Exemplar Problem

Trigonometric Functions

9. Prove that $\sin 4A = 4\sin A \cos^3 A - 4\cos A \sin^3 A$.

Solution:

 $\sin 4A = \sin (2A + 2A)$

We know that,

sin(A + B) = sin A cos B + cos A sin B

Therefore, sin 4A = sin 2A cos 2A + cos 2A sin 2A

⇒ sin 4A = 2 sin 2A cos 2A

From T-ratios of multiple angle,

We get,

 $\sin 2A = 2 \sin A \cos A$ and $\cos 2A = \cos^2 A - \sin^2 A$

 \Rightarrow sin 4A = 2(2 sin A cos A)(cos ² A - sin ² A)

 \Rightarrow sin 4A = 4 sin A cos 3 A - 4 cos A sin 3 A

Hence, $\sin 4A = 4 \sin A \cos^3 A - 4 \cos A \sin^3 A$