

Below is an excerpt from:

Babylonian Mathematical Texts I. Reciprocals of Regular Sexagesimal Numbers

Author: A. J. Sachs; Source: Journal of Cuneiform Studies, Vol. 1, No. 3 (1947), pp. 219-240

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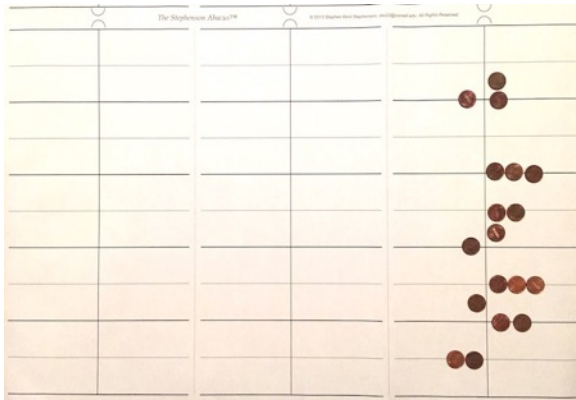
Line	Text	Calculation
21	10 vpd, 6, 48, 53, 20	10, 6, 48, 53, 20
22	20 vpd, 13, 37, 46, 40	20, 13, 37, 46, 40
23	40 vpd, 27, 15, 33, 20	40, 27, 15, 33, 20
24	1, 20 vpd, 54, 31, 6, 40	1, 20, 54, 31, 6, 40
25	2, 40 vpd, 1, 49, 2, 13, 20	2, 41, 49, 2, 13, 20
26	5, 20 vpd, 3, 38, 4, 26, 40	5, 23, 38, 4, 26, 40
27	10, 40 vpd, 7, 16, 8, 53, 20	10, 47, 16, 8, 53, 20
28	21, 20 vpd, 14, 32, 17, 46, 40	21, 34, 32, 17, 46, 40
29	42, 40 vpd, 29, 4, 35, 33, 20	43, 9, 4, 35, 33, 20
30 ¹²	1, 25, 20 vpd, 58, 9, 11, 6, 40	1, 26, 18, 9, 11, 6, 40
31	2, 50, 40, 1, 56, 18, 22, 13, 20	2, 52, 36, 18, 22, 13, 20
32	5, 41, 20, 3, 52, 36, 44, 26, 40	5, 45, 12, 36, 44, 26, 40
33	[11, 32, 40, 7, 45, 13, 28, 53, 20	11, 30, 25, 13, 28, 53, 20
34	[22, 45, 20, 15, 30, 26, 57, 46, 40]	23, 0, 50, 26, 57, 46, 40
35	[45, 30, 40] 31, 0, 53, [55, 33, 20]	46, 1, 40, 53, 55, 33, 20
36	[1, 31, 1, 20, 1, 2, 1, 47, 51, 6, 40]	1, 32, 3, 21, 47, 51, 6, 40

Let's recreate this doubling calculation sequence from line 19 through line 36 on a three table base 60 Salamis Tablet.

19) 2, 31, 42, 13, 20 at right.

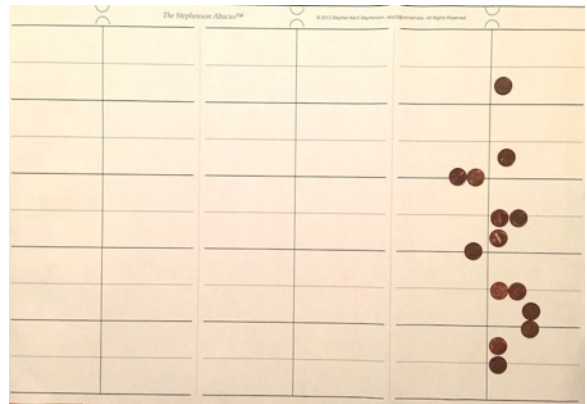
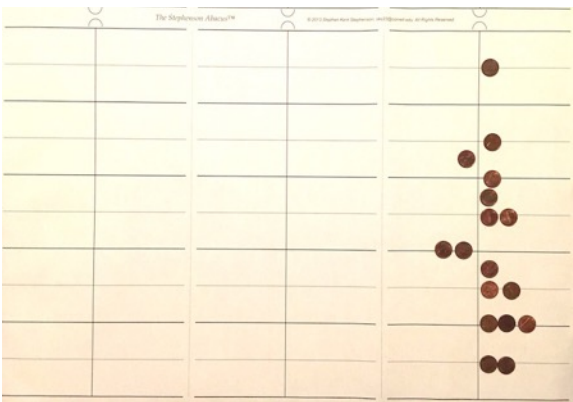
Doubled below.

[$2 \Rightarrow 5-1$, $1/2 \Rightarrow 1$]



Below, make readable: 20) 5,3,24,26,40.

