

Proving and Using Trigonometric Identities

Grade 12 – Precalculus math · Test · Standards: F-TF.C.8, F-TF.C.9

Name: _____ Date: _____ Class: _____

This 45-minute test has 8 questions worth 20 points. It covers simplifying, identities from the unit circle, verifying identities, exact values from sum formulas, double-angle values and equations. Show every step.

Standards: F-TF.C.8, F-TF.C.9 · **Level:** Grade 12 Precalculus

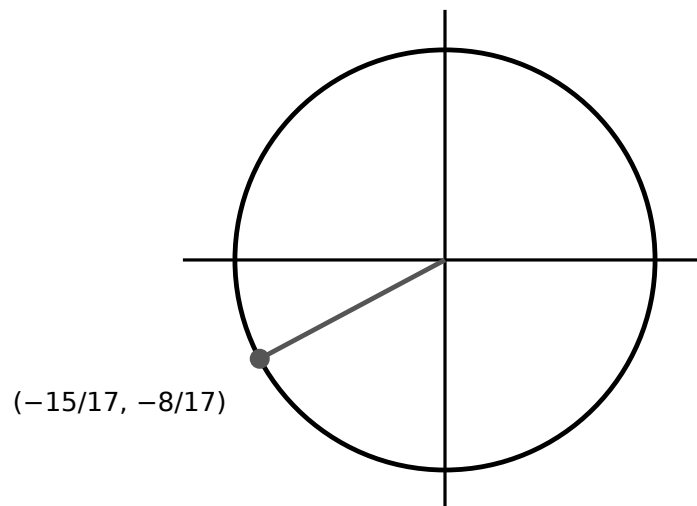
Time: 45 minutes · 8 questions · Total: 20 points · Calculator: as allowed by your teacher

Question 1 Simplify Expressions (2 points)

Simplify. (a) $\cos x(\sec x - \cos x)$ (1 point) (b) $(1 + \tan^2 x) \cos^2 x$ (1 point)

Question 2 Find Cosine and Tangent (2 points)

Angle θ lies in Quadrant III and $\sin \theta = -8/17$. Find $\cos \theta$ and $\tan \theta$.



A point in Quadrant III.

Question 3 Verify an Identity (3 points)

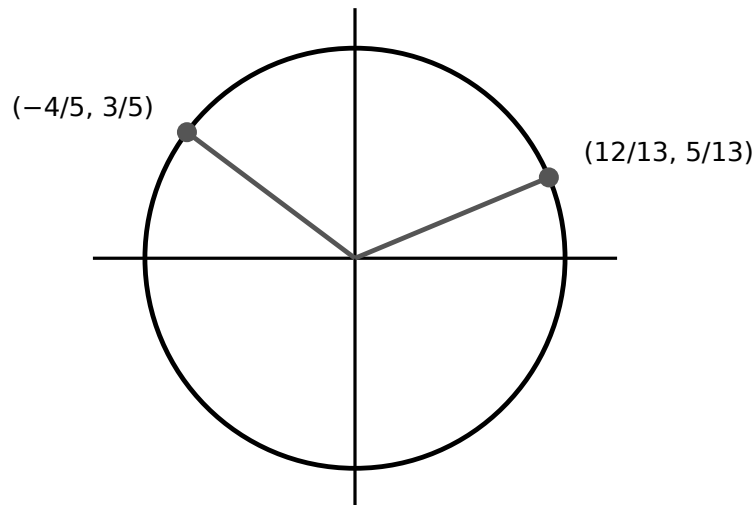
Verify that $\frac{(\sin x)}{(1 - \cos x)} = \frac{(1 + \cos x)}{(\sin x)}$.

Question 4 Exact Values from Sum Formulas (3 points)

(a) Find the exact value of $\cos 105^\circ$, using $105^\circ = 60^\circ + 45^\circ$. (2 points) (b) Find the exact value of $\tan(\pi/12)$, using $\pi/12 = \pi/3 - \pi/4$. (1 point)

Question 5 Sum of Two Angles from a Graph (3 points)

The unit circle shows point P at angle α and point Q at angle β .



Points P (angle α) and Q (angle β).

- Read $\sin$ and $\cos$ of α and β from the coordinates. (1 point)
- Find $\sin(\alpha + \beta)$. (1 point)
- Find $\cos(\alpha + \beta)$. (1 point)

Question 6 Double-Angle Values (2 points)

Angle θ lies in Quadrant II and $\sin \theta = 4/5$. Find $\sin 2\theta$ and $\cos 2\theta$.

Question 7 Verify with Double Angles (3 points)

Verify that $\frac{(\sin 2x)}{(1 + \cos 2x)} = \tan x$.

Question 8 Solve a Double-Angle Equation (2 points)

Solve $\cos 2x = \sin x$ on $[0, 2\pi)$. Use $\cos 2x = 1 - 2\sin^2 x$.