Compound angle formulae and trigonometric identities

Objectives:

- Know what compound angle formulae refer to
- Know as many trigonometric identities as possible, and how to use them

Key points:

Compound here refers to the mixture (addition) of two angles inside the sin, or cos function. So we're talking about two angles A, and B and wanting to be able to evaluate $\sin(A+B)$, or $\cos(A+B)$. Sometimes you use the formula to expand one of these, other times it's beneficial to do the reverse and turn two added terms into one function.

Trigonometric identities are any trig. equations which are always true. They can be used to simplify equations, and solve problems. Examples include: (these are true for all values of x)

- $\sin^2(x)+\cos^2(x)=1$ (and rearrangements like $1-\sin^2(x)=\cos(x)$)
- $\sin(2x)=2\sin(x)\cos(x)$ (this is just the $\sin(A+B)$ formula with $A=B=x$!)
- $\cos(2x)=\cos^2(x)-\sin^2(x)$ and $\cos(2x)=2\cos^2(x)-1$

You don't really need to learn both the $\cos(2x)$ formulae, because you can work out either one from the other if you've remembered that $\sin^2(x)+\cos^2(x)=1$.

The **important things to remember** are: (for all values of x and y)

- There are formulae for $\sin(x\pm y)$ and $\cos(x\pm y)$ using only $\sin(x)$, $\sin(y)$, $\cos(x)$ and $\cos(y)$.
- You can write $\sin^2(x)$ in terms of $\cos^2(x)$, and vice versa
- There's a formula for $\sin(2x)$ in terms of $\sin(x)$ and $\cos(x)$
- There's a formula for $\cos(2x)$ in terms of $\cos^2(x)$ or $\sin^2(x)$

Formulae for $\tan(2A)$ or $\tan(A+B)$ are not needed at this stage.

Recommended links:

Highly recommended: HELM notes (See sin and cos formulae in Key Points 13, 14 and 17. Can skip Key Points 14 and 16, including tan identities)

Highly recommended: MathTutor Add. Formulae, MathTutor Dbl. Angle (Ignore tan identities)

Other links: Khan Academy (first 4 parts), Khan Academy (4 part lesson)