C12 - 6.0 - Trig Formula Sheet/Steps Review

$let\ m = sinx$

IDs
Fractions
Factoring
Conjugate

Pythagorean Identities

$\sin^2\theta + \cos^2\theta = 1$ $\quad 1 + \tan^2\theta = \sec^2\theta$ $\quad 1 + \cot^2\theta = \csc^2\theta$

Reciprocal and Quotient Identities

$sec\theta = \frac{1}{cos\theta}$ $\quad csc\theta = \frac{1}{sin\theta}$ $\quad cot\theta = \frac{1}{tan\theta}$ $\quad tan\theta = \frac{sin\theta}{cos\theta}$ $\quad cot\theta = \frac{cos\theta}{sin\theta}$

Addition Identities

$\sin(\alpha + \beta) = sin\alpha cos\beta + cos\alpha sin\beta$

$\sin(\alpha - \beta) = sin\alpha cos\beta - cos\alpha sin\beta$

$\cos(\alpha + \beta) = cos\alpha cos\beta - sin\alpha sin\beta$

$\cos(\alpha - \beta) = cos\alpha cos\beta + sin\alpha sin\beta$

Double Angle Identities

$cos2\theta = \cos^2\theta - \sin^2\theta$
$= 2\cos^2\theta - 1$
$= 1 - 2\sin^2\theta$

$sin2\theta = 2sin\theta cos\theta$

Trig Identities: Steps
Get into sin and cos
Identities

Conjugates, Foil Conjugate, Pythag, Simplify
Distribution and FOIL (where necessary)
Rearrange terms
Add and subtract 1

Fractions
Simplify
Adding and subtracting fractions
LCD: Do to the top do to the bottom
Multiplying by 1
Flip and multiply
Separate fractions

(Complex Fractions)

Add Fractions top and bottom,
Flip and multiply

OR

Multiply top and bottom by LCD

Factoring (Check by distribution/FOIL)
GCF
Trinomials
Differences of Squares

Chooses a $cos2\theta$ to:
Cross off the '1' or
Combine with the #/$\sin^2 x$/ $\cos^2 x$ *etc*
Factor
Watch out for $GCF = -ve$
Negative Distribution !

$\tan(\alpha + \beta) = \frac{tan\alpha + tan\beta}{1 - tan\alpha\ tan\beta}$ $\quad \tan(\alpha - \beta) = \frac{tan\alpha - tan\beta}{1 + tan\alpha\ tan\beta}$ $\quad \tan 2\theta = \frac{2\tan\theta}{1 - \tan^2\theta}$

C12 - 6.0 - Fractions/LCD/Exponents/Distribution Theory

Multiply $\frac{a}{b}\times\frac{c}{d}=\frac{ac}{bd}$ $a\times\frac{b}{c}=\frac{ab}{c}$ $\frac{a}{b}\times c=\frac{ac}{b}$ $\frac{1}{a}\times a=1$

Divide

$\frac{a}{b}\div\frac{c}{d}=$
$\frac{a}{b}\times\frac{d}{c}=\frac{ad}{bc}$

$\frac{\left(\frac{a}{b}\right)}{\left(\frac{c}{d}\right)}=$
$\frac{a}{b}\div\frac{c}{d}=$
$\frac{a}{b}\times\frac{d}{c}=\frac{ad}{bc}$

$a\div\frac{b}{c}=$
$a\times\frac{c}{b}=\frac{ac}{b}$

$\frac{a}{\left(\frac{b}{c}\right)}=$
$a\div\frac{b}{c}=$
$a\times\frac{c}{b}=\frac{ac}{b}$

$\frac{a}{b}\div c=$
$\frac{a}{b}\times\frac{1}{c}=\frac{a}{bc}$

$\frac{\left(\frac{a}{b}\right)}{c}=$
$\frac{a}{b}\div c=$
$\frac{a}{b}\times\frac{1}{c}=\frac{a}{bc}$

Add/Subtract

$\frac{a}{b}+\frac{c}{b}=\frac{a+c}{b}$ | $\frac{a}{b}+\frac{c}{d}=\frac{ad+cb}{bd}$ | $\frac{a}{b}+\frac{c}{bd}=\frac{ad+c}{bd}$ | $\frac{a}{b^2}+\frac{c}{b}=\frac{a+cb}{b^2}$ | $\frac{a}{b}+\frac{c}{b+1}=\frac{a(b+1)+cb}{b(b+1)}$

$\frac{a+b}{c}=\frac{a}{c}+\frac{b}{c}$ Separate $\frac{a}{b+c}\neq\frac{a}{b}+\frac{a}{c}$ Common Mistakes $\cancel{\frac{x+a}{x}}\neq 1+a$ $\frac{x+a}{x}=\frac{x}{x}+\frac{a}{x}$

$a+b+c=a+c+b$ | $ab=ba$ Rearrange $\begin{matrix}a=b\\b=a\end{matrix}$ Mirror $Reciprocal\colon \frac{a}{b}\to\frac{b}{a}$

$\begin{matrix}\frac{a}{b}=\frac{c}{d}\\da=cb\end{matrix}$ Cross Multiply $\frac{a}{b}=\frac{c}{d}$ $a=\frac{cb}{d}$ $\frac{da}{b}=c$ $\frac{da}{c}=b$ $d=\frac{cb}{a}$

$\begin{matrix}\frac{x}{2}=\frac{1}{2}\\\cancel{\frac{x}{2}=\frac{1}{2}}\\x=1\end{matrix}$ $\cancel{\frac{x}{4}=\frac{1}{4}+\frac{2}{4}}$ Multiply Both Sides By LCD

$\frac{\frac{1}{x}+1}{2+\frac{3}{x}}=\frac{1+x}{2x+3}$ Multiply Top/Bottom By LCD

$x\times x=x^2$ $x\times x^2=x^3$ $x^m\times x^n=x^{m+n}$ $\frac{x^2}{x}=x$ $\frac{x^3}{x^2}=x$ $\frac{x^3}{x}=x^2$ $\frac{x}{x}=1$ $\frac{x^m}{x^n}=x^{m-n}$

$(x^m)^n=x^{m\times n}$ $x^{-a}=\frac{1}{x^a}$ $\frac{1}{x^a}=x^{-a}$ $\frac{2^{-3}-1}{x}=\frac{\frac{1}{2^3}-1}{x}\neq\frac{-1}{2^{-3}x}$ Common Mistakes $x^{\frac{m}{n}}=\sqrt[n]{x^m}$

$x(x+1)$ x^2+x

$(x-2)(x+1)$ x^2-x-2

$(2x+1)(x+1)$ $2x^2+3x+1$

$(x+1)(x-1)$ x^2-1

FOIL Conjugates: FL

x^2+x $x(x+1)$

x^2-x-2 $(x-2)(x+1)$

$2x^2+3x+1$ $(2x+1)(x+1)$

x^2-1 $(x+1)(x-1)$