Solving Trig Identities - Instructions

For students… see the next page for the questions.

For teachers…

1. Print all pages on B&W card

   (or to be more colourful, pages 3-10 on white card and pages 11-18 on a variety of coloured card).

2. Cut pages 3-10 to A5, these will be the templates onto which pupils will place the pieces.
3. Cut the pieces from pages 11-18, being careful not to mix any up!
4. Match each of the puzzle pieces to the respective template.

The Questions

1. $\sin\theta\tan\theta+\cos\theta=\sec\theta$
2. $\cos ec\,\theta+\tan\theta\sec\theta=\cos ec\,\theta\sec^2\theta$
3. $\cos ec\,\theta-\sin\theta=\cot\theta\cos\theta$
4. $(\sin\theta+\cos\theta)^2-1=2\sin\theta\cos\theta$
5. $(\sin\theta-\cos ec\,\theta)^2=\sin^2\theta+\cot^2\theta-1$
6. $(\sec\theta+\tan\theta)(\sec\theta-\tan\theta)=1$
7. $\tan^2\theta+\sin^2\theta=(\sec\theta+\cos\theta)(\sec\theta-\cos\theta)$
8. $\sec^2\theta+\cot^2\theta=\cos ec^2\theta+\tan^2\theta$
9. $(\sin\theta+\cos\theta)(1-\sin\theta\cos\theta)=\sin^3\theta+\cos^3\theta$
10. $\tan^4\theta+\tan^2\theta=\sec^4\theta-\sec^2\theta$
11. $\cos^4\theta-\sin^4\theta=\cos^2\theta-\sin^2\theta$
12. $\sin\theta+\cos\theta=\dfrac{1-2\cos^2\theta}{\sin\theta-\cos\theta}$
13. $\dfrac{\sin\theta}{1+\cos\theta}+\dfrac{1+\cos\theta}{\sin\theta}=2\cos ec\,\theta$
14. $\dfrac{\cos ec\,\theta}{\cot\theta+\tan\theta}=\cos\theta$
15. $\dfrac{1}{1+\tan^2\theta}+\dfrac{1}{1+\cot^2\theta}=1$
16. $\dfrac{1-\sin\theta}{\cos\theta}=\dfrac{1}{\sec\theta+\tan\theta}$

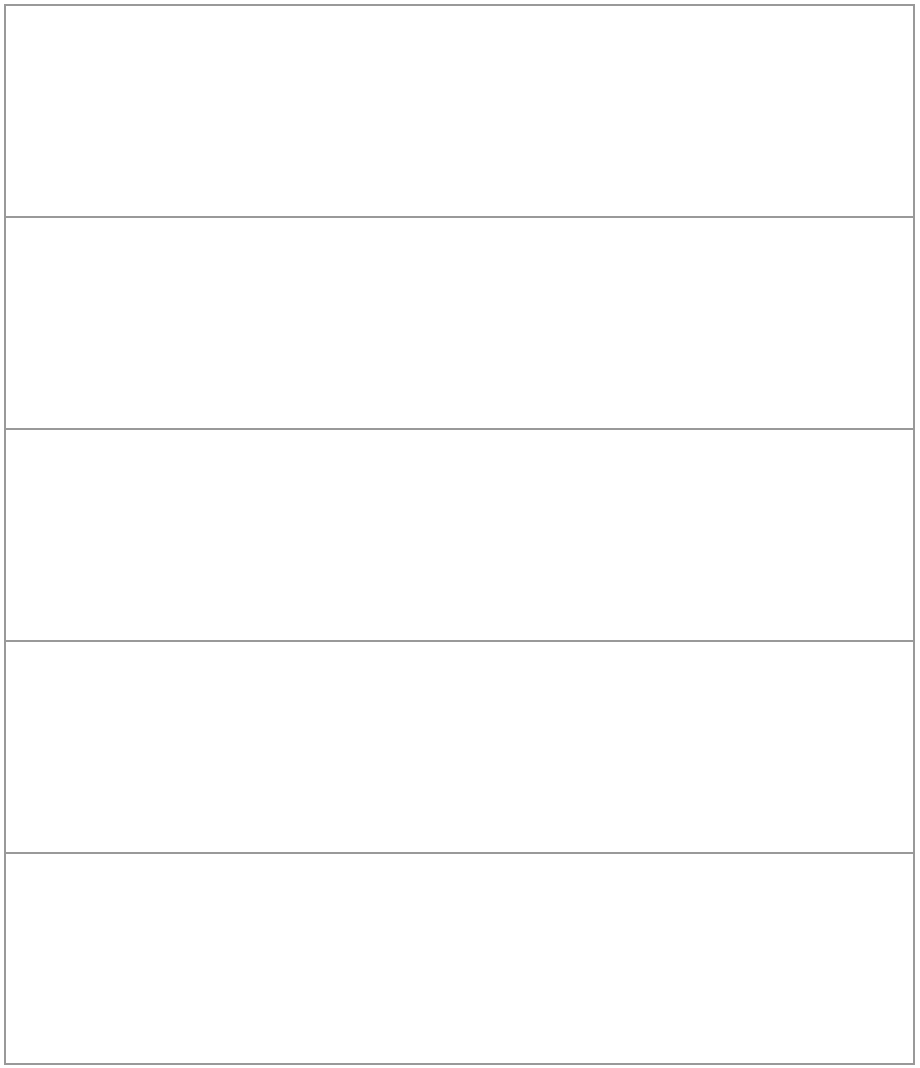
$\sin\theta\tan\theta+\cos\theta=\sec\theta$

