**DEALING WITH SURDS.**

**Dealing with surds is NOT a matter of using “rules” but of using “logic”.**

1. Consider: √9 × √9

Obviously this is 3 × 3

= 9

But notice that we can do this **in a different order**: √9 × √9

= √( 9 × 9)

= √ (81)

= 9 as above!

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2. This means that we can write:

√3 ×√5 = √(3×5) = √15

Or in general : ***√a×√b = √(ab)***

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3. BUT consider √(9 + 16)

= √(25)

= 5

But if we try it **in a different order like before it is not correct:**

Consider √(9 + 16)

= √(9) + √(16)

= 3 + 4

= 7

because we know the real answer is 5.

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4. This means that ***√(a + b) ≠ √a + √b***

So even though it **looks** **tempting** to do the following:

***√(x2 + 16) = x + 4*** we cannot do it!

But notice that ***√(x2 + 8x + 16)***

***= √ (x + 4)2***

***= x + 4***

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5. Consider √(62 + 82)

It does look very tempting to put:

√(62 + 82) = 6 + 8 = 14 but we can see that the correct answer is:

√(62 + 82) = √ (36 + 64)

= √100

= 10.

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6. Clearly we can deal with fractions as follows:

so that =

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7. **Some** surds may be simplified as follows as long as a factor is a perfect square:

= ×

= 4×

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8. It is not possible to add √20 + √30

but √50 + √72 can be simplified:

= √(25×2) + √(36×2)

= 5√2 + 6√2

= 11√2

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9. Similarly

=   
 = 3  = 5

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10. Surds are easier to deal with if they have **rational** denominators.

The two types are:

(a)

(b) =

=

=

(we usually write irrationals in the form ***a + b√c*** rather than )

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