(1) $\sin A \cot A = \cos A$

L.S. $\sin A \left(\frac{\cos A}{\sin A}\right)$

$\cos A$

$\therefore$ L.S. = R.S

(2) $\cos A \tan A = \sin A$

L.S $\cos A \frac{\sin A}{\cos A}$

$\sin A$

$\therefore$ L.S = R.S

(3) $\cot A \sec A = \csc A$

L.S. $\frac{\cos A}{\sin A}\left(\frac{1}{\cos A}\right)$

$\csc A$

$\therefore$ L.S. = R.S.

(4) $\sin A \sec A = \tan A$

L.S $\frac{\sin A}{\cos A}$

$\tan A$

L.S. = R.S

(5) $\cos A \csc A = \cot A$

L.S. $\frac{\cos A}{\sin A}$

$\cot A$

$\therefore$ L.S = R.S.

(6) $\cot A \sec A \sin A = 1$

L.S $\left(\frac{\cos A}{\sin A}\right)\left(\frac{\sin A}{\cos A}\right)$

1

L.S R.S

(7) $(1-\cos^2 A)\csc^2 A = 1$

L.S $\sin^2 A \left(\frac{1}{\sin^2 A}\right)$

1

$\therefore$ L.S = R.S

(8) $(1-\sin^2 A)(\sec^2 A) = 1$

L.S. $\cos^2 A \left(\frac{1}{\cos^2 A}\right)$

1

$\therefore$ L.S. = R.S.

(9) $\cot^2\theta(1-\cos^2\theta) = \cos^2\theta$

L.S. $\frac{\cos^2\theta}{\sin^2\theta}(\sin^2\theta)$

$\cos^2\theta$

L.S. = R.S.

(10) $(1-\cos^2\theta)\sec^2\theta = \tan^2\theta$

L.S. $\sin^2\theta\left(\frac{1}{\cos^2\theta}\right)$

$\tan^2\theta$

L.S. = R.S

(11) $(1+\tan^2 A)\cos^2 A = 1$

L.S. $\sec^2 A \cos^2 A$

$\left(\frac{1}{\cos^2 A}\right)\cos^2 A$

1

L.S. = R.S.

(12) $(\sec^2 A - 1)\cot^2 A = 1$

L.S $\tan^2 A \left(\frac{1}{\tan^2 A}\right)$

$\therefore$ L.S. = R.S

(13) $(1-\cos^2\theta)(1+\tan^2\theta) = \tan^2\theta$

L.S. $\sin^2\theta \sec^2\theta$

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

L.S. = R.S.

(14) $\sin^2 A(1+\cot^2 A) = 1$

L.S. $\sin^2 A \csc^2 A$

$\sin^2 A \left(\frac{1}{\sin^2 A}\right)$

1

L.S. = R.S.

(15) $(\csc^2 A - 1)\tan^2 A = 1$

L.S. $\cot^2 A \tan^2 A$

$\left(\frac{1}{\tan^2 A}\right)\tan^2 A$

1

$\therefore$ L.S = R.S.

(16) $\sin^2\theta\cot^2\theta + \sin^2\theta = 1$

L.S. $\sin^2\theta\left(\frac{\cos^2\theta}{\sin^2\theta}\right) + \sin^2\theta$

1

$\therefore$ L.S. = R.S.

(17) $(1-\cos^2 A)(1+\cot^2 A) = 1$

L.S. $\sin^2 A \csc^2 A$

$\sin^2 A \left(\frac{1}{\sin^2 A}\right)$

1

$\therefore$ L.S. = R.S

(18) $(1+\tan^2\theta)(1-\sin^2\theta) = 1$

L.S $\sec^2\theta \cos^2\theta$

$\left(\frac{1}{\cos^2\theta}\right)\cos^2\theta$

1

$\therefore$ L.S. = R.S.

(19) $\sin^2\theta \sec^2\theta = \sec^2\theta - 1$

L.S. $\frac{\sin^2\theta}{\cos^2\theta}$

$\tan^2\theta$

$\sec^2\theta - 1$

L.S. = R.S.

