Everyday Mathematics

Partial-Products Multiplication Algorithm (Focus Algorithm)

Partial-Products Multiplication Algorithm

Partial-products multiplication involves:

- 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 73 × 28.

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

$$73 = 70 + 3$$

$$28 = 20 + 8$$

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

73 × 28

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

Some people think of a bow tie.

Order does not matter.

Remember: 73 = 70 + 3
             28 = 20 + 8

70   3

20   8

Partial-Products Multiplication Algorithm

73×28

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: $73 = 70 + 3$
$28 = 20 + 8$

$$70 \qquad\qquad 3$$
$$|$$
$$20 \qquad\qquad 8$$

$$70 \times 20$$

Everyday Mathematics

Partial-Products Multiplication Algorithm

73 × 28

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: 73 = 70 + 3
              28 = 20 + 8

70   3

20   8

70 × 20   70 × 8

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Partial-Products Multiplication Algorithm
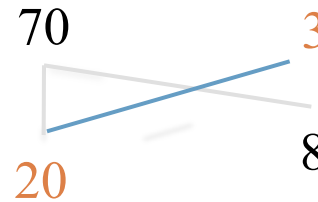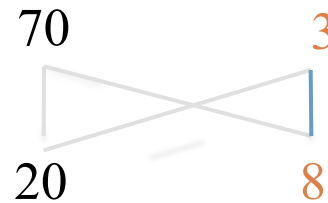
73 × 28

Remember: 73 = 70 + 3
              28 = 20 + 8

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

70   3

20   8

Some people think
of a bow tie.

70 × 20   70 × 8

Notice that order does not
matter.

20 × 3

Partial-Products Multiplication Algorithm

73 × 28

Remember: 73 = 70 + 3
28 = 20 + 8

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.

70   3

20   8

70 × 20   70 × 8

20 × 3   8 × 3

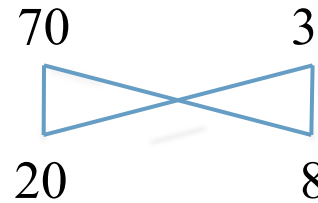*Everyday Mathematics*

Partial-Products Multiplication Algorithm

73×28

Remember: $73 = 70 + 3$
                      $28 = 20 + 8$

Notice that order does not matter.

70   3

20   8

70 × 20   70 × 8

20 × 3   3 × 8

Everyday Mathematics

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.

$$73$$
$$\times\ 28$$
—————
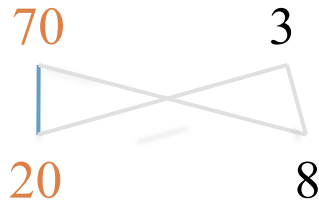
Remember:

$73 = 70 + 3$
$28 = 20 + 8$

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

Everyday Mathematics

Partial-Products Multiplication Algorithm

70   3

20   8

Multiply 70 × 20.

$$\begin{array}{r} 73 \\ \times\ 28 \\ \hline 1400 \end{array}$$

Remember:

73 = 70 + 3
28 = 20 + 8

Everyday Mathematics

Partial-Products Multiplication Algorithm

70   3

20   8

Multiply 70 × 20.

Multiply 70 × 8.

73

× 28
_____
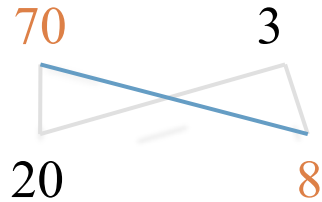
1400

560

Remember:

73 = 70 + 3
28 = 20 + 8

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Partial-Products Multiplication Algorithm

Remember:

73 = 70 + 3

28 = 20 + 8

70   3

20   8

73

× 28

_____

1400

560

60
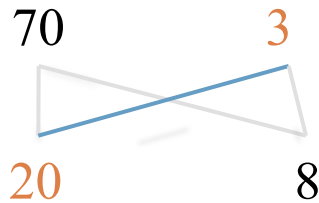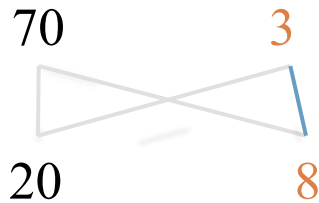
Multiply 70 × 20.

Multiply 70 × 8.

Multiply 20 × 3.

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Partial-Products Multiplication Algorithm

Remember:

$73 = 70 + 3$
$28 = 20 + 8$

70   3

20   8

73

× 28
_____

Multiply 70 × 20.   1400

Multiply 70 × 8.   560

Multiply 20 × 3.   60

Multiply 8 × 3.   24

Everyday Mathematics

Partial-Products Multiplication Algorithm

Add the partial
products together
to find the answer.

$$
\begin{array}{r}
73 \\
\times\ 28 \\
\hline
1400 \\
560 \\
60 \\
+\quad 24 \\
\hline
2{,}044
\end{array}
$$

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Partial-Products Multiplication Algorithm

$73 \times 28 = 2{,}044$

Note that when children use the partial-products multiplication 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.

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