

Precalculus · Trigonometric Identities · Test Answer Key

Common Core F-TF.C.8, F-TF.C.9 · mathovore.fr

This precalculus trig identities test answer key gives the full solution and the scoring guide for each of the 8 test questions on trigonometric identities.

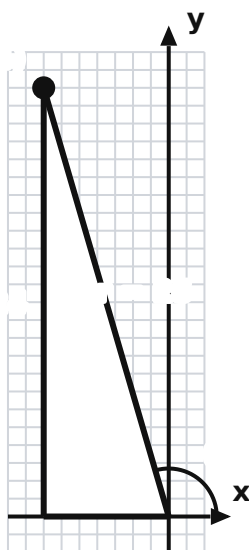
Worked solutions with a scoring guide for every question. Award each point only for the step named in the scoring line, and accept any equivalent exact form such as a rationalized or combined radical.

Precalculus Common Core: F-TF.C.8 · F-TF.C.9

Precalculus Trig Identities Test Answer Key: questions 1-5

Question 1: Six functions from a point (3 points)

- a. $r = \sqrt{49 + 576} = 25$, so $\sin \theta = \frac{24}{25}$, $\cos \theta = -\frac{7}{25}$
- b. $\tan \theta = -\frac{24}{7}$, $\sec \theta = -\frac{25}{7}$
- c. $\frac{576}{625} + \frac{49}{625} = \frac{625}{625} = 1$. **Shown.**



Reference triangle: 7, 24, 25.

Scoring: 1 point for each part; in (a) and (b) both values must be correct.

Question 2: Values from a Pythagorean identity (2 points)

- a. $\cos^2\theta = 1 - \frac{81}{1681} = \frac{1600}{1681}$; cosine is positive in Quadrant IV, so $\cos\theta = \frac{40}{41}$
b. $\tan\theta = \frac{-9/41}{40/41} = -\frac{9}{40}$

Scoring: 1 point for each part; part (a) needs the correct sign.

Question 3: Simplify (2 points)

- a. $\tan^2\theta \cos^2\theta = \frac{\sin^2\theta}{\cos^2\theta} \cdot \cos^2\theta = \sin^2\theta$
b. $\frac{\sin\theta}{\sin^2\theta} = \frac{1}{\sin\theta} = \csc\theta$

Scoring: 1 point for each correct simplification.

Question 4: Verify an identity (3 points)

Start with the right side and multiply top and bottom by $1 + \sin\theta$:

$$\frac{\cos\theta(1+\sin\theta)}{(1-\sin\theta)(1+\sin\theta)} = \frac{\cos\theta(1+\sin\theta)}{1-\sin^2\theta} = \frac{\cos\theta(1+\sin\theta)}{\cos^2\theta} = \frac{1+\sin\theta}{\cos\theta}, \text{ which is the left side. Verified.}$$

Scoring: 1 point for multiplying by the conjugate, 1 point for using $1 - \sin^2\theta = \cos^2\theta$, 1 point for cancelling and matching the left side.

Question 5: Exact value of $\sin 105^\circ$ (2 points)

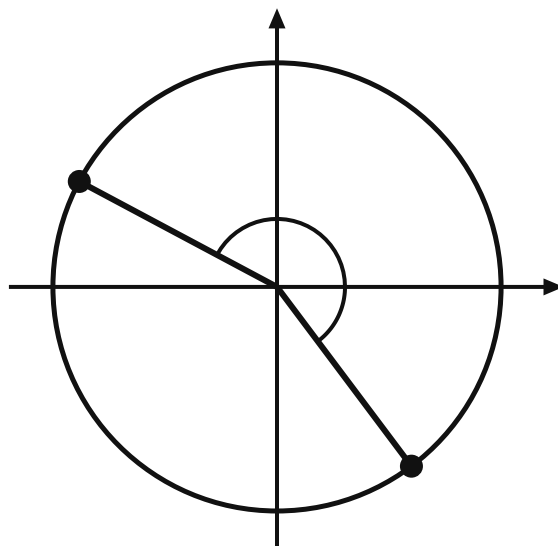
$$105^\circ = 60^\circ + 45^\circ. \sin 105^\circ = \frac{\sqrt{3}}{2} \cdot \frac{\sqrt{2}}{2} + \frac{1}{2} \cdot \frac{\sqrt{2}}{2} = \frac{\sqrt{6} + \sqrt{2}}{4} \text{ (about 0.966).}$$

Scoring: 1 point for a valid split with the correct sum formula, 1 point for the exact simplified result.

Precalculus Trig Identities Test Answer Key: questions 6-8

Question 6: Difference formulas (3 points)

- a. $\cos A = -\frac{15}{17}$ and $\sin B = -\frac{4}{5}$
b. $\cos(A-B) = \cos A \cos B + \sin A \sin B = -\frac{45}{85} - \frac{32}{85} = -\frac{77}{85}$
c. $\sin(A-B) = \sin A \cos B - \cos A \sin B = \frac{24}{85} - \frac{60}{85} = -\frac{36}{85}$

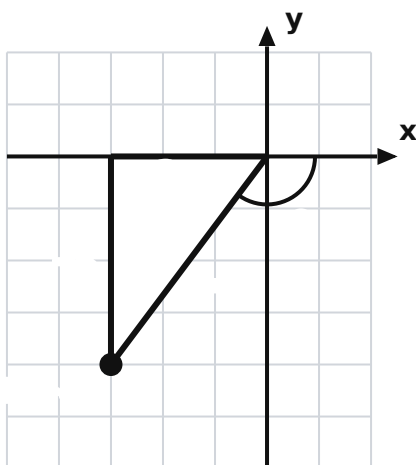


A and B for reference.

Scoring: 1 point for each part; (a) needs both values with correct signs.

Question 7: Double angle from a tangent (3 points)

- $\sec^2\theta = 1 + \frac{16}{9} = \frac{25}{9}$, $\cos\theta < 0$ in Quadrant III, so $\cos\theta = -\frac{3}{5}$ and $\sin\theta = -\frac{4}{5}$
- $\sin 2\theta = 2\left(-\frac{4}{5}\right)\left(-\frac{3}{5}\right) = \frac{24}{25}$, $\cos 2\theta = \frac{9}{25} - \frac{16}{25} = -\frac{7}{25}$
- $\frac{\sin 2\theta}{\cos 2\theta} = \frac{24/25}{-7/25} = -\frac{24}{7}$ and $\frac{2 \cdot \frac{4}{3}}{1 - \frac{16}{9}} = \frac{8/3}{-7/9} = -\frac{24}{7}$. Both agree.



Reference triangle: 3, 4, 5.

Scoring: 1 point for each part; (c) needs both methods.

Question 8: Prove a double-angle identity (2 points)

Start with the right side and rewrite the tangent: $\frac{1 - \frac{\sin^2 \theta}{\cos^2 \theta}}{1 + \frac{\sin^2 \theta}{\cos^2 \theta}}$. Multiply top and bottom by $\cos^2 \theta$ to get $\frac{\cos^2 \theta - \sin^2 \theta}{\cos^2 \theta + \sin^2 \theta} = \frac{\cos^2 \theta - \sin^2 \theta}{1} = \cos 2\theta$. **Proved.**

Scoring: 1 point for rewriting in sine and cosine and clearing the fractions, 1 point for using the Pythagorean identity and the double-angle formula.

Scoring summary

Total
20 points: add the points of every question of this precalculus trig identities test answer key.

How to use this precalculus trig identities test answer key

Use this precalculus trig identities test answer key to score the test fairly and to see which skills need more practice.

