



# 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

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

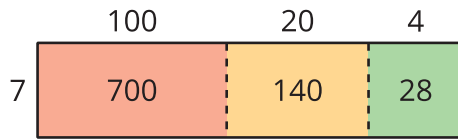
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$$50 + 50 + 50 + 50 + 50 + 50 + 50$$

## 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?

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2. Noah learns another way to record the multiplication.

#### Step 1

$$\begin{array}{r} \times \quad 124 \\ \hline \quad 28 \end{array} \quad 7 \times 4$$

#### Step 2

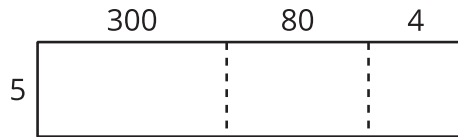
$$\begin{array}{r} \times \quad 124 \\ \hline \quad 28 \\ 140 \end{array} \quad \begin{array}{l} 7 \times 4 \\ 7 \times 20 \end{array}$$

#### Step 3

$$\begin{array}{r} \times \quad 124 \\ \hline \quad 28 \\ 140 \\ + 700 \\ \hline 868 \end{array} \quad \begin{array}{l} 7 \times 4 \\ 7 \times 20 \\ 7 \times 100 \end{array}$$

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

3. Complete the diagram to find the value of  $384 \times 5$ . 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

$$\begin{array}{r} \phantom{0000}2,947 \\ \times \phantom{0000}6 \\ \hline \phantom{0000}42 \\ \phantom{000}240 \\ \phantom{00}5,400 \\ + 12,000 \\ \hline \end{array}$$

**Mai**

$$\begin{array}{r}
 \phantom{000}2,947 \\
 \times \phantom{000}6 \\
 \hline
 12,000 \\
 \phantom{00}5,400 \\
 \phantom{000}240 \\
 + \phantom{0000}42 \\
 \hline
 \end{array}$$

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

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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.  $7 \times 983$

