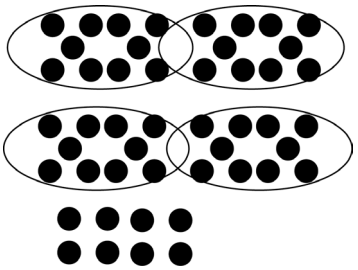
Methods Describe Consistency

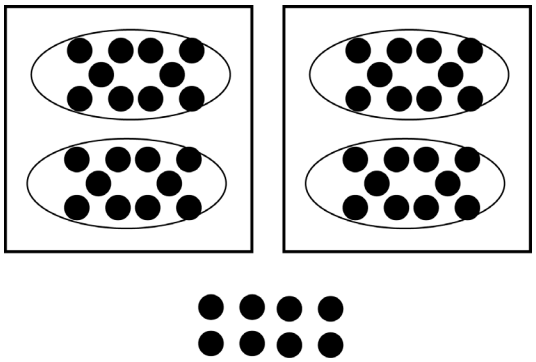
As a child, I proudly learned long division, all the while clueless why the long division method worked. Why do we divide numbers the way we do? How does this method work? How does it lead to the correct answer?

To answer these questions, let us look at a different way to solve the equation 48 ÷ 2 using circles as an illustration. We will then see how the traditional long division method uses this same process to automate solving division problems on paper.

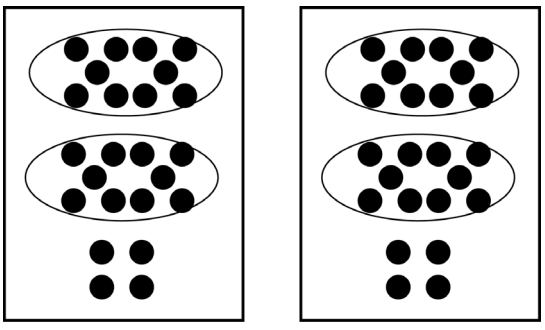
Rather than trying to divide 48 directly by 2, look at the 48 circles as 4 groups of 10 and 8 individual circles.



Next, divide the 4 groups of 10 by 2. Notice that just as 4 divided by 2 equals 2, 4 piles of 10 divided by 2 equals 2 piles of 10.



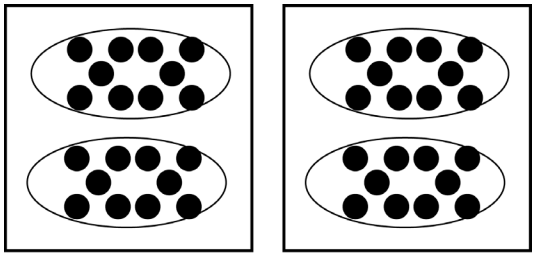
Now divide the 8 individual circles into two piles, getting 4 in each pile, and add these piles to the ones obtained from dividing 4 groups of 10, forming 2 piles of 24. 48 divided by 2 equals 24.

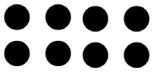


The traditional division method completes this same basic process on paper. To solve 48 ÷ 2 using it, start by writing the 48 and the 2 separated by a partial box that looks a bit like a stair. This "stair" format is a popular way to keep the numbers separated.

$$2\overline{)48}$$

Then ask, "If I were to divide 40, or 4 groups of 10, into 2 piles, how many would be in each pile?" The answer is 20, or 2 groups of ten. To represent this, put a 2 over the 4 in 48 because the 4 is in the ten's place and the 2 represents 2 groups of 10, or 20.



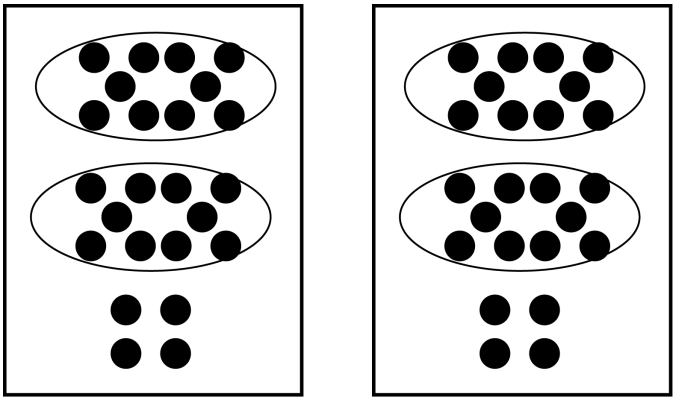


$$\begin{array}{r} 2 \\ 2\overline{)48} \end{array}$$

Now multiply 2 x 2 (groups of 10) to find out the quantity divided so far (2 piles with 2 groups of 10 in each). The purpose of this multiplication is to verify if all the ten's groups have been divided. 2 groups of 10 times 2 equals 4 groups of 10, or 40. Write 40 underneath the 48 and draw a little line and write a 0 to show the 0 groups of 10 left over (4 groups split into 2 groups perfectly) and an 8 to show the 8 circles left to divide.

$$\begin{array}{r} 2 \\ 2\overline{)48} \\ 40 \\ \hline 08 \end{array}$$

Now deal with the one's place, or the individual circles. Ask, "How many groups of 2 can be made from the 8?" and write the answer (4) up next to the 2.



$$\begin{array}{r} 24 \\ 2\overline{)48} \\ 40 \\ \hline 08 \end{array}$$

Once again, use multiplication to make sure all the circles have been divided. Multiply 2 x 4 and write an 8 underneath to represent the number of circles used to make 2 groups of 4. Minus it out of the 8 to see that all the circles have been used—0 remain undivided. The answer to 48 ÷ 2 is 24!

```
   24
 2 | 48
   40
   08
    8
    0
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Do you see how the division method and rules to divide numbers on paper break a division problem into little steps? When we divide a two-digit number under 100 on paper, we are really dividing the groups of 10 first, then the single items. As numbers get larger, we follow a similar process, beginning with the highest place value.

Because this method keeps track of place value for us, we can divide groups of 10 (or 100, 1,000, etc.) as easily as we would individual items. Just as 4 divided by 2 equals 2, 4 groups of 10 (or 4 tens) divided by 2 equals 2 groups of 10 (or 2 tens). We do not even necessarily have to think of the fact that we are dividing groups of 10—the division method keeps track of all that for us. By breaking numbers down, we can use the basic division facts we have memorized to divide numbers of any size!

Division methods are good examples of how we can use the creativity and reason God gave us to observe and record His creation.

Conclusion

Division methods are useful ways to divide quantities on paper easily. Each method works because it accurately represents the real-life consistency God created and sustains.

TEACHING SUGGESTIONS AND IDEAS

Objective: *To help your child understand long division algorithms as methods to represent what happens when objects divide; to learn to divide large numbers proficiently.*

Specific Points to Communicate:

- *The division method being taught describes the consistency God placed around us; other methods also exist.*
- *Division aids in exploring God's creation and completing real-life tasks.*

As you present division methods (algorithms), encourage your child to stop and think about why each method works. You can do this by demonstrating what is actually happening using household manipulatives. Divide the manipulatives, pointing out