106.23 Proof without words: $\sin 3x = 3 \sin x - 4 \sin^3 x$
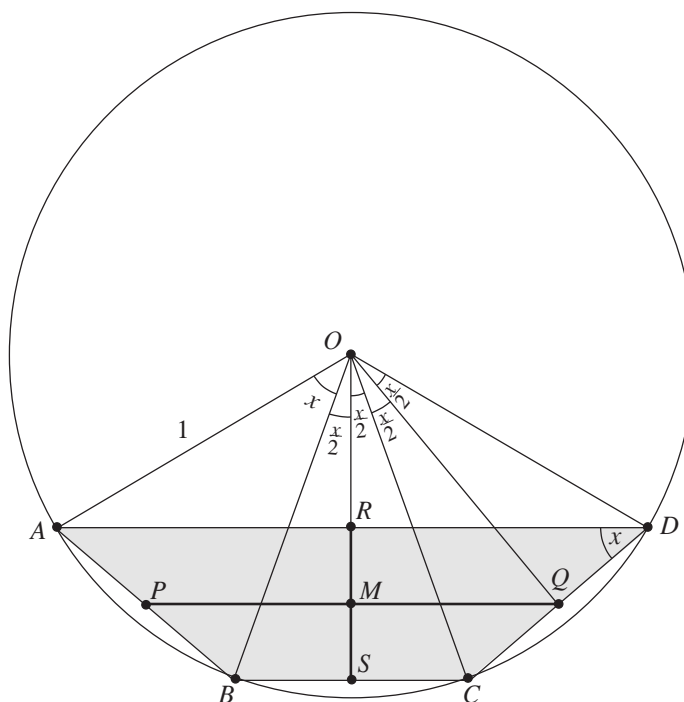

$$\text{area}\,(OABCD) - \text{area}\,(OAD) = \text{area}\,(ABCD)$$

$$\tfrac{1}{2}\,(3 \sin x) - \tfrac{1}{2}\,(\sin 3x) = RS{\cdot}PQ = (CD \sin x)(2OQ \sin x)$$

$$= \left(2 \sin \tfrac{1}{2}x \sin x\right)\left(2 \cos \tfrac{1}{2}x \sin x\right)$$

$$= 2 \sin^3 x$$

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