(20) $\csc^2\theta \tan^2\theta \cdot 1 = \tan^2\theta$

L.S. $\frac{1}{\sin^2\theta}\left(\frac{\sin^2\theta}{\cos^2\theta}\right) - 1$

$\sec^2\theta - 1$

$\tan^2\theta$

$\therefore$ L.S. = R.S.

(21) $\frac{1}{\sec^2 A} + \frac{1}{\csc^2 A} = 1$

L.S. $\cos^2 A + \sin^2 A$

1

$\therefore$ L.S. = R.S.

(22) $\frac{1}{\cos^2 A} - \frac{1}{\cot^2 A} = 1$

L.S. $\sec^2 A - \tan^2\theta$

1

$\therefore$ L.S. = R.S.

(23) $\frac{\sin A}{\csc A} + \frac{\cos A}{\sec A} = 1$

L.S $\sin^2 A + \cos^2 A$

1

$\therefore$ L.S. = R.S.

(24) $\frac{\sec A}{\cos A} - \frac{\tan A}{\cot A} = 1$

L.S.

$\sec^2 A - \tan^2 A$

1

L.S - R.S

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(25) $\sin^4\theta - \cos^4\theta = 2\sin^2\theta - 1$

L.S. $(\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta)$

$\sin^2\theta - (1 - \sin^2\theta)$

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

$2\sin^2\theta - 1$

$\therefore$ L.S. = R.S.

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

L.S. $(\sec^2\theta - 1)(\sec^2\theta + 1)$

$\tan^2\theta(1 + \tan^2\theta + 1)$

$2\tan^2\theta + \tan^4\theta$

$\therefore$ L.S. = R.S.

(27) $\csc^4\theta - 1 = 2\cot^2\theta + \cot^4\theta$

L.S. $(\csc^2\theta + 1)(\csc^2\theta - 1)$

$(1 + \cot^2\theta + 1)(\cot^2\theta)$

$2\cot^2\theta + \cot^4\theta$

$\therefore$ L.S. = R.S.

(28) $(\tan\theta\csc\theta)^2 - (\sin\theta\sec\theta)^2 = 1$

L.S. $\left(\frac{\sin\theta}{\cos\theta}\left(\frac{1}{\sin\theta}\right)\right)^2 - \left(\frac{\sin\theta}{\cos\theta}\right)^2$

$\sec^2\theta - \tan^2\theta$

1

$\therefore$ L.S. = R.S.

(29) $(\sec\theta\cot\theta)^2 - (\cos\theta\csc\theta)^2 = 1$

L.S. $\left(\frac{1}{\cos\theta}\frac{\cos\theta}{\sin\theta}\right)^2 - \left(\frac{\cos\theta}{\sin\theta}\right)^2$

$\csc^2\theta - \cot^2\theta$

1

$\therefore$ L.S. = R.S.

(30) $\tan^2\theta - \cot^2\theta = \sec^2\theta - \csc^2\theta$

L.S. $\sec^2\theta - 1 - \csc^2\theta + 1$

$\sec^2\theta - \csc^2\theta$

$\therefore$ L.S. = R.S.

(31) $\frac{\sin A\cot^2 A}{\cos A} = \frac{1}{\tan A}$

L.S. $\tan A\left(\frac{1}{\tan^2 A}\right)$

$\frac{1}{\tan A}$

$\therefore$ L.S. = R.S.

(32) $\frac{\sec^2\theta\cot\theta}{\csc^2\theta} = \tan\theta$

L.S. $\frac{\sin^2\theta\cos\theta}{\cos\theta\sin\theta}$

$\frac{\sin\theta}{\cos\theta}$

$\tan\theta$

$\therefore$ L.S. = R.S.

(33) $\sec\theta - \tan\theta\sin\theta = \cos\theta$

L.S. $\frac{1}{\cos\theta} - \frac{\sin^2\theta}{\cos\theta}$

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

$\cos\theta$

$\therefore$ L.S. = R.S.

(34) $\tan\theta + \cot\theta = \sec\theta\csc\theta$

L.S. $\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta}$

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

$\sec\theta\csc\theta$

$\therefore$ L.S. = R.S.

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

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

2

$\therefore$ L.S. = R.S.

