(9) If $\tan\theta + \sec\theta = l$

$$\Rightarrow \frac{\sin\theta}{\cos\theta} + \frac{1}{\cos\theta} = l$$

$$\Rightarrow \frac{1+\sin\theta}{\cos\theta} = l$$

Squaring both sides

$$\left(\frac{1+\sin\theta}{\cos\theta}\right)^2 = l^2$$

$$\Rightarrow l^2 = \frac{(1+\sin\theta)^2}{\cos^2\theta}$$

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

$$= \frac{(1+\sin\theta)^{\cancel{2}}}{(1-\sin\theta)\cancel{(1+\sin\theta)}}$$

$$= \frac{1+\sin\theta}{1-\sin\theta}$$

$$RHS = \frac{l^2+1}{2l}$$

$$= \frac{\frac{1+\sin\theta}{1-\sin\theta} + \frac{1}{1}}{\frac{2(1+\sin\theta)}{\cos\theta}}$$

$$= \frac{\frac{1+\cancel{\sin\theta}+1-\cancel{\sin\theta}}{1-\sin\theta}}{\frac{2(1+\sin\theta)}{\cos\theta}}$$

$$= \frac{\cancel{2}}{1-\sin\theta} \times \frac{\cos\theta}{\cancel{2}(1+\sin\theta)}$$

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

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

$$= \frac{1}{\cos\theta}$$

$$= \sec\theta$$

$$= LHS$$

(10) $p = \sin\theta + \cos\theta \ldots (i)$

$$q = \sec\theta + \operatorname{cosec}\theta$$

$$= \frac{1}{\cos\theta} + \frac{1}{\sin\theta}$$

$$q = \frac{\sin\theta + \cos\theta}{\sin\theta\cos\theta} \ldots (ii)$$

Squaring (i)

$$p^2 = (\sin\theta + \cos\theta)^2$$

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

$$p^2 = 1 + 2\sin\theta\cos\theta \ldots (iii)$$

$$LHS = q(p^2-1)$$

$$= \frac{\sin\theta+\cos\theta}{\sin\theta\cos\theta}\left[\cancel{1}+2\sin\theta\cos\theta-\cancel{1}\right]$$

$$= \frac{\sin\theta+\cos\theta}{\cancel{\sin\theta\cos\theta}} \times 2\cancel{\sin\theta\cos\theta}$$

$$= 2p \quad (\text{using } i)$$

$$= RHS$$