19. $\tan\left(\frac{\pi}{2} - u\right) = \cot u$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

$$= \frac{\tan\frac{\pi}{2} - \tan u}{1 + \tan\frac{\pi}{2}\tan u}$$

$$\frac{\sin\left(\frac{\pi}{2} - u\right)}{\cos\left(\frac{\pi}{2} - u\right)} = \frac{\overset{1}{\cancel{\sin\frac{\pi}{2}}}(\cos u) - \overset{0}{\cancel{\cos\frac{\pi}{2}}}\sin u}{\underset{0}{\cancel{\cos\frac{\pi}{2}}}\cos u + \underset{1}{\cancel{\sin\frac{\pi}{2}}}\sin u}$$

$$= \frac{\cos u}{\sin u} = \cot u$$

25. $\sin(x - \pi) = -\sin x$

$$\sin x \underbrace{\cancel{\cos\pi}}_{(-1)} - \overbrace{\cancel{\sin\pi}}^{0}\cos x$$

$= -\sin x$

21. $\sec\left(\frac{\pi}{2} - u\right) = \csc u$

$$\frac{1}{\cos(\frac{\pi}{2}-u)} = \frac{1}{\underbrace{\cos\frac{\pi}{2}}_{0}\cos u + \underbrace{\sin\frac{\pi}{2}}_{1}\sin u} = \frac{1}{\sin u}$$

$$= \csc u$$

7. $\sin \frac{19\pi}{12}$ $= \sin 285$

$= -\sin 75$

$= -\left(\frac{\sqrt{6}+\sqrt{2}}{4}\right)$

$$\sin\left(\frac{19\pi}{12}\right) = \sin\left(\frac{A\pi}{3} + \frac{B\pi}{4}\right)$$

$4A + 3B = 19$ $\qquad \frac{4A\pi}{12} + \frac{3B\pi}{12}$

$\cancel{0}$

1 5 ✓ $\qquad \sin\left(\frac{\pi}{3} + \frac{5\pi}{4}\right)$

2

3 $\qquad = \sin\frac{\pi}{3}\cos\frac{5\pi}{4} + \cos\frac{\pi}{3}\sin\frac{5\pi}{4}$

4 1 ✓

$$= -\sin\frac{\pi}{3}\cos\frac{\pi}{4} - \cos\frac{\pi}{3}\sin\frac{\pi}{4}$$

$$= -\frac{\sqrt{3}}{2}\cdot\frac{\sqrt{2}}{2} - \frac{1}{2}\cdot\frac{\sqrt{2}}{2}$$

$$= -\frac{\sqrt{6}}{4} - \frac{\sqrt{2}}{4}$$

29. $\cos\left(x + \frac{\pi}{6}\right) + \sin\left(x - \frac{\pi}{3}\right) = 0$

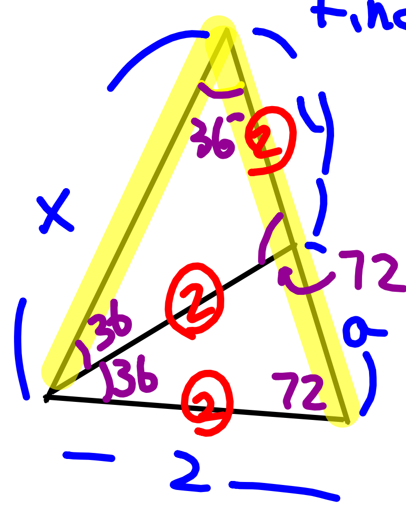
$$\cancel{\cos x \cos\frac{\pi}{6}} - \sin\frac{\pi}{6}\sin x + \sin x \cos\frac{\pi}{3} - \cancel{\cos x \sin\frac{\pi}{3}}$$

$$= 0$$

sin 18°

Find x & y

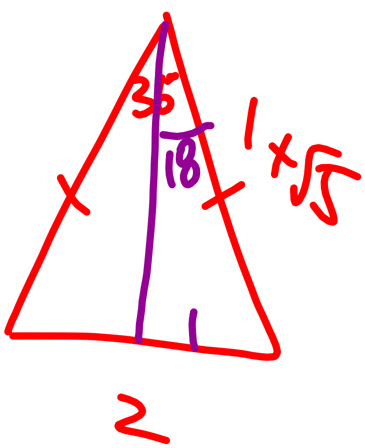
2



$$\frac{2}{a} = \frac{2+a}{2}$$

$$4 = a^2 + 2a$$

$$5 = (a+1)^2 \qquad a = \pm\sqrt{5} - 1 \qquad a = \sqrt{5} - 1$$



$$\sin 18^\circ = \frac{1}{1+\sqrt{5}}$$