

Algorithm

We are going to use a strategy known as area model multiplication to work the problem 32×17 . We can think of the number 32 as 30 plus two. We are going to place this number on the left-hand side of the multiplication model. We have 30 plus two, which is equal to the number 32. Using the same idea, we will think of the number 17 as 10 plus seven and we will place this number at the top of the area model. The number 10 plus seven is the same as 17.

Remember that to find the area of a rectangle it is necessary to multiply the length times the width. In this example, the whole rectangle is 32 by 17, but we have broken the rectangle into smaller area pieces. Let's look at the first small piece. It has a length of 30 and a width of 10. Since it is 30 by 10, we would multiply 30 times 10, and the area of that piece would be 300. The next piece of the rectangle is 30 by seven. If we multiply 30 and seven we would get an answer of 210. Using the same process, a two by 10 rectangle would have an area of 20, and a two by seven rectangle would have an area of 14.

Now, we just need to add the individual pieces in order to get the area of the total rectangle. Starting in the ones column: four plus zero plus zero plus zero will give us an answer of four. Next, we move to the tens column: one plus one plus two plus zero also gives us an answer of four. Then, in the hundreds column: two plus three will give us an answer of five. The total area of the rectangle, which was 32 by 17, is 544.

Let's prove that the area model strategy will give you the same answer as the traditional method you've probably seen in the past. We start by multiplying seven times two, which is 14. We put the four in the ones column, and we carry the one up to the tens column. Notice that we also had a 14 when we used the area model strategy. Next, we will multiply seven times three, which is 21, plus the one we carried up will give us 22. Although we say that we are multiplying seven times three in this situation, what we are really doing is multiplying seven times 30. Remember from the area model that seven times 30 gave us an answer of 210. Notice that the first two numbers in the area model example add together to give us the same number that we get in the first line of multiplication in the traditional model.

The first thing that we need to do when we get ready to start our second line of multiplication is to place a zero in the ones place. This is a placeholder because when we multiply times the one we're not really multiplying by one; we're actually multiplying by a value of 10. The zero holds that place to make sure all of the digits have the right place value. We know that one times two is two, but remember we're really multiplying 10 times two, which is 20, just like we had in the area model example. Then, we continue to one times three, which is three, but what we're actually multiplying is ten times 30. If we think about the place value, which is exactly like the 10 by 30 area we had in the area model, it gave us a value of 300. Notice that the 20 plus 300 would give us 320, which is exactly what we came up with in the traditional model. Starting in the ones column, if we add four plus zero, we get an answer of four. In the tens column, two plus two also gives us four. And finally in the hundreds column, two plus three gives us an answer of five. Our answer of 544 does match the answer we got in the area model. Therefore, we have proven two different ways that 32×17 equals 544. Since we know that both methods give the correct answer, you can use whichever method you feel most comfortable with.