Ex 5 p 144 memo

2) $\cos^3 x + \cos x . \sin^2 x = \cos x$

Common factor

LHS: $\cos x(\underbrace{\cos^2 x + \sin^2 x}_{\text{ID !!}})$

$= \cos x\ (1)$

$\therefore$ LHS = RHS = $\cos x$

4) $(1 - \sin^2 x)(1 + \tan^2 x) = 1$

Two ways to do this one!

longer, trickier way

LHS: $1 + \tan^2 x - \sin^2 x - \sin^2 x . \tan^2 x$

$= 1 + \dfrac{\sin^2 x}{\cos^2 x} - \dfrac{\sin^2 x}{1} - \left(\dfrac{\sin^2 x}{1}\right)\left(\dfrac{\sin^2 x}{\cos^2 x}\right)$

$= \dfrac{1}{1}^{\times \cos^2 x} + \dfrac{\sin^2 x}{\cos^2 x} - \dfrac{\sin^2 x}{1}^{\times \cos^2 x} - \dfrac{\sin^4 x}{\cos^2 x}$

$= \dfrac{\overset{\text{ID.}}{(\cos^2 x + \sin^2 x)} \underline{- \sin^2 x . \cos^2 x - \sin^4 x}}{\cos^2 x}$ LCD

Common factor

$= \dfrac{1 - \sin^2 x(\cos^2 x + \sin^2 x)}{\cos^2 x}$

$= \dfrac{1 - \sin^2 x(1)}{\cos^2 x} \overset{\text{Id!}}{=} \dfrac{\cos^2 x}{\cos^2 x} = 1$

$\therefore$ LHS = RHS = 1

$$\boxed{\text{OR}}$$

ID!

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

LHS: $\left(\frac{\cos^2 x}{1}\right)\left(1 + \frac{\sin^2 x}{\cos^2 x}\right)$

short & sweet!

why it's NB. to know ID-s!!

$$= \cos^2 x + \sin^2 x$$ } ID!

$$= 1$$

$\therefore$ LHS = RHS = 1

6) $\frac{\cos x - \cos^3 x}{\cos x - \cos x . \sin^2 x} = \tan^2 x$

HCF!!

Id!!

LHS: $\frac{\cos x (1 - \cos^2 x)}{\cos x (1 - \sin^2 x)}$

Id!!

$$= \frac{\sin^2 x}{\cos^2 x}$$

ID.

$$= \tan^2 x$$

$\therefore$ LHS = RHS = $\tan^2 x$

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

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

$= \dfrac{(\sin^2\theta + \cos^2\theta)}{\cos^2\theta}$ ID!! {LCD}

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

$\therefore$ LHS = RHS.

10) $\tan\theta + \dfrac{1}{\tan\theta} = \dfrac{1}{\sin\theta \cdot \cos\theta}$

LHS: $\dfrac{\sin\theta}{\cos\theta} + \left(\dfrac{1}{1} \div \dfrac{\sin\theta}{\cos\theta}\right)$ $\dfrac{1}{\frac{\sin\theta}{\cos\theta}}$

$= \dfrac{\sin\theta}{\cos\theta} + \left(\dfrac{1}{1} \times \dfrac{\cos\theta}{\sin\theta}\right)$

$= \dfrac{(\sin^2\theta + \cos^2\theta)}{\sin\theta \cdot \cos\theta}$ ID! $\rightarrow$ LCD

$= \dfrac{1}{\sin\theta \cdot \cos\theta}$

$\therefore$ LHS = RHS

8) $\tan^2\theta + 1 = \frac{1}{\cos^2\theta}$

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

$= \frac{(\sin^2\theta + \cos^2\theta)}{\cos^2\theta\ \{LCD\}}$ ID!!

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

$\therefore$ LHS = RHS.

10) $\tan\theta + \frac{1}{\tan\theta} = \frac{1}{\sin\theta \cdot \cos\theta}$

LHS: $\frac{\sin\theta}{\cos\theta} + \left(\frac{1}{1} \div \frac{\sin\theta}{\cos\theta}\right)$ $\frac{1}{\frac{\sin\theta}{\cos\theta}}$

$= \frac{\sin\theta}{\cos\theta} + \left(\frac{1}{1} \times \frac{\cos\theta}{\sin\theta}\right)$

$= \frac{(\sin^2\theta + \cos^2\theta)}{\sin\theta \cdot \cos\theta}$ ID! $\rightarrow$ LCD

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

$\therefore$ LHS = RHS

12) $\dfrac{\cos x}{1+\sin x} + \tan x = \dfrac{1}{\cos x}$

LHS: $\dfrac{\cos x}{(1+\sin x)} + \dfrac{\sin x}{\cos x}$

LCD $= \cos x(1+\sin x)$

$= \dfrac{\cos^2 x + \sin x(1+\sin x)}{\cos x(1+\sin x)}$

$= \dfrac{\cos^2 x + \sin x + \sin^2 x}{\cos x(1+\sin x)}$

order terms to see square ID a bit easier

$= \dfrac{\overbrace{(\cos^2 x + \sin^2 x)}^{\text{ID.}} + \sin x}{\cos x(1+\sin x)}$

$= \dfrac{\cancel{(1+\sin x)}}{\cos x\cancel{(1+\sin x)}}$

$= \dfrac{1}{\cos x}$

$\therefore$ LHS = RHS

14) $\tan^2 x . \cos^2 x + \dfrac{\sin^2 x}{\tan^2 x} = 1$

$$\text{LHS: } \left(\frac{\sin^2 x}{\cos^2 x}\right)\left(\frac{\cos^2 x}{1}\right) + \left(\frac{\sin^2 x}{1} \div \frac{\sin^2 x}{\cos^2 x}\right)$$

$$= \frac{\sin^2 x}{1} + \left(\frac{\cancel{\sin^2 x}}{1} \times \frac{\cos^2 x}{\cancel{\sin^2 x}}\right)$$

$= \sin^2 x + \cos^2 x \rightarrow$ ID !!

$= 1$

$\therefore$ LHS = RHS

*When it comes to Identities ....
MOST NB is knowing them of by heart !! ☺

if you see tan, change it !!

- $\boxed{\tan \alpha} = \dfrac{\sin \alpha}{\cos \alpha}$
- $\sin^2 \alpha + \cos^2 \alpha = 1$

can Also be $\cos^2 \alpha + \sin^2 \alpha$

$\rightarrow \sin^2 \alpha = (1 - \cos^2 \alpha)$
$\cos^2 \alpha = (1 - \sin^2 \alpha)$

remember to check for these we derived from square ID.

And :
- The more you practise .... the easier it becomes.