(36) L.S. $(1 + \tan\theta)^2 + (1 - \tan^2\theta) = 2\sec^2\theta$

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

$\sec^2\theta + \sec^2\theta$

$2\sec^2\theta$

$\therefore$ L.S. = R.S.

(37) $(\cot\theta - 1)^2 + (\cot\theta + 1) = 2\csc^2\theta$

L.S. $\cot^2\theta - 2\cot\theta + 1 + \cot^2\theta + 2\cot\theta + 1$

$\csc^2\theta + \csc^2\theta$

$2\csc^2\theta$

$\therefore$ L.S. = R.S.

(38) $\sin^2 A(1 - \cot A)^2 + \cos^2 A(1 + \tan A)^2 = 2$

L.S. $\sin^2 A(1 - 2\cot A + \cot^2 A) + \cos^2 A(1 + 2\tan A + \tan^2 A)$

$\sin^2 A - 2\sin A\cos A + \cos^2 A + \cos^2 A + 2\sin A\cos A + \sin^2 A$

2

$\therefore$ L.S. = R.S.

(39) $\cos^2 A(\sec^2 A - \tan^2 A) + \sin^2 A(\csc^2 A - \cot^2 A) = 1$

L.S. $1 - \sin^2 A + 1 - \cos^2 A$

$2 - (\sin^2 A + \cos^2 A)$

$2 - 1$

1

$\therefore$ L.S. = R.S

(40) $\cot^2\theta + \cot^4\theta = \csc^4\theta - \csc^2\theta$

L.S. $\cot^2\theta(1 + \cot^2\theta)$

$(\csc^2\theta - 1)(\csc^2\theta)$

$\csc^4\theta - \csc^2\theta$

$\therefore$ L.S. = R.S.

(41) $\dfrac{\tan^2\theta}{1+\tan^2\theta} \cdot \dfrac{1+\cot^2\theta}{\cot^2\theta} = \sin^2\theta\sec^2\theta$

L.S. $\dfrac{\sin^2\theta\cos^2\theta}{\cos^2\theta} \cdot \dfrac{\sin^2\theta}{\sin^2\theta\cos^2\theta}$

$\sin^2\theta\sec^2\theta$

$\therefore$ L.S. = R.S.

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

L.S. $\dfrac{1+\sin\theta + 1 - \sin\theta}{1 - \sin^2\theta}$

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

$2\sec^2\theta$

$\therefore$ L.S. = R.S.

(43) $\dfrac{\tan\theta}{\sec\theta - 1} + \dfrac{\tan\theta}{\sec\theta + 1} = 2\csc\theta$

L.S. $\dfrac{\tan\theta\sec\theta + \tan\theta + \tan\theta\sec\theta - \tan\theta}{\sec^2\theta - 1}$

$\dfrac{2\tan\theta\sec\theta}{\tan^2\theta}$

$\dfrac{2\cos\theta}{\sin\theta\cos\theta}$

$2\csc\theta$ $\therefore$ L.S. = R.S

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

L.S. $\dfrac{1 + \sec^2\theta + 1 + \sin^2\theta}{1 + \csc^2\theta + 1 + \sin^2\theta}$

1

$\therefore$ L.S. = R.S

(45) $(\sec\theta + \csc\theta)(\sin\theta + \cos\theta) = 2 + \sec\theta\csc\theta +$

L.S. $\dfrac{\sin\theta}{\cos\theta} + 1 + 1 + \dfrac{\cos\theta}{\sin\theta}$

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

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

$\sec\theta\csc\theta + 2$ $\therefore$ L.S. = R.S

(46) $(\cos\theta - \sin\theta)(\csc\theta - \sec\theta) = \sec\theta\csc\theta - 2$

L.S. $\dfrac{\cos\theta}{\sin\theta} - 1 - 1 - \dfrac{\sin\theta}{\cos\theta}$

(By #45 and #43)

$\sec\theta\csc\theta - 2$ $\therefore$ L.S. = R.S

(47) $(1 + \cot\theta + \csc\theta)(1 + \cot\theta - \csc\theta) = 2\cot\theta$

L.S. $1 + \cot\theta - \csc\theta + \cot\theta + \cot^2\theta - \cot\theta\csc\theta + \csc\theta + \cot\theta\csc\theta - \csc^2\theta$