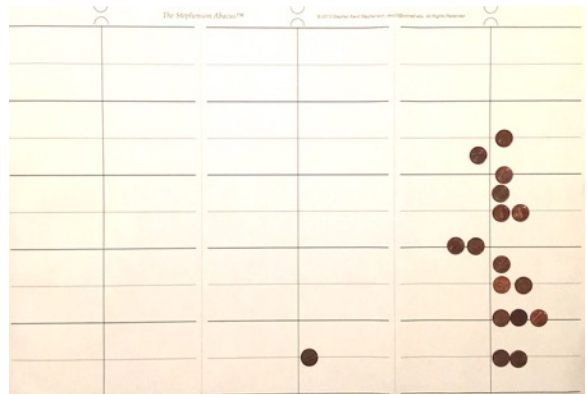
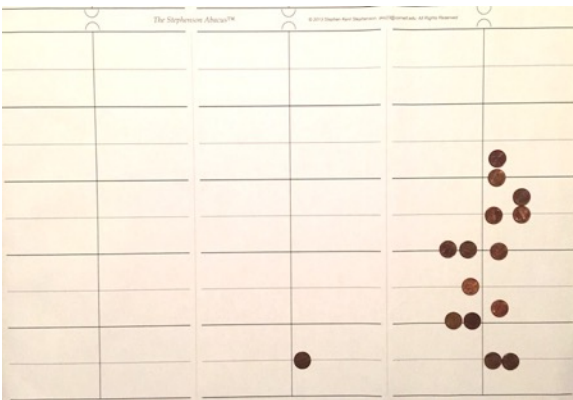
Doubled below. [$10+10 \Rightarrow 30+10$]



Below, top digit of right table moved to bottom digit of middle table. Splitting the number into two parts here implies the use of an abacus with 5 digits per table and at least two tables.

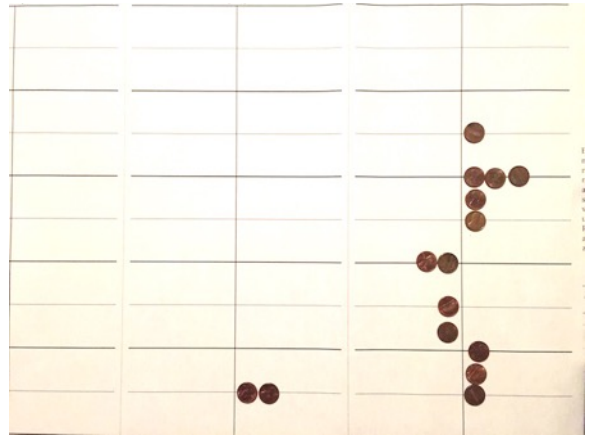
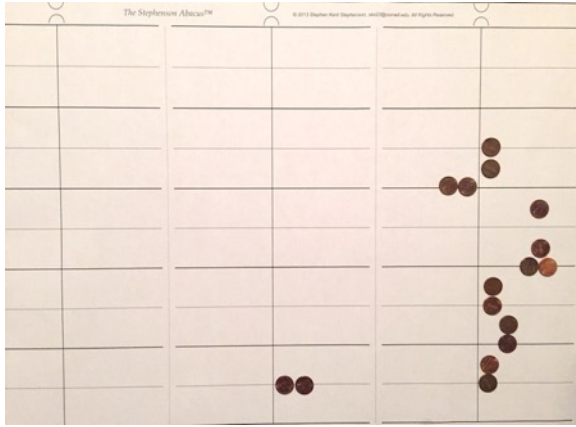
Below, made readable: 21) 10 vpd, 6, 48, 53, 20

[$50 = 60 - 10$ w/2 tokens instead of 3]



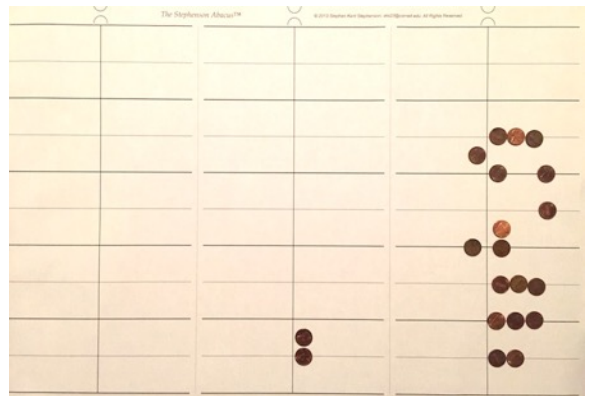
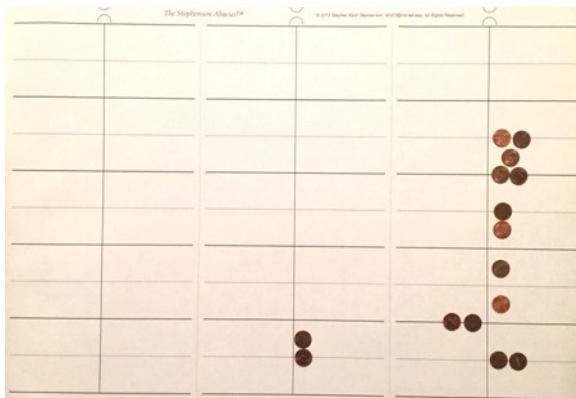
Right, double.

