Precalculus

Homework

Trig cofunction identities and angle-sum formulas

1.	Use the known values of $\sin 30^\circ, \cos 30^\circ, \sin 45^\circ, \cos 45^\circ, \sin 60^\circ, \cos 60^\circ, \ldots$, the angle sum formulas and the cofunction identical values of $\sin 30^\circ, \cos 30^\circ, \sin 45^\circ, \cos 45^\circ, \sin 60^\circ, \cos 60^\circ, \ldots$
	tities to find an exact value (using radicals) for the trigonometric function.

((a)	The	six	trigor	ometric	functions	of 105°	$= 45^{\circ}$ -	+ 60°·
١	a)	1110	SIA	uigui	ionicuic	runcuons	01 100	- 40 -	ruu .

• sin (105°).

•
$$\sin\left(\frac{\pi}{12}\right)$$
.

answer: $\frac{\sqrt{6}+\sqrt{2}}{4}$ • $\cos{(105^{\circ})}$. Should your answer be a positive or a negative number?

answer: $\frac{4}{\sqrt{2-\sqrt{6}}}$

• tan (105°).

• $\cot (105^{\circ})$.

answer:
$$-\sqrt{8}$$
 $\sqrt{2}$

answet: $\sqrt{s} - 2$

• $\csc{(105^{\circ})}$.

• sec (105°).

answer:
$$-\sqrt{3}$$
 – 2

• $\cot\left(\frac{\pi}{12}\right)$.

•
$$\sec\left(\frac{\pi}{12}\right)$$
.

• $\tan\left(\frac{\pi}{12}\right)$.

answer: $\sqrt{6}-\sqrt{2}$ • $\csc\left(\frac{\pi}{12}\right)$.

• $\cos\left(\frac{\pi}{12}\right)$. Should $\sin\left(\frac{\pi}{12}\right)$ be larger or smaller than $\cos\left(\frac{\pi}{12}\right)$?

(b) The six trigonometric functions of $\frac{\pi}{12} = \frac{\pi}{3} - \frac{\pi}{4}$:

2. Simplify to a trigonometric function of the angle θ . The answer key has not been proofread, use with caution.

(a)
$$\sin\left(\frac{\pi}{2} - \theta\right)$$
.

(b) $\cos\left(\frac{13\pi}{2} - \theta\right)$.

(c) $\tan (\pi - \theta)$

(d)
$$\cot\left(\frac{3\pi}{2} - \theta\right)$$

(e) $\csc\left(\frac{3\pi}{2} + \theta\right)$

answei: cos
$$heta$$

answer: $\frac{42+\sqrt{6}}{4}$

answer: $\sqrt{3} + 2$

answer: $\sqrt{6} - \sqrt{2}$

answer: sin θ

апѕмет: тап Ө

answet: sec θ

3. Using the power-reducing formulas, rewrite the expression in terms of first powers of the cosines and sines of multiples of the angle θ .

(a) $\sin^4 \theta$.

Survice:
$$\frac{8}{1}\cos(4\theta) - \frac{7}{1}\cos(2\theta) + \frac{8}{3}$$

(b) $\cos^4 \theta$.

Suzange:
$$\frac{8}{1}\cos{(4\theta)}+\frac{5}{1}\cos{(5\theta)}+\frac{8}{3}$$

(c) $\sin^6 \theta$.

answer:
$$\sin^6\theta = \frac{1}{32}\cos(2\theta) + \frac{3}{16}\cos(4\theta) = \frac{15}{22}\cos(2\theta) + \frac{15}{16}\sin(2\theta) = \frac{15}{16$$

(d) $\cos^6 \theta$.

Submodes
$$\cos_\theta \ \theta = \frac{35}{1} \cos \left(\theta \theta \right) + \frac{16}{3} \cos \left(\theta \theta \right) + \frac{35}{12} \cos \left(5 \theta \right) + \frac{16}{2}$$

4. Use the sum-to-product formulas to find all solutions of the trigonometric equation in the interval $[0, 2\pi)$.

Please note that typing a query such as "solve($\sin(x)+\sin(3x)=0$)" at www.wolframalpha.com will provide you with a correct answer and a function plot.

(a) $\sin(x) + \sin(3x) = 0$.

answer:
$$x=0$$
 , π , $\frac{\pi}{2}$, $0=x$: The same $\frac{3\pi}{2}$

(b) $\cos(x) + \cos(-3x) = 0$.

$$\frac{\pi 7}{\hat{L}}$$
 , $\frac{\pi E}{C}$, $\frac{\pi \tilde{L}}{\hat{L}}$, π , $\frac{\pi E}{\hat{L}}$, $\frac{\pi}{C}$, $\frac{\pi}{\hat{L}}$, $\frac{\pi}{\hat{L}}$ = x :Inward

(c) $\sin(x) - \sin(3x) = 0$.

answer
$$\frac{\pi \, 7}{4} \, , \frac{\pi \, 6}{4} \, , \pi \, , \frac{\pi \, 6}{4} \, , \frac{\pi \, 7}{4} \, , 0 = x$$
 . Then we have the sum of the sum o

(d) $\cos(2x) - \cos(3x) = 0$.

answer
$$x=0$$
 , $\frac{\pi 8}{5}$, $\frac{\pi 6}{5}$, $\frac{\pi}{5}$, $\frac{4}{5}$, $0=x$ Therefore