CHINESE ROD NUMERAL MULTIPLICATION

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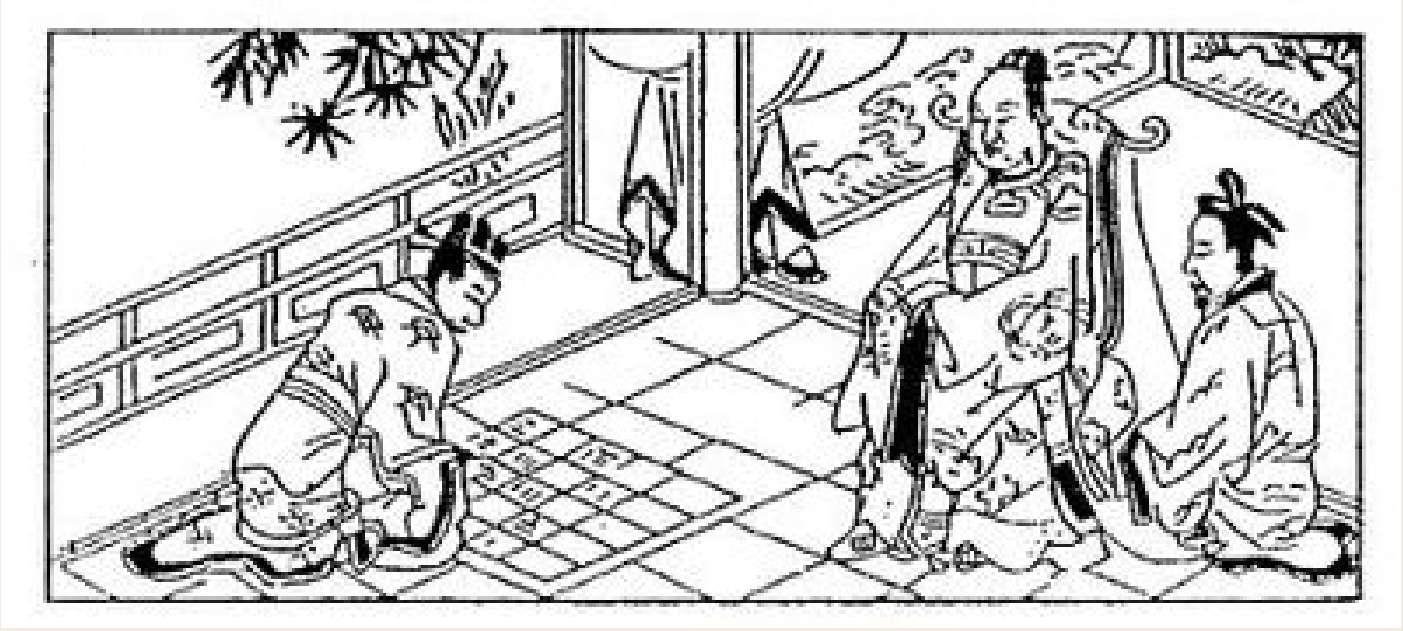
Counting rods and rod numerals are attested to throughout eastern Asia from the 5th century BCE.

Calculations done on a counting board using methods similar to (multiplication) or the same as (division) Western algorithms



