

Dear parent or guardian: This is a summary of the key ideas your child is learning in mathematics. You can use this summary as background as you support your child's work.

1 Multiplying Three-Digit Numbers by One-Digit Numbers

When Should I Multiply?

Multiplication situations can appear to be very different even though they are the same mathematically. It is important to know when a problem can be solved using multiplication.

For example, the problems below can be solved using multiplication.

- You can calculate the total of two or more equal-sized groups.
There are 3 boxes with 125 books in each. How many books are there altogether?



- You can calculate the result of a comparison when one item is so many times another in size.

Kalia is buying a used tablet for \$115. A new tablet costs 4 times as much. How much does a new tablet cost?



Multiplication Strategies — Conventional Algorithms

There are many ways to multiply using conventional, or standard, algorithms.

- One way involves decomposing, or breaking up the greater factor into place-value parts, multiplying each part, and then adding the parts together. This is often called the partial-products algorithm.

For example, to calculate 3×249 (the total of 3 groups of 249):

$$249 = 200 + 40 + 9$$

So, 3 groups of 249 = 3 groups of 200 + 3 groups of 40 + 3 groups of 9.

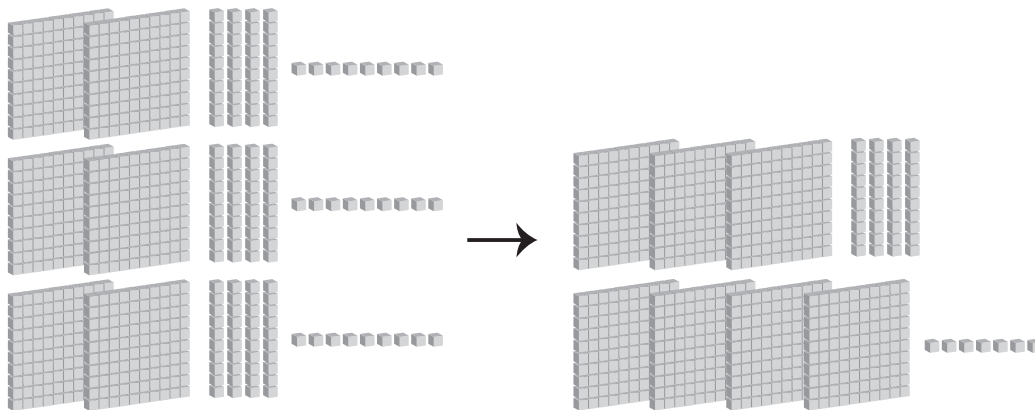
$$\text{So, } 3 \times 249 = 3 \times 200 + 3 \times 40 + 3 \times 9.$$

The base ten block model below shows 3×249 as 3 groups of 249.

You can also see 3 groups of 200 + 3 groups of 40 + 3 groups of 9.

The total is 6 hundreds blocks (600) + 12 tens blocks (120) + 27 ones blocks (27).

After combining and regrouping the blocks, you have the product: 747.



Here are some ways to record this.

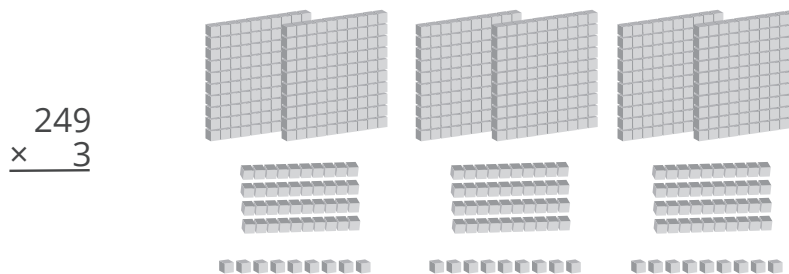
$$\begin{array}{r} 249 \\ \times 3 \\ \hline 600 \\ 120 \\ + 27 \\ \hline 747 \end{array} \quad \begin{array}{l} (3 \text{ groups of } 200) \\ (3 \text{ groups of } 40) \\ (3 \text{ groups of } 9) \end{array}$$

$$\begin{array}{r} 249 \\ \times 3 \\ \hline 27 \\ 120 \\ + 600 \\ \hline 747 \end{array} \quad \begin{array}{l} (3 \text{ groups of } 9) \\ (3 \text{ groups of } 40) \\ (3 \text{ groups of } 200) \end{array}$$

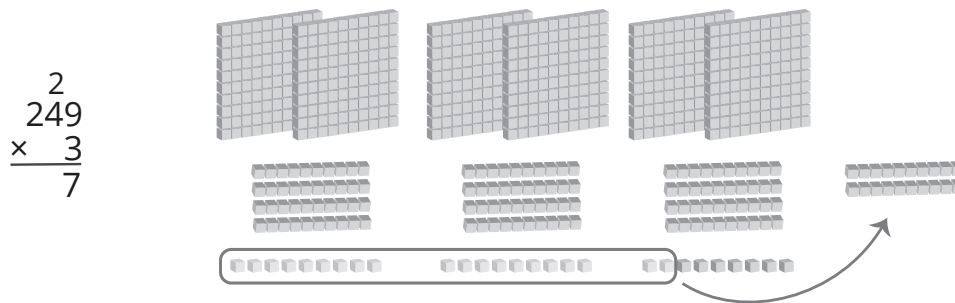
Multiplication Strategies — Conventional Algorithms
(continued)

- Here is another conventional algorithm for multiplication. It also involves multiplying in place-value parts. Starting with the ones, you multiply each part and regroup as you go, rather than at the end.

