

Trick: Multiplication using Binary System

"We can perform "trick" multiplication which is influenced by binary system. The procedure is as given below:

$$41 \times 13 = 533$$

$\div 2$ & Ignore Remainder $\times 2$

Start \rightarrow	41	13	13
	$\rightarrow 20$	26	
Ignore	$\rightarrow 10$	52	
Rows	5	104	104
with	$\rightarrow 2$	208	
Even values!	1	416	<u>416</u>
			<u>533</u> !!

This method works for all multiplications. You can try other examples!

The given $12 \times 10 = 120$

	<u>$\div 2$</u>	<u>$\times 2$</u>	
	$\rightarrow 12$	10	
Ignore	$\rightarrow 6$	20	
Rows	3	40	40
with			
Even values.	1	80	<u>80</u>
			<u>120</u>

• The question is how does the method work? (Think before you turn the page!)

Solution

Consider 41×13

We can express 41 as factors using powers of 2
Powers of 2 are: 1, 2, 4, 8, 16, 32, 64, 128, 256,

$$41 \Rightarrow 32 + 9 \Rightarrow 32 + 8 + 1 \\ = 2^5 + 2^3 + 2^0$$

Let us revisit the multiplication

($\div 2$)	($\times 2$)
41	13 $\Rightarrow 13 \times 2^0 \checkmark$
20	26 $\Rightarrow 13 \times 2^1$
10	52 $\Rightarrow 13 \times 2^2$
5	104 $\Rightarrow 13 \times 2^3 \checkmark$
2	208 $\Rightarrow 13 \times 2^4$
1	416 $\Rightarrow 13 \times 2^5 \checkmark$

$$\therefore \text{we have } 41 \times 13 = (2^5 + 2^3 + 2^0) \times 13 \\ = \underline{\underline{533}}$$

Hence, the above method picks up the relevant factors. The 'odd' values provide the factors as these divisions produce a remainder of 1. Such rows are retained!

Reference Book

Mathematics — by Charles Solomon
Publishers — Sun Books, Melbourne
& Paul Hamlyn, London.

(Refer Pages 24 to 27).