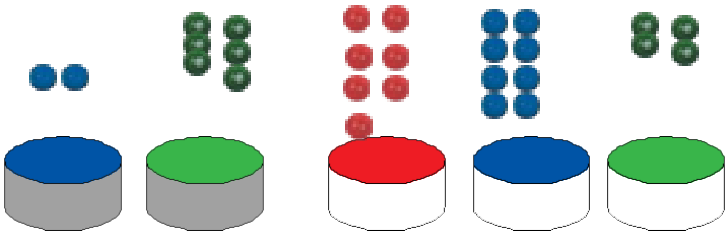
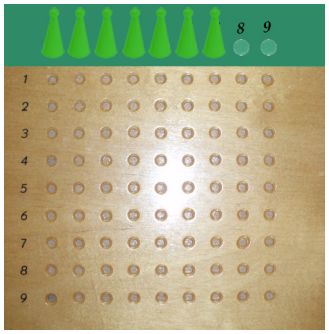
Test Tube Division:
- The boards are used to demonstrate the divisor.
- Every test tube has to have a bead.
- Colors of rack and cups are color coded.
    - White outside are simple
    - Gray outside are thousands
    - Black outside are millions
- Skittles used to set up divisor.
- Draws on knowledge with the stamp game and distribution.
- Group division: If you have 20 lire and want to buy some candies, and each candy costs 5 lines, how many can I buy. (How many times is 5 contaied in 20?)
- Distributive: If i have 12 candies and want to give them to 6 children, how many will each child receive?

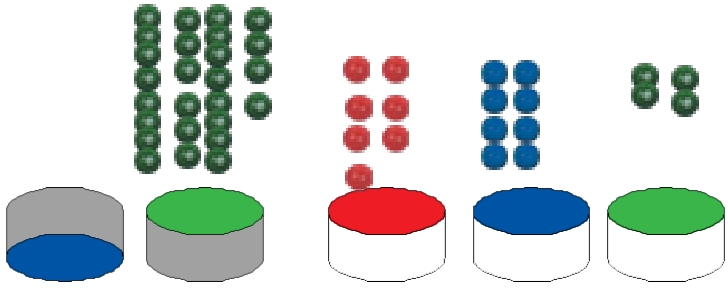
Test Tube Division (long division, one digit divisor, distributive):

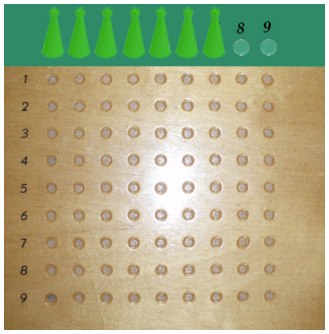
Equation (26,784 / 7)
- Need the tubes up to 10,000s





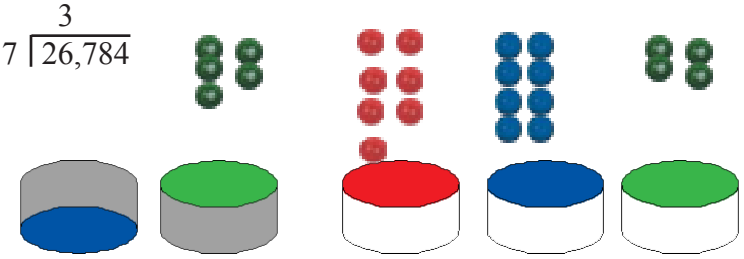
Child lays out the dividen into the different cups and the divisor (using skittles on the board.

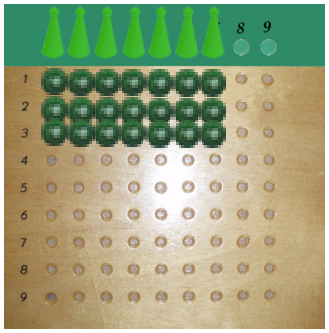




First we need to see if the 10,000s can be divided out. Since it can not they go into the 1,000 and it shows we really have 26 1,000. Flip over the cup.v

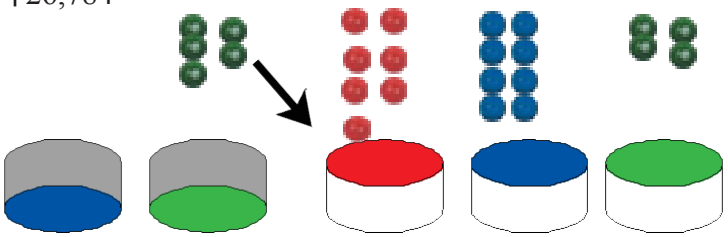
3
7 ⟌ 26,784

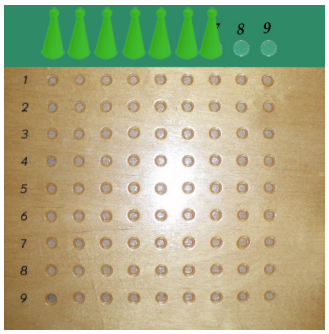




Now we need to distribute the bead over to the board evenly.

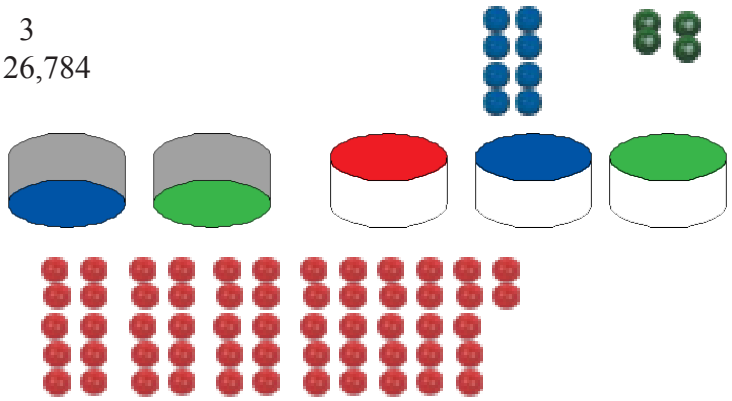
3
7 ⟌ 26,784

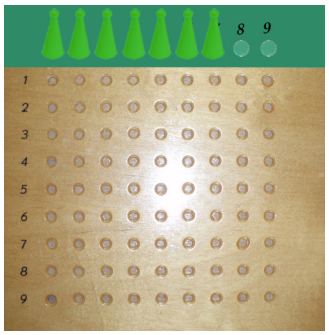




Now we need to clear the cups and the child puts the left over beads in the 1000s into the 100s cup. And than clear the board of the green beads. Turn the 1000s cup over.

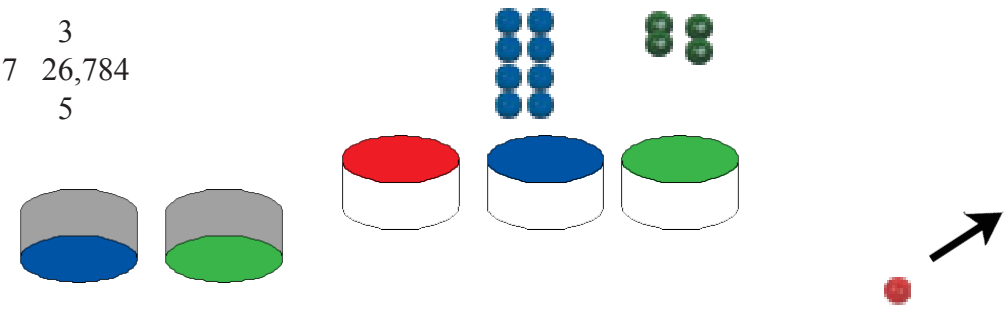
3
7 26,784

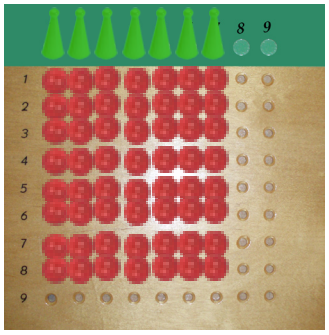




We now that we have 57 red beads (5 green and 7 red) and now we need to exchange them. As you put 1 1000s bead into the tube, dump out 10 red tube

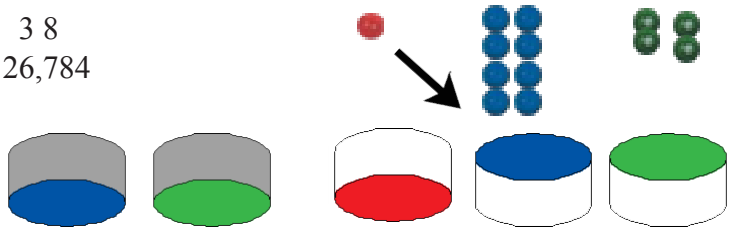
3
7 26,784
5

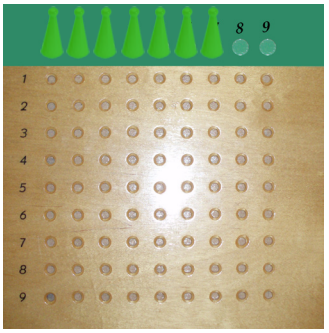




Now distribute the beads onto the board until you can't distribute evenly.

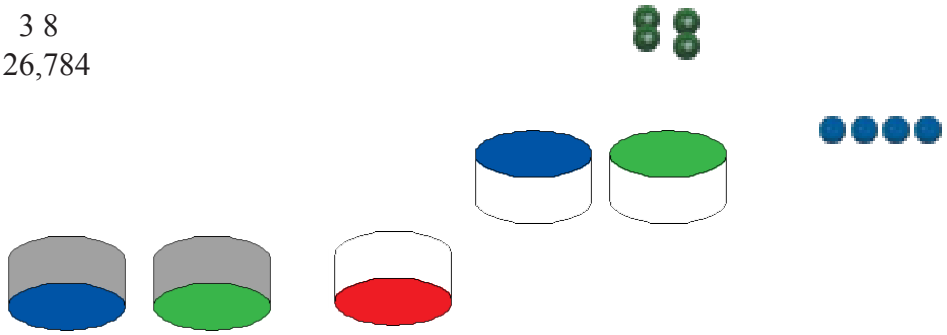
3 8
7 26,784

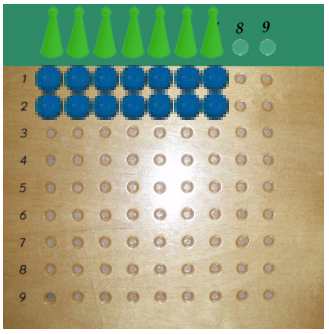




Now record the number, dump the extra red bead into the blue cup and clear the board of the red beads. When you put the red bead into the blue, turn over the red cup.

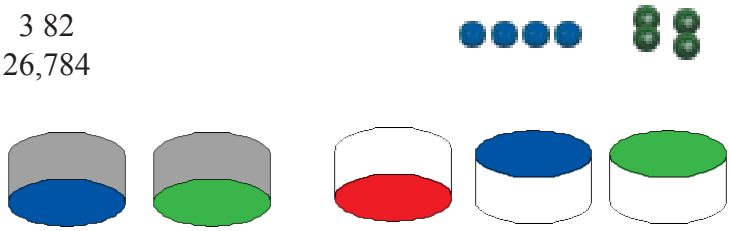
3 8
7 26,784

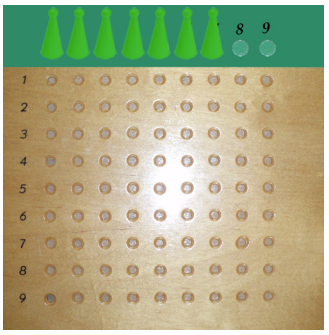




Now exchange the red bead for 10 blue beads to make the number 10 and than distribute to the board.

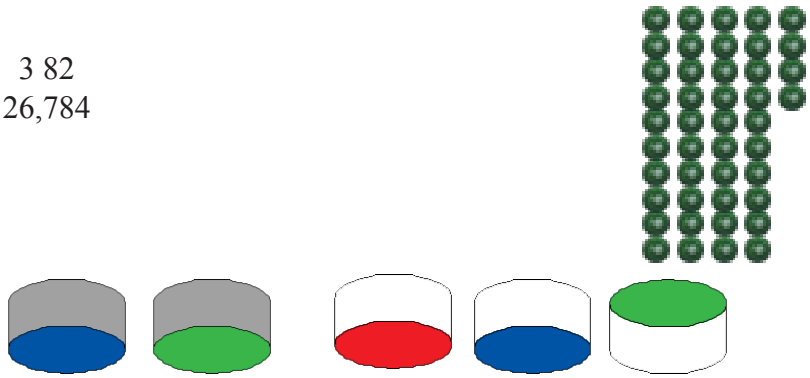
3 82
7 26,784

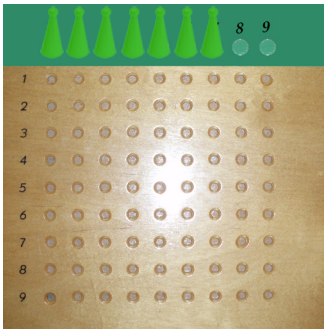




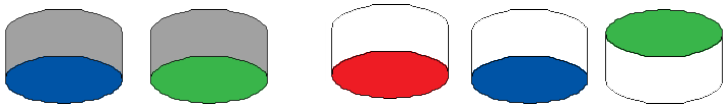
Now we see that we have 4 blue beads left over. Record the answer onto the problem, put the beads into the green cup, and clear the board.

