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.

Everyday Mathematics

Partial-Products Multiplication Algorithm

We will solve 58 × 37.

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

$$58 = 50 + 8$$
$$37 = 30 + 7$$

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.

Everyday Mathematics

Partial-Products Multiplication Algorithm

58 × 37

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

Some people think of a bow tie.

Order does not matter.

Remember: 58 = 50 + 8
             37 = 30 + 7

50	8
30	7

Partial-Products Multiplication Algorithm

58 × 37

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

Some people think of a bow tie.

Notice that order does not matter.

Remember: 58 = 50 + 8
            37 = 30 + 7

50   8

30   7
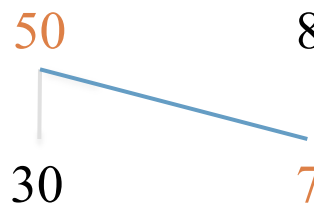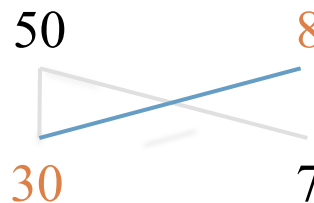
50 × 30

Partial-Products Multiplication Algorithm

58×37

Remember: $58 = 50 + 8$
$37 = 30 + 7$

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

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Notice that order does not matter.

50   8

30   7

50×30 50×7
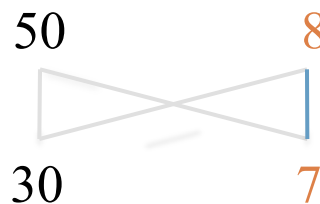
Partial-Products Multiplication Algorithm

58×37

Remember: $58 = 50 + 8$
$37 = 30 + 7$

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

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50   8

30   7

50×30 50×7

30×8

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Partial-Products Multiplication Algorithm

58 × 37

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

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Remember: 58 = 50 + 8
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50   8
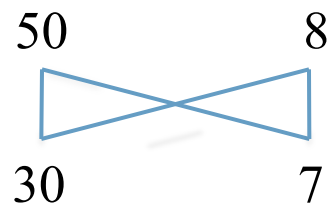
30   7

50 × 30   50 × 7

30 × 8   8 × 7

Partial-Products Multiplication Algorithm

58 × 37

Remember: 58 = 50 + 8
37 = 30 + 7

Notice that order does not matter.

50   8

30   7

50 × 30   50 × 7

30 × 8   8 × 7

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.

Multiply each factor in one number by each factor in the other number.
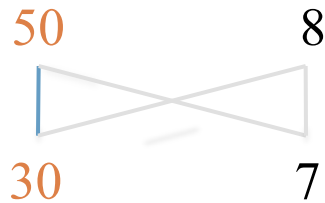
$$58$$
$$\times\ 37$$

Remember:

58 = 50 + 8
37 = 30 + 7

Partial-Products Multiplication Algorithm

Remember:

58 = 50 + 8
37 = 30 + 7

50   8

30   7

58

× 37

1500

Multiply 30 × 50.

Partial-Products Multiplication Algorithm

Remember:

58 = 50 + 8
37 = 30 + 7

50   8

30   7

$$58$$
$$\times\ 37$$

Multiply 30 × 50.   1500

Multiply 30 × 8.   240

Partial-Products Multiplication Algorithm

Remember:

58 = 50 + 8
37 = 30 + 7

50   8

30   7

$$\begin{array}{r} 58 \\ \times\ 37 \\ \hline 1500 \\ 240 \\ 350 \end{array}$$
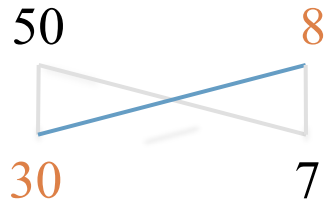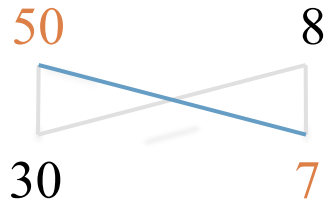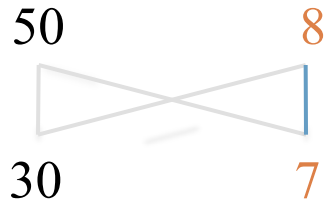
Multiply 30 × 50.

Multiply 30 × 8.

Multiply 7 × 50.

Partial-Products Multiplication Algorithm

Remember:

58 = 50 + 8
37 = 30 + 7

50   8

30   7

$$\begin{array}{r} 58 \\ \times\ 37 \\ \hline 1500 \\ 240 \\ 350 \\ 56 \end{array}$$

Multiply 30 × 50.   1500

Multiply 30 × 8.   240

Multiply 7 × 50.   350

Multiply 7 × 8.   56

Partial-Products Multiplication Algorithm

Add the partial
sums together
to find the answer.

$$
\begin{array}{r}
58 \\
\times\ 37 \\
\hline
1500 \\
240 \\
350 \\
+\quad 56 \\
\hline
2{,}146
\end{array}
$$

Partial-Products Multiplication Algorithm

58 × 37 = 2,146

Note that when children use the partial-products algorithm to solve a multiplication problem, they have an 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.

Everyday Mathematics