Below, make readable: 22) 20 vpd, 13, 37, 46, 40



Below, double.

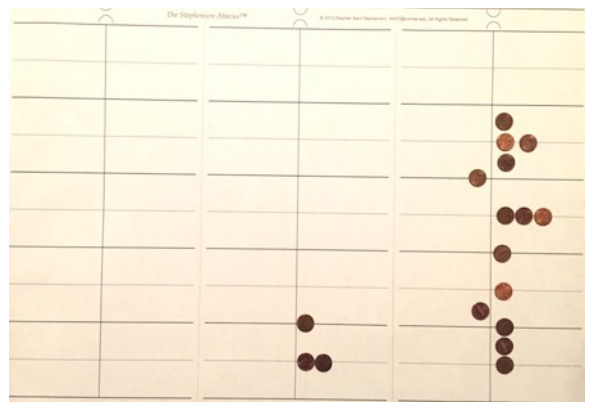
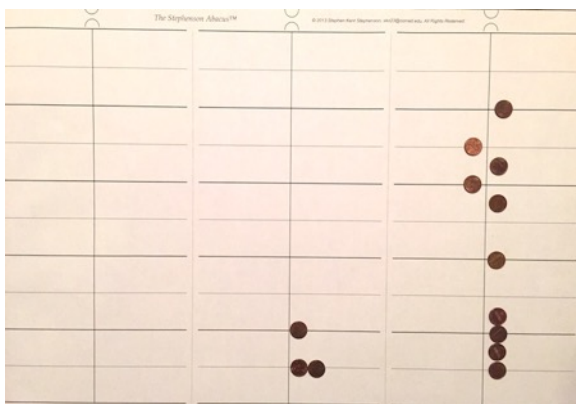
Below, make readable: 23) 40 vpd, 27, 15, 33, 20



Below, double.

Below, make readable:

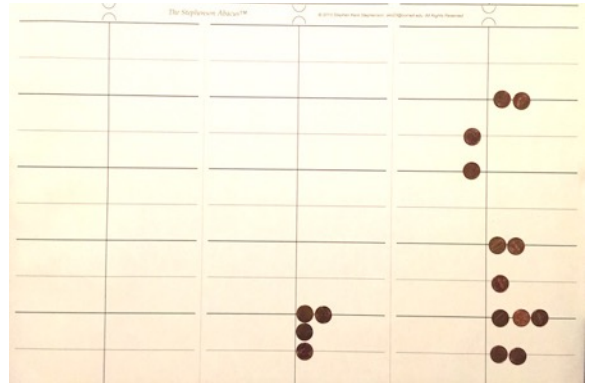
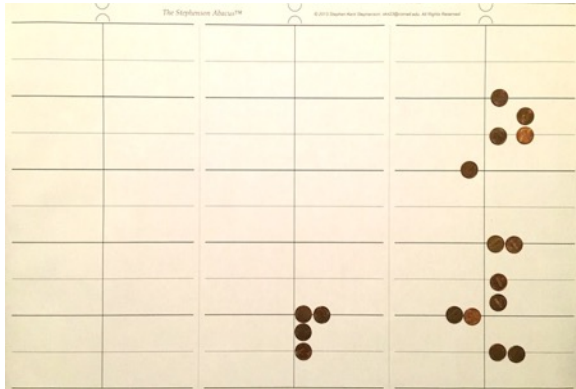
24) 1, 20 vpd, 54, 31, 6, 40



At right, double.

Below, make readable:

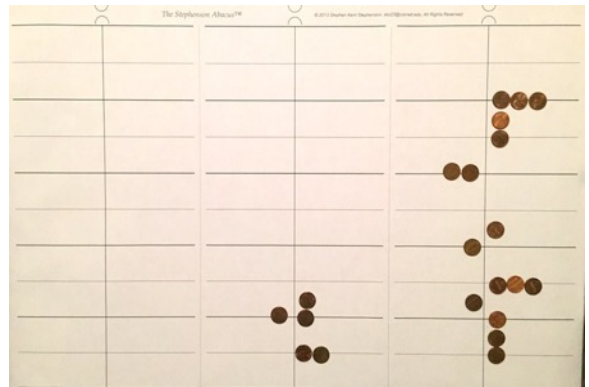
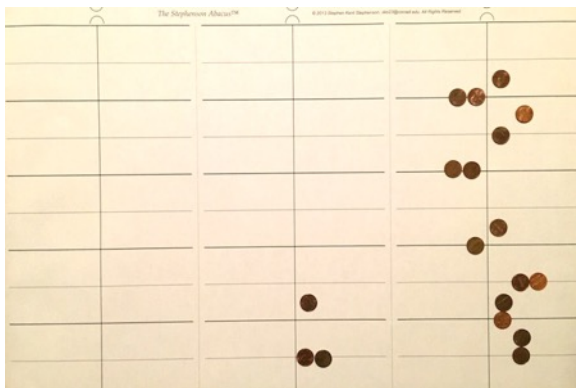
25) 2, 40 vpd, 1, 49, 2, 13, 20



Next the top right digit should be accumulated into the middle bottom digit, but is not. Instead, double both parts; below.

