



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

$$7 \times 50$$

B

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

C

$$(5 \times 10) \times 7$$

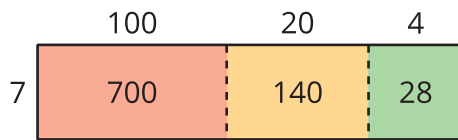
D

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

Activity 1

An Algorithm for Noah

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



$$700 + 140 + 28 = 868$$

$$7 \times 124$$

$$7 \times (100 + 20 + 4)$$

$$(7 \times 100) + (7 \times 20) + (7 \times 4)$$

$$700 + 140 + 28$$

How does each expression represent Noah's diagram?

2. Noah learns another way to record the multiplication.

Step 1

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

Step 2

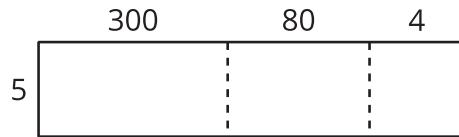
$$\begin{array}{r} \times \quad 1 \ 2 \ 4 \\ \hline \quad \quad 2 \ 8 \\ 1 \ 4 \ 0 \end{array} \quad \begin{array}{l} 7 \times 4 \\ 7 \times 20 \end{array}$$

Step 3

$$\begin{array}{r} \times \quad 1 \ 2 \ 4 \\ \hline \quad \quad 2 \ 8 \\ + \quad 1 \ 4 \ 0 \\ \hline 7 \ 0 \ 0 \\ \hline 8 \ 6 \ 8 \end{array} \quad \begin{array}{l} 7 \times 4 \\ 7 \times 20 \\ 7 \times 100 \end{array}$$

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.



$$\begin{array}{r} 384 \\ \times 5 \\ \hline \end{array}$$

$$5 \times 4$$

$$5 \times 80$$

$$5 \times 300$$

$$+ \underline{\hspace{2cm}}$$

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

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

Mai

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

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