$\sec\theta=\sec\theta$

$\cos ec\,\theta+\tan\theta\sec\theta=\cos ec\,\theta\sec^2\theta$

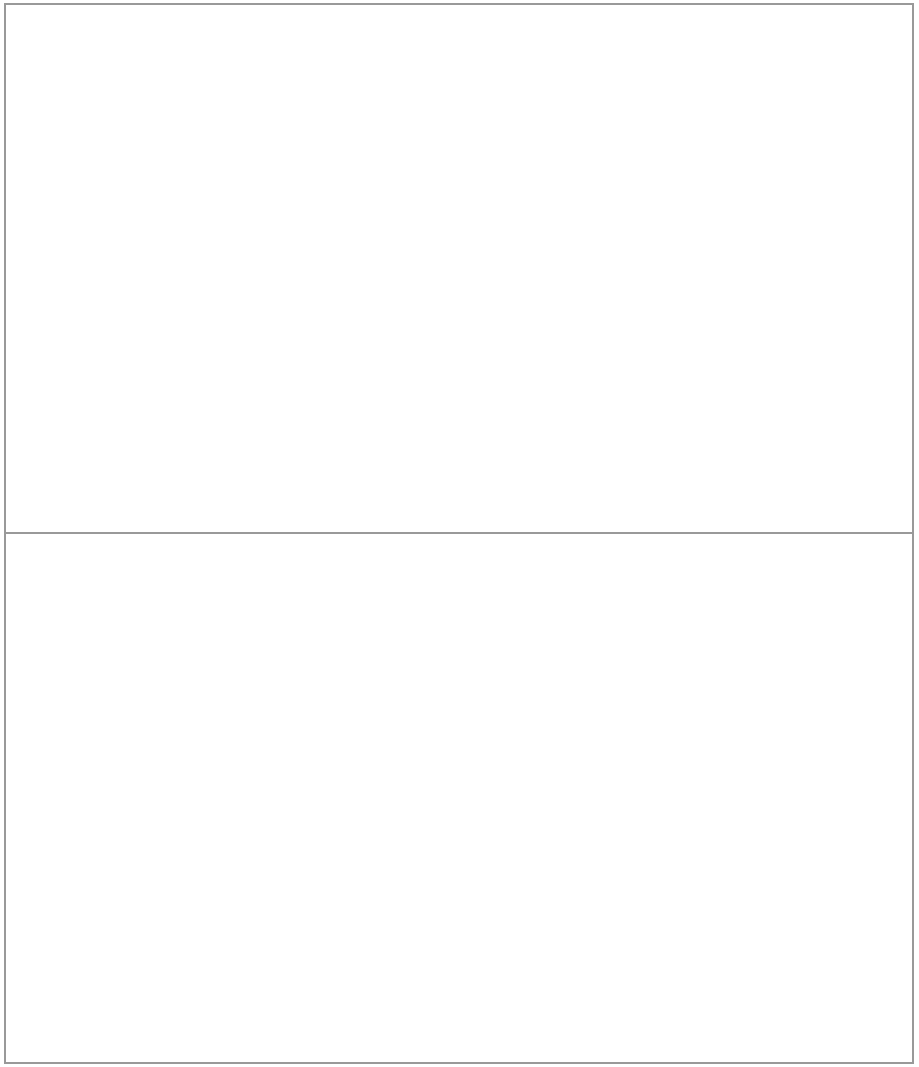
$\cos ec\,\theta\sec^2\theta=\cos ec\,\theta\sec^2\theta$