Base 10 place-value system

*ingenious way to depict place value without zero

Positive numbers

	0	1	2	3	4	5	6	7	8	9
Vertical										
Horizontal										

Negative numbers

	0	−1	−2	−3	−4	−5	−6	−7	−8	−9
Vertical										
Horizontal										

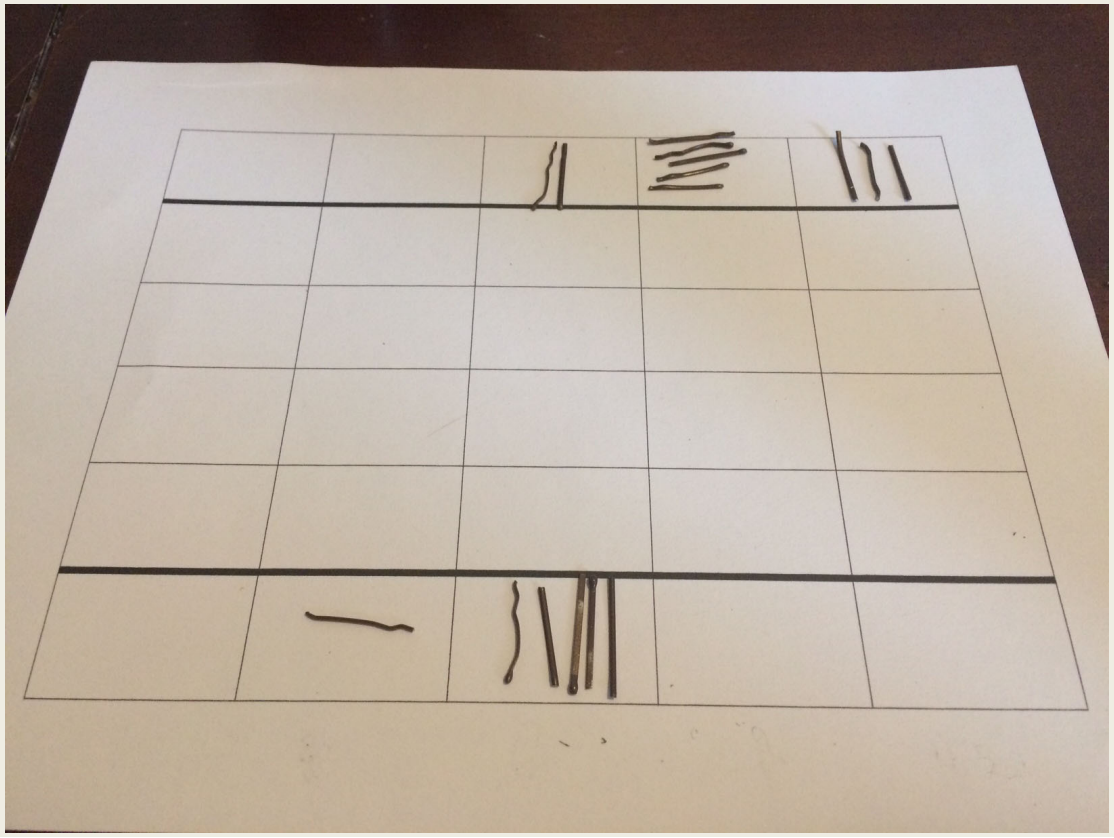
Examples:

231				
5089				
−407				
−6720				

*Alignment alternates, starting with vertical in ones digit

Multiplication

Starts with the leading digit of the multiplicand as opposed to the last digit of the multiplier

