

5.2 Compound Angle Formulas Worksheet

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1) Use an appropriate compound angle formula to express as a single trig function, and then determine an exact value for each

a) $\sin \frac{\pi}{4} \cos \frac{\pi}{12} + \cos \frac{\pi}{4} \sin \frac{\pi}{12}$	b) $\sin \frac{\pi}{4} \cos \frac{\pi}{12} - \cos \frac{\pi}{4} \sin \frac{\pi}{12}$
c) $\cos \frac{\pi}{4} \cos \frac{\pi}{12} - \sin \frac{\pi}{4} \sin \frac{\pi}{12}$	d) $\cos \frac{\pi}{4} \cos \frac{\pi}{12} + \sin \frac{\pi}{4} \sin \frac{\pi}{12}$
e) $\cos \frac{2\pi}{9} \cos \frac{5\pi}{18} - \sin \frac{2\pi}{9} \sin \frac{5\pi}{18}$	f) $\cos \frac{10\pi}{9} \cos \frac{5\pi}{18} + \sin \frac{10\pi}{9} \sin \frac{5\pi}{18}$

3) Apply a compound angle formula, and then determine an exact value for each.

a) $\sin \left(\frac{\pi}{3} + \frac{\pi}{4} \right)$	b) $\cos \left(\frac{\pi}{3} + \frac{\pi}{4} \right)$
c) $\cos \left(\frac{2\pi}{3} - \frac{\pi}{4} \right)$	d) $\sin \left(\frac{2\pi}{3} - \frac{\pi}{4} \right)$
e) $\tan \left(\frac{\pi}{4} + \pi \right)$	f) $\tan \left(\frac{\pi}{3} - \frac{\pi}{6} \right)$

4) Use an appropriate compound angle formula to determine an exact value for each.

a) $\sin \frac{7\pi}{12}$	b) $\sin \frac{5\pi}{12}$
c) $\cos \frac{11\pi}{12}$	d) $\cos \frac{5\pi}{12}$
e) $\sin \frac{13\pi}{12}$	f) $\cos \frac{17\pi}{12}$

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g) $\sin \frac{19\pi}{12}$	h) $\cos \frac{23\pi}{12}$
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5) Angles x and y are located in the first quadrant such that $\sin x = \frac{3}{5}$ and $\cos y = \frac{5}{13}$. Determine exact values for $\cos x$ and $\sin y$.

6) Refer to the previous question. Determine an exact value for each of the following.

a) $\sin(x + y)$	b) $\sin(x - y)$
c) $\cos(x + y)$	d) $\cos(x - y)$

7) Use a compound angle formula to show that $\cos(2x) = \cos^2 x - \sin^2 x$

Answer Key

1) a) $\frac{\sqrt{3}}{2}$ b) $\frac{1}{2}$ c) $\frac{1}{2}$ d) $\frac{\sqrt{3}}{2}$ e) 0 f) $-\frac{\sqrt{3}}{2}$

3) a) $\frac{\sqrt{6} + \sqrt{2}}{4}$ b) $\frac{\sqrt{2} - \sqrt{6}}{4}$ c) $\frac{\sqrt{6} - \sqrt{2}}{4}$ d) $\frac{\sqrt{6} + \sqrt{2}}{4}$ e) 1 f) $\frac{\sqrt{3}}{3}$

4) a) $\frac{\sqrt{2} + \sqrt{6}}{4}$ b) $\frac{\sqrt{2} + \sqrt{6}}{4}$ c) $\frac{-\sqrt{2} - \sqrt{6}}{4}$ d) $\frac{\sqrt{6} - \sqrt{2}}{4}$ e) $\frac{\sqrt{2} - \sqrt{6}}{4}$ f) $\frac{\sqrt{2} - \sqrt{6}}{4}$ g) $\frac{-\sqrt{2} - \sqrt{6}}{4}$ h) $\frac{\sqrt{2} + \sqrt{6}}{4}$

5) $\cos x = \frac{4}{5}$, $\sin y = \frac{12}{13}$

6) a) $\frac{63}{65}$ b) $-\frac{33}{65}$ c) $-\frac{16}{65}$ d) $\frac{56}{65}$