Below, make readable:

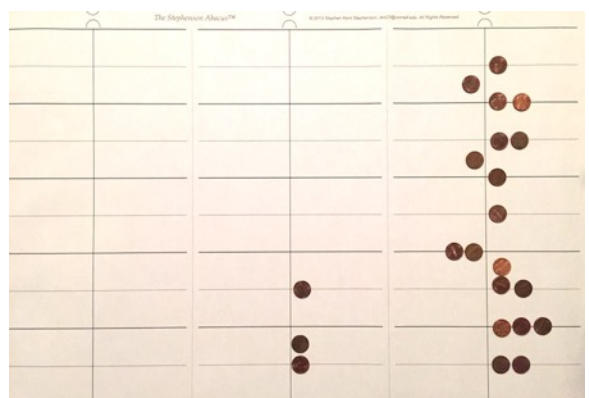
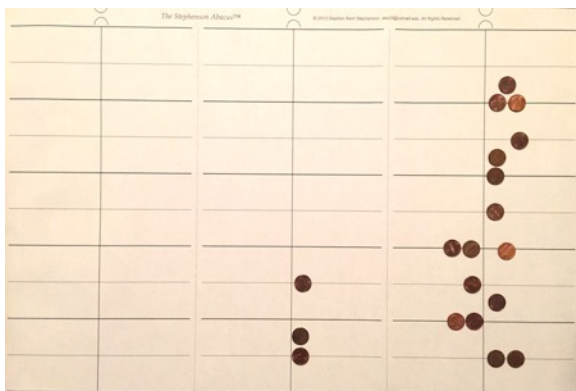
26) 5, 20 vpd, 3, 38, 4, 26, 40



Below, double.

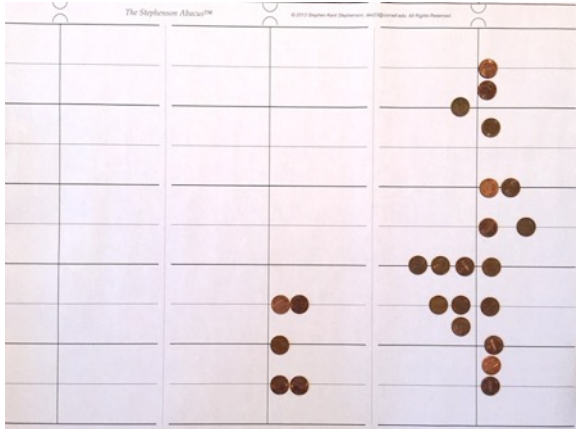
Below, make readable:

27) 10, 40 vpd, 7, 16, 8, 53, 20



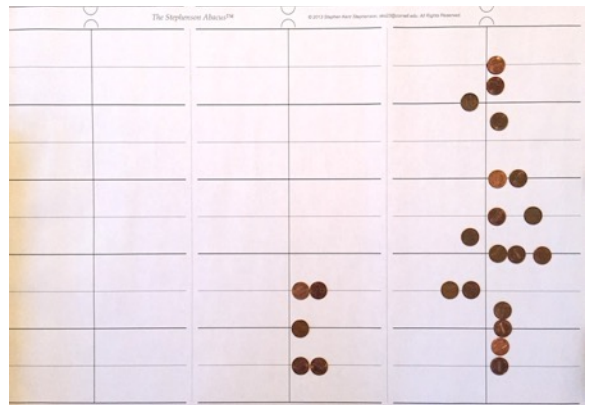
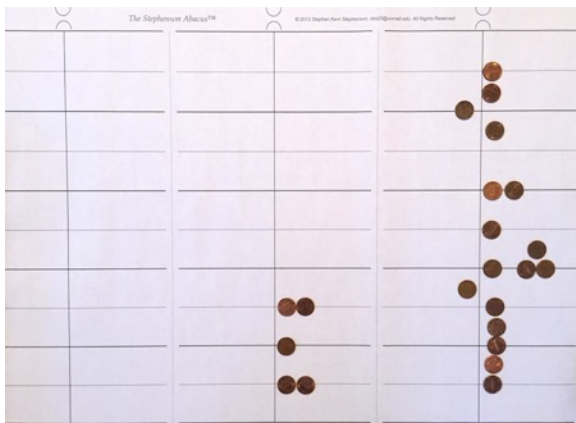
At right, doubled.

Below, start make readable by adding zero pairs.



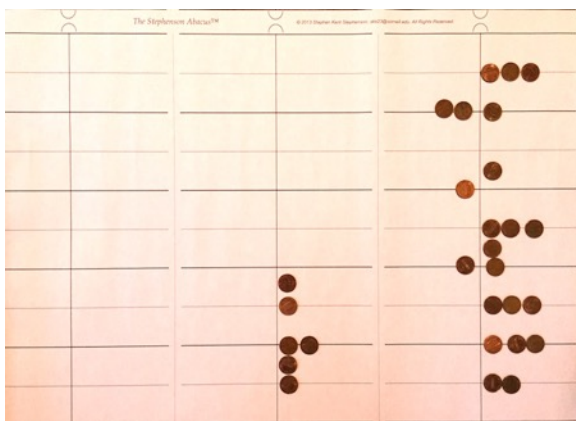
Below, a next step in make readable.