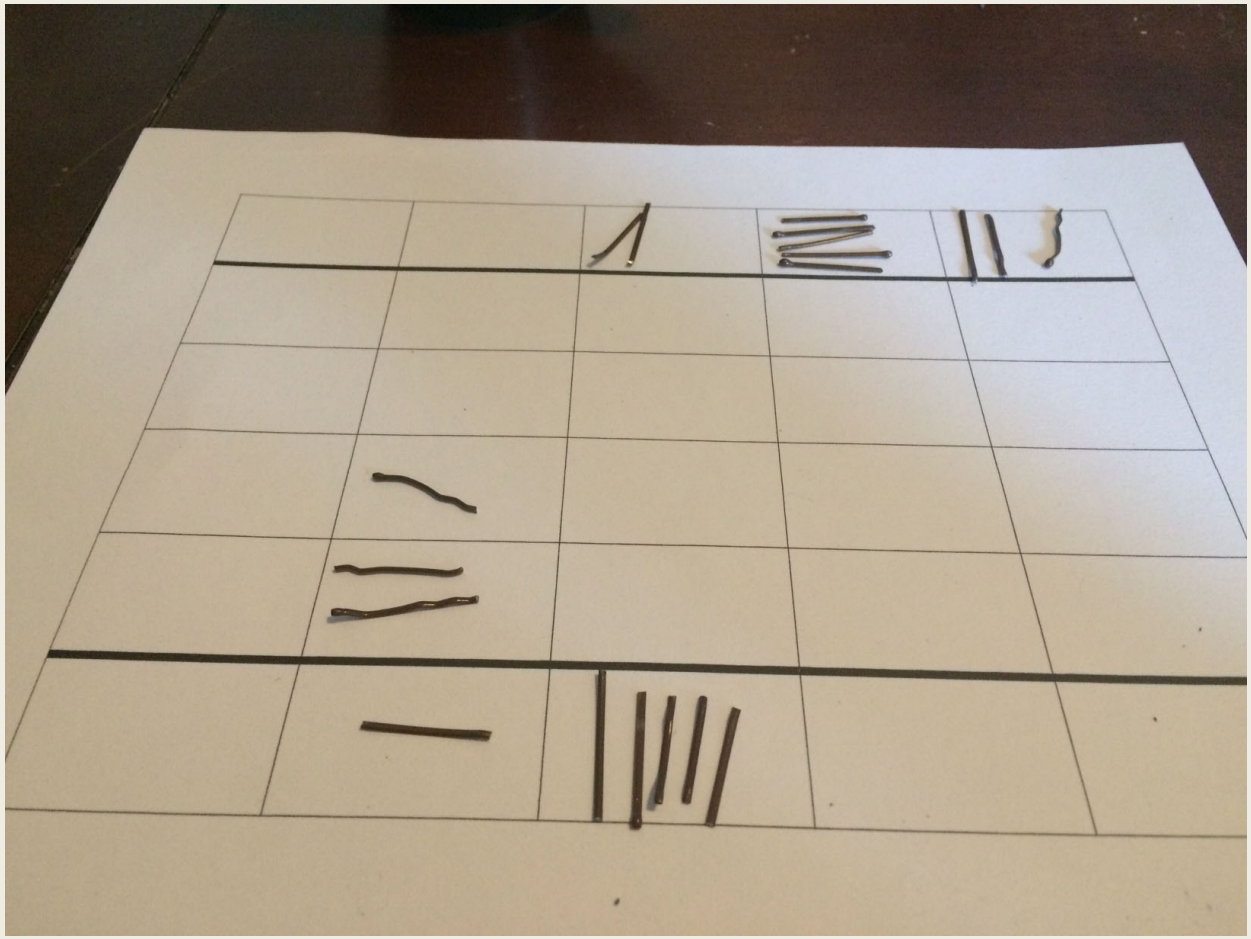


<u>Set up</u>

253 x 15

Notice alignment of multiplier under leading digit of multiplicand

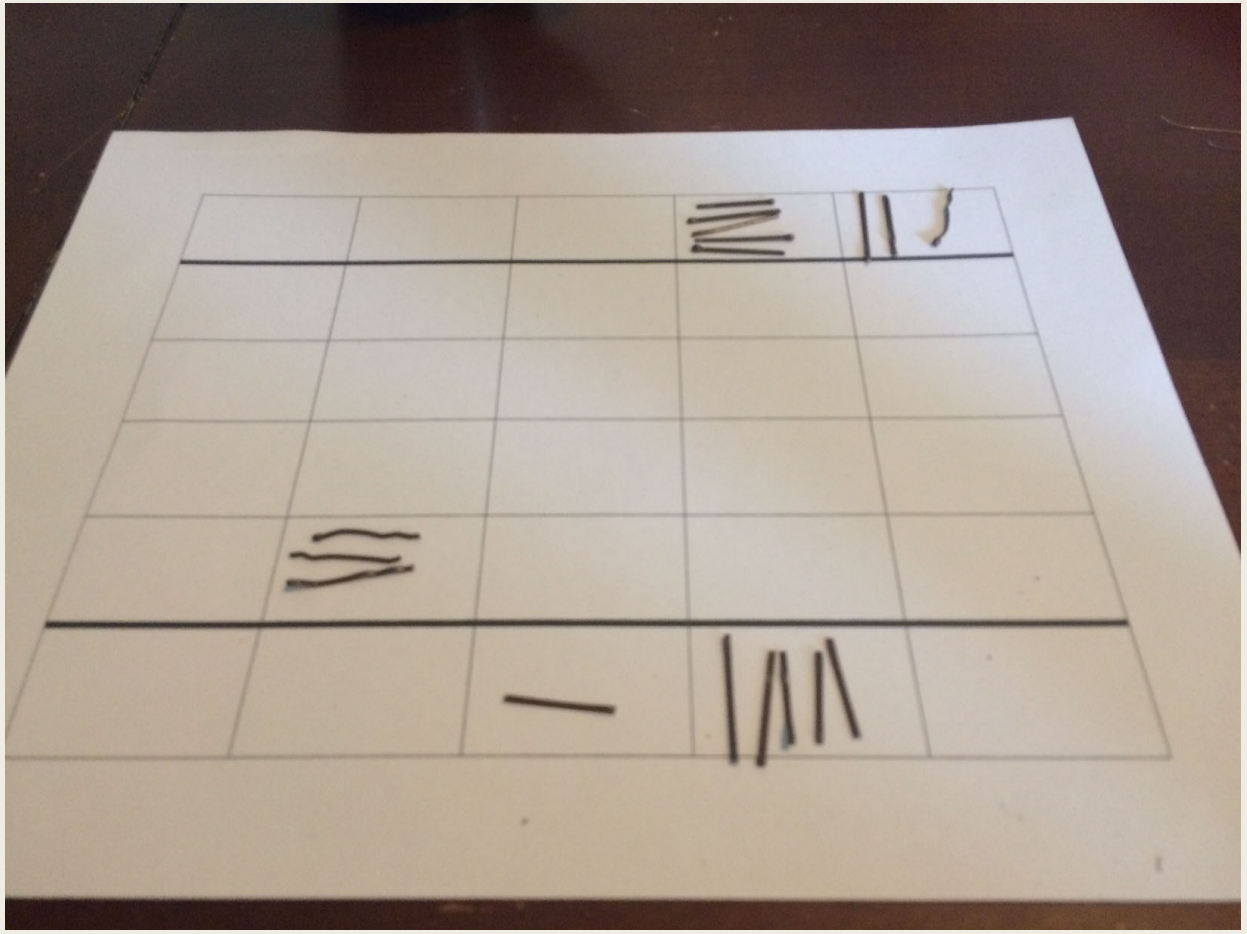
Student work using bobby pins! (they don't roll)



