

The diagram illustrates two multiplication problems using colored digit counters. The first problem shows 158 multiplied by 23, and the second shows 79 multiplied by 46. Both result in the product 3634.

$$\begin{array}{r} * \quad \begin{array}{ccc} \boxed{1} & \boxed{5} & \boxed{8} \\ & \boxed{2} & \boxed{3} \end{array} \\ \hline 3634 \end{array} = \begin{array}{r} * \quad \begin{array}{cc} \boxed{7} & \boxed{9} \\ \boxed{4} & \boxed{6} \end{array} \\ \hline 3634 \end{array}$$

Nine counters, each bearing one of the nine digits from 1 through 9, are arranged in two groups as is shown. Each group represents a multiplication and, more interestingly, results in the same product. As it can be seen 158 multiplied by 23 is the same as 79 multiplied by 46 which gives 3,634 in both cases.

The challenge is to rearrange the counters so that to get as large product as possible. Remember both groups must multiply to the same amount, and there must be three counters multiplied by two in one group, and two multiplied by two counters in the other, just as it is now. What is the biggest amount which can be produced?

$$\begin{array}{r} * \quad 1 \quad 7 \quad 4 \\ \quad \quad 3 \quad 2 \\ \hline 5 \quad 5 \quad 6 \quad 8 \end{array} = \begin{array}{r} * \quad 9 \quad 6 \\ \quad \quad 5 \quad 8 \\ \hline 5 \quad 5 \quad 6 \quad 8 \end{array}$$

A product as large as 5,568 can be created if 174 is multiplied by 32 in one group and 96 by 58 in another.