Below, a next step in make readable.



Below, final step in make readable:
28) 21, 20 vpd, 14, 32, 17, 46, 40

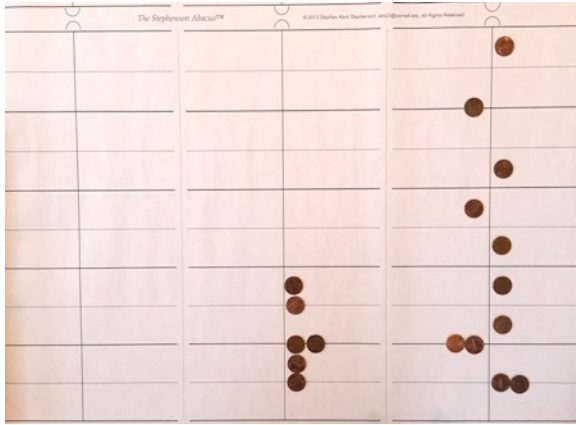
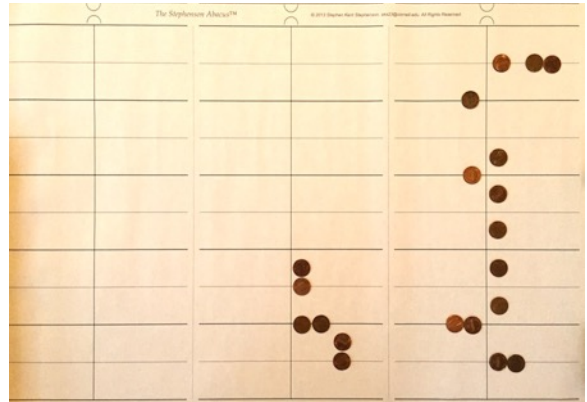
Below, doubled.



At right, make readable:

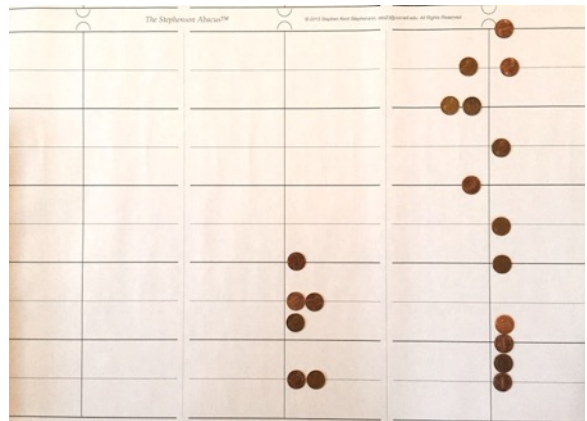
29) 42, 40 vpd, 29, 4, 35, 33, 20

Below, simplify before doubling.

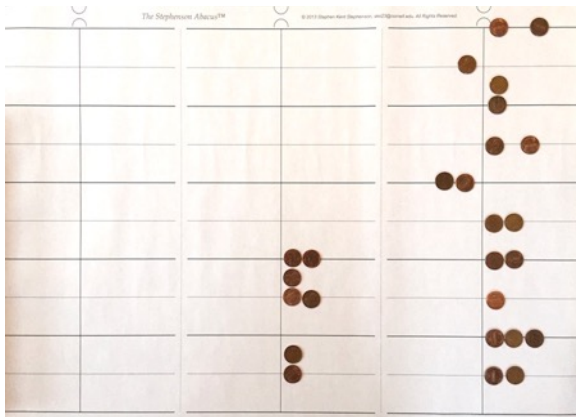


Below, doubled and made readable

30) 1, 25, 20 vpd, 58, 9, 11, 6, 40

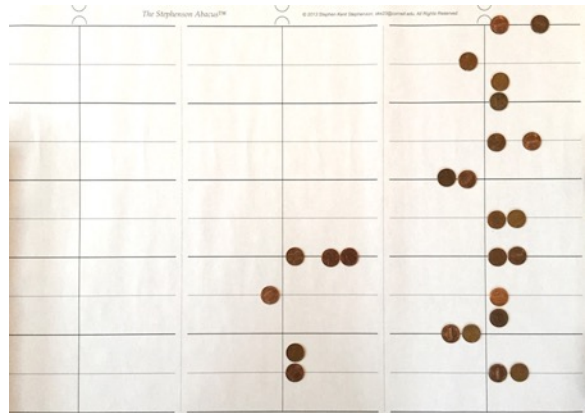


Below, doubled.



