Verifying Trig. Identities

1) $2\sin.6\cos.6 = \sin(2\cdot.6) = \boxed{\sin(1.2)}$

2) $2\sin 3\cos 3 = \sin(2\cdot 3) = \boxed{\sin 6}$

3) $2\sin 2\cos 2 = \sin(2\cdot 2) = \boxed{\sin 4}$

4) $\cos^2.45 - \sin^2.45 = \cos(2\cdot.45) = \boxed{\cos.9}$

5) $2\cos^2 5 - 1 = \cos(2\cdot 5) = \boxed{\cos 10}$

6) $1 - 2\sin^2 3 = \cos(2\cdot 3) = \boxed{\cos 6}$

7) $2\sin\frac{\pi}{6}\cos\frac{\pi}{6} = \sin\left(2\cdot\frac{\pi}{6}\right) = \boxed{\sin\frac{\pi}{3}}$

8) $\cos^2\frac{\pi}{10} - \sin^2\frac{\pi}{10} = \cos\left(2\cdot\frac{\pi}{10}\right) = \boxed{\cos\frac{\pi}{5}}$

9) $1+\sin 2\theta = (\sin\theta+\cos\theta)^2$

$= (\sin\theta+\cos\theta)(\sin\theta+\cos\theta)$ Distribute all terms (FOIL)

$= \sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta$

$= 1 + 2\sin\theta\cos\theta$

$= \boxed{1+\sin 2\theta}$ ✓

10) $\sin 2\theta = 2\cot\theta\sin^2\theta$

$= 2\cdot\frac{\cos\theta}{\sin\theta}\cdot\sin^2\theta$

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

$= \boxed{\sin 2\theta}$ ✓

11) $\cos 2\theta = \dfrac{1-\tan^2\theta}{1+\tan^2\theta}$

$= \dfrac{1-\tan^2\theta}{\sec^2\theta}$

$= \dfrac{1}{\sec^2\theta} - \dfrac{\tan^2\theta}{\sec^2\theta}$

$= \cos^2\theta - \dfrac{\sin^2\theta/\cos^2\theta}{1/\cos^2\theta}$

$= \cos^2\theta - \dfrac{\sin^2\theta}{\cos^2\theta} \cdot \dfrac{\cos^2\theta}{1}$

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

$= \boxed{\cos 2\theta}$ ✓

12) $\sec^2\theta = \dfrac{2}{1+\cos 2\theta}$

$= \dfrac{2}{1+2\cos^2\theta - 1}$

$= \dfrac{2}{2\cos^2\theta}$

$= \dfrac{1}{\cos^2\theta}$

$= \boxed{\sec^2\theta}$ ✓

13) $\dfrac{1-\cos 2\theta}{2} = \sin^2\theta$

$\dfrac{1-(1-2\sin^2\theta)}{2} =$

$\dfrac{1-1+2\sin^2\theta}{2} =$

$\dfrac{2\sin^2\theta}{2} =$

$\boxed{\sin^2\theta}$ ✓

14) $\dfrac{\sin^2\theta + \cos^2\theta}{\sin^2\theta - \cos^2\theta} = -\sec 2\theta$

$\dfrac{1}{1-\cos^2\theta-\cos^2\theta} =$

$\dfrac{1}{1-2\cos^2\theta} =$

$-1\left(\cos 2\theta = 2\cos^2\theta - 1\right)$

$-\cos 2\theta = -2\cos^2\theta + 1$

$\dfrac{1}{-\cos 2\theta} =$

$\boxed{-\sec 2\theta}$ ✓

15) $\dfrac{(\sin\theta + \cos\theta)^2}{\sin 2\theta} = \csc 2\theta + 1$

$\dfrac{(\sin\theta+\cos\theta)(\sin\theta+\cos\theta)}{\sin 2\theta} =$ ← distribute/FOIL

$\dfrac{\sin^2\theta + 2\sin\theta\cos\theta + \cos^2\theta}{2\sin\theta\cos\theta} =$

$\dfrac{1 + 2\sin\theta\cos\theta}{2\sin\theta\cos\theta} =$

$\dfrac{1}{2\sin\theta\cos\theta} + \dfrac{2\sin\theta\cos\theta}{2\sin\theta\cos\theta} =$

$\dfrac{1}{\sin 2\theta} + 1$

$\boxed{\csc 2\theta + 1}$ ✓