Warm Up

Prove the following identities:

$$\tan \theta + \tan^3 \theta = \frac{1}{\cot \theta \cos^2 \theta}$$

$$\tan\theta \left(1 + \tan^2\theta\right) \qquad\qquad \frac{1}{\frac{\cos\theta}{\sin\theta} \cdot \cos^2\theta}$$

$$\frac{\sin\theta}{\cos\theta} \cdot \sec^2\theta \qquad\qquad \frac{1}{\frac{\cos^3\theta}{\sin\theta}}$$

$$\frac{\sin\theta}{\cos\theta} \cdot \frac{1}{\cos^2\theta} \qquad\qquad 1 \cdot \frac{\sin\theta}{\cos^3\theta}$$

$$\boxed{\frac{\sin\theta}{\cos^3\theta}} \qquad\qquad \boxed{\frac{\sin\theta}{\cos^3\theta}}$$

$$\tan \theta + \tan^3 \theta = \frac{1}{\cot \theta \cos^2 \theta}$$

$$\underline{\tan\theta\left(1+\tan^2\theta\right)} \quad \left(\frac{1}{\cot\theta}\right)\left(\frac{1}{\cos^2\theta}\right)$$

$$\boxed{\tan\theta \sec^2\theta} \qquad \boxed{\tan\theta \sec^2\theta}$$

⑥ $\sin^2\theta + 2\cos^2\theta - 1 = \cos^2\theta$

group like terms → $2\cos^2\theta - \cos^2\theta$ $\quad\Big|\quad$ $\boxed{1 - \sin^2\theta}$

$\cos^2\theta$ $\qquad\qquad$ $\cos^2\theta$

⑩ $\dfrac{1 + 2\sin\theta\cos\theta}{\sin\theta + \cos\theta} = \dfrac{\sin\theta + \cos\theta}{1}$

$\boxed{1 + 2\sin\theta\cos\theta}$ $\quad\Big|\quad$ $(\sin\theta + \cos\theta)(\sin\theta + \cos\theta)$

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

$\qquad\qquad\qquad$ $\boxed{1 + 2\sin\theta\cos\theta}$

⑦ $\sec^2\theta - \sin^2\theta = \cos^2\theta + \tan^2\theta$

$\sec^2\theta - \tan^2\theta$ $\quad\Big|\quad$ $\cos^2\theta + \sin^2\theta$

1 $\qquad\qquad\quad$ 1

⑨ $\tan^2\theta - \sin^2\theta = \sin^2\theta\,\tan^2\theta$

$\dfrac{\sin^2\theta}{\cos^2\theta} - \dfrac{\sin^2\theta}{1}$ $\quad\Big|\quad$ $\dfrac{\sin^2\theta}{1}\left(\dfrac{\sin^2\theta}{\cos^2\theta}\right)$

Factor → $\dfrac{\sin^2\theta - \sin^2\theta\cos^2\theta}{\cos^2\theta}$ $\qquad$ $\dfrac{\sin^4\theta}{\cos^2\theta}$

$\dfrac{\sin^2\theta\left(1 - \cos^2\theta\right)}{\cos^2\theta}$

$\dfrac{\sin^2\theta\left(\sin^2\theta\right)}{\cos^2\theta}$

$\boxed{\dfrac{\sin^4\theta}{\cos^2\theta}}$

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$$\frac{1}{\sec^2\theta\cot\theta} = \frac{\sin\theta - \sin^3\theta}{\cos\theta}$$

$$\boxed{\frac{1}{\sec^2\theta}} \cdot \boxed{\frac{1}{\cot\theta}} \qquad \frac{\sin\theta\,(1-\sin^2\theta)}{\cos\theta}$$

$$\cos^2\theta \cdot \boxed{\tan\theta} \qquad \frac{\sin\theta \,\cos^2\theta}{\cos\theta}$$

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

$$\boxed{\sin\theta\cos\theta} \qquad\qquad \boxed{\sin\theta\cos\theta}$$

Homework

③ $\cos\theta + \boxed{\tan\theta}\sin\theta = \boxed{\sec\theta}$

$\cos\theta + \left(\dfrac{\sin\theta}{\cos\theta}\right)\sin\theta$

$\boxed{\dfrac{1}{\cos\theta}}$

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

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

$\boxed{\dfrac{1}{\cos\theta}}$