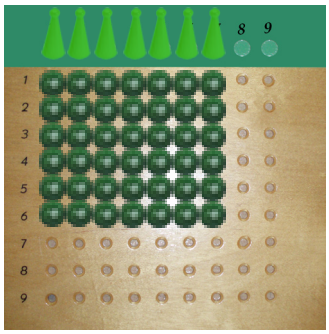
3 82
7 26,784





Now we need to exchange the blue beads. Each blue Bead is 10 green ones. We should have a total of 44.





$$\begin{array}{r} 3\,826\ \text{R2} \\ 7\overline{)\,26{,}784} \\ 5\ 7\downarrow\downarrow \\ \quad 18 \\ \quad\ 44 \end{array}$$

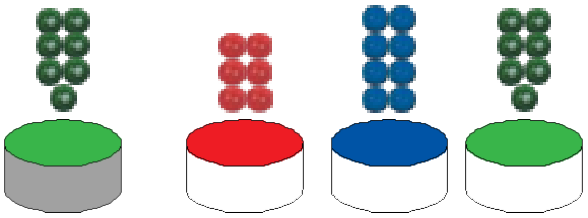
Now distribute the beads to the board. We see that 7 goes into 44 6 times with 2 left over. Now reacord that onto the problem and recrd the answer.

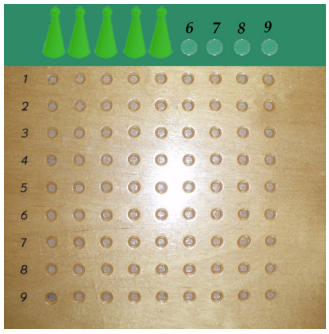
Test Tube Division (long division, one digit divisor, Group):

$$5\overline{)7{,}687}$$

Equation (7, 687/ 5)

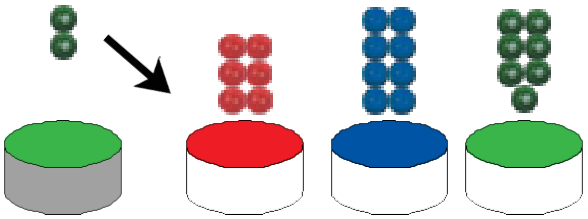
- Need the tubes up to 1000s

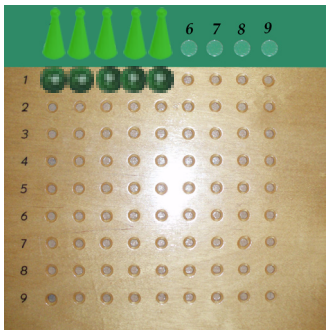




Lay out the board and the right amount of beads inside the approprage cup. Now we need to say "How many times is 5 contained in 7, 687."

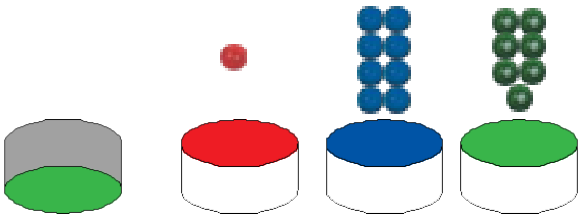
$$\begin{array}{r} 1 \\ 5\overline{)7{,}687} \\ 5 \\ 2 \end{array}$$

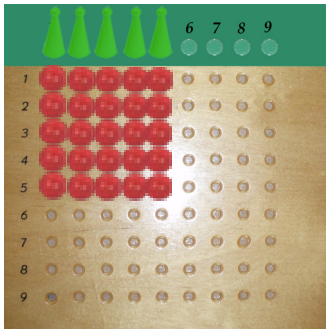




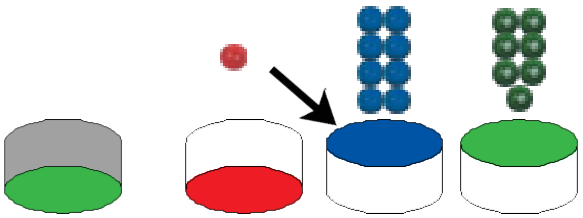
Bring the green 1000s beads over to the board and ask "How many times is 5 contained in 7?" Now talk about how many beads we have used so far and record that under the 7.

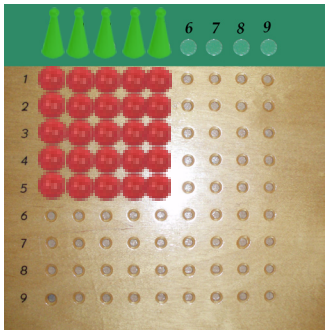
$$\begin{array}{r} 1 \\ 5\overline{)7{,}687} \\ 5\downarrow \\ 2\ 6 \end{array}$$





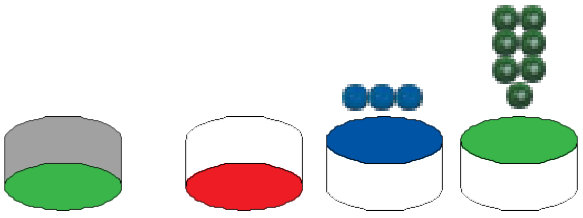
Now we shoudl see that we have 26 beads within the cup and with 2 green beads and 6 red we have 26. Now we need to create 26 red beads. "How many 5s are contained in 26. Important that you lay them out vertically to show how many groups of 5 are in 26.

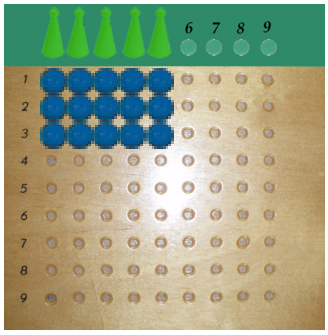




```
   1 5
5 ⟌7,687
   5
   2 6
   2 5
     1
```

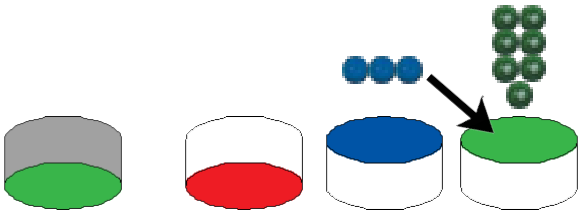
Now we record our answer. Also count number of beads we used and record it under the 26. Write the number remaining (1) under the 25. Clear the board and put the red bead into blue cup.

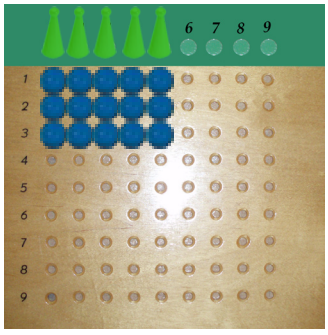




```
   1 5
5 ⟌7,687
   5
   2 6
   2 5
     18
```

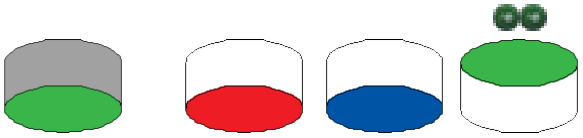
Now bring the 8 down as we count number of beads in the cup. 18 = 18. Exchange the 1 red bead for 10 blue beads. Now say "How many groups of 5 are in 18?" And lay out the number.

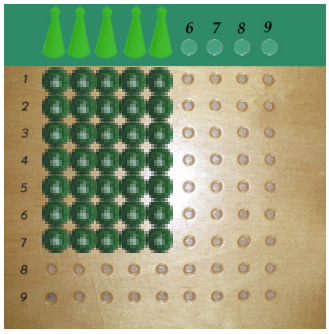




```
   1 53
5 ⟌7,687
   5
   2 6
   2 5
     18
     15
      3
```

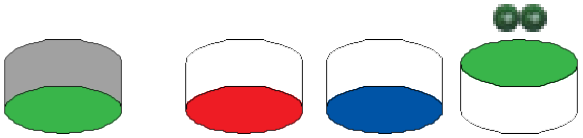
Record your answer, write number of beads you used (15) under the 18. Under 15 write the number of beads left over under the 15. Place the beads in to units cup and clear board.

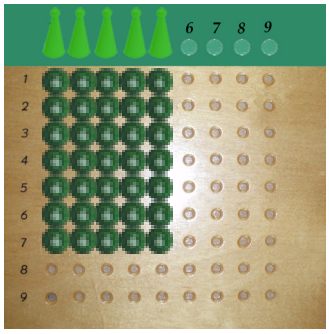




$$\begin{array}{r} 1\,53 \\ 5\overline{)7{,}687} \\ 5 \\ \hline 2\,6 \\ 2\,5 \\ \hline 18 \\ 15 \\ \hline 3 \end{array}$$

Now we need to exchange the 3 blue beads for 30 green beads for a total of 37. Now we need to distribute the green beads by asking "How many groups of 5 go into 37?" We see its 7 groups of 5 with a remainder of 2.



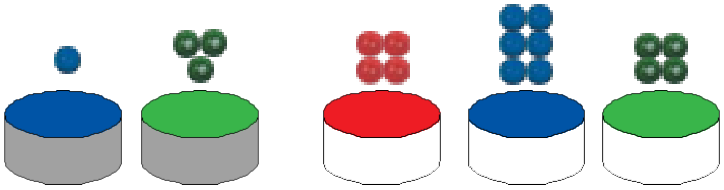


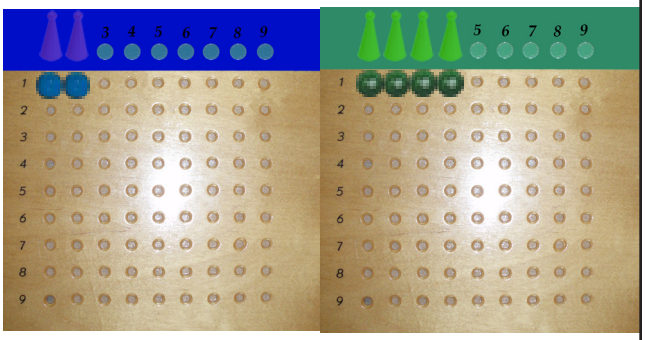
$$\begin{array}{r} 1\,537\text{ R }2 \\ 5\overline{)7{,}687} \\ \underline{5} \\ 2\,6 \\ \underline{2\,5} \\ 18 \\ \underline{15} \\ 37 \\ \underline{35} \\ 2 \end{array}$$

We need to record our answer now. We used 7 groups so it goes above the 7 in the dividen. "How many beads did we use?" 35 is the answer so we record that under the 37. With 2 left over we need to record that as teh remainder.

Test Tube Division (long division, two digit divisor, Distributive):

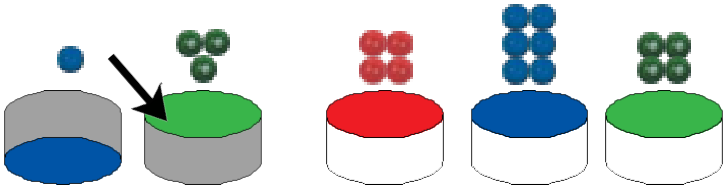
Equation (37, 464/ 24)
- Need the tubes up to 1000s

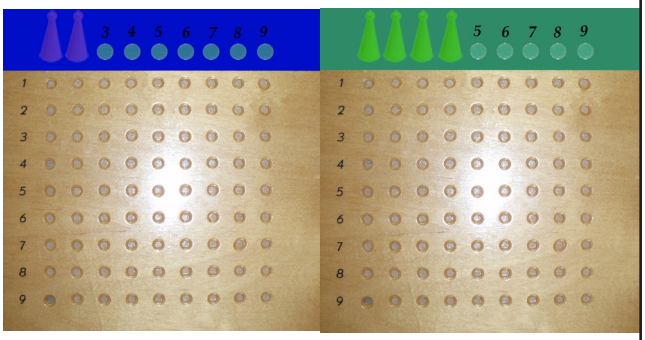




Take highest value and give to 10s board. Put greens on the units board. Remembering that the units get 10x less than the tens. Answer is what 1 unit gets. the unit received 1 but it is 1000s.

