

Read About Multiplying Up To 4 Digits (Area Model)

WHAT IS MULTIPLYING UP TO 4 DIGITS?

An area model shows multiplication by giving the factors as side lengths of a rectangle. The product is the area of the rectangle. An area model makes things simpler by allowing you to divide the rectangle into smaller rectangles whose area is easier to find.

To better understand multiplying up to 4 digits...

LET'S BREAK IT DOWN!

Camping

Multiplying a 1-digit number by a 2-digit number can help you find how many snacks you need for a camping trip. Let's say you are going camping for 6 days and you need 28 snacks a day for the group. How many snacks do you need altogether? We can figure this out by thinking of 28 as $20 + 8$. We can

multiply $6 \times 20 = 120$ and $6 \times 8 = 48$. Then we can add the products: $120 + 48 = 168$. You need 168 snacks. Try this one yourself: **You and your friends are headed to a carnival. There are 7 of you. Each person needs 43 tickets to ride all the rides. How many tickets do you need in total so that everyone can ride all the rides?**



Millipedes

Multiplying a 1-digit number by a 3-digit number can help you find how many total legs a group of millipedes has. Let's say you see 3 millipedes and each millipede has 142 legs. How many legs do you see? We can figure this out by thinking of 142 as $100 + 40 + 2$. We can multiply $3 \times 100 = 300$, $3 \times 40 = 120$, and $3 \times 2 = 6$.



Then we can add the products. $300 + 120 + 6 = 426$. There are 426 legs. Try this one yourself: **You are on a hike and you see 7 millipedes. Each millipede has 142 legs. How many legs do you see in all?**

Soccer Stadium

Multiplying a 1-digit number by a 4-digit number can help you find how many seats there are in a stadium. Let's say the stadium has 4 sections. Each section has 2,316 seats. How many seats does the stadium have altogether? We can figure this out by thinking of 2,316 as $2000 + 300 + 10 + 6$. We can multiply 4



$4 \times 2,000 = 8,000$, $4 \times 300 = 1,200$, $4 \times 10 = 40$, and $4 \times 6 = 24$. Then we can add the products: $8,000 + 1,200 + 40 + 24 = 9,264$. There are 9,264 seats. Try this one yourself: **You need to decide if there are enough seats in the stadium for all fans to attend. There are 3 trains, and each train brings 3,104 people to the stadium. How many seats does the stadium need for all the people on the trains to attend? Does the stadium have enough seats?**

Record Collection

Multiplying a 2-digit number by a 2-digit number can help you find how many records there are in a collection. Let's say there are 14 boxes of records and each box contains 38 records. How many records are in the collection? We can figure this out by thinking of 14 as $10 + 4$ and 38 as $30 + 8$. We can

multiply $10 \times 30 = 300$, $10 \times 8 = 80$, $4 \times 30 = 120$, and $4 \times 8 = 32$. Then we can add the products: $300 + 80 + 120 + 32 = 532$. There are 532 records in the collection. Try this one yourself: **You find 23 boxes of records in the garage. Each box contains 35 records. How many records do you have in all?**



MULTIPLYING UP TO 4 DIGITS (AREA MODEL) VOCABULARY

Multiply

Add equal groups.

Digit

One of the symbols from 0 to 9.

Repeated Addition

Adding equal groups together.

Area

The number of square units needed to cover a surface.

Area Model

A diagram in which the length and width of a rectangle represents factors and the area represents the product.

Rectangle

A plane figure with 4 straight sides and 4 right angles.

MULTIPLYING UP TO 4 DIGITS (AREA MODEL) DISCUSSION QUESTIONS

How could you multiply 9×35 using an area model?

I could draw a rectangle and divide it into two sections. At the top I write 30 and 5. At the left side I write 9. Then I multiply 9×30 , which is 270, and multiply 9×5 , which is 45. Then I add the partial products: $270 + 45 = 315$. $9 \times 35 = 315$.

How do the numbers at the top of an area model relate to place value?

The number 35 is 3 tens and 5 ones. The left box is tens, so I write 30, and the right box is ones, so I write 5.

How would the rectangle change if the problem is $9 \times 4,735$? How does the change relate to place value?

I would need 2 more boxes, one for the hundreds place and one for the thousands place. Then I would label them 4,000 and 700. Then I can multiply $9 \times 4,000$, which is 36,000, and 9×700 , which is 6,300. Then I add all four partial products: $36,000 + 6,300 + 270 + 45 = 42,615$. $9 \times 4,735 = 42,615$.

How could you multiply 26×81 using an area model?

I could draw a rectangle and divide it into four sections. At the top I would write 80 and 1 above the two sections. At the top left side I would write 20 and the bottom left side I would write 6. Then I multiply in each section: $20 \times 80 = 1,600$, $20 \times 1 = 20$, $6 \times 80 = 480$, and $6 \times 1 = 6$. Then add the parts: $1,600 + 20 + 480 + 6 = 2,106$. So $26 \times 81 = 2,106$.

Erin says that $57 \times 34 = 1,528$. Is she correct? Explain.

No. She multiplied $50 \times 30 = 1,500$ and $7 \times 4 = 28$. She left out two more partial products: $50 \times 4 = 200$ and $7 \times 30 = 210$. The product is 1,938.