$\cos ec\,\theta - \sin\theta = \cot\theta\cos\theta$



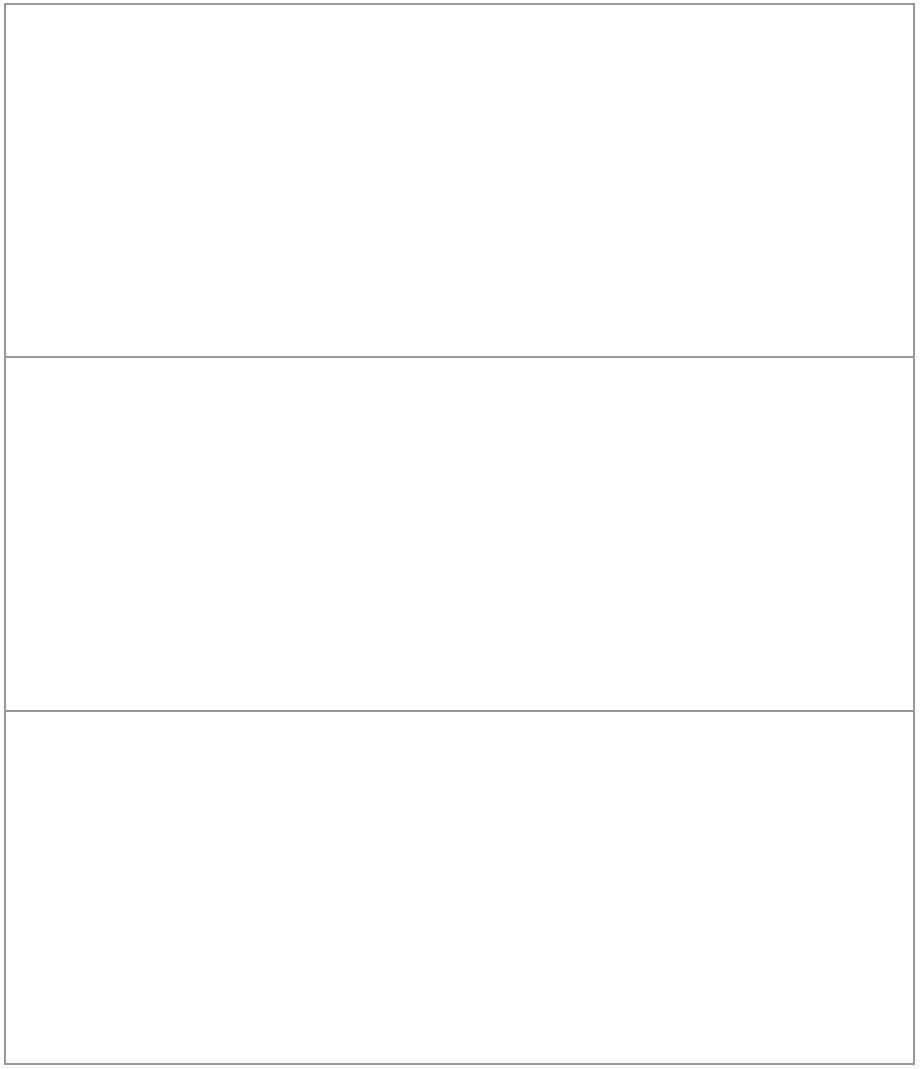
$\cot\theta\cos\theta = \cot\theta\cos\theta$