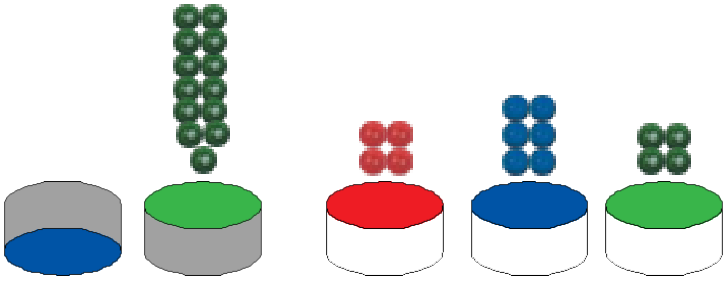
$$\begin{array}{r} 1 \\ 24\overline{)\,37{,}464} \end{array}$$

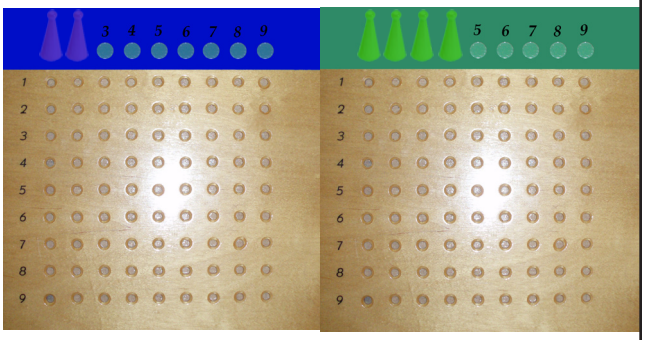




Dump the blue bead into the 1000s cup and record number of beads you used. 24 taken 1 time is 24. Under 24 record number left over (13). Flip cup over. Clear Board!

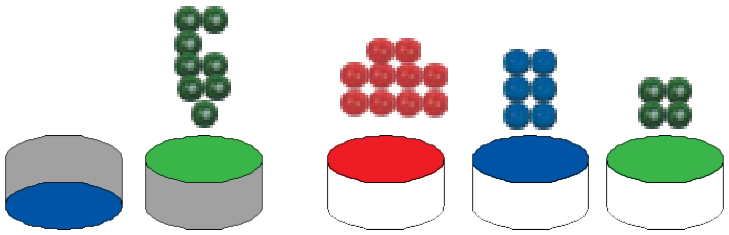
$$\begin{array}{r} 1 \\ 24\overline{)\,37{,}464} \\ 24 \\ 13 \end{array}$$

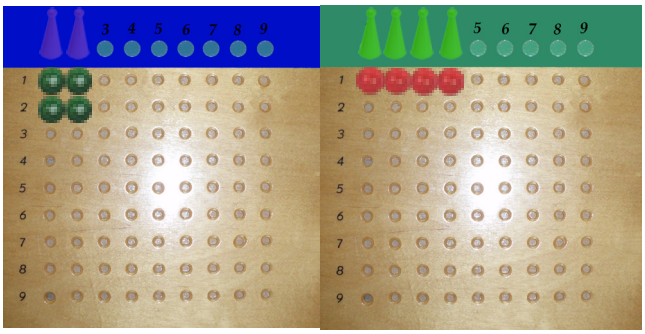




Exchange the blue bead for 10 green. Now distribute the green 1000s bead to the 10s board. REMEMBER THE 100s GO TO THE UNITS BOARD!!!

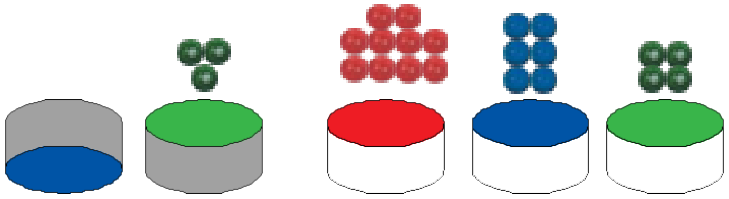
$$\begin{array}{r} 1 \\ 24\overline{)\,37{,}464} \\ 24\downarrow \\ 13\ 4 \end{array}$$

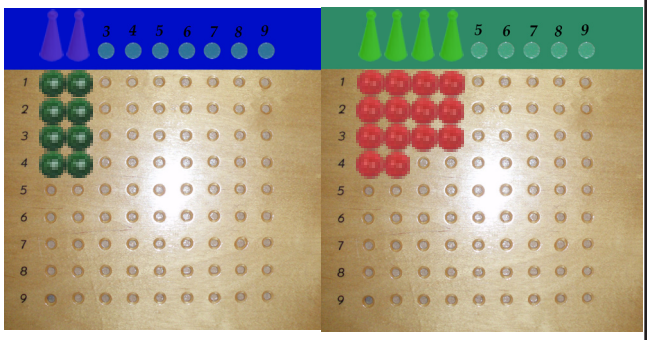




Distribute to the board. At this point I need exchange 1 green for 10 red.

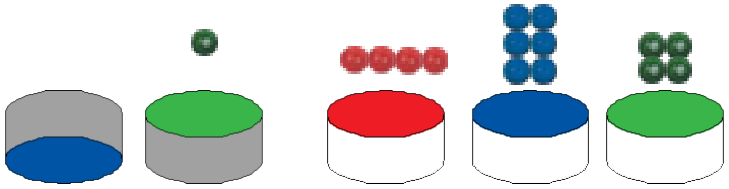
$$\begin{array}{r} 1 \\ 24\overline{)\,37{,}464} \\ 24\downarrow \\ 13\ 4 \end{array}$$

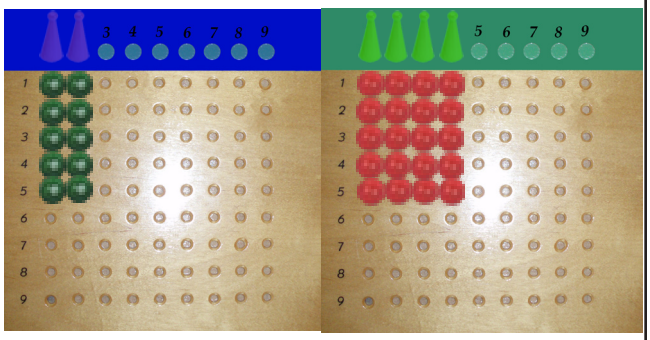




Once you exchange u can continue to distribute. Exchange green beads when needed.

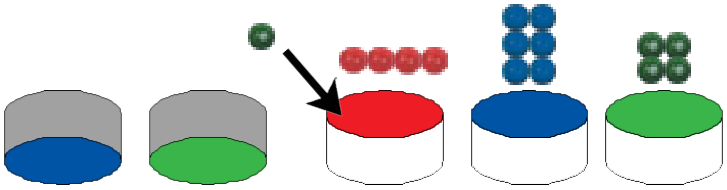
$$\begin{array}{r} 1 \\ 24\overline{)\,37{,}464} \\ 24\downarrow \\ 13\ 4 \end{array}$$

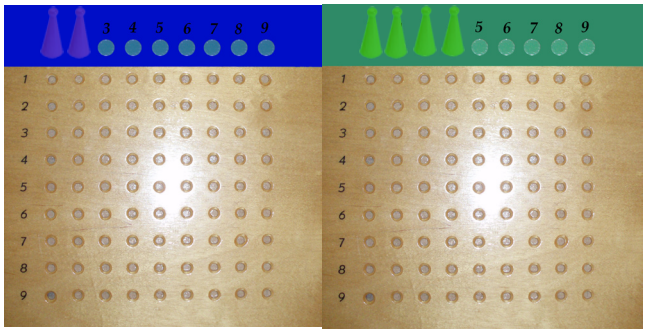




We have taken 24 x 5 to get a total of 120. Record 120 under the 134. Now record the number of beads left under 120.

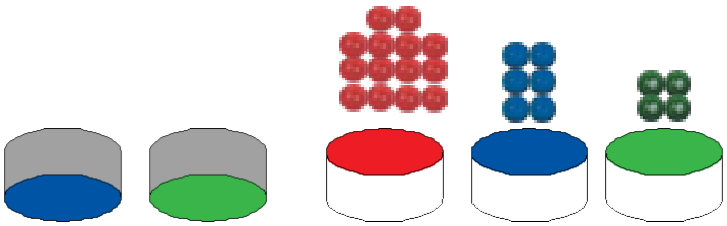
$$\begin{array}{r} 1\ 5 \\ 24\overline{)\,37{,}464} \\ 24\downarrow \\ 13\ 4 \\ 12\ 0 \\ 1\ 4 \end{array}$$

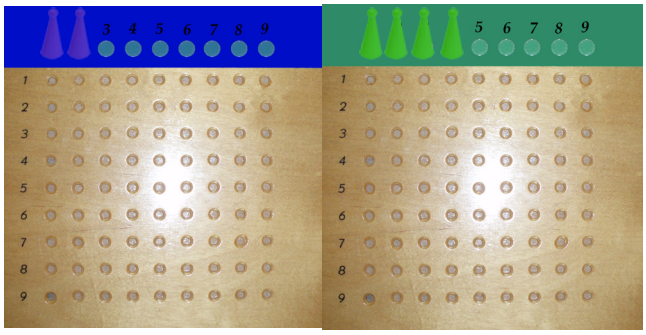




Clear board, put remainder 1000s bead in the 100s cup. Bring down the 6 (tens) in the problem.

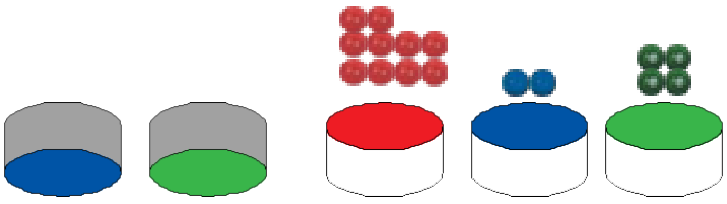
$$\begin{array}{r} 1\,5 \\ 24\overline{)\,37{,}464} \\ 24\downarrow \\ 13\,4\downarrow \\ 12\,0\downarrow \\ 1\,46 \end{array}$$

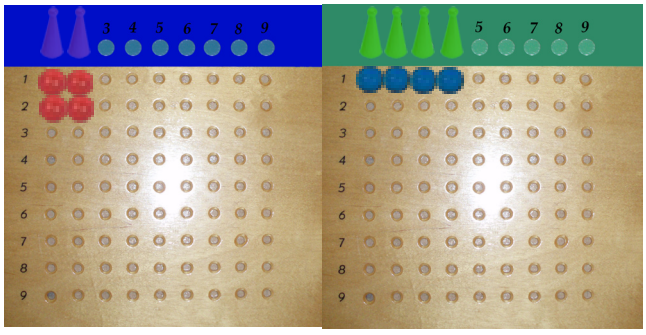




Exchange the 1 green bead for 10 red.

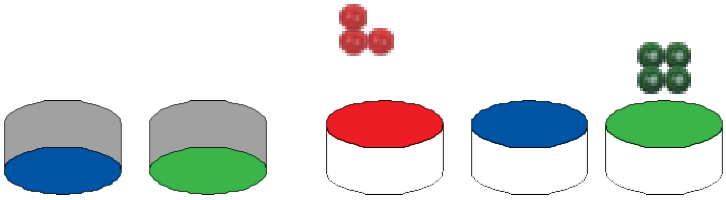
$$\begin{array}{r} 1\,5 \\ 24\overline{)\,37{,}464} \\ 24\downarrow \\ 13\,4\downarrow \\ 12\,0\downarrow \\ 1\,46 \end{array}$$

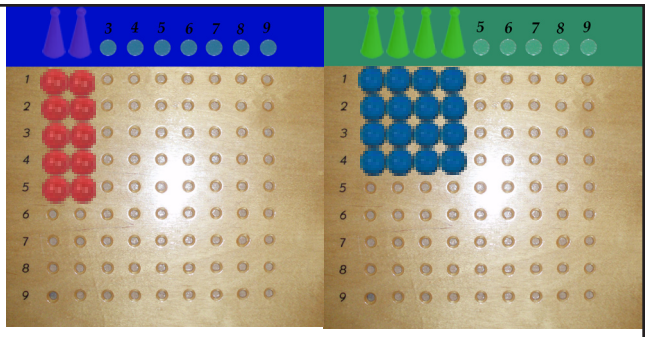




Begin to distribute. Since We can't distribute the 10s evenly we need to give one red bead for 10 blue beads.

