Making Magic Addition Prediction Board

An Interesting Addition Property

$$\begin{array}{r} 6 \\ 4 \\ +\,9 \\ \hline 19 \end{array} \qquad \begin{array}{r} 6 \\ 5 \\ +\,8 \\ \hline 19 \end{array} \qquad \begin{array}{r} 4 \\ 7 \\ +\,8 \\ \hline 19 \end{array}$$

Pick any 3 single digit numbers whose sum is 19.
Select 2 more sets of 3 numbers whose sums are 19.
The first set selected is shown in **red** and
the next 2 are shown in **blue** and **black.**

We will now create **three 2 digit numbers** by placing the 3 digits from **any set** of 3 numbers shown above in the ones places in **any order** and then placing the 3 digits from **any other set** of 3 numbers shown above in **any order** in the tens places.

When you find the total of those four 2 digit numbers **the total will always be 209.**

Examples

$$\begin{array}{r} 1 \\ 5\,9 \\ 6\,4 \\ +\,8\,6 \\ \hline 209 \end{array} \qquad \begin{array}{r} 1 \\ 4\,8 \\ 6\,5 \\ +\,9\,6 \\ \hline 209 \end{array} \qquad \begin{array}{r} 1 \\ 4\,9 \\ 7\,4 \\ +\,8\,6 \\ \hline 209 \end{array}$$

A Proof of the Property using 2 general sets of numbers.

$$\begin{array}{r} a \\ b \\ +\,c \\ \hline 19 \end{array} \qquad \begin{array}{r} d \\ e \\ +\,f \\ \hline 19 \end{array}$$

Pick any 3 single digit numbers whose sum is 19.
Select a second 3 single digit numbers whose sum is 19.
The first set selected is shown in **red** and
the next set is shown in **blue**.

$$\begin{array}{r} 1 \\ d\,a \\ e\,b \\ +\,f\,c \\ \hline 9 \end{array}$$

The sum of any order of **a, b and d** will be 19.
If the **a, b and c** are in the ones column that
means the sum will have a **9 in the ones place**
and a **carry of 1 to the tens place.**

$$\begin{array}{r} 1 \\ d\,a \\ e\,b \\ +\,f\,c \\ \hline 209 \end{array}$$

The sum of any order of **d, e and f** will be 19.
If the **d, e and f** are in the tens column that
means the sum of the tens column will be **19 and**
the added carry of 1 will total 209.

Note: The **a, b, and c** could have been in any order for the one column to total 19.
The **d, e, and f** could have been in any order for the one column to total 19.

Rule. If the tens and ones columns are composed of numbers that have a 2 digit total of x y (where y is in the ones place and x is in the tens place) Then the total of the number will be   (xy +1) B

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$$
\begin{array}{r}
\textcolor{red}{6} \\
\textcolor{red}{4} \\
+\,\textcolor{red}{9} \\
\hline
19
\end{array}
\qquad
\begin{array}{r}
\textcolor{blue}{6} \\
\textcolor{blue}{5} \\
+\,\textcolor{blue}{8} \\
\hline
19
\end{array}
\qquad
\begin{array}{r}
4 \\
7 \\
+\,8 \\
\hline
\mathbf{19}
\end{array}
$$

Pick any 3 single digit numbers whose sum is 19.
Select 2 more sets of 3 numbers whose sums are 19.
The first set selected is shown in **red** and
the next 2 are shown in **blue** and **black.**

We will now create **three 3 digit numbers** by placing the 3 digits from **any set** of 3 numbers shown above in the ones places in **any order** and then placing the 3 digits from **any other set** of 3 numbers shown above in **any order** in the tens places and then placing the 3 digits from **the last set** of 3 numbers shown above in **any order** in the hundreds places.