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



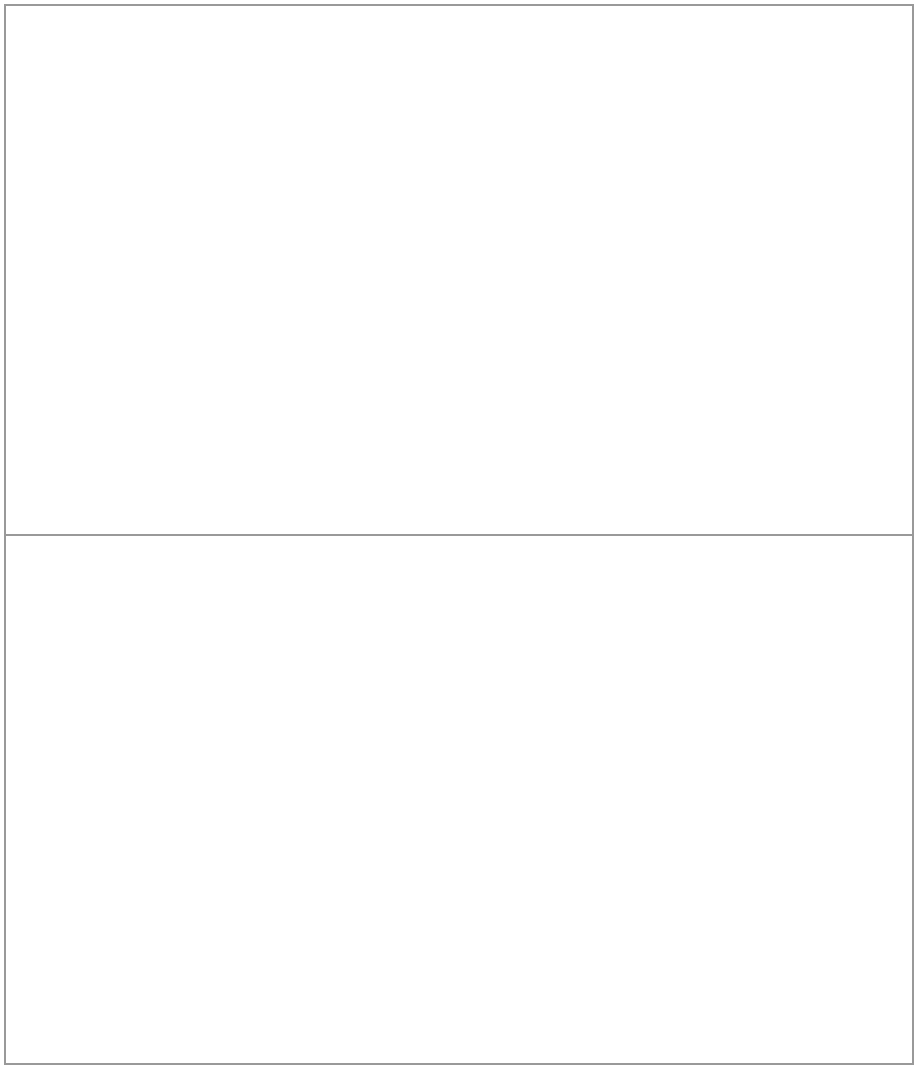
$2\sin\theta\cos\theta = 2\sin\theta\cos\theta$

$(\sin\theta - \cos ec\,\theta)^2 = \sin^2\theta + \cot^2\theta - 1$



$\sin^2\theta + \cot^2\theta - 1 = \sin^2\theta + \cot^2\theta - 1$

$(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$



$1 = 1$

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

$\sec^2\theta + \cot^2\theta = \cos ec^2\theta + \tan^2\theta$

$(\sec\theta + \cos\theta)(\sec\theta - \cos\theta) = (\sec\theta + \cos\theta)(\sec\theta - \cos\theta)$