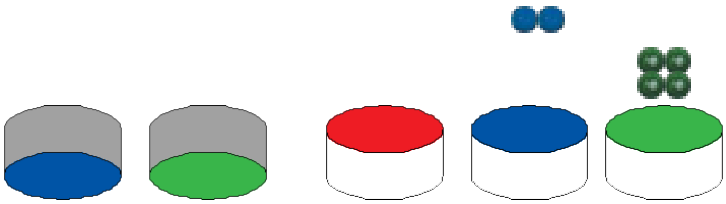
$$\begin{array}{r} 1\,5 \\ 24\overline{)\,37{,}464} \\ 24\downarrow \\ 13\,4\downarrow \\ 12\,0\downarrow \\ 1\,46 \end{array}$$

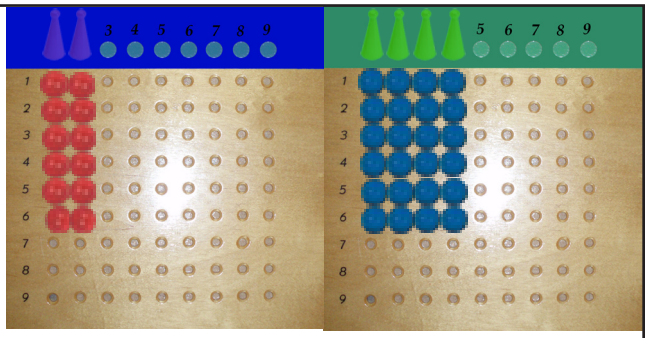




Continue to distribute. Since we need more 10s, we need to trade in 1 red bead for 10 blue beads.

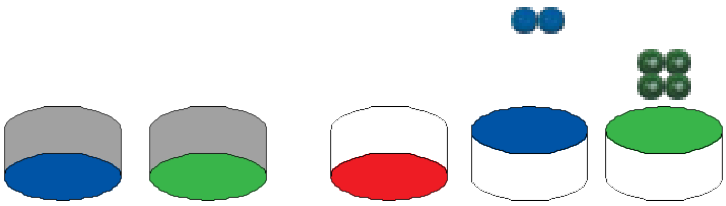
$$\begin{array}{r} 1\,5 \\ 24\overline{)\,37{,}464} \\ \underline{24\downarrow} \\ 13\,4\downarrow \\ \underline{12\,0\downarrow} \\ 1\,46 \end{array}$$

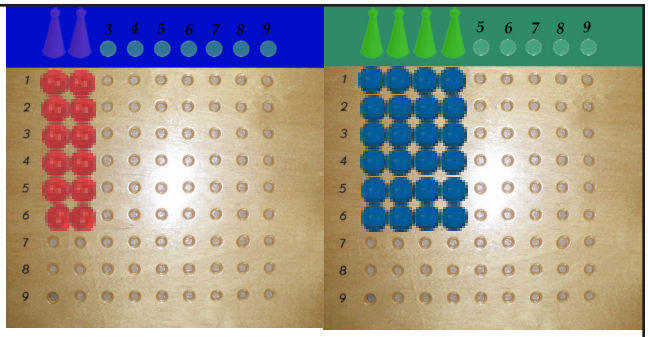




Continue to distribute.

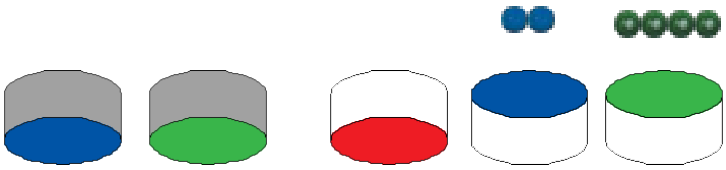
$$\begin{array}{r} 1\,5 \\ 24\overline{)\,37{,}464} \\ \underline{24\downarrow} \\ 13\,4\downarrow \\ \underline{12\,0\downarrow} \\ 1\,46 \end{array}$$

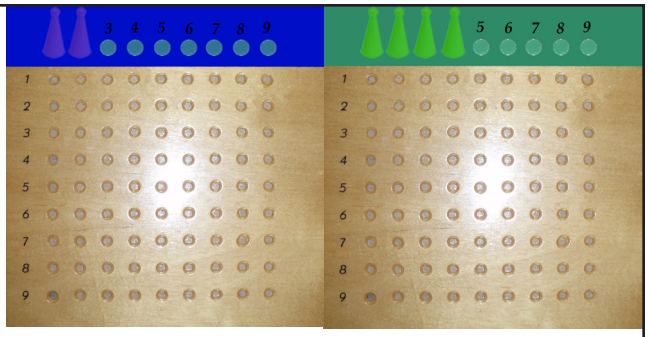




Since we can not distribute the 100s anymore we need to record out answer. How many times does 24 go into 146? answer is 6 and it goes above the 10s. 24 taken 6 times is 144. Record under 146. Put down the remaining beads. Since we do not have any 100s left we don't need to exchange.

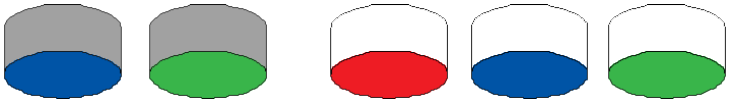
$$\begin{array}{r} 1\,56 \\ 24\overline{)\,37{,}464} \\ \underline{24\downarrow} \\ 13\,4\downarrow \\ \underline{12\,0\downarrow} \\ 1\,46 \\ \underline{1\,44} \\ 2 \end{array}$$

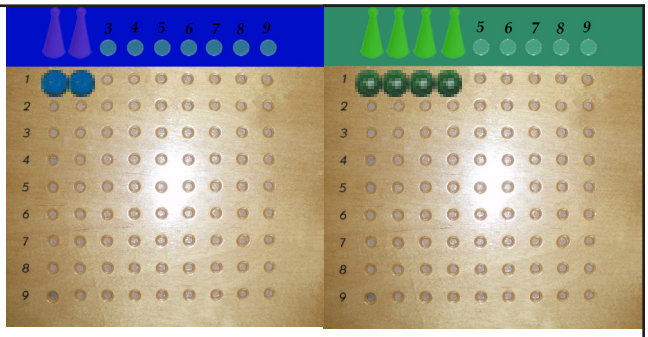




Clear the board and bring down the number of units beads (4).

$$
\begin{array}{r}
1\,56 \\
24\overline{)\,37{,}464} \\
24\downarrow \\
13\,4\downarrow \\
12\,0\downarrow \\
1\,46\downarrow \\
1\,44\downarrow \\
24
\end{array}
$$





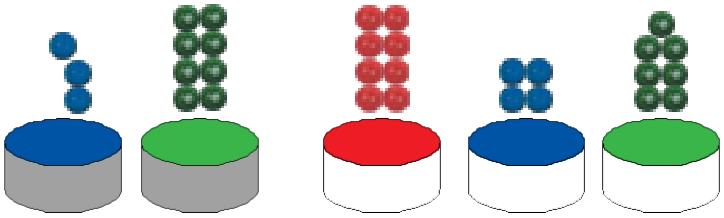
Begin distribute the beads. Record your answer. How many times does 24 go into 24? Answer is 1 so you record it.

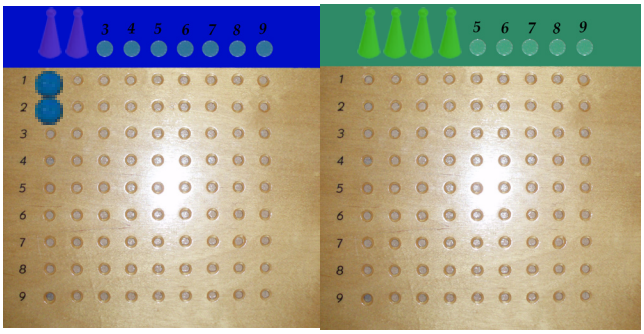
Once you record we know anwer is the quotient or 1, 561.

$$
\begin{array}{r}
1\,561 \\
24\overline{)\,37{,}464} \\
\underline{24}\downarrow \\
13\,4\downarrow \\
\underline{12\,0}\downarrow \\
1\,46\downarrow \\
\underline{1\,44}\downarrow \\
24 \\
\underline{24} \\
0
\end{array}
$$

Test Tube Division (long division, two digit divisor, Group):

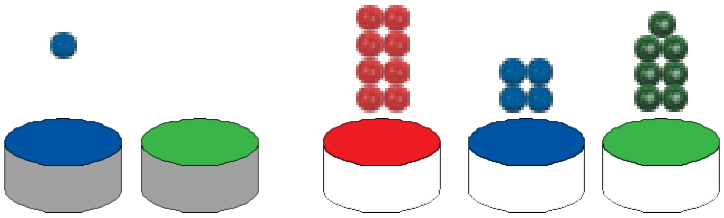
Equation (58, 847/ 24)
- Need the tubes up to 1000s

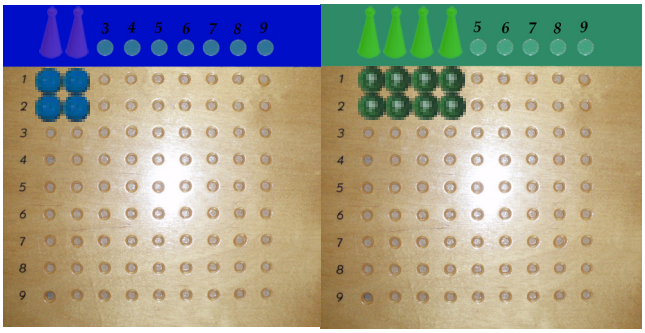




Lay out the board so you have right amount of beads, divisors. We need to determine how many times 2 goes into 5? Begin by Laying out 1 group of 2.

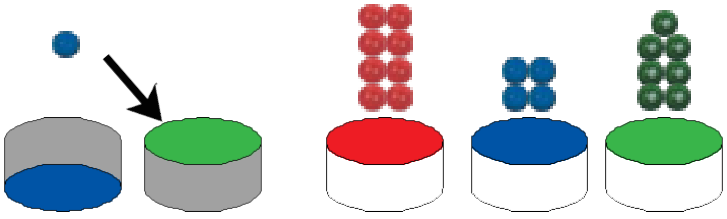
$$24\overline{)58{,}847}$$

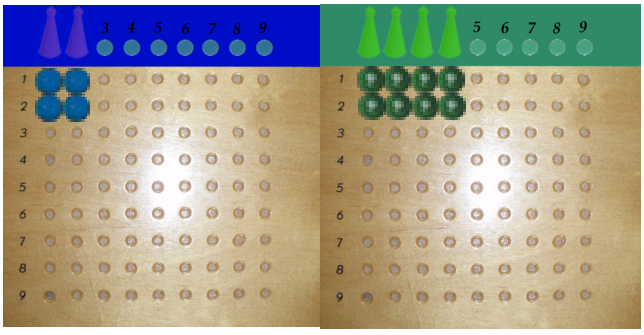




Now lay out the 2nd set of 2. And do the same thing with the units. We see that it is 2 times and it works so record your answer (what one unit gets). Record how many you use. 24 taken 2 times. and count the remainder (1 blue bead = 10 green.

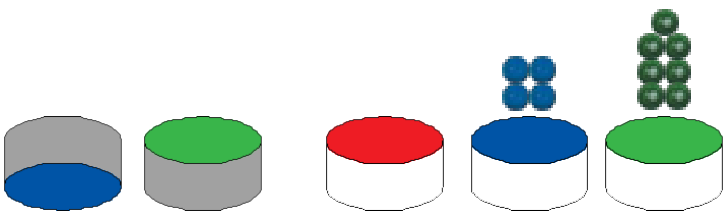
$$\begin{array}{r} 2 \\ 24\overline{)58{,}847} \\ \underline{48} \\ 10 \end{array}$$

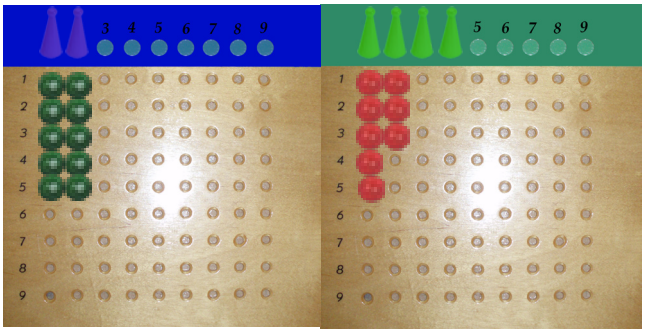




Now we need to exchange the 1 blue bead for 10 green beads. Clear the board. Bring down the 8 red beads to teh board and the 8 in the problem.