When you find the total of those four 2 digit numbers **the total will always be 2109**

Examples

$$
\begin{array}{r}
^{2\ 1} \\
4\,\textcolor{blue}{5}\,\textcolor{red}{6} \\
7\,\textcolor{blue}{8}\,4 \\
+\,8\,\textcolor{blue}{6}\,\textcolor{red}{9} \\
\hline
2109
\end{array}
\qquad
\begin{array}{r}
^{2\ 1} \\
\textcolor{red}{6}\,\textcolor{blue}{5}\,4 \\
\textcolor{red}{9}\,8\,7 \\
+\,4\,\textcolor{blue}{6}\,8 \\
\hline
2109
\end{array}
\qquad
\begin{array}{r}
^{2\ 1} \\
\textcolor{blue}{5}\,4\,\textcolor{red}{9} \\
\textcolor{blue}{6}\,7\,4 \\
+\,\textcolor{blue}{8}\,8\,\textcolor{red}{6} \\
\hline
2109
\end{array}
$$

A Proof of the Property using 3 general sets of numbers.

$$
\begin{array}{r}
\textcolor{red}{a} \\
\textcolor{red}{b} \\
+\,\textcolor{red}{c} \\
\hline
19
\end{array}
\qquad
\begin{array}{r}
\textcolor{blue}{d} \\
\textcolor{blue}{e} \\
+\,\textcolor{blue}{f} \\
\hline
19
\end{array}
$$

Pick any 3 single digit numbers whose sum is 19.
Select a second 3 single digit numbers whose sum is 19.
The first set selected is shown in **red** and
the next set is shown in **blue**.

$$
\begin{array}{r}
^{1} \\
g\,\textcolor{blue}{d}\,\textcolor{red}{a} \\
h\,\textcolor{blue}{e}\,\textcolor{red}{b} \\
+\ i\,\textcolor{blue}{f}\,\textcolor{red}{c} \\
\hline
9
\end{array}
$$

If the **a, b and c** are in the ones column
the sum will have a **9 in the ones place**
and a **carry of 1 to the tens place.**

$$
\begin{array}{r}
^{2\ 1} \\
g\,\textcolor{blue}{d}\,\textcolor{red}{a} \\
h\,\textcolor{blue}{e}\,\textcolor{red}{b} \\
+\ i\,\textcolor{blue}{f}\,\textcolor{red}{c} \\
\hline
0\,9
\end{array}
$$

If the **d, e and f** are in the 10s column
the sum will have a **0 in the 10s place**
and a **carry of 2 to the 100s place.**

$$
\begin{array}{r}
^{2\ 1} \\
g\,\textcolor{blue}{d}\,\textcolor{red}{a} \\
h\,\textcolor{blue}{e}\,\textcolor{red}{b} \\
+\ i\,\textcolor{blue}{f}\,\textcolor{red}{c} \\
\hline
21\,0\,9
\end{array}
$$

If the **g,h and i** are in the 100s column
the sum will have a **1 in the 100s place**
and a **2 in the 1000s place.**

Note: The **a, b, and c** and the **d, e, and f** and the **g,h, i** could have been in any order for the column to total 19.

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How do we turn this information into a Magic Trick ?

Where are we at:

1. We have 3 sets of single digits numbers that all have the same total.

2. If we create an addition problem where each column of that number is composed of one of the sets with the common total then the answer to the addition problem is known in advance.

|			
6	**5**	**4**	Pick any 3 single digit numbers whose sum is 19.
4	**6**	**7**	Select 2 more sets of 4 numbers whose sums are 19.
+ 9	**+ 8**	**+ 8**	The first set selected is shown in **red** and
19	19	**19**	the next 2 are shown in **blue** and **black.**

Addition Prediction Board

Materials required:

1. A square board with a 3 by 3 grid of small nails. This is like a 3 by 3 Geo Board.

2. Take 9 hanging tags with holes at the top (Staples)that will be used to hang the tags on a nail. Put one of each of the 9 numbers on a tag shown below. DO NOT USE THE COLORS SHOWN. **Make all the numbers black.** The colors will help for to see what is happening.
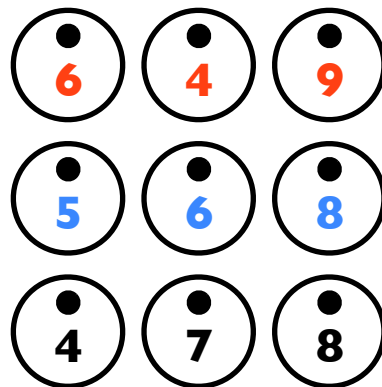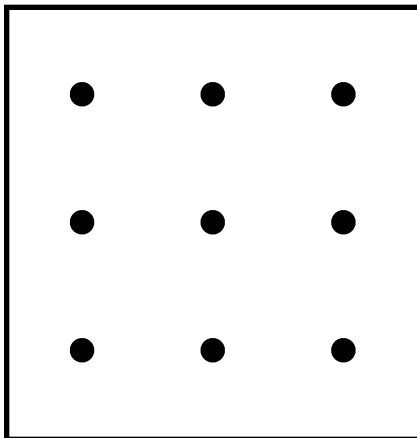
A hand written prediction paper with 2109 written on it.

2109
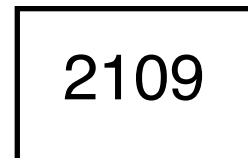
Preparation.

1. Place the board in front of the class on a table with the **nails facing the class.** I use a stand so the board is stable.

2. Place the prediction paper on the desk face down.

3. Place a white board at the front of the class and a marker. If not have a sheet of paper and a marker on the table

4. Put a stack of the 9 tags on the desk in the following order 6, 4, 6 and 5, 6, 8 and 4, 7, 8.

Presentation:

1. Ask 1 student to come to the front of the class. Pick up the stack of tags and put the top 3 in one pile, the next 3 in a 2nd stack and the last 3 in a 3rd stack. Ask the student to select one of the stacks of 3 tags and then ask them to go behind the table and hang the 3 tags they have on any single row in any order with the numbers facing out so they can be seen. Be sure they understand the tags all go on the same row in any order. Be sure they do not move the Geo Board or turn it around. Have them sit down.

2. Repeat this with a second and then a third student.

3. Select another student to come to the front of the class. Put them at the whiteboard and give them a marker. Go to the front of the class pick up the Geo Board. A**s you turn around to show the class you rotate it 90 degrees clockwise.**

4. Read out the three numbers the students created. Have the student write down the three numbers on the board under each other. Turn the board over so the tags fall onto the desk and lay down the board. Have the student draw a line under them numbers and then have the student add up the 3 numbers.

Example.

$$
\begin{array}{r}
{\scriptstyle 1} \\
4\,5\,6 \\
7\,6\,4 \\
+\,8\,8\,9 \\
\hline
9
\end{array}
\qquad
\begin{array}{r}
{\scriptstyle 2}\,{\scriptstyle 1} \\
4\,5\,6 \\
7\,6\,4 \\
+\,8\,8\,9 \\
\hline
0\,9
\end{array}
\qquad
\begin{array}{r}
{\scriptstyle 2}\,{\scriptstyle 1} \\
4\,5\,6 \\
7\,6\,4 \\
+\,8\,8\,9 \\
\hline
2\,1\,0\,9
\end{array}
$$

4. Remind the class that each student had a free choice of what stack they selected. They had a free choice of what row they placed the tags in. They had a free choice of the order of the tags in the row. Have the student turn over the prediction card and revel that you had correctly predicted the total.
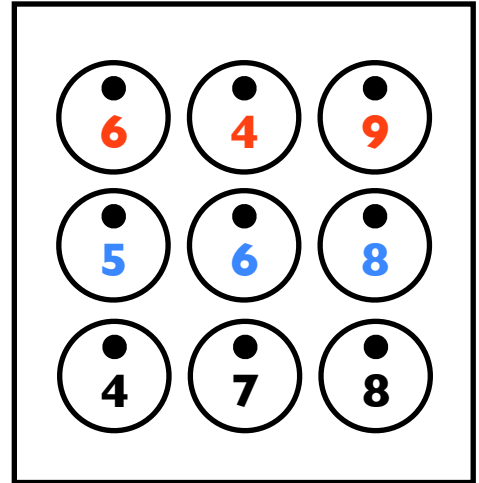
How the effect works:

The first student puts their tags on any row
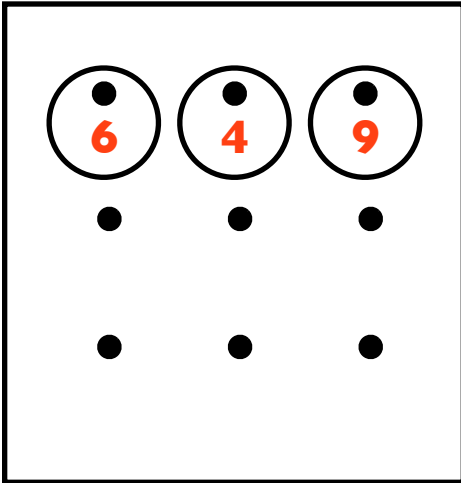
The second student put their tags on any open row
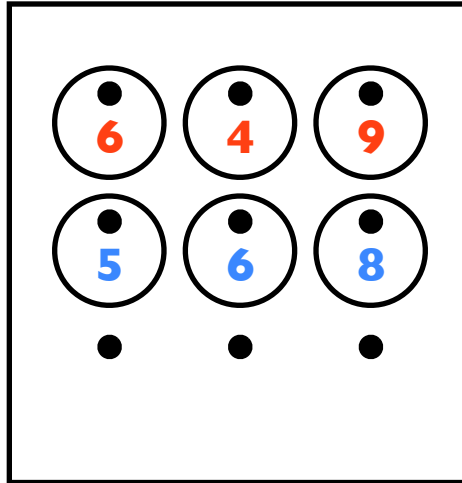
The last student put their tags on the last open row

Pick up the Geo Board with the tags facing away from you. As you turn around to show the class **you rotate it 90 degrees clockwise.** The tags will spin on the nail heads and all the red tags will be in column 1, all the blue tags will be in column 2 and all the black tags will be in column 3.
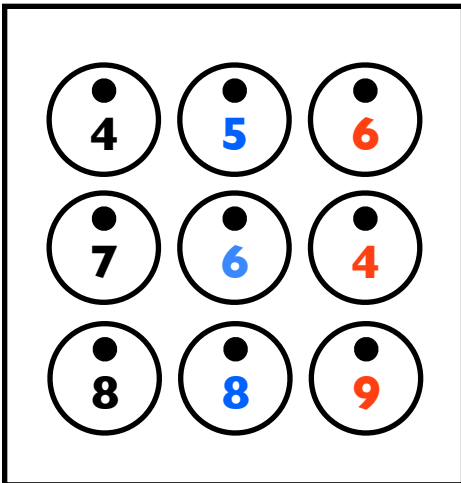
In this a configuration the total will be 2109 no mater which rows the tags were put in and no matter what order in the row they were placed.

```
        1              2 1            2 1
    4 5 6          4 5 6          4 5 6
    7 6 4          7 6 4          7 6 4
  + 8 8 9        + 8 8 9        + 8 8 9
        9            0 9        2 1 0 9
```

Have the students find the sum of the 3 numbers. Turn over the prediction card and revel that you had correctly predicted the total.

In general I just have 2 students both find the total and have them check each other but you may decide to have a calculator on hand if you feel the addition my be a problem.

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Issues to overcome:

The tags.

I do not use the tags they sell that have a metal edge.. It helps if the tags and the board are the same color.

The board.

The board must be square with the nails placed so the tags fit close together in a row to form a 3 digit number. The space between rows should be the same.

The edge that shows around the 3 rows of tags should be the same width. When you rotate the board the tags rotate but they change position relative to the border. Each tag is below and to the right of where it started . This makes the right and bottom border smaller and the top and left border a bit larger.   The larger the width around the tags compared to the size of the tags the less the change will be noticed.

This can be hidden somewhat if you hold the top and right edges with your hands covering as much o the edge as you can. Only hold the board long enough for the student to copy the 3 numbers on the white board and then spill the tags on the table and lay the board down. You can then take as log as you like to add the numbers and show the prediction.

Handing out the tags.

