Sum + Product Identities

Purpose – to switch between addition + multiplication of sines + cosines

$$\sin 40^\circ - \sin 100^\circ = 2\cos\left(\frac{40^\circ + 100^\circ}{2}\right)\sin\left(\frac{40^\circ - 100^\circ}{2}\right)$$

$$= 2\cos 70^\circ \sin(-30^\circ)$$

$$= -2\cos 70^\circ \sin 30^\circ$$

Convert to a sum.

$$\cos 4x \sin 12x = \frac{1}{2}\left[\sin(4x + 12x) - \sin(4x - 12x)\right]$$

$$= \frac{1}{2}\left[\sin 16x + \sin(+8x)\right]$$

IDENTITIES REVIEW

Write 8 fund. identities

True/False
#1-10

$\tan 120^\circ = \sqrt{\frac{1+\cos 240^\circ}{1-\cos 240^\circ}}$ False

$\tan 120^\circ = \sqrt{\frac{1-\cos 60^\circ}{1+\cos 60^\circ}}$ False

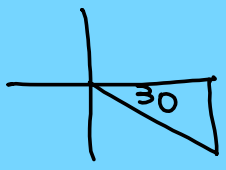
$\tan 120^\circ = -\sqrt{\frac{1-\cos 240^\circ}{1+\cos 240^\circ}}$ False

$\tan 120^\circ$ ↑ QII

Evaluate. ← Solution is a number.

$$\frac{2\tan 165^\circ}{1-\tan^2 165^\circ} = \tan(2\cdot 165^\circ)$$

$$= \tan 330^\circ$$



$$= -\frac{\sqrt{3}}{3}$$

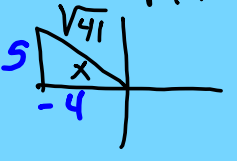
#15-20 – Draw a picture!

16 Given $\cot x = -\frac{4}{5}$ (x, y) $\quad \frac{\pi}{2} < x < \pi$ II

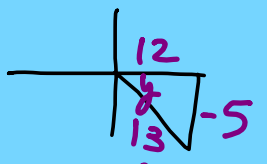
$\sec y = \frac{13}{12}$ (r, x) $\quad \frac{3\pi}{2} < y < 2\pi$ IV

$25 + 16 = r^2$

$\sqrt{41} = \sqrt{r^2}$



$$\tan(x-y) = \frac{\tan x - \tan y}{1 + \tan x \cdot \tan y}$$



$144 + y^2 = 169$

$y^2 = 25$

$y = 5$

$$= \frac{\frac{5}{-4} + \frac{+5}{12}}{1 + \left(\frac{-5}{4}\right)\left(\frac{-5}{12}\right)}$$

$$= \frac{-\frac{15}{12} + \frac{5}{12}}{\frac{48}{48} + \frac{25}{48}} = \frac{\frac{-10}{12}}{\frac{73}{48}} = \frac{-10}{12} \cdot \frac{4}{73} = \boxed{\frac{-40}{73}}$$

Find $\cos\frac{A}{2}$ given $\sin A = -\frac{3}{5}$ & A in QIII.

$270^\circ < A < 360^\circ$

$135^\circ < \frac{A}{2} < 180^\circ$ II

$$= \pm\sqrt{\frac{1+\cos A}{2}} = -\sqrt{\frac{1+\frac{4}{5}}{2}}$$

$\cos\frac{A}{2}$ in QII

Verify = 4 problems = 1 Easy, 2 Med, 1 Pizzazz

#21-31

31) $\underbrace{\sin 6\theta \cos 4\theta}_{\text{Sum + prod}} - \underbrace{\sin 3\theta \cos 7\theta}_{\text{Sum + prod}} = \underbrace{\sin 3\theta \cos \theta}_{\text{Sum + prod}}$