SM 3H

8.3 Sum & Difference Identities for Cosine

2023-2024

SCORE: /

Name ____________________ Date ______________ Period __________

Find the exact values (leave in terms of π) of the following sums or differences.

1. $\frac{3\pi}{4}+\frac{\pi}{3}$

2. $\frac{\pi}{4}-\frac{\pi}{3}$

3. $\frac{\pi}{2}-\frac{\pi}{6}$

Express each given angle as $\alpha+\beta$ *or* $\alpha-\beta$**, where** $\cos\alpha$ *and* $\cos\beta$ **are known exactly.**

4. $75°$

5. $165°$

6. $\frac{\pi}{12}$

7. $\frac{5\pi}{12}$

Use appropriate identities to find the exact value of each expression. You can use a unit circle.

8. $\cos(15°)$

9. $\cos(105°)$

10. $\cos(165°)$

11. $\cos\left(\frac{13\pi}{12}\right)$

12. $\cos\left(\frac{-\pi}{12}\right)$

13. $\cos\left(\frac{-5\pi}{12}\right)$

Simplify each expression by using the appropriate identities. Do not use a calculator.

14. $\cos(23°)\cos(67°)+\sin(23°)\sin(67°)$

15. $\cos(34°)\cos(13°)+\sin(34°)\sin(13°)$

16. $\cos(5)\cos(6)-\sin(5)\sin(6)$

17. $\cos\left(-\frac{\pi}{2}\right)\cos\left(\frac{\pi}{5}\right)+\sin\left(\frac{\pi}{2}\right)\sin\left(\frac{\pi}{5}\right)$

18. $\cos(3y)\cos(y)-\sin(3y)\sin(y)$

Solve each problem

19. Find the exact value of $\cos(\alpha+\beta)$ if $\sin\alpha=\frac{3}{5}$ and $\sin\beta=\frac{5}{13}$, with α in quadrant II and β in quadrant I.

20. Find the exact value of $\cos(\alpha-\beta)$ if $\sin\alpha=\frac{\sqrt{3}}{2}$ and $\cos\beta=\frac{-\sqrt{2}}{2}$, with α in quadrant I and β in quadrant II.

21. Find the exact value of $\cos(\alpha - \beta)$ if $\sin\alpha = \frac{7}{25}$ and $\cos\beta = \frac{-24}{25}$, with α in quadrant II and β in quadrant III.

Match each expression with an equivalent expression from a-d. Show your work using the <u>cofunction identities</u>!!!

Original Questions	WORK	Answer	Matching Letter
22. $\sin(20°)$			
23. $\cos(90°)$			
24. $\sec\left(\frac{\pi}{6}\right)$			
25. $\sin\left(\frac{5\pi}{12}\right)$			

a) $\csc\left(\frac{\pi}{3}\right)$

b) $\cos(70°)$

c) $\cos\left(\frac{\pi}{12}\right)$

d) $\sin(0°)$

Simplify each expression by applying the odd/even identities, cofunction identities, and cosine of a sum or difference identities. Do not use a calculator. SHOW WORK!

26. $\cos(10°)\cos(20°) + \sin(-10°)\cos(70°)$

27. $\sin(85°)\sin(40°) + \sin(-5°)\sin(-50°)$

Write each expression as a function with α alone. Use the cofunction identities or sum and difference identities. Remember the angle is negative in the cofunction identities.

28. $\tan\left(\frac{\pi}{2}-\alpha\right)$

29. $\cos\left(\frac{\pi}{2}+\alpha\right)$

30. $\sin\left(90°-\left(90°-\alpha\right)\right)$

31. $\cos\left(180°-\alpha\right)$

Verify that each equation is an identity.

32. $\cos\left(x-\frac{\pi}{2}\right)=\cos x\tan x$

33. $\frac{\cos\left(x+y\right)}{\cos x\cos y}=1-\tan x\tan y$

34. $\cos\left(2x\right)=\cos^2 x-\sin^2 x$ **Hint: $2x = x + x$**

35. $\frac{\csc\left(\frac{\pi}{2}-\theta\right)}{\tan\left(-\theta\right)}=-\csc\theta$

Simplify.

36. $\frac{\csc x}{\sec x}\cdot\frac{\csc x}{\sec x}$

37. $\left(1-\sin x\right)\left(1+\sin x\right)$