<u>1st multiplication</u>

2 x 15 = 20+10

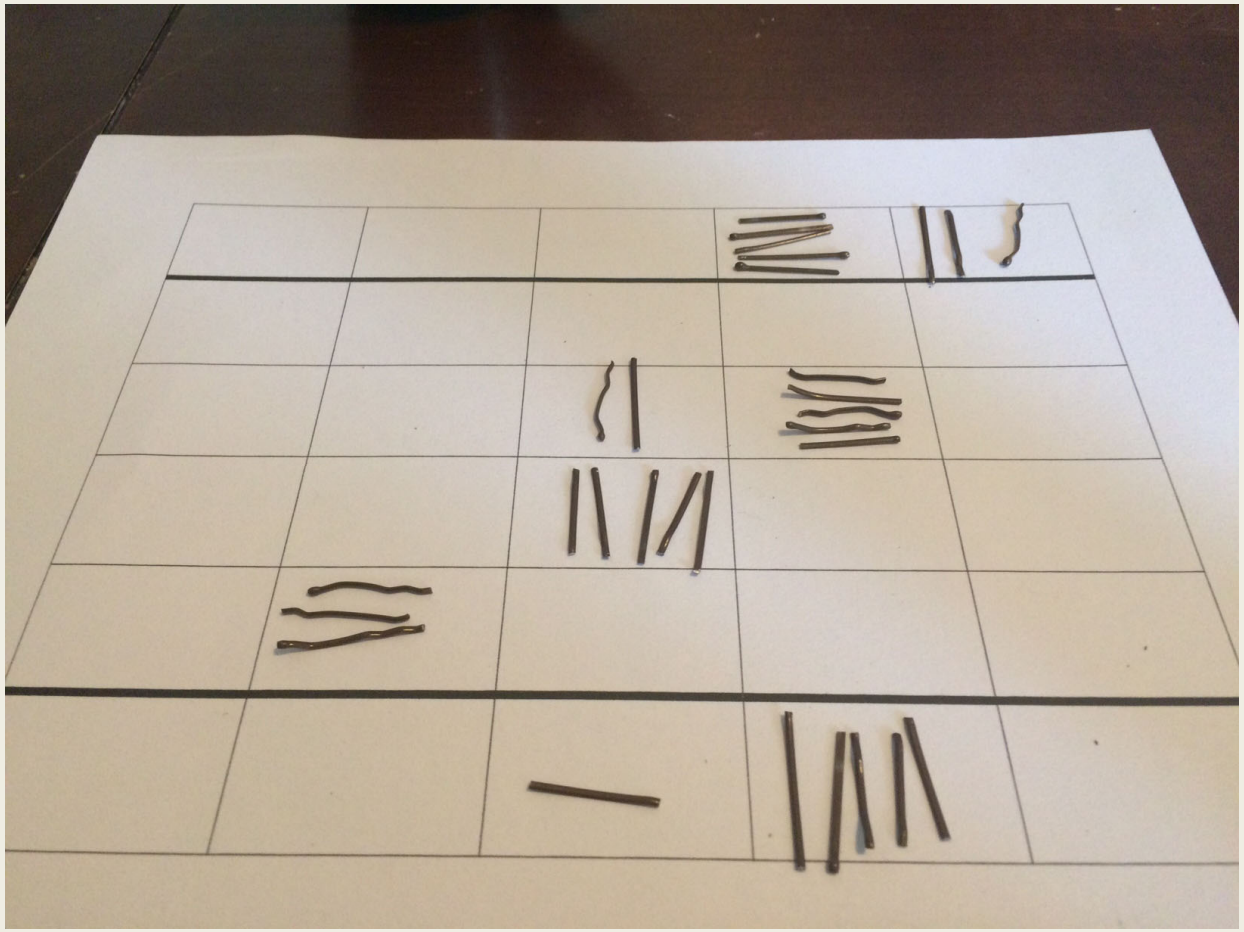
Notice placement of multiplier's ones digit dictates placement of first partial product



