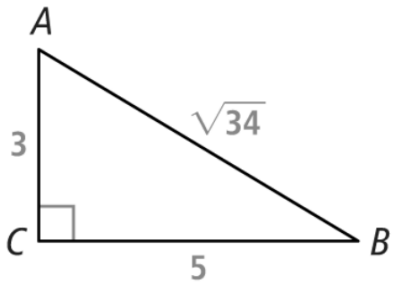
7. Use $\triangle ABC$ to find the trigonometric ratio for tan B.

$\tan B = \frac{3}{5}$

$\cos B = \frac{5}{\sqrt{34}}$

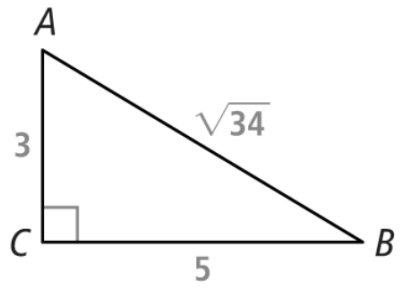
$\sin B = \frac{3}{\sqrt{34}}$

Enter your answer.



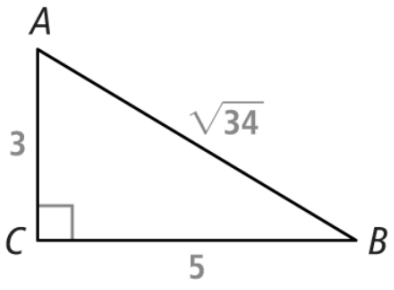
8. Use $\triangle ABC$ to find the trigonometric ratio for cos B.

Enter your answer.



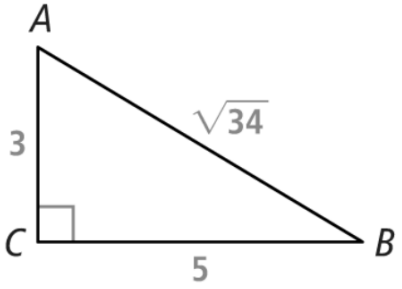
9. Use $\triangle ABC$ to find the trigonometric ratio for sin A.

Enter your answer.



10. Use $\triangle ABC$ to find the trigonometric ratio for tan A.

Enter your answer.

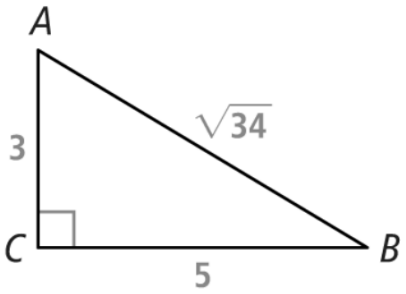


Use $\triangle ABC$ to find $m\angle B$.

$\tan^{-1}\left(\frac{3}{5}\right)$ $\cos^{-1}\left(\frac{5}{\sqrt{34}}\right)$ $\sin^{-1}\left(\frac{3}{\sqrt{34}}\right)$

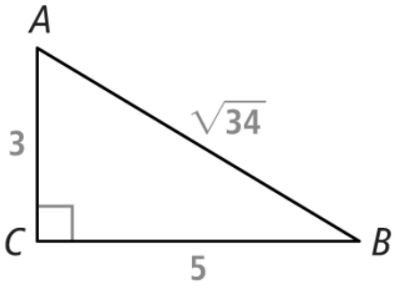
Enter your answer.

$m\angle B = 31^\circ$

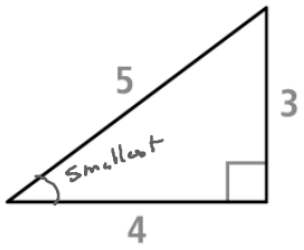


12. Use $\triangle ABC$ to find $m\angle A$.

Enter your answer.

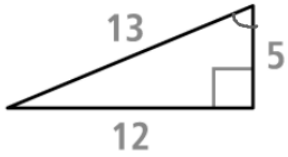


13. What are the sine and cosine of the smallest angle in the right triangle shown?



Enter your answer.

14. What is the measure of the largest acute angle in the right triangle shown?



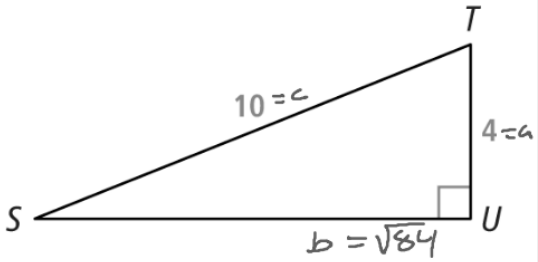
15. ~~In the figure shown, what are $m\angle S$ and $m\angle T$?~~

$\sin T = \frac{\sqrt{84}}{10} = \frac{2\sqrt{21}}{10} = \frac{\sqrt{21}}{5}$

$\cos T = \frac{4}{10} \qquad \frac{2}{5}$

$\tan T = \frac{\sqrt{84}}{4} \quad \frac{2\sqrt{21}}{4} = \frac{\sqrt{21}}{2}$

Enter your answer.



$a^2 + b^2 = c^2$

$4^2 + b^2 = 10^2$

$16 + b^2 = 100$

$b^2 = 84$

$b = \sqrt{84}$