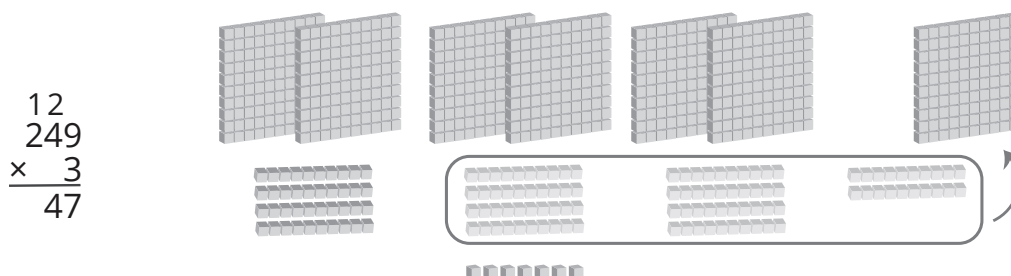
For example, to calculate 3×249 (the total of 3 groups of 249), model 3×249 as 3 groups of 249.



Multiply the ones: 3×9 ones = 27 ones.
Regroup 20 ones as 2 tens: 27 ones = 2 tens 7 ones.
Record 7 in the ones place of the product and 2 above the tens place.



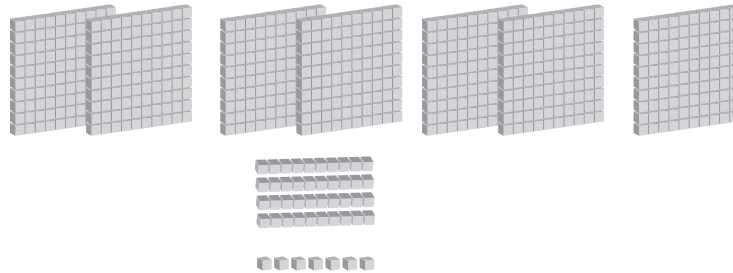
Multiply the tens: 3×4 tens = 12 tens.
Add the extra 2 tens: 12 tens + 2 tens = 14 tens.
Regroup 10 tens for 1 hundred: 14 tens = 1 hundred, 4 tens.
Record 4 in the tens place of the product and 1 above the hundreds place:



Multiplication Strategies — Conventional Algorithms
(continued)

Multiply the hundreds: 3×2 hundreds = 6 hundreds.
 Add the extra 1 hundred: 6 hundreds + 1 hundred = 7 hundreds.
 Record 7 in the hundreds place of the product:

$$\begin{array}{r} 12 \\ 249 \\ \times 3 \\ \hline 747 \end{array}$$



Estimating to Check Products

It is always a good idea to estimate to check a product.

- You usually use factors that can be multiplied mentally.
- It can be helpful to know if your estimate is high or low.

Here are some ways to estimate 3×249 .

- It can help to think of 3×249 as 3 groups of 249 to understand why some estimates are high or low.

3×249 is about $3 \times 200 = 600$.

Notice that 600 is a very low estimate. That's because each of the 3 groups is a lot smaller than the factor 249.

A product of 747 seems reasonable, knowing that 600 is a very low estimate.

3×249 is about $3 \times 250 = 750$.

Notice that 750 is a close but high estimate. That's because each of the 3 groups is a little bit bigger than the factor 249.

A product of 747 seems reasonable, knowing that 750 is a very close but high estimate.

Estimating to Check Products (continued)

- You can also estimate using a range.

3×249 is about halfway between $3 \times 200 = 600$ and $3 \times 300 = 900$.

The halfway point between 600 and 900 is 750.

So, 3×249 is about 750.

A product of 747 seems reasonable.

Notes

Multiplication sentences are usually described the following ways for consistency, although, mathematically, both 2×216 and 216×2 are correct.

- For equal-group situations:

2 groups of 216 would be written as 2×216 .

- For comparison situations:

2 times as many as 216 would be written as 2×216 .

Definitions

algorithm: a multistep process for performing a calculation

decomposition: the process of separating a number into parts; for example, $123 = 100 + 20 + 3$ or $50 = 2 \times 25$

factor: one of the numbers you multiply in a multiplication sentence; for example, in $2 \times 5 = 10$, 2 and 5 are factors

product: the result of multiplying; for example, in $3 \times 4 = 12$, 12 is the product

regroup: to represent a number in a different way without changing its value; for example, 3000 can be modelled as 3 thousands, which can be regrouped as 30 hundreds; 4 tens 5 ones can be regrouped as 3 tens 15 ones