$\cos ec^2\theta + \tan^2\theta = \cos ec^2\theta + \tan^2\theta$

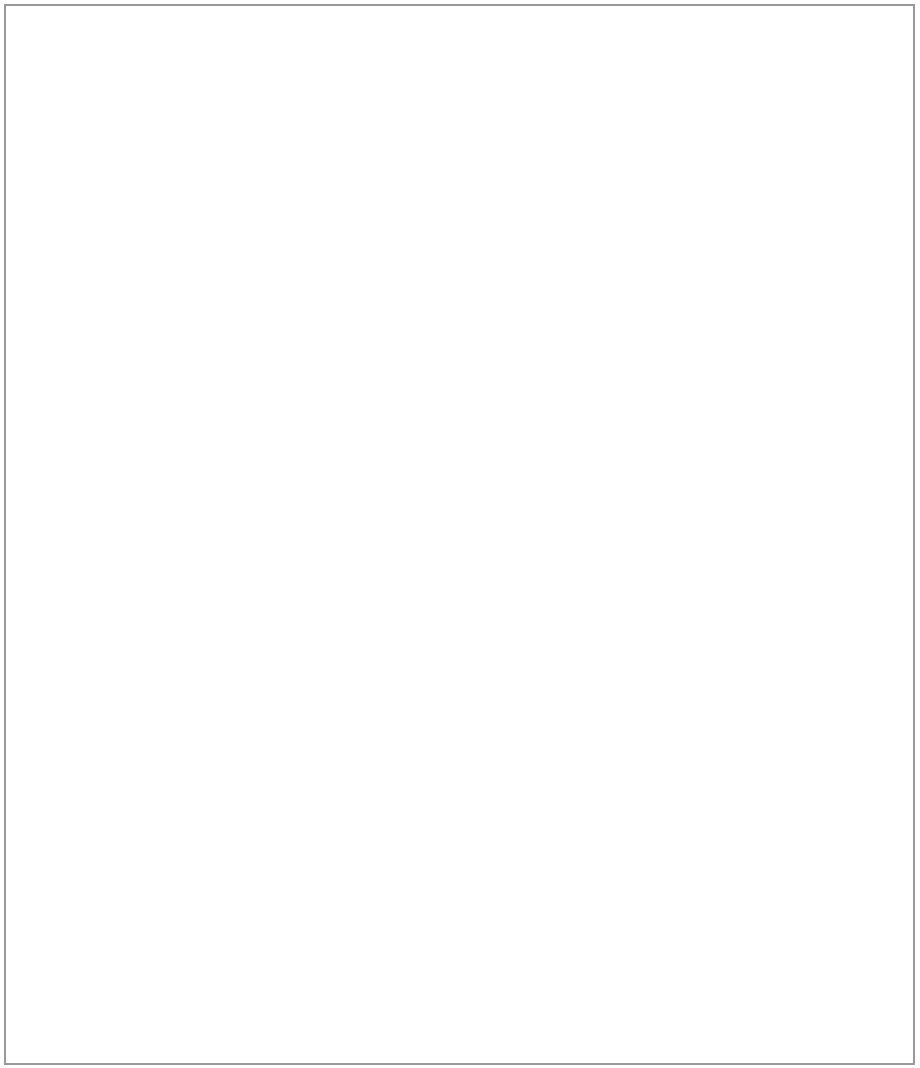
$(\sin\theta+\cos\theta)(1-\sin\theta\cos\theta)=\sin^3\theta+\cos^3\theta$

$\sin^3\theta+\cos^3\theta=\sin^3\theta+\cos^3\theta$

$\tan^4\theta+\tan^2\theta=\sec^4\theta-\sec^2\theta$

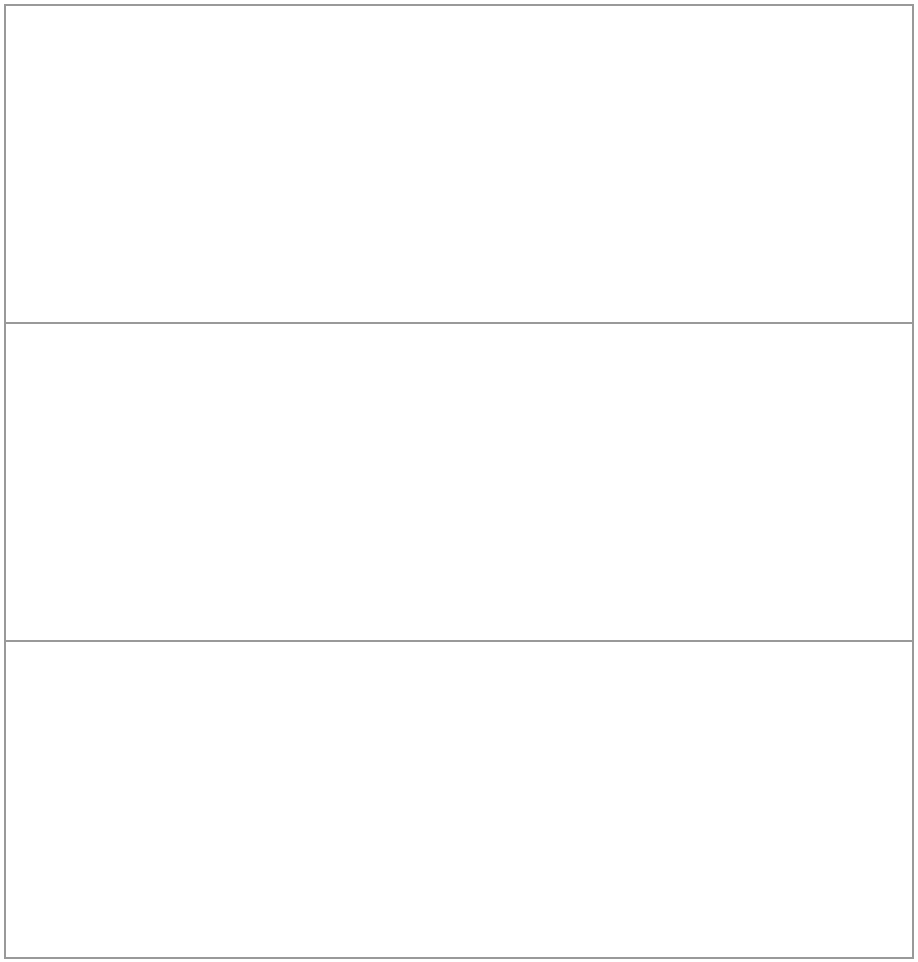
$\sec^4\theta-\sec^2\theta=\sec^4\theta-\sec^2\theta$

