Unit 6, Lesson 9

Recording Partial Products: One-Digit and Three- or Four-Digit Factors

Let's analyze and try an algorithm that uses partial products.

Warm-up

Which Three Go Together: Expressions Galore

Which 3 go together?

A

7×50

B

$(3 \times 50) + (4 \times 50)$

C

$(5 \times 10) \times 7$

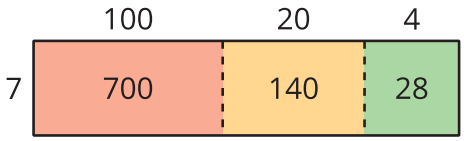
D

$50 + 50 + 50 + 50 + 50 + 50 + 50$

Activity 1

An Algorithm for Noah

1. Noah draws a diagram and writes expressions to multiply 2 numbers.



700 + 140 + 28 = 868

7×124
$7 \times (100 + 20 + 4)$
$(7 \times 100) + (7 \times 20) + (7 \times 4)$
$700 + 140 + 28$

How does each expression represent Noah's diagram?

2. Noah learns another way to record the multiplication.

Step 1

$$\begin{array}{r} 1\ 2\ 4 \\ \times\quad\ 7 \\ \hline 2\ 8 \end{array}$$

7×4

Step 2

$$\begin{array}{r} 1\ 2\ 4 \\ \times\quad\ 7 \\ \hline 2\ 8 \\ 1\ 4\ 0 \end{array}$$

7×4
7×20

Step 3

$$\begin{array}{r} 1\ 2\ 4 \\ \times\quad\ 7 \\ \hline 2\ 8 \\ 1\ 4\ 0 \\ +\ 7\ 0\ 0 \\ \hline 8\ 6\ 8 \end{array}$$

7×4
7×20
7×100

Make sense of each step of the calculations and record your thoughts.

3. Complete the diagram to find the value of 384×5. Use Noah's recording method to check your work.



$$\begin{array}{r} 3\ 8\ 4 \\ \times \quad\ 5 \\ \hline \end{array}$$

5×4

5×80

5×300

$+$ _____

Activity 2

Try an Algorithm with Partial Products

Noah and Mai want to find the value of $6 \times 2{,}947$. They record their steps in different ways.

Noah

$$
\begin{array}{r}
2,947 \\
\times \quad 6 \\
\hline
42 \\
240 \\
5,400 \\
+ \; 12,000 \\
\hline
\end{array}
$$

Mai

$$
\begin{array}{r}
2,947 \\
\times \quad 6 \\
\hline
12,000 \\
5,400 \\
240 \\
+ \quad 42 \\
\hline
\end{array}
$$

1. How are these notations alike? How are they different?

2. Use a diagram to show what each of the partial products 42, 240, 5,400 and 12,000 represent. Then find the value of $6 \times 2{,}947$.

3. Find the value of each expression. Use the algorithm that Noah used for at least one expression. Show your thinking using diagrams, symbols, or other representations.

   a. $4 \times 5{,}342$

   b. 7×983