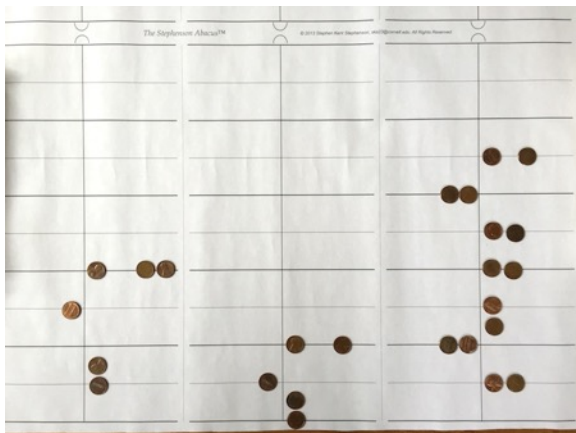
Below, made readable:

31) 2, 50, 40 (vpd), 1, 56, 18, 22, 13, 20



Below, moved middle table tokens to left table, then unit

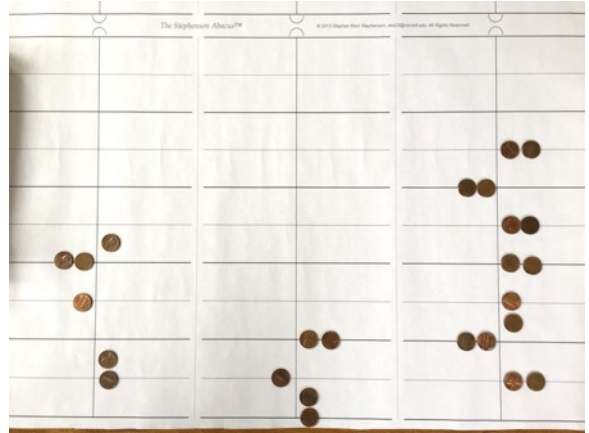
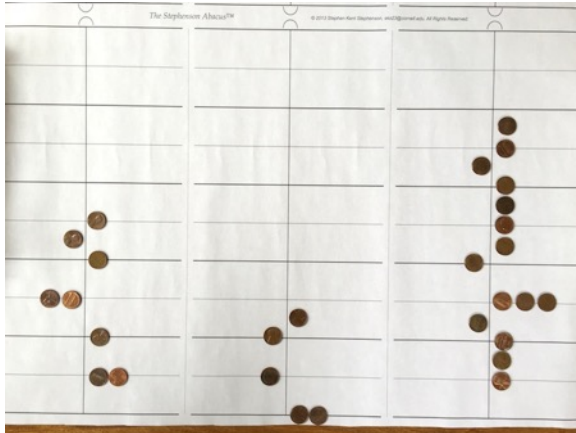
and top digit tokens of right table to bottom of middle table.



This is necessary to continue the calculations and may be verification that a three table abacus was used.

At right, simplify before doubling.

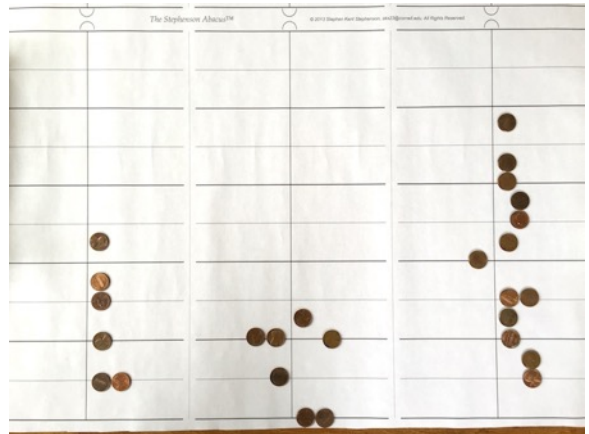
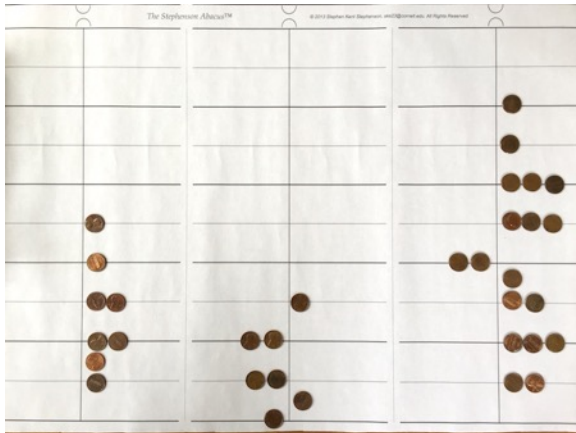
Below, doubled.



Below, made readable:

32) 5, 41, 20 (vpd), 3, 52, 36, 44, 26, 40

Below, doubled.

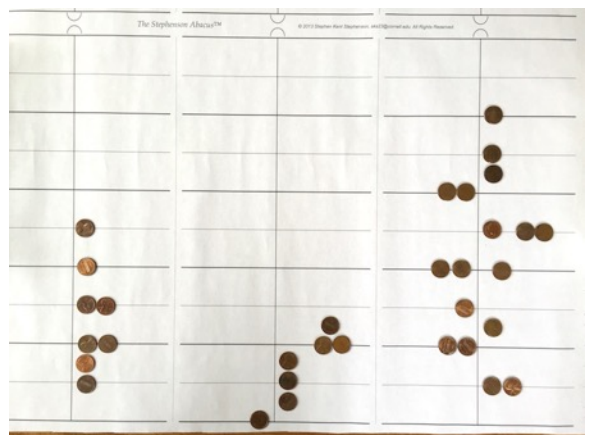


Below, made readable:

11, 22, 40 (vpd), 7, 44, (vpd), 1, 13, 28, 54, 20.