Regroup

Move multiplier one place to right

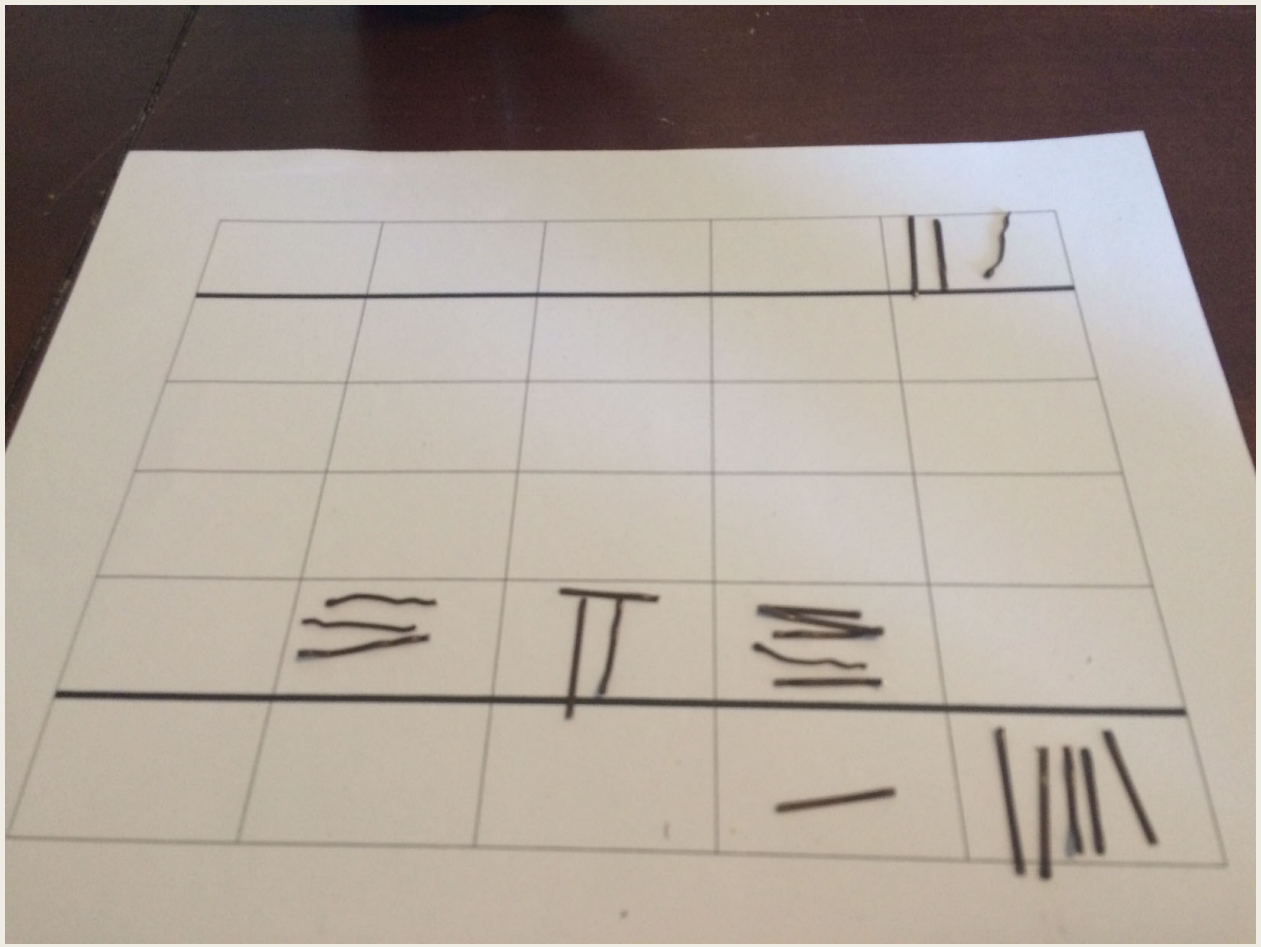
Remove used leading digit in multiplicand
(I like this strategy!)



