

## FACTORISATION FORMULAE SUMMARY

$$\sin A + \sin B = 2 \sin \frac{A+B}{2} \cos \frac{A-B}{2}$$

$$\sin A - \sin B = 2 \cos \frac{A+B}{2} \sin \frac{A-B}{2}$$

$$\cos A + \cos B = 2 \cos \frac{A+B}{2} \cos \frac{A-B}{2}$$

$$\cos A - \cos B = -2 \sin \frac{A+B}{2} \sin \frac{A-B}{2}$$

**These formulae may be remembered as:**

Sum of two sines =  $2 \sin(\text{semi sum}) \cos(\text{semi difference})$

Difference of two sines =  $2 \cos(\text{semi sum}) \sin(\text{semi difference})$

Sum of two cosines =  $2 \cos(\text{semi sum}) \cos(\text{semi difference})$

Difference of two cosines = minus  $2 \sin(\text{semi sum}) \sin(\text{semi difference})$

They are however given in the formula booklet.

They are used to **FACTORISE** trigonometric equations involving sin and cos.

This means writing a **SUM** or **DIFFERENCE** as a **PRODUCT**.

**The main use will be to solve equations involving sums or differences of sin and cos which can be arranged to equal zero.**

**EXAMPLE 1**

(Question taken from 2001/2002 Specimen WJEC P4 paper)

(a) Use the formula for  $\sin(A+B)$  and  $\sin(A-B)$  to show that

$$\sin X + \sin Y = 2 \sin \frac{1}{2}(X + Y) \cos \frac{1}{2}(X - Y)$$

(b) Find the general solution, in radians, of the equation

$$\sin 6\theta + \sin 2\theta = 0$$

## FACTORISATION FORMULAE

### EXERCISE

1. FACTORISE:

$$\sin 3A + \sin A$$

$$\sin 4A - \sin 2A$$

$$\cos 5A + \cos 3A$$

$$\cos 7A - \cos A$$

2. SOLVE the following equations giving the general solutions in radians.

$$\cos 2X + \cos 4X = 0$$

$$\sin 3X - \sin X = 0$$

$$\sin 4\theta + \sin 2\theta = 0$$

$$\cos X = \cos 2X + \cos 4X$$

$$\cos \theta + \cos 3\theta = \sin \theta + \sin 3\theta$$

### 3.PAST PAPER JUNE P4 2002 WJEC

Find the general solution, in radians, of the equation

$$\cos 2\theta + \cos 4\theta + \cos 6\theta = 0$$

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### 4.TAKEN FROM LONDON BOARD

Find the general solutions of the following equations giving your answer in radians.

$$\cos 4x + \cos 2x = 0$$

$$\cos 4x + \cos 2x = \cos x$$

$$\cos x + \cos 3x + \cos 5x = 0$$

NOTICE THE STYLE OF QUESTION. THERE ARE OTHER SIMILAR  
LOOKING QUESTIONS IN P3 WHICH INVOLVE BOTH SIN AND COSINE.  
THE TECHNIQUES ARE VERY DIFFERENT!!