

Verify each of the following trigonometric expressions.

1. $\cot x \cos x + \sin x = \csc x$
2. $\frac{\tan x}{\sec x + 1} = \csc x - \cot x$
3. $\frac{1 - \cos x}{\sin x} + \frac{\sin x}{1 - \cos x} = 2 \csc x$
4. $\tan x (\cot x + \tan x) = \sec^2 x$
5. $\sec x \sin x \cot x = 1$
6. $\cos x (\sec x - \cos x) = \sin^2 x$
7. $\sec^2 x - \tan^2 x = 1$
8. $\frac{\tan^2 x}{\tan^2 x + 1} = \sin^2 x$

Find the exact value for each of the following:

9. $\cos 165^\circ$
10. $\sin\left(\frac{\pi}{6} + \frac{\pi}{4}\right)$
11. $\sin 15^\circ + \cos 75^\circ$

Write each of the following as a single trigonometric expression.

12. $\sin 8x \cos 2x + \cos 8x \sin 2x$
13. $\cos(7x) \cos(x) + \sin(7x) \sin(x)$

Draw picture, then evaluate.

14. Given $\cos \alpha = \frac{-8}{17}$ in Quadrant II, $\tan \beta = \frac{5}{12}$ in Quadrant III, find: $\sin(\alpha + \beta)$ and $\cos(\alpha - \beta)$

Verify the following trigonometric expressions:

15. $\sin\left(x - \frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}(\sin x - \cos x)$
16. $\cos(x + \pi) = -\cos x$

Use the Law of Sines to solve the following problems. Round all answers to the nearest hundredth.

17. In $\triangle RST$, $m\angle R = 42^\circ$, $t = 12$ in, and $r = 14$ in. Find $m\angle T$.
18. Two people are walking toward each other on the beach. A plane flies directly above the beach between them. One of the walkers, a female, sees the plane when looking east at an angle of elevation of 56° . The other walker, a male, sees the plane looking west at an angle of elevation of 82° . If the walkers are 67 yards apart, how far is the plane from the female observer? Draw a triangle to represent the problem. Round your answer to the nearest hundredth.

Use the Law of Cosines to solve the following problems. Round all answers to the nearest hundredth.

19. In $\triangle RST$, $r = 14$ cm, $s = 11$ cm and $t = 7$ cm. Find $m\angle R$.
20. In $\triangle ABC$, $A = 31^\circ$, $b = 30$ mm, $c = 40$ mm. Find a .
21. Use Law of Sines to find B in #20.
22. You are heading to Beech Mountain for a ski trip. Unfortunately, state road 105 in North Carolina is blocked off due to a chemical spill. You have to get to Tynecastle Highway which leads to the resort at which you are staying. NC-105 would get you to Tynecastle Hwy in 12.8 miles. The detour begins with an 18° veer off onto a road that runs through the local city. After 6 miles, there is another turn that leads to Tynecastle Hwy. Assuming that both roads on the detour are straight, how many extra miles are you traveling to reach your destination? Assuming the new path creates a triangle with state road 105, what would the **area** of the triangle be?