2nd multiplication

5 x 15 = 50+25

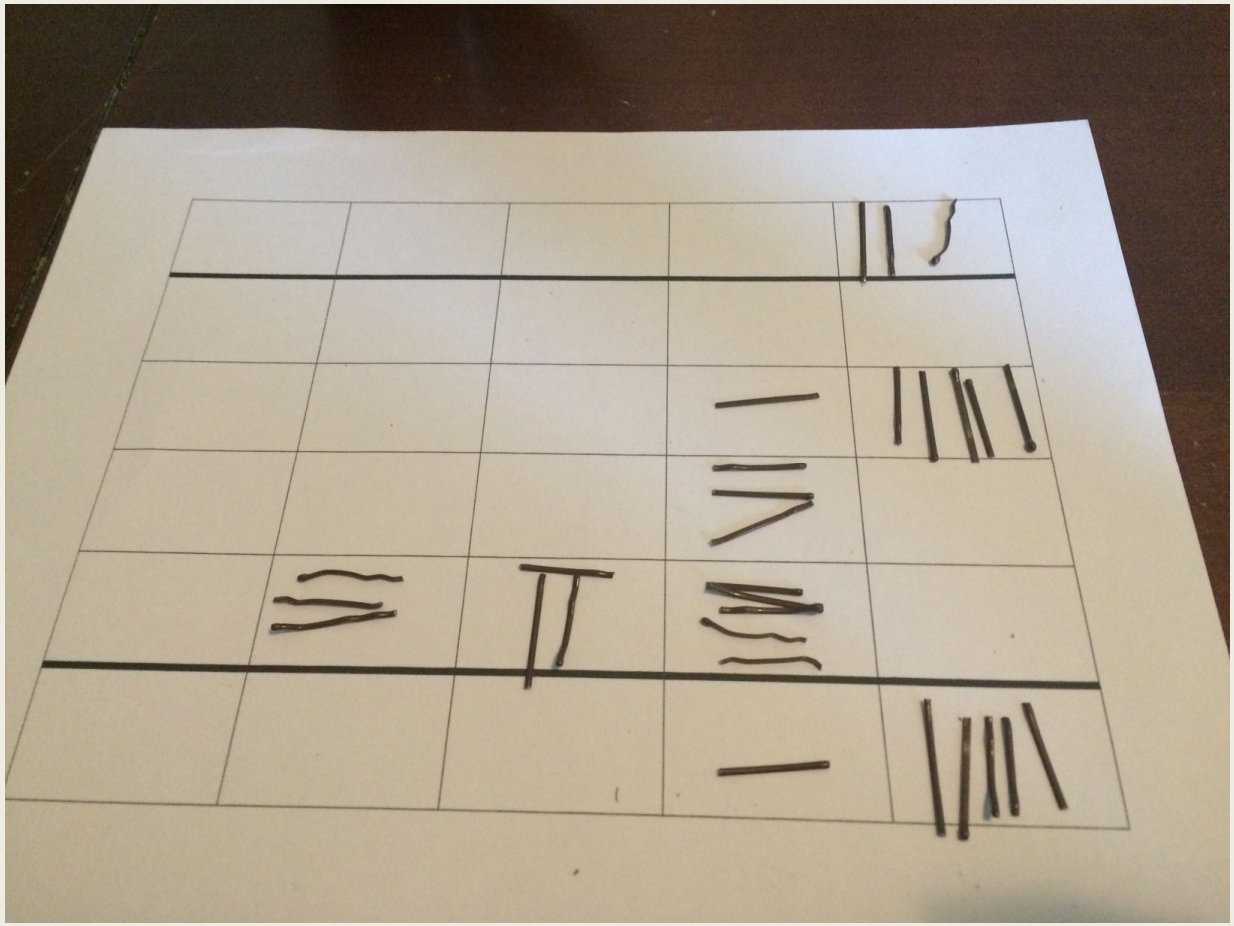
Notice bottom working row is reserved for the partial products