$$\cos^4\theta - \sin^4\theta = \cos^2\theta - \sin^2\theta$$



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

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



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

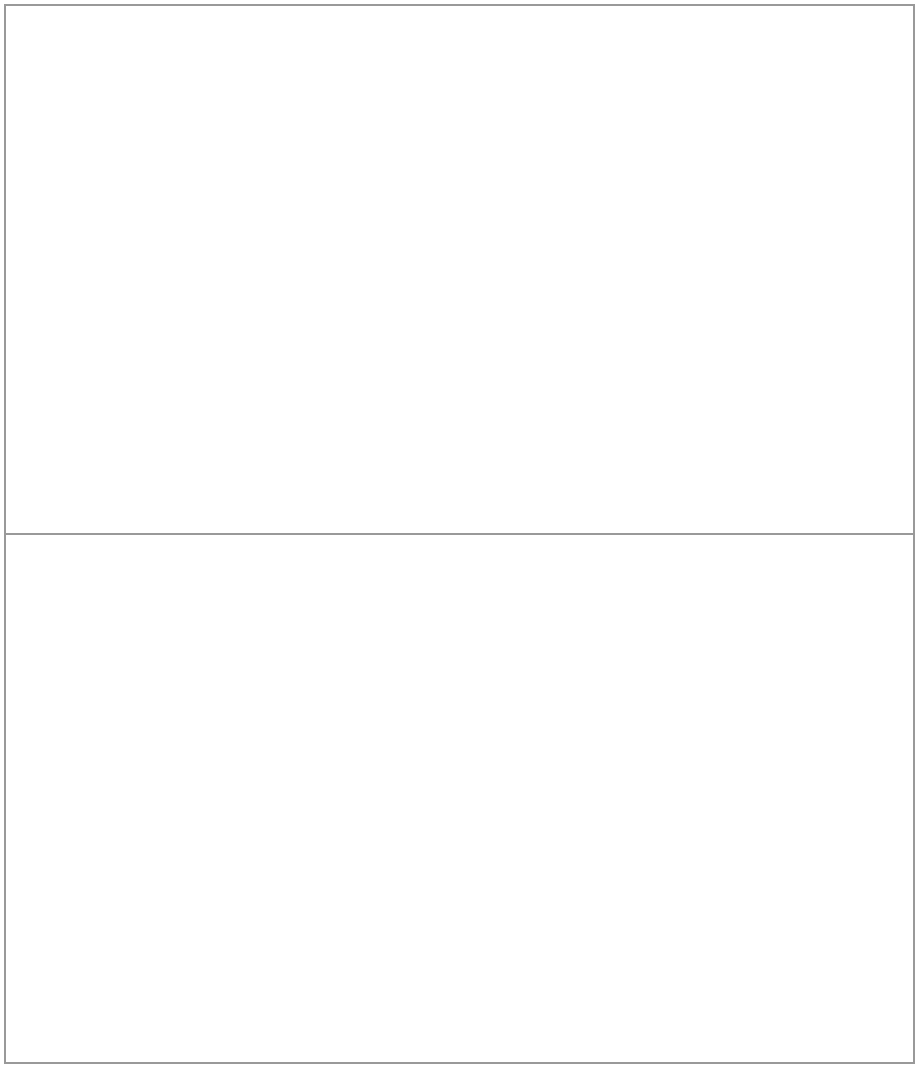
$$\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\cos ec\,\theta$$

