Worksheet

EXAMPLE

1. Prove that $\sin(A + B) - \sin(A - B) = 2 \cos A \sin B$
2. Without a calculator, show that $\sin 72° - \sin 48° = \sin 12°$.
3. Simplify $\cos 288° \cdot \sin 48° - \sin 108° \cdot \sin -42°$.

Solution

1. $\sin(A + B) - \sin(A - B) = \sin A \cos B + \cos A \sin B - (\sin A \cos B - \cos A \sin B)$
$= 2 \cos A \sin B$

2. $\sin(60° + 12°) - \sin(60° - 12°) = 2 \cos 60° \sin 12°$
$= 2\left(\frac{1}{2}\right) \times \sin 12°$
$= \sin 12°$

3. $\cos(360° - 72°) \cdot \sin 48° - \sin(180° - 72°) \cdot (-\sin 42°)$ [use reduction formula]
$= \cos 72° \cdot \sin 48° + \sin 72° \cdot \sin 42°$ [get ratios of acute and positive angles]
$= \cos 72° \cdot \sin 48° + \sin 72° \cdot \cos 48°$ [co-ratio $\sin 42° = \cos(90° - 42°)$]
$= \sin(72° + 48°)$ [compound angle formula]
$= \sin 120°$ [simplify bracket]
$= \sin(180° - 60°)$ [reduction formula]
$= \sin 60°$ [special angle]
$= \frac{\sqrt{3}}{2}$

Exercise 1

1. Use the compound angle formula $\cos(A - B) = \cos A \cos B + \sin A \sin B$ to derive formulae for:
   1.1 $\cos(A + B)$ **1.2** $\sin(A + B)$ **1.3** $\sin(A - B)$
2. Use the formula $\sin(A - B) = \sin A \cos B - \cos A \sin B$ to show that $\sin(90° - P) = \cos P$.
3. Without using a calculator, determine the value of the following:
   $\sin 85° \cos 35° + \cos 85° \sin 35°$.
4. Prove $\cos(A + B) + \cos(A - B) = 2 \cos A \cos B$.
5. **5.1** Show that $\cos(A + B) \cdot \cos(A - B) = \cos^2 A - \sin^2 B$
   5.2 Determine (without the use of a calculator) the value of $\cos^2 37{,}5° - \sin^2 7{,}5°$. Leave the answer in surd form.
6. If $\cos 28° = k$, express the following in terms of k:
   6.1 $\sin 28°$
   6.2 $\cos 124°$
   6.3 $\sin 16° \sin 12° - \cos 16° \cos 12°$
7. Simplify $\frac{1}{2}(\cos 15° + \sqrt{3} \sin 15°)$.
8. Show that $\sin 15° = \frac{\sqrt{3} - 1}{2\sqrt{2}}$.
9. Show that $\cos 75° = \frac{\sqrt{2}(\sqrt{3} - 1)}{4}$.
10. If $\sin 31° \cdot \cos 22° + \sin 22° \cdot \cos 31° = k$, determine the values of the following in terms of k without the use of a calculator.
   10.1 $\sin 53°$ **10.2** $\cos 143°$
   10.3 $\sin 75° \cdot \sin 22° + \cos 75° \cdot \cos 22°$

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