Regroup

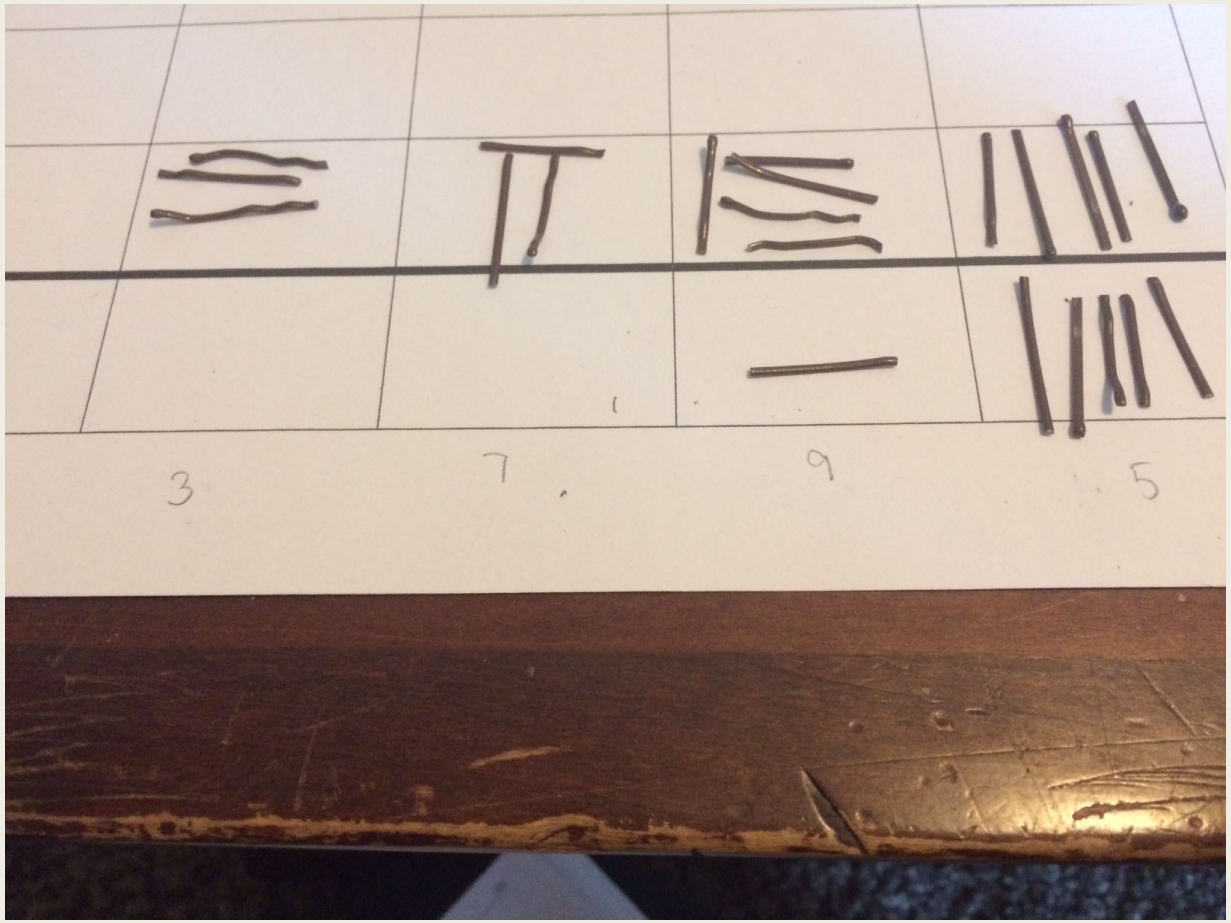
Move multiplier one place to right

Remove used leading digit in multiplicand



3rd multiplication

3 x 15 = 30+15

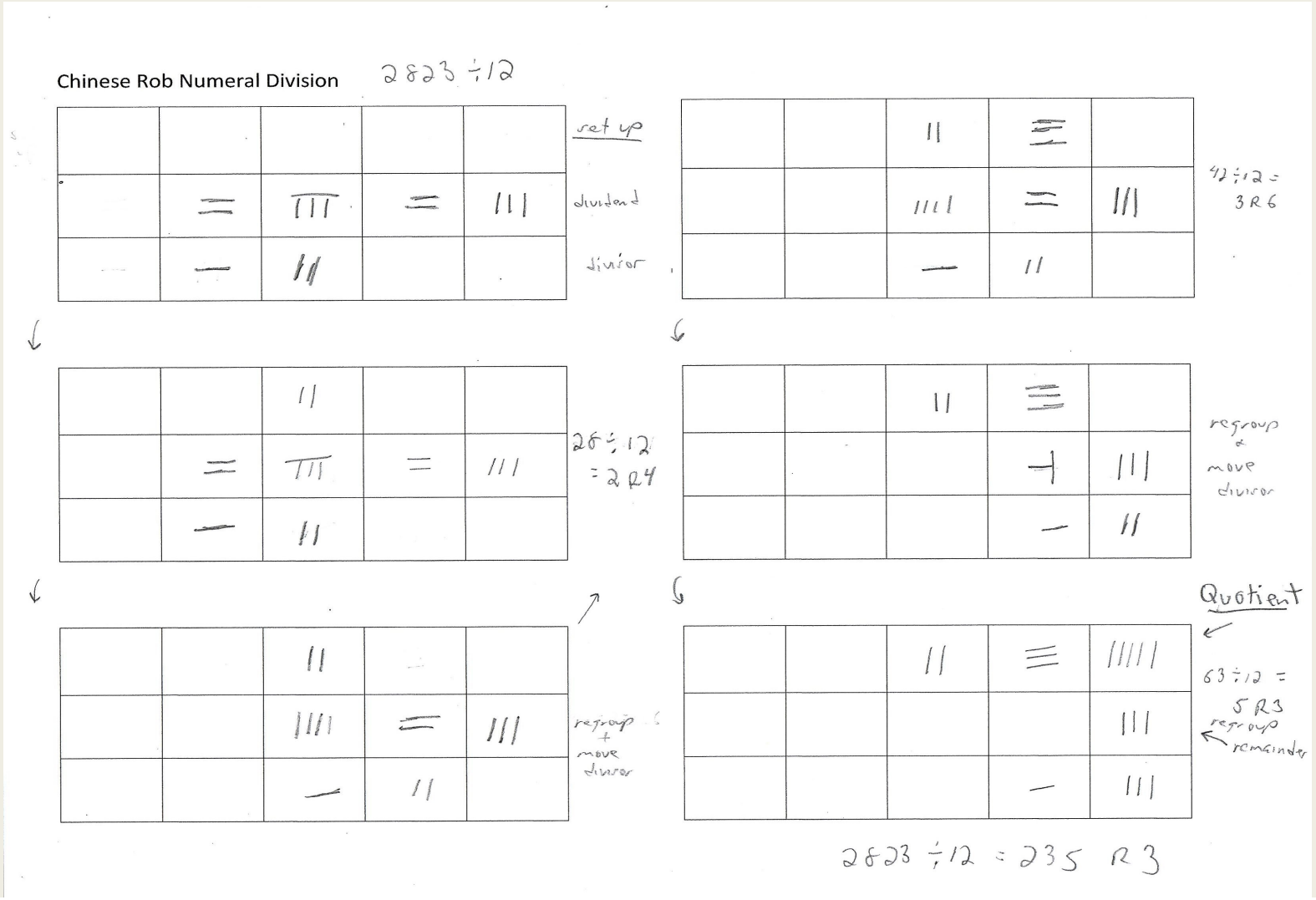


Regroup to show final product

Remove last digit of multiplicand to indicate you are done!
(not shown)

253 x 15 = 3795

Division: same as our method



Thank you very much

Famous “Pascal's” triangle by Yang Hui, 1303