But here the scribe transfers the top digit of the right

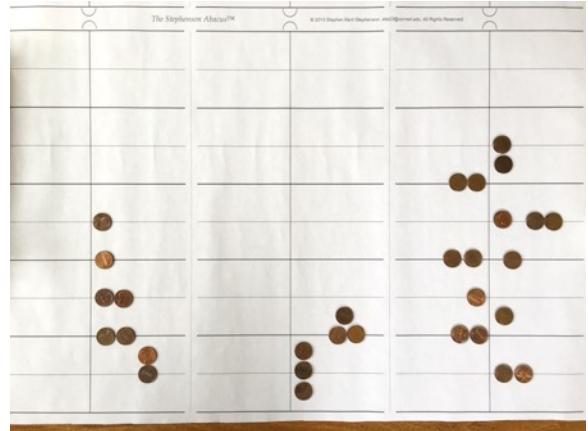
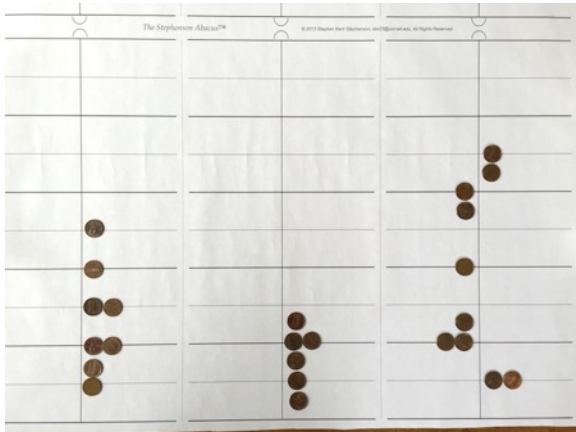
table to the bottom digit of the middle table, (at left), so he knows how to do this! ...



... Result (at right):

33) 11, 22, 40 (vpd), 7, 45 (vpd), 13, 28, 54, 20

Below, simplify prior to doubling.



Below, doubled.

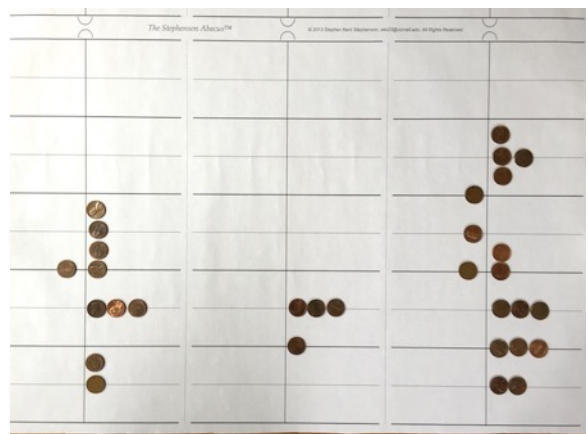


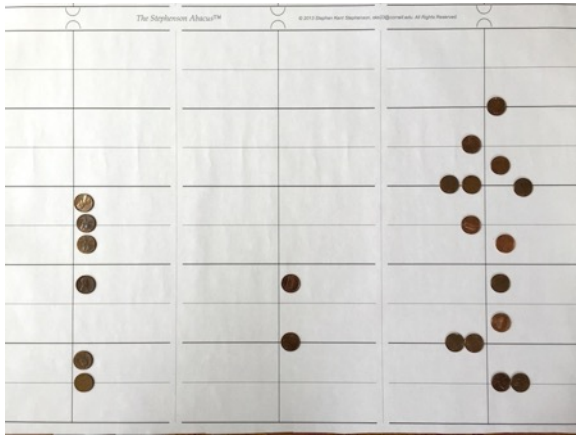
Below, made readable:

34) 22, 45, 20 (vpd), 15, 30 (vpd), 26, 57, 46, 40



Below, doubled.