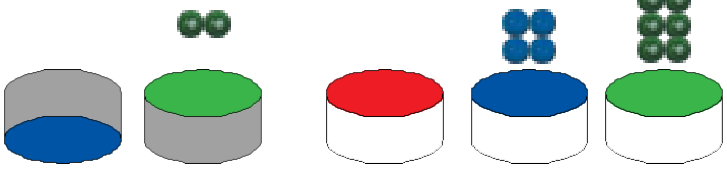
$$\begin{array}{r} 2 \\ 24\overline{)58{,}847} \\ \underline{48}\downarrow \\ 10\ 8 \end{array}$$

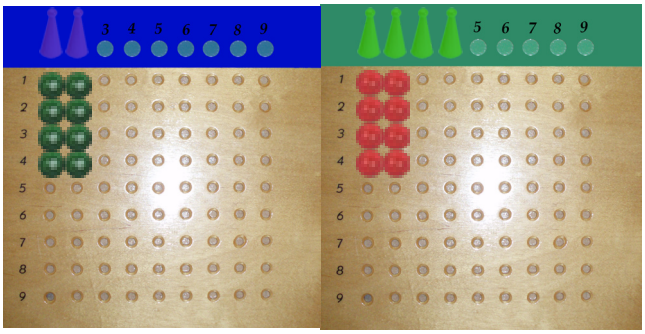




Now determine how many groups of 2 are in 10. Since it is 5 we begin to lay out. Now when we distribute the 100s into the units we realize the estimage is too high. We don't have enough to distribute to the ones so we need to go back and reconsider.

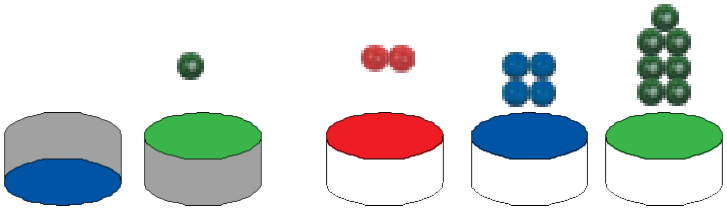
$$\begin{array}{r} 2 \\ 24\overline{)\,58{,}847} \\ \underline{48} \\ 10\,8 \end{array}$$

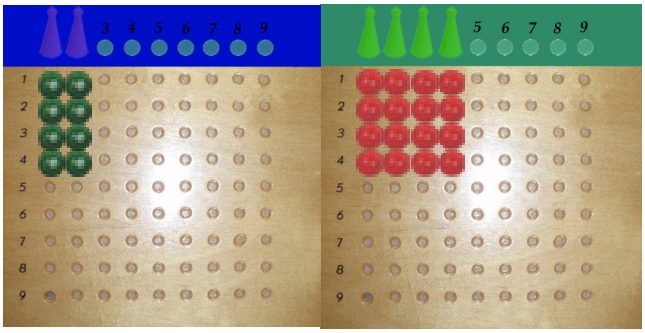




Now we make 2 groups of 4 and put them back in the cup. Now we need to exchange 1 green for 10 red.

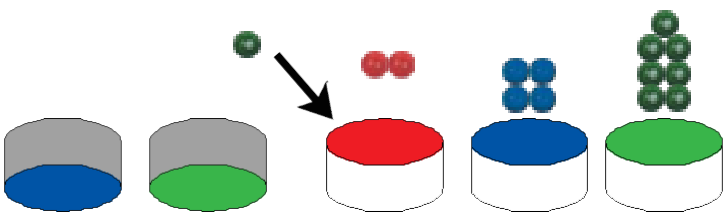
$$\begin{array}{r} 2 \\ 24\overline{)\,58{,}847} \\ \underline{48} \\ 10\,8 \end{array}$$

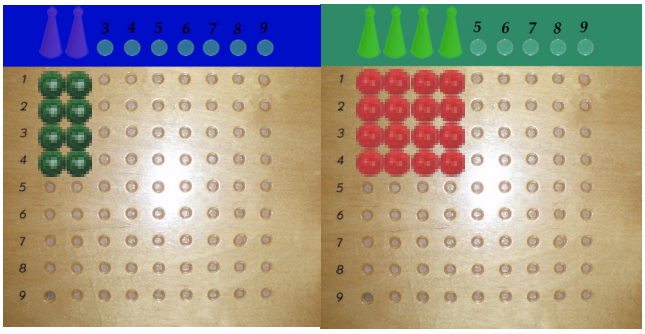




Now continue to distribute to the units. Record the number in units (4). how much is 24 taken 4 times? (96) and write that under 108. And write how much is remaining (1 green and 2 red).

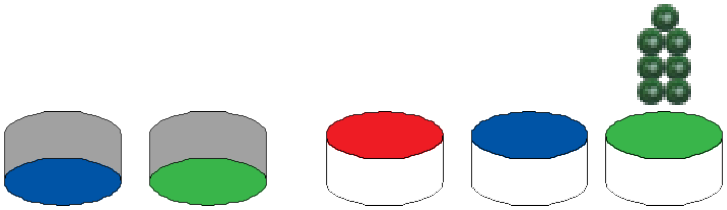
$$\begin{array}{r} 2\,4 \\ 24\overline{)\,58{,}847} \\ \underline{48} \\ 10\,8 \\ \underline{9\,6} \\ 1\,2 \end{array}$$

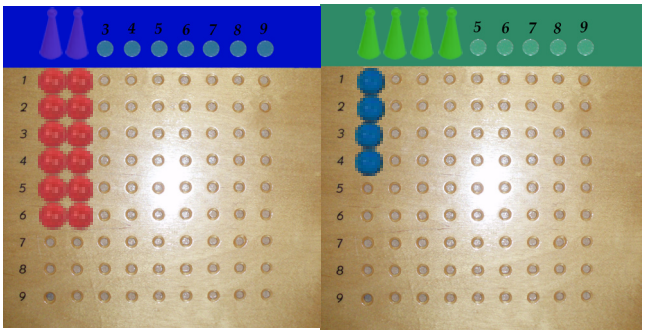




Now we need to clear the board, put the green bead into the red and exchange.

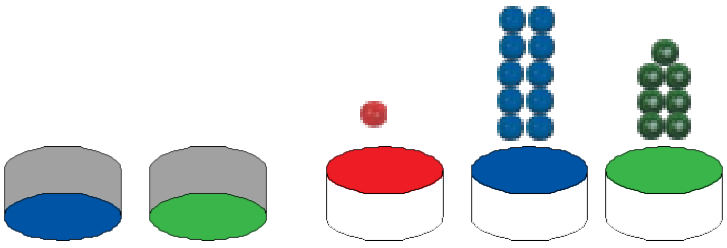
$$\begin{array}{r} 2\,4 \\ 24\overline{)\,58{,}847} \\ \underline{48} \\ 10\,8 \\ \underline{9\,6} \\ 1\,2 \end{array}$$

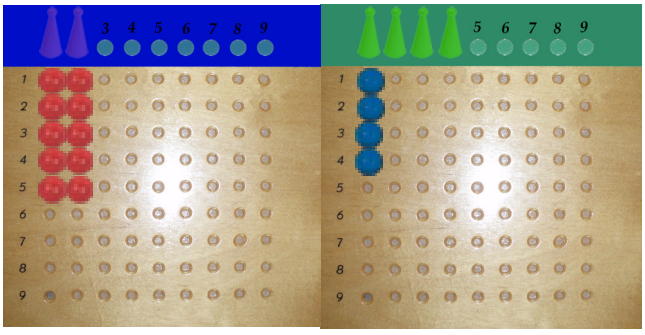




Bring down the 10s (4) to the board and begin to distribute. "How many times does 2 go into 12?"

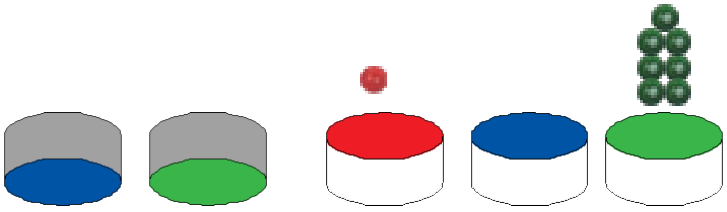
$$\begin{array}{r} 2\,4 \\ 24\overline{)\,58{,}847} \\ \underline{48} \\ 10\,8 \\ \underline{9\,6} \\ 1\,24 \end{array}$$

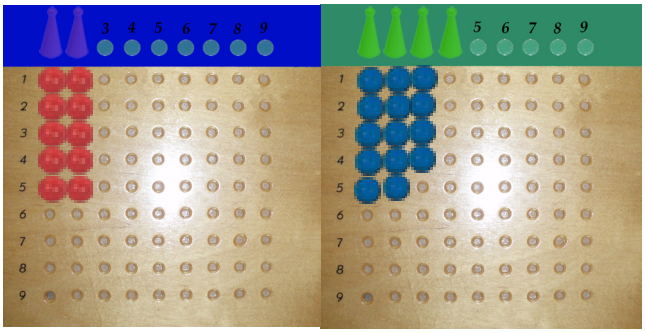




Since it does not work we take the last row off of the red and exchange 1.

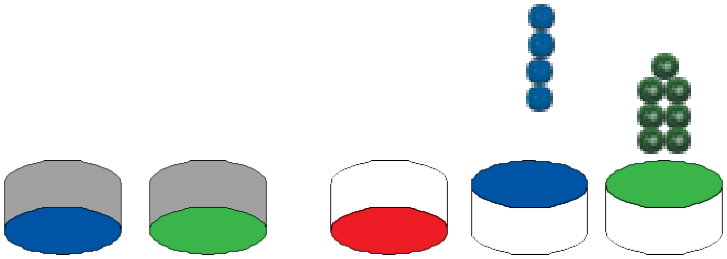
$$\begin{array}{r} 2\,4 \\ 24\overline{)\,58{,}847} \\ \underline{48} \\ 10\,8 \\ \underline{9\,6} \\ 1\,24 \end{array}$$

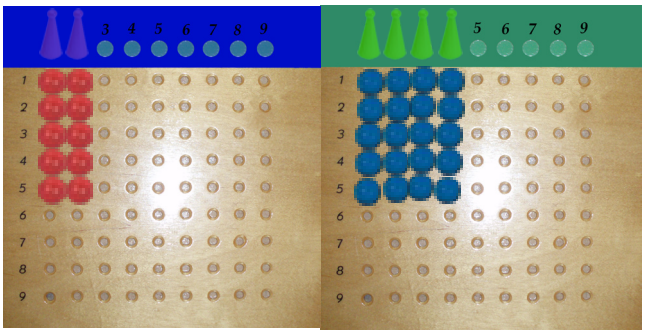




Continue to distribute. Since we need more blue beads and we have 1 red still we can exchange the 1 red bead for 10 blues.

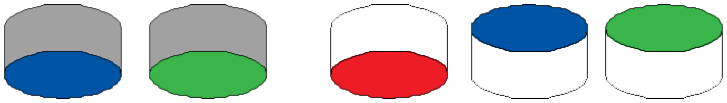
```
  2 4
24 58,847
   48
   10 8
    9 6
    1 24
```

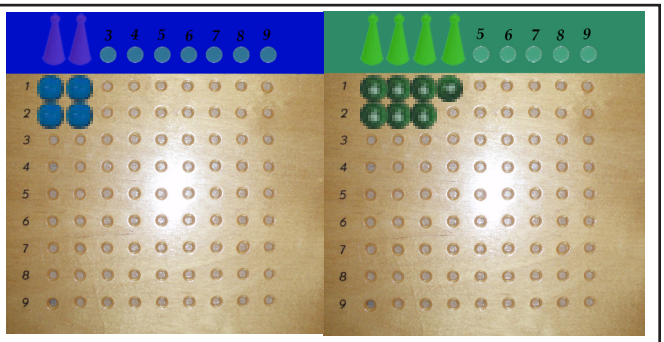




Continue to distribute. Since we have 5 rows of 4 we know that the answer is how much a unit gets (5). Record your answer, flip the red cup over and clear the board.

