**GENERAL SOLUTIONS OF TRIGONOMETRICAL EQUATIONS.**

I strongly believe that, in general, the reliance on a formula sheet does not aid understanding. It certainly facilitates a way of producing an “answer” but this is yet another illustration of the famous saying **“THERE IS A BIG DIFFERENCE BETWEEN *KNOWING* A THING AND *UNDERSTANDING* IT”.**

The formulas for General Solutions of trigonometric equations are just another example of this concept.



I would guarantee that 99% of students have

no idea WHY these formulae produce the

general solutions of trigonometric equations.

Personally, I **never** teach students to use them.

A **logical approach** is far superior and even the weaker students grasp it **and** they understand what they are doing!

Examples.

1. **Consider the General Solution of:** ***sin* *x* = ½**

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|  |  |  |  |  |  |  |  |  |  |  |  |  | *y* = ½ |
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 The basic solution is *x* = 300 The way to find the Then another 3600

 (or π/6 rad) next solution in the to get the next

 same relative position one which is 7500

 is simply to add

 3600 and get 3900

 .

We think of this as 300 plus any number of 360’s = 30 + 360n (or π/6 + 2πn)

The other set of solutions is of course 1500 + 360n (or 5π/6 + 2πn)

Compared to this, the form on the formula sheet is absurdly complicated. ***nπ +(-1)nα***

2. **Consider the general solution of:** ***cos 4x* = –½** (basic angle = 600)

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| --- | --- | --- | --- | --- | --- |
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|  |  |  |  |  |  |

 OR

 1200 2400

  1200 2400

 so *4x = 120 + 360n or 4x = 240 + 360n*

 *x = 30 + 90n or x = 60 + 90n*

 I am positive this is far better and

 much **easier to understand** than :

 *4x = 360n ± 120*

 *x = 90n ± 30*

3. **Consider the general solution of*: tan(x – 20 ) = √3*** (basic angle = 600)

 600 2400

 so *x – 20 = 60 + 360n and x – 20 = 240 + 360n*

 *x = 40 + 360n and x = 220 + 360n*

 The formula method gives:

 *x – 20 = 180n + 60*

 *x = 180n + 40*

The **“logic”** method uses ONE concept: namely solutions repeat by adding on 360’s

and **real understanding is achieved!**

**The “formula” method is yet another way that teachers can be responsible for MYSTIFYING mathematics for students.**