$$2\cos ec\,\theta=2\cos ec\,\theta$$

$$\frac{\cos ec\,\theta}{\cot\theta + \tan\theta} = \cos\theta$$

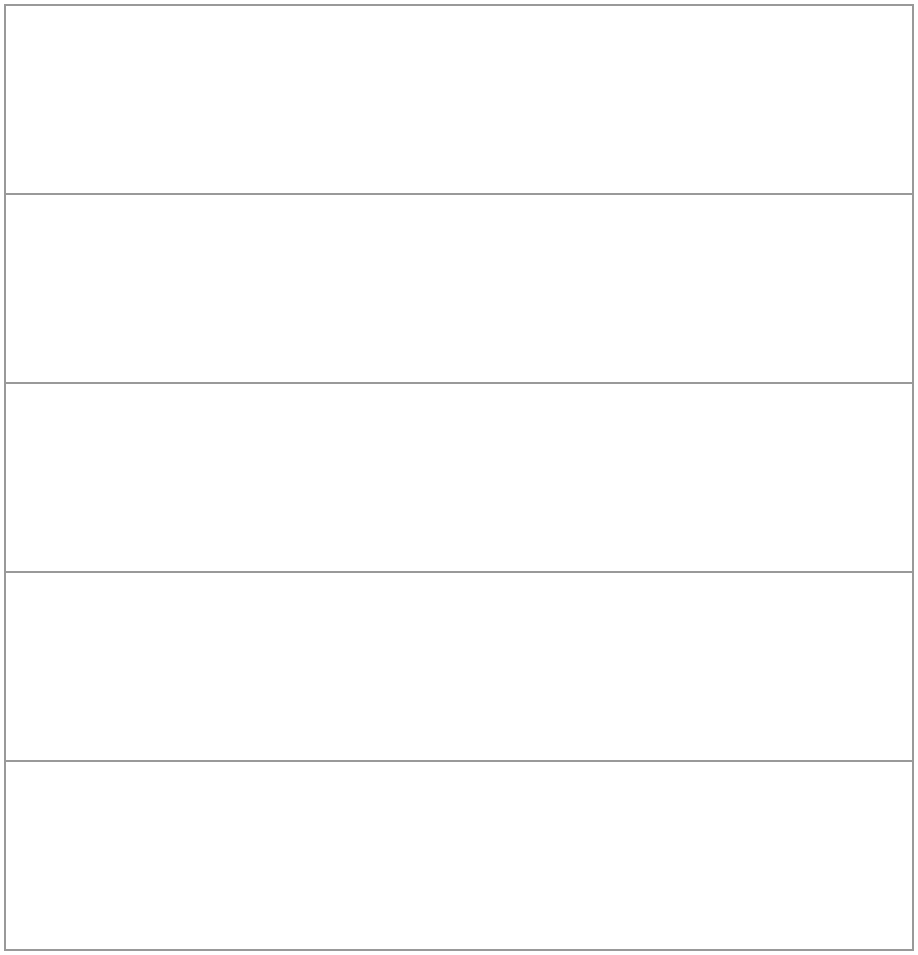
$$\cos\theta = \cos\theta$$

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



$1=1$

$$\frac{1-\sin\theta}{\cos\theta}=\frac{1}{\sec\theta+\tan\theta}$$



$$\frac{1}{\sec\theta+\tan\theta}=\frac{1}{\sec\theta+\tan\theta}$$

$$\sin\theta\tan\theta+\cos\theta=\sec\theta$$

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

$$\sec\theta=\sec\theta$$

$$\cos ec\theta+\tan\theta\sec\theta=\cos ec\theta\sec^2\theta$$

$\frac{1}{\sin\theta}+\frac{\sin\theta}{\cos^2\theta}=\cos ec\theta\sec^2\theta$
$\frac{\cos^2\theta}{\sin\theta\cos^2\theta}+\frac{\sin^2\theta}{\sin\theta\cos^2\theta}=\cos ec\theta\sec^2\theta$
$\frac{\cos^2\theta+\sin^2\theta}{\sin\theta\cos^2\theta}=\cos ec\theta\sec^2\theta$
$\frac{1}{\sin\theta\cos^2\theta}=\cos ec\theta\sec^2\theta$
$\frac{1}{\sin\theta}\frac{1}{\cos^2\theta}=\cos ec\theta\sec^2\theta$

$$\cos ec\theta\sec^2\theta=\cos ec\theta\sec^2\theta$$

$$\cos ec\,\theta - \sin\theta = \cot\theta\cos\theta$$

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

$$\cot\theta\cos\theta = \cot\theta\cos\theta$$

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

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

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

$$(\sin\theta - \cos ec\,\theta)^2 = \sin^2\theta + \cot^2\theta - 1$$

$\sin^2\theta - 2\sin\theta\cos ec\,\theta + \cos ec^2\theta = \sin^2\theta + \cot^2\theta - 1$
$\sin^2\theta - 2 + \cos ec^2\theta = \sin^2\theta + \cot^2\theta - 1$
$\sin^2\theta - 2 + 1 + \cot^2\theta = \sin^2\theta + \cot^2\theta - 1$