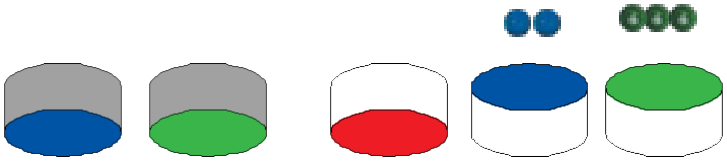
```
  2 45
24 58,847
   48
   10 8
    9 6
    1 24
    1 20
       4
```

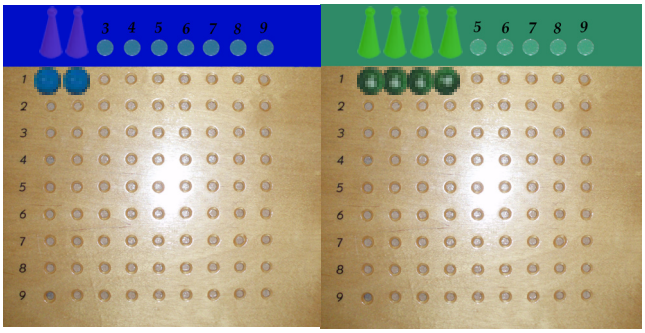




Bring down the units in the beads and in the problem. Begin to distribute. How many times does 2 go into 4?

```
  2 45
24 58,847
   48
   10 8
    9 6
    1 24
    1 20
       47
```



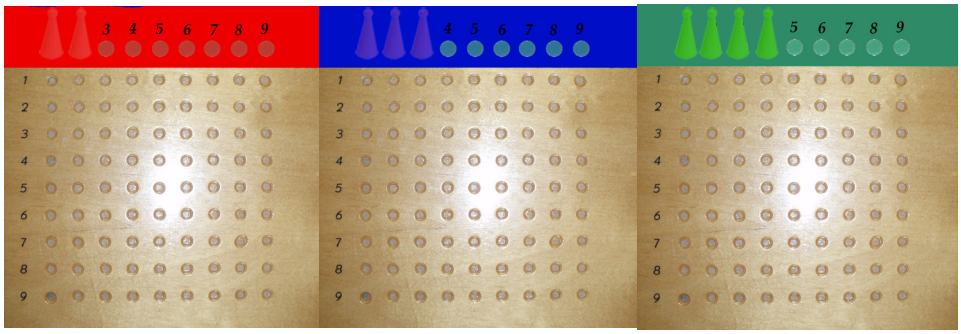


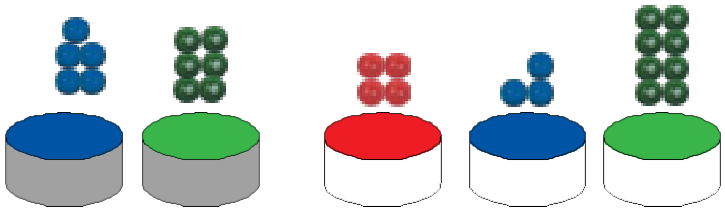
Since we see that we don't have enough units, we need to take off the last row and record our answer. We know 24 goes into 47 1 time with a remainder of 23.

$$
\begin{array}{r}
2\,451 \\
24\overline{)\,58{,}847} \\
\underline{48} \\
10\,8 \\
\underline{9\,6} \\
1\,24 \\
\underline{1\,20} \\
47 \\
\underline{24} \\
23
\end{array}
$$

Test Tube Division (long division, Three digit divisor, Group):

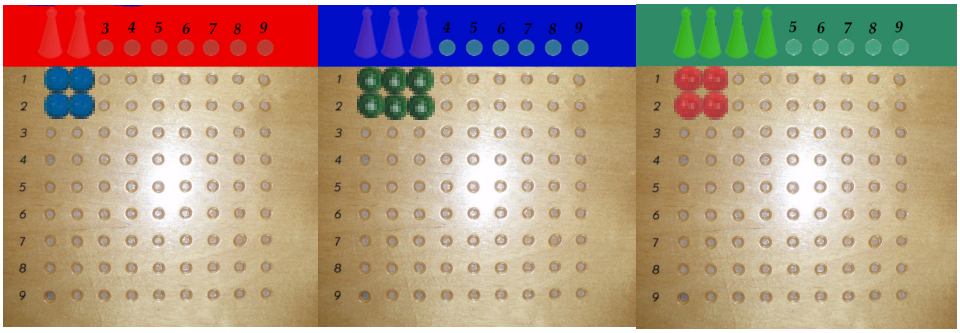
Equation (56, 438/ 234)
- Need the tubes up to 10000s

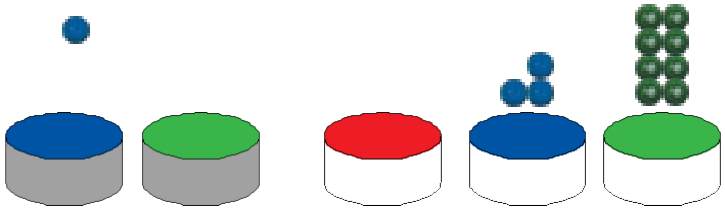




$$234 \overline{)\,56{,}438}$$

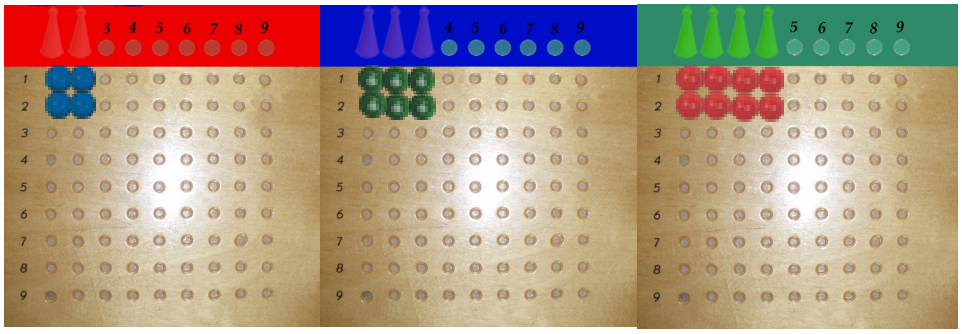
Lay out the board so you have right amount of beads, divisors. We need to determine how many times 2 goes into 5? Begin by Laying out 1 group of 2. We need to look at the 10s and 1s board to make sure the estimate is correct. 2 goes into 5 2 times, 3 goes into 6 2 times but 4 goes into 4 1 time. We know we need to put it in1 time to start

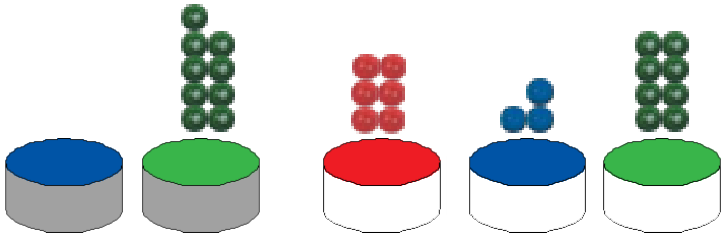




$$234 \overline{)\,56{,}438}$$

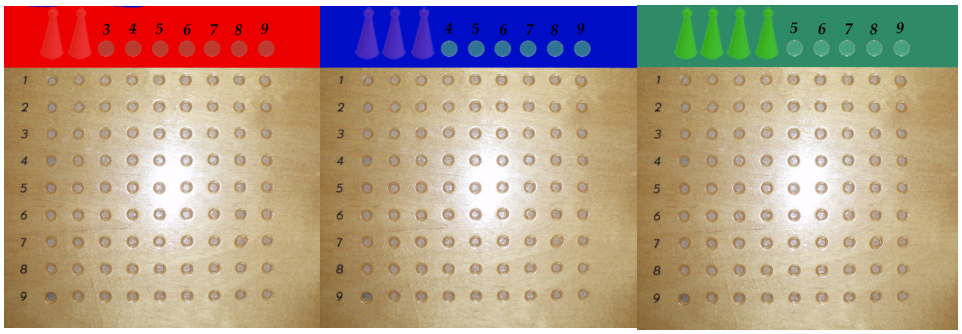
Now we can not make the final 2 groups of to so we look to the 1000s. Since there is none we go to the 10000s and exchange the blue bead.

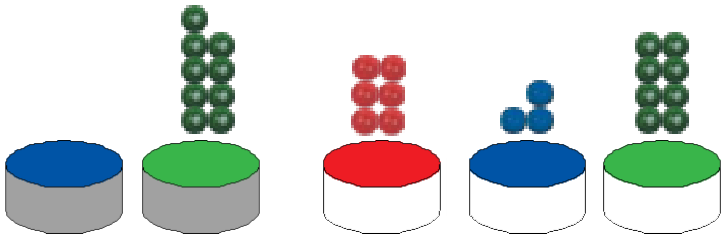




$$\begin{array}{r} 2 \\ 234\overline{)\,56{,}438} \\ \underline{46\,8} \\ 9\,6 \end{array}$$

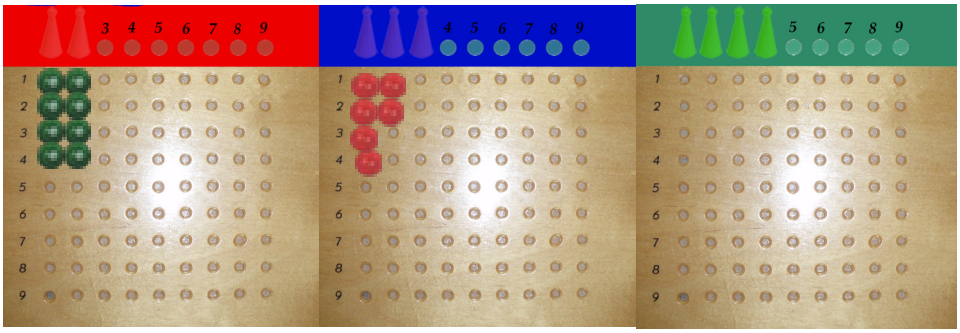
And now we have 10 green beads so we can excahnge one green for 10 reds and distribute. Now we look at the units to determine what our answer is and we see its 2(100s). Need to determine how many beads we used (468) and record it. Under that we write how many we have left over. Clear the Board!

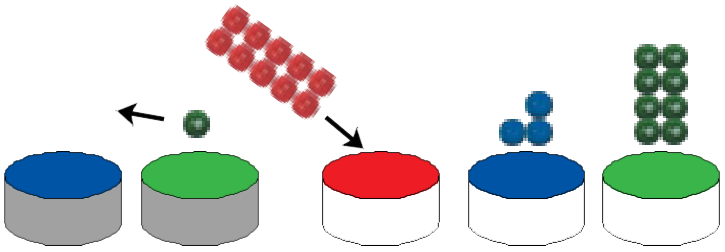




$$\begin{array}{r} 2 \\ 234\overline{)\,56{,}438} \\ \underline{46\,8}\downarrow \\ 9\,63 \end{array}$$

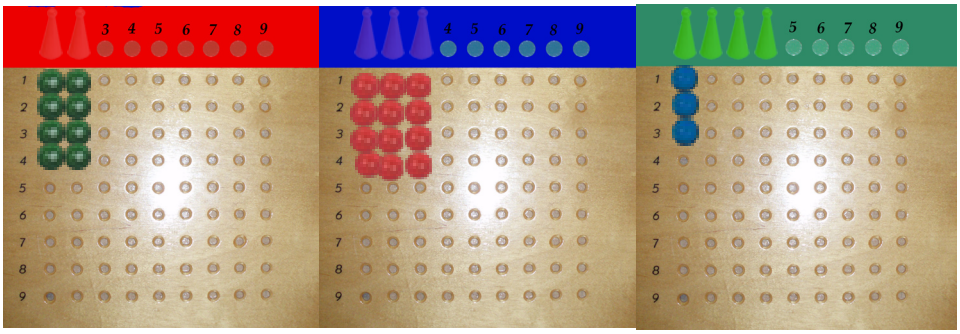
Bring down the 10s to the board and on the equation. Start to determine how many times 2 goes into 9, 3 goes into 6 and 4 goes into 3. Start with 4 groups because the 100s board is the only one where we can get 4 groups but we can distribute through the different cups.

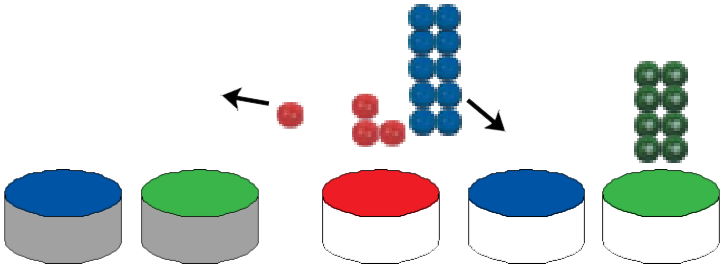




$$\begin{array}{r} 2 \\ 234\overline{)\,56{,}438} \\ \underline{46\,8\downarrow} \\ 9\,63 \end{array}$$

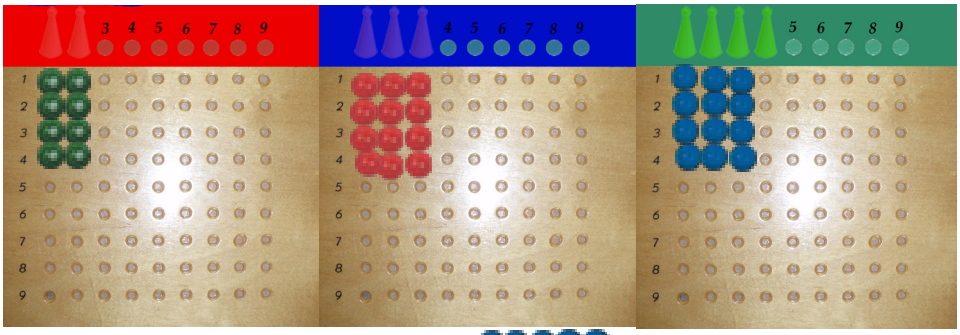
Distribute and exchange where necessary.