The method suggested in the description is easy and works well. You just put the stack in order and give the top 3 to the 1st student and the next 3 to the 2nd student and the last 3 to the 3rd student.

Alternate handling 1:   You can improve this by having 4 sets of tags that all have a total of 19. Just put the stack in order of the 4 sets. Take out the stack and then deal out 4 stacks on the table. As each student comes up let them select a stack. This leaves a last stack that is unused. This seems even more random.

You can make the stack of 12 tags set up with the the first 4 positions containing 1 of each set and the second 4 positions containing 1 of each set. This means that if you deal out the tags 1 per pile you will have the 4 sets ready to go.

Alternate handling 2:

This looks a lot better but does require a switch. I have the material in a box on the table. I place 2 identical stacks in the box. When I start the trick I take out one pile and shuffle it. I then reach in the box to take out the prediction envelop or the board and when I do I drop the mixed stack and pick up the second stack and the proceed from there.

Alternate handling 3: Just have 9 blanks tags. When the first student comes up ask him to have any single digit from 1 to 9. Write it on a tag. Then ask him a second number and write it in a tag. Ask hime to put both of the 2 tags on the same on the board. Then say "here you need 1 more to finish off the row and write the number need to make the 3 tags total 19 and give it to the student to place on the last nail on the row the other 2 tags are on. Do this same thing to the other 2 students .

Alternate handling 4:

You may worry that the student will not see the 3 digit numbers they placed on their when the board is reveled. If so this handling may help with that worry. Ask 3 students to come up. Use any of the techniques listed above to get all 3 students 3 tags. Ask one them to put a tag in any row on any open nail. Ask a 2nd student to put a tag in any open nail IN THE SAME ROW AS THE LAST STUDNT USED. Ask a 3rd student to put a tag ion the last open nail IN THE SAME ROW AS THE LAST STUDNT USED. Continue this for the next 3 rows. Since no student put all their tags on the same row it is less likely they will see the row as "their number".

My method.

I use 12 tags, shuffle them and then do a switch I deal out 4 piles, one card per pile until 4 piles have 3 cards. They the select their own pile and see that one extra pile is left unused when the trick is complete.

Avoiding the issue of students saying those are not their numbers when the board is rotated.

When the 3 students put their tags on the nails they do not know the next step is to add them together. They see it as just putting numbers on the board. Have each student that puts a row of tags on the board move back to the front of the board when they are done.

The reason for the nails facing away from the class is so the class does not get to see the numbers as the rows are filled. Only 3 students see them and only the last of the 3 sees the board full. I have these students stand next to me facing the class with the rest o fthe class facing the board. I then turn the board around (as I rotate it 90 degrees) to show the class. The class can then add the totals and the 3 students next to me will not be as likely to see the new rows. This has worked well for me.

A second handling I use is to ask a 4th student to come up to the front of the class. I turn the board to the class so they see the numbers and then turn the board away from everyone and towards the 4th student and ask them to total the numbers. This has worked well also.

Do the rows need to have the same total?

I had all 3 rows add to 19. The numbers in each row do not need to add to the same total. You could have each row add to a different sum and still predict the total. I find it easier to have all rows add to the same total. If I want to repeat the effect (I seldom do) then I produce a new prediction page and I switch out the tags for a new set.

History:

The fact that the numbers in a column can be in any order and sill have the same sum must have been known several hundreds ds of years ago. The fact that if each column has the same sum you can predict the total in advance is surly more recent but must also be quite old. In recent times many performers have used of this math fact to good use to force an outcome and then revel the outcome in various ways. Jack London has been credited in books as one of the first to write about it. Fred Rosenbaum used it in his "Szechuan Sampler" effect. "Predict Perfect" by Meir Yedid is also mentioned in magic forums as using this effect. Bob Mason had an effect called "Predict a Board". I am not sure of how he preformed the effect but his board is similar board to the one I describe.

I had all 3 rows add to 19. The numbers in each row do not need to add to the same total. You could have each row add to a different sum and still predict the total. Tom Jones had an effect based on 4 different sums but the handling of this effect is harder.