Everyday Mathematics

Partial-Products Multiplication Algorithm (Focus Algorithm)

Partial-Products Multiplication Algorithm

Partial-products multiplication involves:

- Using the distributive property of multiplication,
- Thinking of the place value of digits in the numbers,
- Using place value to rename numbers in expanded notation,
- Generating partial products by multiplying parts of numbers together, and
- Adding the partial products together to get a total.

Partial-Products Multiplication Algorithm

We will solve 66×49.

Begin by thinking of the expanded notation for the numbers being multiplied:

$$66 = 60 + 6$$
$$49 = 40 + 9$$

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With the partial products, you can start from the right or the left. Starting on the left can help students stay on track and find a quick estimate.

Partial-Products Multiplication Algorithm

66×49

Figure out what parts of the numbers need to be multiplied together.

Some people think of a bow tie.

Order does not matter.

Remember: $66 = 60 + 6$
$49 = 40 + 9$

	60	6
40		
9		

Partial-Products Multiplication Algorithm

66×49

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60 6

40 9

60×40

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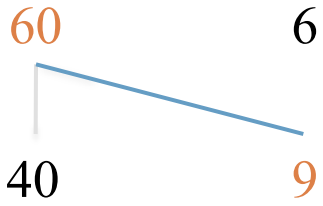

60×40 60×9

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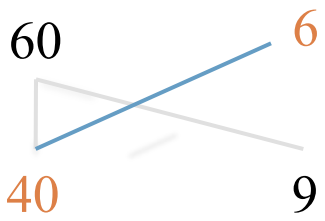

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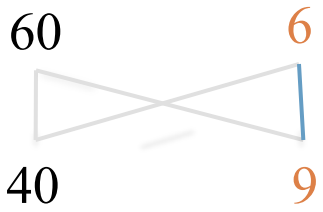

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60×40 60×9

Notice that order does not matter.

40×6 6×9

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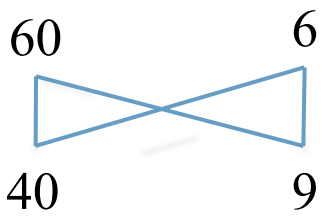


60×40 60×9

40×6 6×9

Partial-Products Multiplication Algorithm

With the partial products, you can start from the right or the left. Starting on the left can help students stay on track and find a quick estimate.

$$\begin{array}{r} 66 \\ \times\ 49 \\ \hline \end{array}$$

Remember:

$66 = 60 + 6$
$49 = 40 + 9$

Multiply each addend from the expanded form of one number by each addend of the other number.

Partial-Products Multiplication Algorithm

$$\begin{array}{r} 66 \\ \times\ 49 \\ \hline \end{array}$$

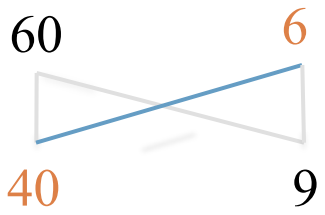
Remember:

66 = 60 + 6
49 = 40 + 9

Multiply 60 × 40

2400

Partial-Products Multiplication Algorithm



Multiply 60 × 40

Multiply 40 × 6

$$\begin{array}{r} 66 \\ \times\ 49 \\ \hline 2400 \\ 240 \end{array}$$

Remember:

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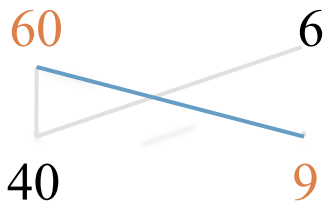
Partial-Products Multiplication Algorithm



Multiply 60 × 40

Multiply 40 × 6

Multiply 9 × 60

$$\begin{array}{r} 66 \\ \times\ 49 \\ \hline 2400 \\ 240 \\ 540 \end{array}$$

Remember:

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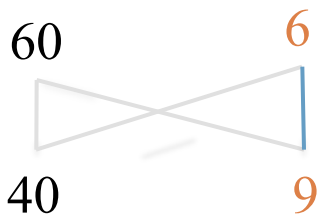
49 = 40 + 9

Partial-Products Multiplication Algorithm



Multiply 60 × 40

Multiply 40 × 6

Multiply 9 × 60

Multiply 9 × 6

$$\begin{array}{r} 66 \\ \times\ 49 \\ \hline \end{array}$$

2400

240

540

54

Remember:

66 = 60 + 6
49 = 40 + 9

Partial-Products Multiplication Algorithm

Add the partial products together to find the answer.

$$
\begin{array}{r}
66 \\
\times\ 49 \\
\hline
2400 \\
240 \\
540 \\
+\quad 54 \\
\hline
3{,}234
\end{array}
$$

Everyday Mathematics

Partial-Products Multiplication Algorithm

$66 \times 49 = 3{,}234$

Note that when children use the partial-products multiplication algorithm to solve a multiplication problem, they have the opportunity to practice skills related to developing number sense and algebraic reasoning.

These skills include:

- *Writing numbers in expanded notation*
- *Identifying the place value of digits*
- *Adding to find the answer*

If children work from left to right (which is generally their inclination), they begin the problem-solving process with a reasonable estimate of what the final answer should be.