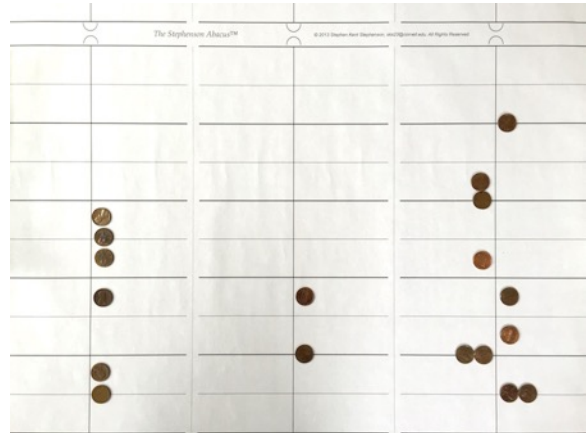




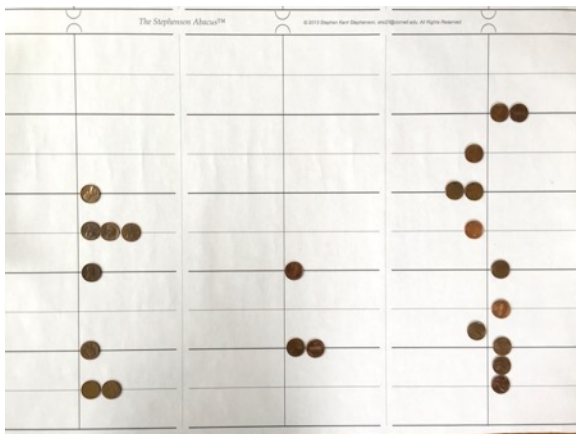
At left, made readable:

35) 45, 30, 40 (vpd), 31, 0 (vpd), 53, 55, 33, 20

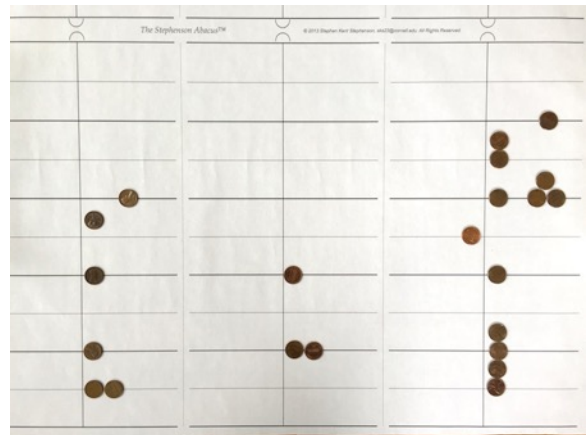
Below, simplify before doubling.



Below, doubled.

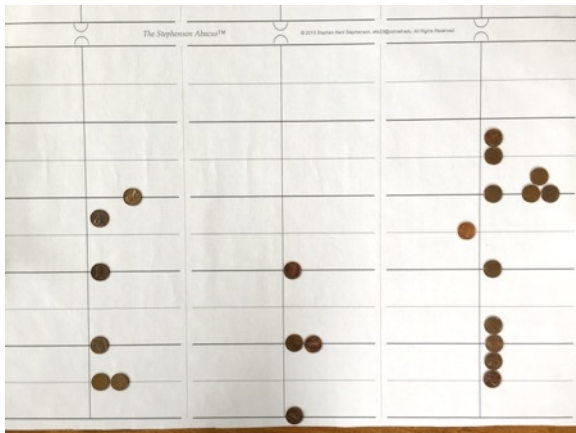


Below, make readable.



Below, transfer top digit of right table to bottom digit of middle table and read:

36) 1, 31, 1, 20 (vpd), 1, 2, 1 (vpd), 47, 51, 6, 40



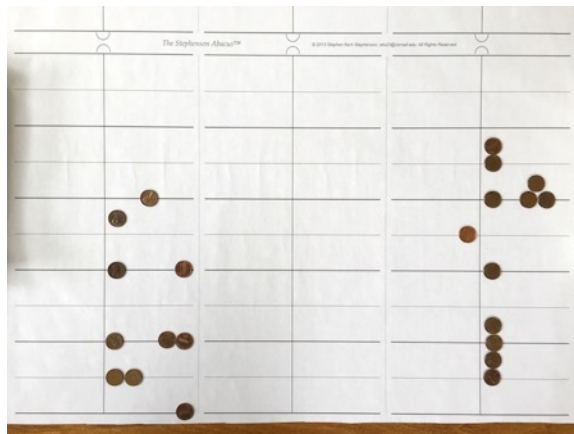
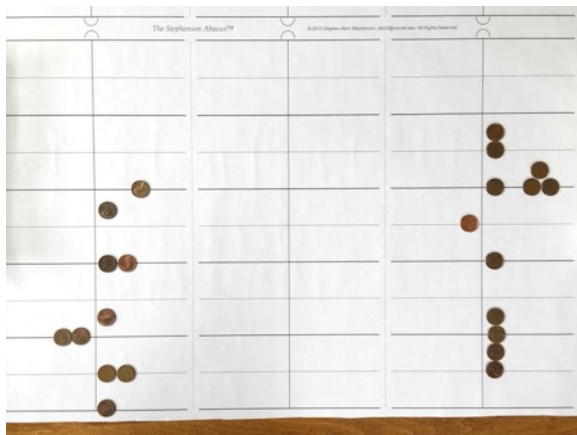
At this point Sachs writes, “The remainder of the reverse is broken away; there would have been enough room for about four lines of writing, assuming that our restoration of the obverse is correct.” Four more doublings would still leave the top digits on all three tables empty, so the three table abacus would have taken care of it.

Now let’s combine the left and middle tables to see if we get Sachs “Calculation” result.

Right, move middle table tokens to left table.

Below, add and read:

1, 32, 3, 21, 47, 51, 6, 40



Which agrees with Sachs.