$1 + 2\cot\theta + \cot^2\theta - \csc^2\theta$

$2\cot\theta$ L.S. = R.S

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

L.S. $\sec^2\theta - \sec\theta\tan\theta + \sec\theta + \sec\theta\tan\theta - \tan^2\theta + \tan\theta - \sec\theta + \tan\theta - 1$

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

$\tan^2\theta - \tan^2\theta + 2\tan\theta$

$2\tan\theta$

$\therefore$ L.S. = R.S

(49) $(\sin A + \csc A)^2 + (\cos A + \sec A)^2 = \tan^2 A + \cot^2 A + 7$

L.S. $\sin^2 A + 2 + \csc^2 A + \cos^2 A + 2 + \sec^2 A$

$1 + 1 + 1 + \cot^2 A + 1 + \tan^2 A$

$\tan^2 A + \cot^2 A + 7$

$\therefore$ L.S. = R.S.

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

L.S. $\tan^2\theta + 2\tan\theta\sec\theta + \sec^2\theta$

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

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

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

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

L.S. = R.S.

(51) $\sin^4 A + 2\cos^2 A - \cos^4 A - 1$

L.S. $(\sin^2 A + \cos^2 A)(\sin^2 A - \cos^2 A) + 2\cos^2 A$

$1 - \cos^2 A - \cos^2 A + 2\cos^2 A$

1

L.S. = R.S.

(52) $(1+\tan^2 A)(1-\tan^2 A) = 2\sec^2 A - \sec^4 A$

L.S. $\sec^2 A(1 - \sec^2 A + 1)$

$\sec^2 A - \sec^4 A$

$\therefore$ L.S. = R.S.

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

R.S. $\cos A - \sin A\cos^2 A + \sin A - \sin^2 A\cos A$

$\cos A - \sin A(1 - \sin^2 A) + \sin A - (1 - \cos^2 A)\cos A$

$\cos A - \sin A + \sin^3 A + \sin A - \cos A + \cos^3 A$

$\sin^3 A + \cos^3 A$

$\therefore$ L.S. = R.S.

(54) $\sin^4 y - 2\sin^2 y = \cos^4 y - 1$

L.S. $\sin^2 y(\sin^2 y - 2)$

$(1 - \cos^2 y)(1 - \cos^2 y - 2)$

$(1 - \cos^2 y)(-1 - \cos^2 y)$

$= (\cos^2 y - 1)(\cos^2 y + 1)$

$= \cos^4 y - 1$

$\therefore$ L.S. = R.S.

(55) $\frac{\sqrt{1-\cos^2\theta}}{\cos\theta} \times \sqrt{\sec^2\theta - 1} = \tan^2\theta$

L.S. $\frac{\sqrt{\sin^2\theta}}{\cos\theta} \times \sqrt{\tan^2\theta}$

$\frac{\sin\theta}{\cos\theta} \times \tan\theta$

$\tan\theta \times \tan\theta$

$\tan^2\theta$

$\therefore$ L.S. = R.S.

(56) $\frac{\cos x}{1+\sin x} + \frac{1+\sin x}{\cos x} = 2\sec x$

L.S. $\frac{\cos^2 x + 1 + 2\sin x + \sin^2 x}{(1+\sin x)\cos x}$

$\frac{2 + 2\sin x}{(1+\sin x)\cos x}$

$\frac{2(1+\sin x)}{(1+\sin x)\cos x}$

$2\sec x \quad \therefore$ L.S. = R.S.

(57) $\sin^2 A\tan A + \cos^2 A\cot A + 2\sin A\cos A = \tan A + \cot A$

L.S. $\frac{\sin^3 A}{\cos A} + \frac{\cos^3 A}{\sin A} + 2\sin A\cos A$

$\frac{\sin^4 A + 2\sin^2 A\cos^2 A + \cos^4 A}{\cos A\sin A}$

$\frac{(\sin^2 A + \cos^2 A)^2}{\cos A\sin A}$

$\frac{\sin^2 A}{\cos A\sin A} + \frac{\cos^2 A}{\cos A\sin A} \Rightarrow \tan A + \cot A$

$\therefore$ L.S. = R.S.