Compound-angle and double-angle identities worksheet – Grade 12

Grade 12 · Mixed level · 20 questions · **Version X2414**

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1. What is the exact value of $\cos\frac{4\pi}{5}\cos\frac{\pi}{30}-\sin\frac{4\pi}{5}\sin\frac{\pi}{30}$?

   A. $\sqrt{3}$ **B.** $\frac{\sqrt{3}}{2}$ **C.** $\frac{\sqrt{2}}{2}$ **D.** $-\frac{\sqrt{3}}{2}$

2. Work out the exact value of $\cos\frac{3\pi}{20}\cos\frac{\pi}{10}-\sin\frac{3\pi}{20}\sin\frac{\pi}{10}$.

   A. 1 **B.** $\frac{\sqrt{3}}{2}$ **C.** $-\frac{\sqrt{2}}{2}$ **D.** $\frac{\sqrt{2}}{2}$

3. Find the exact value of $\sin\frac{3\pi}{5}\cos\frac{\pi}{15}+\cos\frac{3\pi}{5}\sin\frac{\pi}{15}$.

   A. 0 **B.** $-\frac{\sqrt{2}}{2}$ **C.** $-\frac{1}{2}$ **D.** $\frac{\sqrt{3}}{2}$

4. What is the exact value of $\dfrac{\tan\frac{2\pi}{3}+\tan\frac{\pi}{12}}{1-\tan\frac{2\pi}{3}\tan\frac{\pi}{12}}$?

   A. $-\frac{\sqrt{3}}{3}$ **B.** -1 **C.** $\sqrt{3}$ **D.** 1

5. Work out the exact value of $\sin\frac{2\pi}{7}\cos\frac{\pi}{21}+\cos\frac{2\pi}{7}\sin\frac{\pi}{21}$.

   A. $\frac{\sqrt{3}}{2}$ **B.** $-\frac{\sqrt{3}}{2}$ **C.** $-\frac{1}{2}$ **D.** 0

6. Find the exact value of $\dfrac{\tan\frac{4\pi}{9}+\tan\frac{7\pi}{18}}{1-\tan\frac{4\pi}{9}\tan\frac{7\pi}{18}}$.

   A. $\frac{1}{2}$ **B.** $\frac{\sqrt{2}}{2}$ **C.** $-\frac{\sqrt{3}}{3}$ **D.** $-\frac{\sqrt{3}}{2}$

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7. Work out the exact value of $\sin\frac{\pi}{5}\cos\frac{4\pi}{5}+\cos\frac{\pi}{5}\sin\frac{4\pi}{5}$.

   A. $\frac{1}{2}$ **B.** $\frac{\sqrt{2}}{2}$ **C.** $\sqrt{3}$ **D.** 0

8. Use a compound-angle formula to find the exact value of $\sin\left(\frac{19\pi}{12}\right)$.

   A. $\frac{\sqrt{2}-\sqrt{6}}{4}$ **B.** $\frac{\sqrt{6}-\sqrt{2}}{4}$ **C.** $\frac{\sqrt{6}+\sqrt{2}}{4}$ **D.** $-\frac{\sqrt{6}+\sqrt{2}}{4}$

9. If $\cos x=-\frac{56}{65}$ and $\frac{\pi}{2}<x<\pi$, find the exact value of $\cos 2x$. (Give a fraction.)

   Answer: _____

10. If $\cos x=-\frac{12}{37}$ and $\pi<x<\frac{3\pi}{2}$, find the exact value of $\cos 2x$. (Give a fraction.)

    Answer: _____

11. Use a compound-angle formula to find the exact value of $\cos\left(\frac{5\pi}{12}\right)$.

    A. $\frac{\sqrt{2}-\sqrt{6}}{4}$ **B.** $-\frac{\sqrt{6}+\sqrt{2}}{4}$ **C.** $\frac{\sqrt{6}+\sqrt{2}}{4}$ **D.** $\frac{\sqrt{6}-\sqrt{2}}{4}$

12. Use a compound-angle formula to find the exact value of $\tan\left(\frac{13\pi}{12}\right)$.

    A. $2-\sqrt{3}$ **B.** $-2-\sqrt{3}$ **C.** $-2+\sqrt{3}$ **D.** $2+\sqrt{3}$

13. If $\sin x=-\frac{33}{65}$ and $\pi<x<\frac{3\pi}{2}$, find the exact value of $\sin 2x$. (Give a fraction.)

    Answer: _____

14. Use a compound-angle formula to find the exact value of $\tan\left(\frac{\pi}{12}\right)$.

    A. $2+\sqrt{3}$ **B.** $-2+\sqrt{3}$ **C.** $-2-\sqrt{3}$ **D.** $2-\sqrt{3}$

15. If $\tan a=-1$ and $\tan b=-4$, find the exact value of $\tan(a+b)$. (Give a fraction or whole number.)

    Answer: _____

16. Which expression is identical to $\frac{\sin 2x}{1+\cos 2x}$?

    A. $\sin^2 x$ **B.** $-\cos x$ **C.** $\tan x$ **D.** $\cos^2 x$

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17. $\cos a = \dfrac{60}{61}$ with $0 < a < \dfrac{\pi}{2}$, and $\sin b = \dfrac{9}{41}$ with $0 < b < \dfrac{\pi}{2}$. Find the exact value of $\cos(a + b)$. (Give a fraction.)

    Answer: _____

18. If $\tan a = 2$ and $\tan b = \dfrac{1}{3}$, find the exact value of $\tan(a + b)$. (Give a fraction or whole number.)

    Answer: _____

19. $\cos a = -\dfrac{12}{37}$ with $\pi < a < \dfrac{3\pi}{2}$, and $\cos b = -\dfrac{8}{17}$ with $\dfrac{\pi}{2} < b < \pi$. Find the exact value of $\cos(a - b)$. (Give a fraction.)

    Answer: _____

20. Which expression is identical to $\cos\left(\dfrac{3\pi}{2} - x\right)$?

    A. $\cos x - \sin x$ **B.** $-\sin x$ **C.** $\tan x$ **D.** $2\cos x$

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Answer key · Version X2414

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1. **D (**$-\frac{\sqrt{3}}{2}$**)**
2. **D (**$\frac{\sqrt{2}}{2}$**)**
3. **D (**$\frac{\sqrt{3}}{2}$**)**
4. **B (**-1**)**
5. **A (**$\frac{\sqrt{3}}{2}$**)**
6. **C (**$-\frac{\sqrt{3}}{3}$**)**
7. **D (0)**
8. **D (**$-\frac{\sqrt{6}+\sqrt{2}}{4}$**)**
9. **2047/4225**
10. **-1081/1369**
11. **D (**$\frac{\sqrt{6}-\sqrt{2}}{4}$**)**
12. **A (**$2-\sqrt{3}$**)**
13. **3696/4225**
14. **D (**$2-\sqrt{3}$**)**
15. **5/3**
16. **C (**$\tan x$**)**
17. **2301/2501**
18. **7**
19. **-429/629**
20. **B (**$-\sin x$**)**

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