

Calculus 1 - Trig Identities Worksheet

Name: _____ Date: _____

Basic Angle Reference

Use the sine row and the sine-cosine relationship to complete cosine. Then use $\tan \theta = \sin \theta / \cos \theta$.

	0°	30°	45°	60°	90°
Radians	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
Sine	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
Cosine					
Tangent					

Remember: $\cos \theta = \sin(90^\circ - \theta)$, and $\tan 90^\circ$ is undefined because $\cos 90^\circ = 0$.

Bell Work - Thursday Review

Keep Thursday classwork/homework on your desk for the teacher to check.

1. Write $\sin(\alpha - \beta)$.
2. Write $\cos(\alpha + \beta)$.
3. Find $\cos 75^\circ$ exactly.
4. Complete the cosine and tangent rows in the reference table.

Part I - Sum & Difference Review

1. Find $\sin 105^\circ$ exactly.
2. Find $\cos 15^\circ$ exactly.
3. Find $\sin 165^\circ$ exactly.
4. Given $\sin A = 8/17$ and $\cos B = 12/13$, where A and B are acute, find $\sin(A - B)$.

Practice A - Independent Check

Work independently.

1. Find $\cos 105^\circ$ exactly.

2. Find $\sin 135^\circ$ exactly.

3. Given $\cos A = 5/13$ and $\sin B = 3/5$, with A and B acute, find $\sin(A + B)$.

4. Given $\sin A = 5/13$ and $\cos B = 3/5$, with A and B acute, find $\cos(A - B)$.

Part II - Derive the Tangent Sum & Difference Identities

Start with $\tan \theta = \sin \theta / \cos \theta$.

$$\begin{aligned}\tan(\alpha + \beta) &= \sin(\alpha + \beta) / \cos(\alpha + \beta) \\ &= \end{aligned}$$

Divide every term in the numerator and denominator by $\cos \alpha \cos \beta$.

$$\tan(\alpha + \beta) =$$

$$\tan(\alpha - \beta) =$$

What sign pattern do you notice?

Part III - Tangent Practice

5. Find $\tan 75^\circ$ exactly.

6. Find $\tan 15^\circ$ exactly.

Practice B - Independent Tangent Check

Try these without help first.

1. Find $\tan 105^\circ$ exactly.

2. Find $\tan 30^\circ$ using the reference table.

3. If $\tan A = 1/3$ and $\tan B = 1/2$, find $\tan(A + B)$.

Part IV - What If the Two Angles Are the Same?

Let $\alpha = \beta = x$ in each sum identity.

$$\sin(x + x) =$$

$$\sin(2x) =$$

$$\cos(x + x) =$$

$$\cos(2x) =$$

$$\tan(x + x) =$$

$$\tan(2x) =$$

Using $\sin^2 x + \cos^2 x = 1$, write two more forms of $\cos(2x)$.

$$\cos(2x) =$$

$$\cos(2x) =$$

Part V - Double-Angle Practice

7. If $\sin x = 3/5$ and x is acute, find $\sin(2x)$.

8. Under the same condition, find $\cos(2x)$.

9. If $\tan x = 1/2$, find $\tan(2x)$.

10. If $\sin x = 4/5$, find $\cos(2x)$ without finding $\cos x$.

11. If $\cos x = -3/5$ and x is in Quadrant II, find $\sin(2x)$.

Practice C - Independent Double-Angle Check

1. If $\cos x = 12/13$ and x is acute, find $\sin(2x)$.

2. If $\cos x = 4/5$, find $\cos(2x)$ without finding $\sin x$.

3. If $\tan x = 1/3$, find $\tan(2x)$.

4. If $\sin x = 5/13$ and x is acute, find both $\sin(2x)$ and $\cos(2x)$.

Homework - Cumulative Practice

1. Find $\sin 135^\circ$ exactly.
2. Find $\cos 165^\circ$ exactly.
3. Find $\tan 105^\circ$ exactly.
4. Given $\cos A = 12/13$ and $\sin B = 8/17$, where A and B are acute, find $\cos(A + B)$.
5. If $\tan x = 2/3$, find $\tan(2x)$.
6. If $\sin x = 8/17$ and x is acute, find $\sin(2x)$.
7. Under the same condition, find $\cos(2x)$.
8. If $\cos x = 7/25$, find $\cos(2x)$ without finding $\sin x$.
9. Use the sine sum identity to show why $\sin(2x) = 2\sin x \cos x$.
10. Explain why the three forms of $\cos(2x)$ are equivalent.