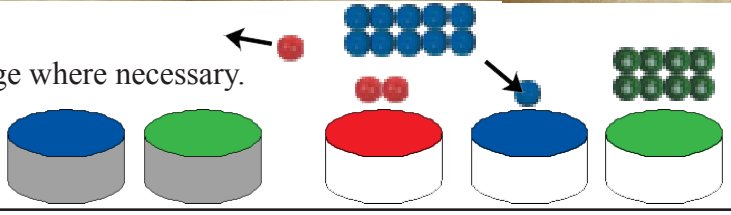




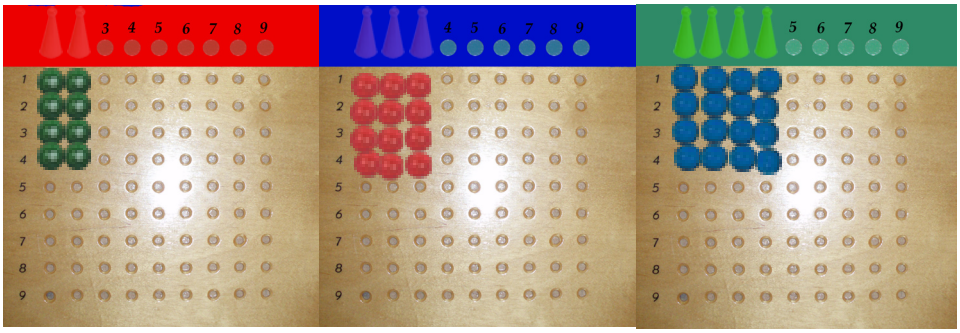
$$\begin{array}{r} 2 \\ 234\overline{)\,56{,}438} \\ \underline{46\,8\downarrow} \\ 9\,63 \end{array}$$

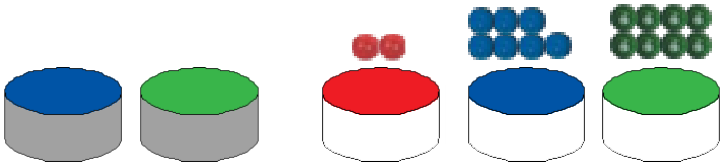
Distribute and exchange where necessary.





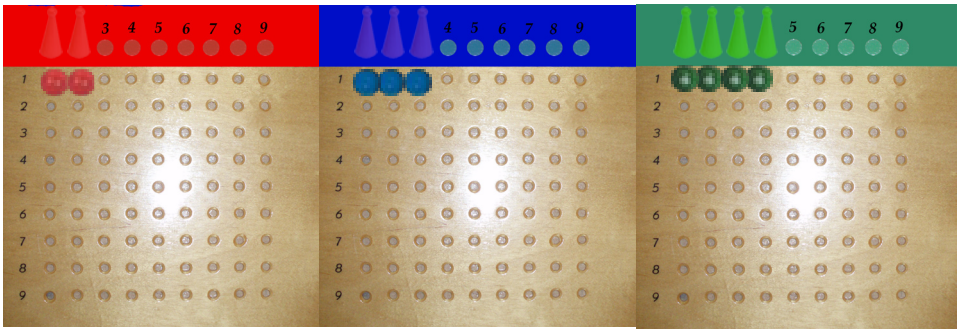
$$\begin{array}{r} 2 \\ 234\overline{)\,56{,}438} \\ \underline{46\,8\downarrow} \\ 9\,63 \end{array}$$

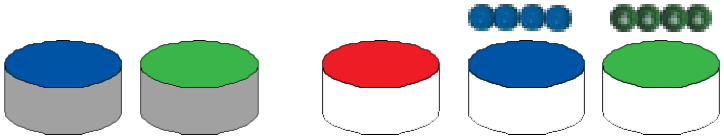




$$\begin{array}{r} 24 \\ 234\overline{)\,56{,}438} \\ \underline{46\,8\downarrow} \\ 9\,63 \end{array}$$

Since we can't distribute any more b.c we have no 1000s beads we record answer, clear the boards, and move the units down.



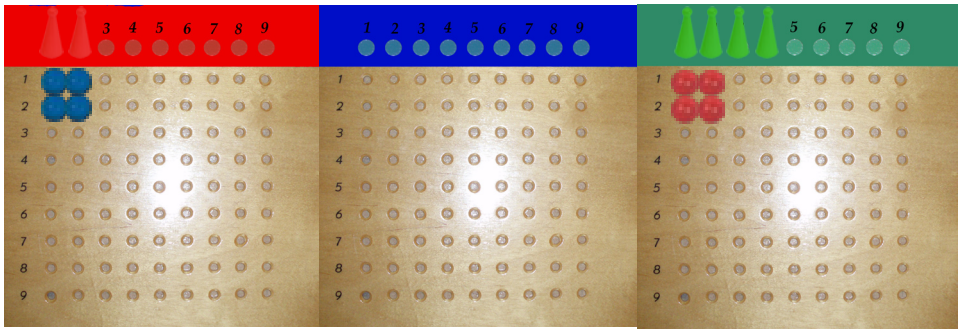


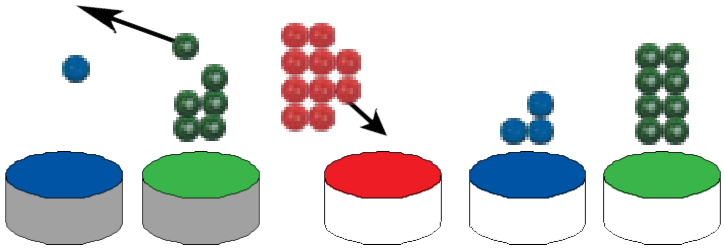
$$\begin{array}{r} 241\text{r}44 \\ 234\overline{)\,56{,}438} \\ \underline{46\,8\downarrow} \\ 9\,63\downarrow \\ \underline{9\,36} \\ 278 \\ \underline{234} \\ 44 \end{array}$$

Now distrubte. Since we have to use both beads in the units, we can not distribute to a second group. We ahe a remainder fo 44.

Test Tube Division (long division, Three digit divisor, Group):

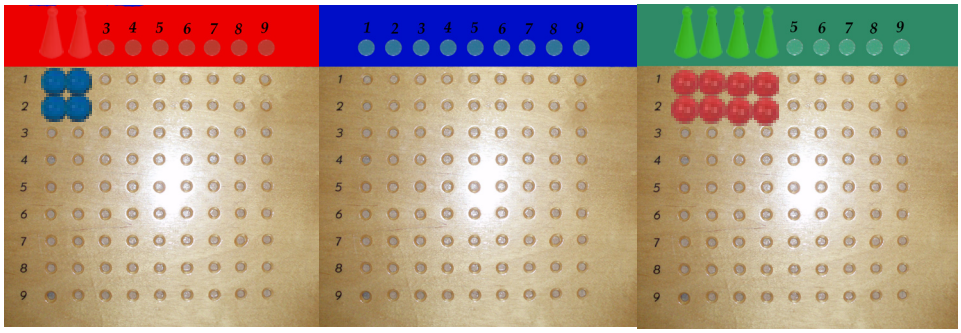
Equation (56, 438/ 204)
- Need the tubes up to 10000s

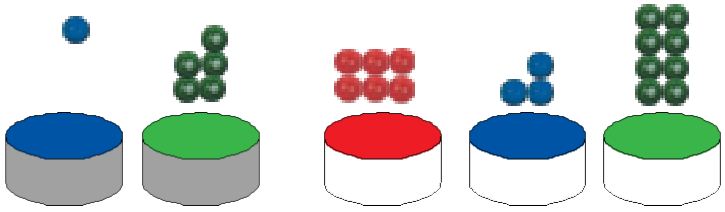




$$204 \overline{)\,56{,}438}$$

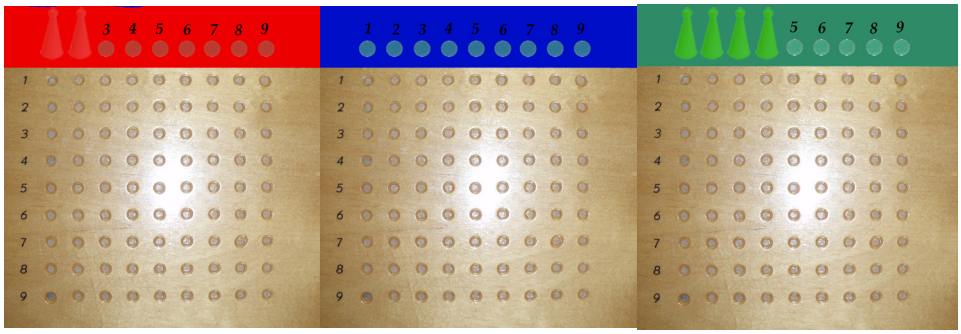
Since we do not have anything on the 10s board we don't put anything on the board. Now we need to look to see how many times 2 goes into 5 and its 2. So we start to distribute to the board. Since we can not put anymore on teh units we need to exchange.

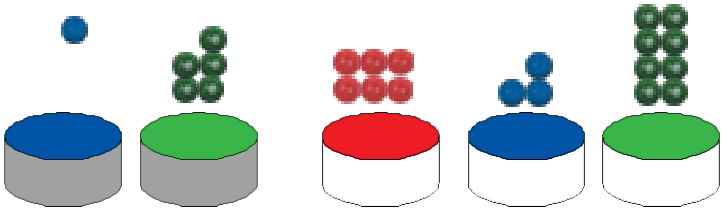




$$\begin{array}{r} 2 \\ 204 \overline{)\,56{,}438} \end{array}$$

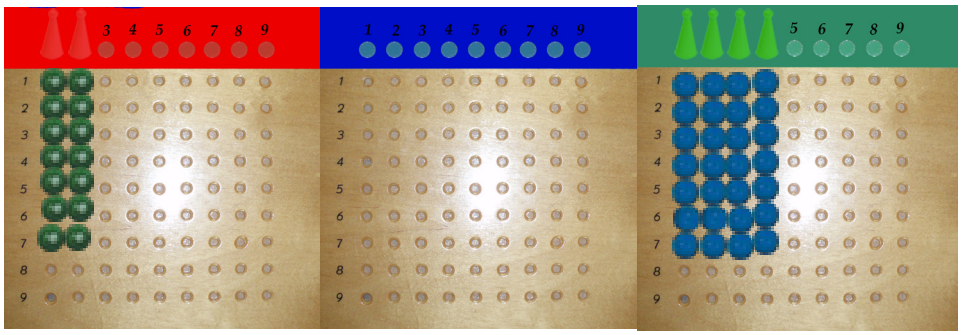
Continue to distribute to the boards. Since we can not put any more on the 100s board we record our answer looking at the units board.

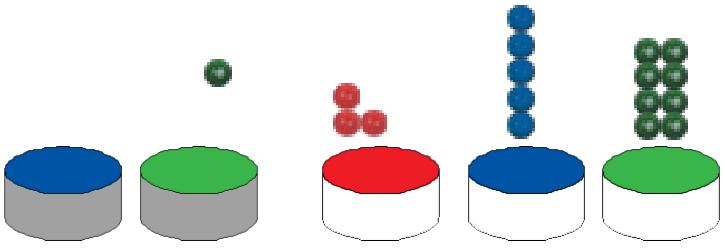




$$204\overline{)56{,}438}\quad 2,\ 40\,8\downarrow,\ 15\,63$$

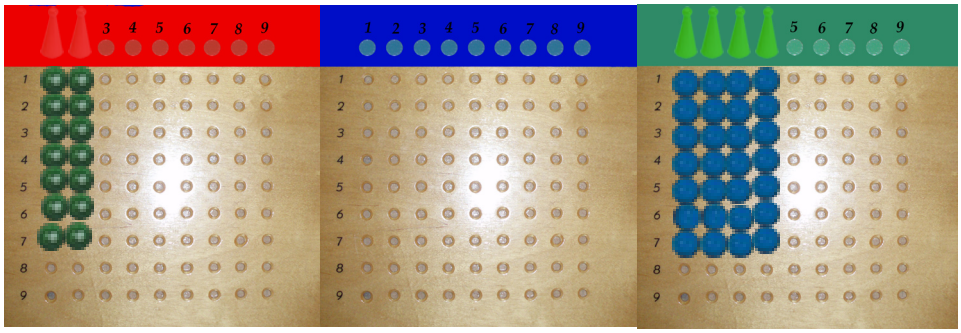
Now clear the board and right down what our remainder is. Bring down the tens cup down.