$$\sin^2\theta + \cot^2\theta - 1 = \sin^2\theta + \cot^2\theta - 1$$

$$(\sec\theta + \tan\theta)(\sec\theta - \tan\theta) = 1$$

$\sec^2\theta - \tan^2\theta = 1$
$1 + \tan^2\theta - \tan^2\theta = 1$

$$1 = 1$$

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

$$\sec^2\theta+\cot^2\theta=\cos ec^2\theta+\tan^2\theta$$

$\tan^2\theta+\sin^2\theta=(\sec\theta+\cos\theta)(\sec\theta-\cos\theta)$
$\tan^2\theta+1-\cos^2\theta=(\sec\theta+\cos\theta)(\sec\theta-\cos\theta)$
$\sec^2\theta-\cos^2\theta=(\sec\theta+\cos\theta)(\sec\theta-\cos\theta)$

$$(\sec\theta+\cos\theta)(\sec\theta-\cos\theta)=(\sec\theta+\cos\theta)(\sec\theta-\cos\theta)$$

$1+\tan^2\theta+\cot^2\theta=\cos ec^2\theta+\tan^2\theta$
$1+\tan^2\theta+\cos ec^2\theta-1=\cos ec^2\theta+\tan^2\theta$

$$\cos ec^2\theta+\tan^2\theta=\cos ec^2\theta+\tan^2\theta$$

$(\sin\theta+\cos\theta)(1-\sin\theta\cos\theta)=\sin^3\theta+\cos^3\theta$

$\sin\theta-\sin^2\theta\cos\theta+\cos\theta-\sin\theta\cos^2\theta=\sin^3\theta+\cos^3\theta$
$\sin\theta-(1-\cos^2\theta)\cos\theta+\cos\theta-\sin\theta(1-\sin^2\theta)=\sin^3\theta+\cos^3\theta$
$\sin\theta-\cos\theta+\cos^3\theta+\cos\theta-\sin\theta+\sin^3\theta=\sin^3\theta+\cos^3\theta$

$\sin^3\theta+\cos^3\theta=\sin^3\theta+\cos^3\theta$

$\tan^4\theta+\tan^2\theta=\sec^4\theta-\sec^2\theta$

$\tan^2\theta(\tan^2\theta+1)=\sec^4\theta-\sec^2\theta$
$(\sec^2\theta-1)(\tan^2\theta+1)=\sec^4\theta-\sec^2\theta$
$\sec\theta(\sec^2\theta-1)=\sec^4\theta-\sec^2\theta$

$\sec^4\theta-\sec^2\theta=\sec^4\theta-\sec^2\theta$

$$\cos^4\theta - \sin^4\theta = \cos^2\theta - \sin^2\theta$$

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

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

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

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

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

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

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

$$\frac{\sin\theta}{1+\cos\theta}+\frac{1+\cos\theta}{\sin\theta}=2\cos ec\,\theta$$

$\frac{\sin^2\theta+(1+\cos\theta)^2}{\sin\theta(1+\cos\theta)}=2\cos ec\,\theta$
$\frac{\sin^2\theta+1+2\cos\theta+\cos^2\theta}{\sin\theta(1+\cos\theta)}=2\cos ec\,\theta$
$\frac{2+2\cos\theta}{\sin\theta(1+\cos\theta)}=2\cos ec\,\theta$
$\frac{2(1+\cos\theta)}{\sin\theta(1+\cos\theta)}=2\cos ec\,\theta$
$\frac{2}{\sin\theta}=2\cos ec\,\theta$

$$2\cos ec\,\theta=2\cos ec\,\theta$$

$$\frac{\cos ec\,\theta}{\cot\theta+\tan\theta}=\cos\theta$$

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

$$\cos\theta=\cos\theta$$

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

$\frac{1}{\sec^2\theta}+\frac{1}{\cos ec^2\theta}=1$
$\cos^2\theta+\sin^2\theta=1$

$$1=1$$

$$\frac{1-\sin\theta}{\cos\theta}=\frac{1}{\sec\theta+\tan\theta}$$

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

$$\frac{1}{\sec\theta+\tan\theta}=\frac{1}{\sec\theta+\tan\theta}$$