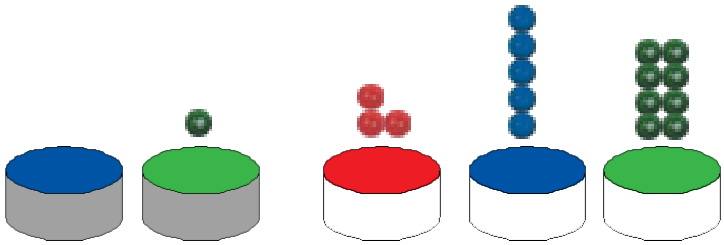




$$204\overline{)56{,}438}\quad 2,\ 40\,8\downarrow,\ 15\,63$$

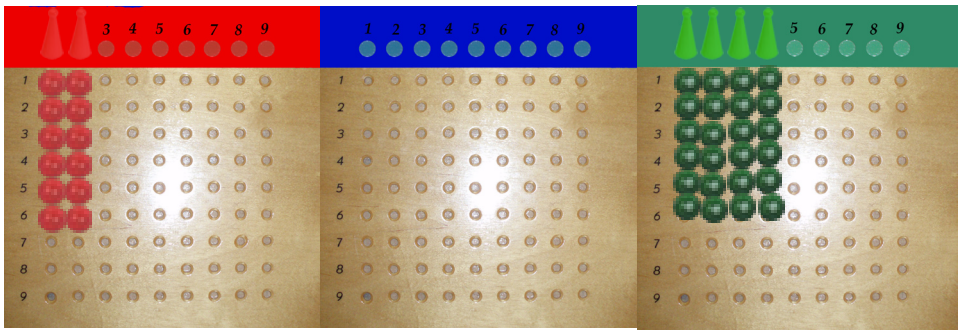
Now we need to distribute and exchange to determine how much we need to place. When you would run out of beads you would exchange similar to previous problems. I am going to skip this to show final answer.

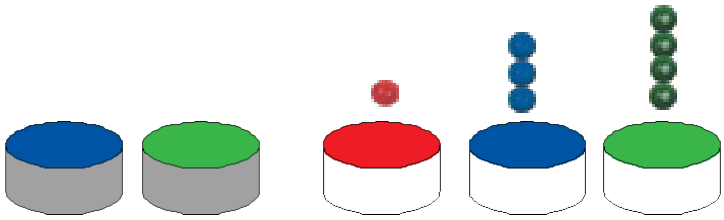




$$\begin{array}{r} 27 \\ 204\overline{)\,56{,}438} \\ \underline{40\;8\downarrow} \\ 15\;63\downarrow \\ \underline{14\;28} \\ 1\;358 \end{array}$$

Record anwer, how many beads we used and how much we have remainding.
Exchange the green 1000s bead for 10 100s beads. and bring down the units.



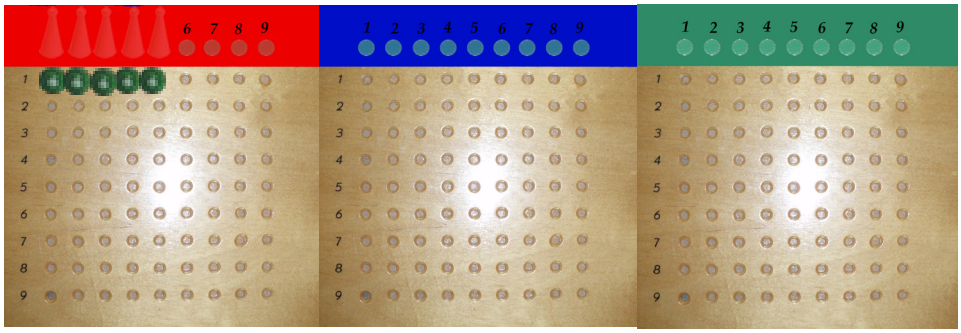


$$\begin{array}{r} 276\text{ r }134 \\ 204\overline{)\,56{,}438} \\ \underline{40\;8\downarrow} \\ 15\;63\downarrow \\ \underline{14\;28\downarrow} \\ 1\;358 \\ \underline{1\;224} \\ 134 \end{array}$$

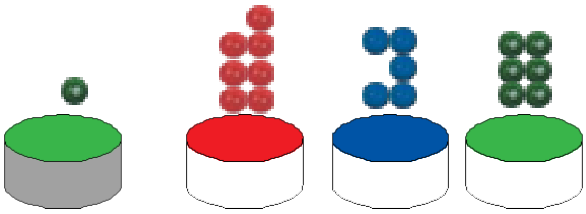
Begin to distribute to the board. Exchange when necessary and record your answer. We have 6 groups. When doing the math and looking at our beads we see that we have 134 remaining.

Test Tube Division (long division, Three digit divisor, Group):

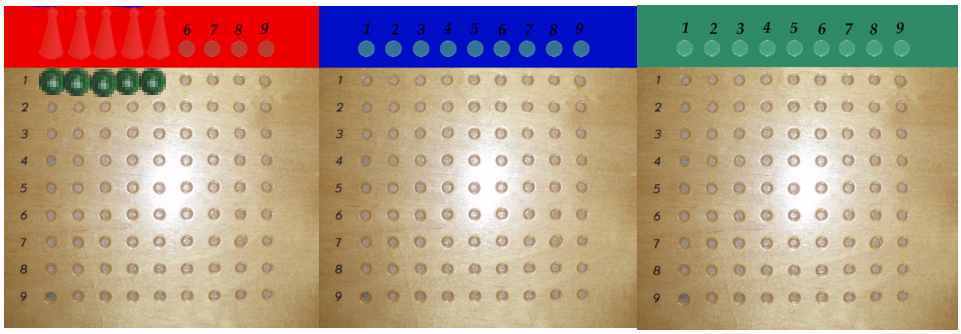
Equation (6, 756/ 500)
- Need the tubes up to 1000s



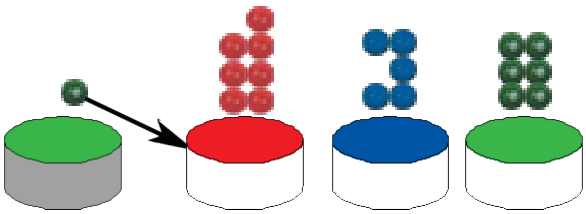
$$500\overline{)6{,}756}\quad 1$$



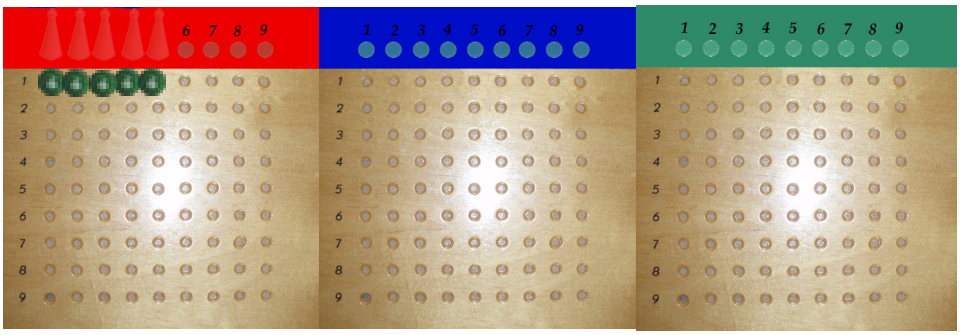
Since we do not have anything on the 10s or 1s board we don't put any skittles on the board. Now we need to look to see how many times 5 goes into 6 and its 1. So we start to distribute to the board. Since we cannot place anything on the 10s or 1s board we are done. Record the Answer.

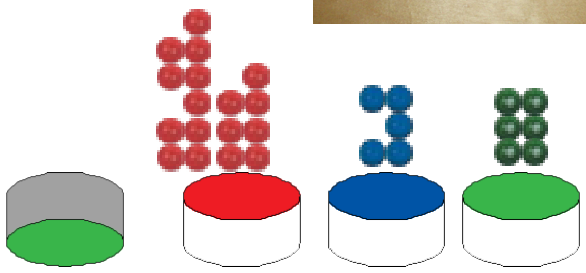


$$\begin{array}{r} 1 \\ 500\overline{)6{,}756} \\ 5\,00 \\ \hline 1\,75 \end{array}$$



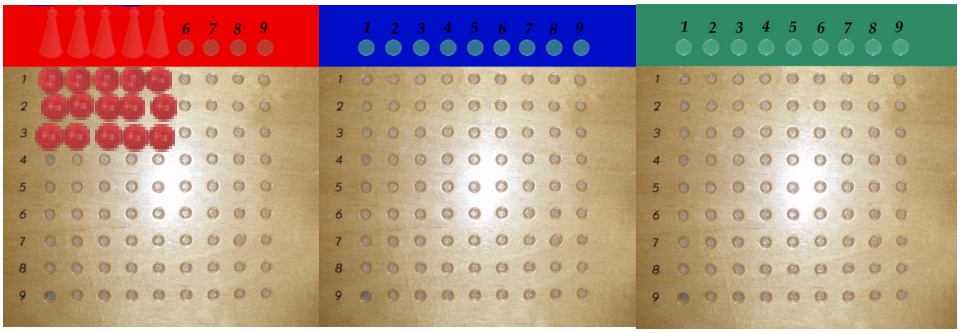
Now we need to count how many we have remaining. Transfur the green 1000s bead to the 100s cup and than exchange. Also we need to clear the board at this point.

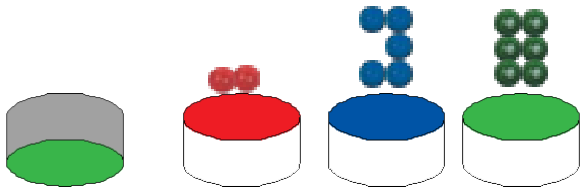




$$\begin{array}{r} 1 \\ 500\overline{)\,6{,}756} \\ \underline{5\;00\downarrow} \\ 1\;756 \end{array}$$

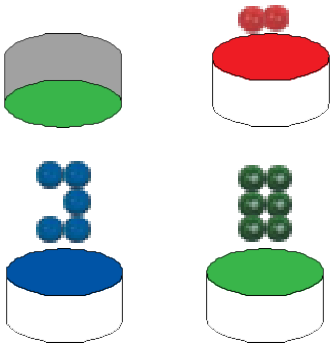
Now we need to exchange the green for 10 red beads. Bring the units down

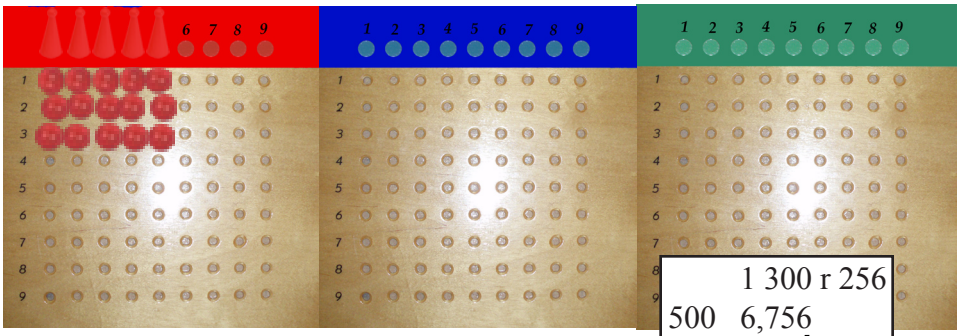




$$\begin{array}{r} 1 \\ 500\overline{)\,6{,}756} \\ \underline{5\;00\downarrow} \\ 1\;756 \end{array}$$

Once we have exchanged and brought the units down we can continue to distribute the 100s beads.





$$\begin{array}{r} 1\;300\text{ r }256 \\ 500\overline{)\,6{,}756} \\ \underline{5\;00\downarrow} \\ 1\;756 \\ 1\;500 \\ \underline{\quad 256} \end{array}$$

Since we can not distribute 5 more 100s bead and we can not exchange, we know that we have our answer. Now we need to ask the children how many times did 500 go into 1756 and we get 3 with a remainder of 256.