Understanding the Standard Algorithm  page 1 of 2

Example
Let’s use the standard algorithm first.

```
4 6
x 3 6
```

Now let’s use a labeled area model and the 4 partial products method to check our work. Remember to work from bottom to top, right to left, starting with region A.

```
  D  40
  C
  B  30
  A

A       = ___
B       = ___
C       = ___
D       = ___
Total   = ___
```

1. Can you find the numbers we got by using the sketch and the four partial products method in the standard algorithm? Where are they?

2. What are some things you need to pay attention to when you use the standard multiplication algorithm?
3  Practice on your own. For each problem below:
- Use the standard algorithm to get the answer.
- Then complete the area model for the problem by labeling each region.
- Finally, write out the four partial products and add them to double-check your work with the standard algorithm.

<table>
<thead>
<tr>
<th>Standard Algorithm</th>
<th>Area Model</th>
<th>Four Partial Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td>43 \times 38</td>
</tr>
<tr>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
<td>A (8 \times 3) = _______</td>
</tr>
<tr>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
<td>B (8 \times 40) = _______</td>
</tr>
<tr>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
<td>C (30 \times 3) = _______</td>
</tr>
<tr>
<td><img src="image9.png" alt="Image" /></td>
<td><img src="image10.png" alt="Image" /></td>
<td>D (30 \times 40) = _______</td>
</tr>
<tr>
<td><img src="image11.png" alt="Image" /></td>
<td><img src="image12.png" alt="Image" /></td>
<td>Total = _______</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard Algorithm</th>
<th>Area Model</th>
<th>Four Partial Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image13.png" alt="Image" /></td>
<td><img src="image14.png" alt="Image" /></td>
<td>35 \times 29</td>
</tr>
<tr>
<td><img src="image15.png" alt="Image" /></td>
<td><img src="image16.png" alt="Image" /></td>
<td>A _______ = _______</td>
</tr>
<tr>
<td><img src="image17.png" alt="Image" /></td>
<td><img src="image18.png" alt="Image" /></td>
<td>B _______ = _______</td>
</tr>
<tr>
<td><img src="image19.png" alt="Image" /></td>
<td><img src="image20.png" alt="Image" /></td>
<td>C _______ = _______</td>
</tr>
<tr>
<td><img src="image21.png" alt="Image" /></td>
<td><img src="image22.png" alt="Image" /></td>
<td>D _______ = _______</td>
</tr>
<tr>
<td><img src="image23.png" alt="Image" /></td>
<td><img src="image24.png" alt="Image" /></td>
<td>Total = _______</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standard Algorithm</th>
<th>Area Model</th>
<th>Four Partial Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image25.png" alt="Image" /></td>
<td><img src="image26.png" alt="Image" /></td>
<td>42 \times 37</td>
</tr>
<tr>
<td><img src="image27.png" alt="Image" /></td>
<td><img src="image28.png" alt="Image" /></td>
<td>A _______ = _______</td>
</tr>
<tr>
<td><img src="image29.png" alt="Image" /></td>
<td><img src="image30.png" alt="Image" /></td>
<td>B _______ = _______</td>
</tr>
<tr>
<td><img src="image31.png" alt="Image" /></td>
<td><img src="image32.png" alt="Image" /></td>
<td>C _______ = _______</td>
</tr>
<tr>
<td><img src="image33.png" alt="Image" /></td>
<td><img src="image34.png" alt="Image" /></td>
<td>D _______ = _______</td>
</tr>
<tr>
<td><img src="image35.png" alt="Image" /></td>
<td><img src="image36.png" alt="Image" /></td>
<td>Total = _______</td>
</tr>
</tbody>
</table>
Al’s Practice Sheet

1. For each problem below:
   - Use the standard algorithm to get the answer.
   - Then complete the area model for the problem by labeling each region.
   - Finally, write out the four partial products and add them to double-check your work with the standard algorithm.

<table>
<thead>
<tr>
<th>Standard Algorithm</th>
<th>Area Model</th>
<th>Four Partial Products</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Standard Algorithm" /></td>
<td><img src="image2" alt="Area Model" /></td>
<td><img src="image3" alt="Four Partial Products" /></td>
</tr>
</tbody>
</table>

\[
39 \times 39
\]

A = _____
B = _____
C = _____
D = _____
Total = _____

\[
28 \times 28
\]

A = _____
B = _____
C = _____
D = _____
Total = _____

2. Al is using the standard multiplication algorithm, but he hasn’t filled in all the numbers. Help him complete each problem by filling in the gray boxes correctly.

<table>
<thead>
<tr>
<th>2</th>
<th>3.4</th>
<th>\times</th>
<th>2.6</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>204</td>
<td>+</td>
<td>80</td>
</tr>
<tr>
<td>8</td>
<td>480</td>
<td>+</td>
<td>120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 \times</th>
<th>9</th>
<th>\times</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>15</td>
<td>+</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>342</td>
<td>+</td>
<td>120</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 \times</th>
<th>5</th>
<th>\times</th>
<th>27</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>52</td>
<td>+</td>
<td>90</td>
</tr>
<tr>
<td></td>
<td>151</td>
<td>+</td>
<td>120</td>
</tr>
</tbody>
</table>
## Fill in the Boxes

For each problem below, fill in the boxes using the standard multiplication algorithm. Then double-check your work by listing and adding the partial products.

### a

\[
\begin{array}{c}
4 \\
56 \\
\times 2 \\
\hline
392 \\
\hline
+ 110 \\
\hline
1512 \\
\end{array}
\]

List and add the four partial products for problem a to double-check your work.

\[
\begin{array}{c}
\_ \times \_ = \_ \\
\_ \times \_ = \_ \\
\_ \times \_ = \_ \\
\_ \times \_ = \_ \\
\text{Total} = \_
\end{array}
\]

### b

\[
\begin{array}{c}
308 \\
\times 7 \\
\hline
256 \\
\hline
\end{array}
\]

List and add the three partial products for problem b to double-check your work.

\[
\begin{array}{c}
7 \times 8 = \_ \\
7 \times 0 = \_ \\
7 \times 300 = \_ \\
\text{Total} = \_
\end{array}
\]

### c

\[
\begin{array}{c}
445 \\
\times 34 \\
\hline
80 \\
\hline
+ 135 \\
\hline
130 \\
\end{array}
\]

List and add all six partial products for problem c to double-check your work.

\[
\begin{array}{c}
4 \times 5 = \_ \\
4 \times 40 = \_ \\
4 \times 400 = \_ \\
30 \times 5 = \_ \\
30 \times 40 = \_ \\
30 \times 400 = \_ \\
\text{Total} = \_
\end{array}
\]
1 For each problem below:

- Use the standard algorithm to solve the problem or fill in the boxes that have been left blank.
- List and add the partial products to double-check your answer.

**Note** If you want, you can use the partial product method first, and then use the standard algorithm to solve the problem again.

### Problem 1

\[ \begin{array}{c}
37 \\
\times 86
\end{array} \]

\[
\begin{array}{c}
6 \times 7 = \\
6 \times 30 = \\
80 \times 7 = \\
80 \times 30 = \\
\text{Total} =
\end{array}
\]

### Problem 2

\[ \begin{array}{c}
54 \\
\times 25
\end{array} \]

\[
\begin{array}{c}
\_ \_ \_ = \\
\_ \_ \_ = \\
\_ \_ \_ = \\
\text{Total} =
\end{array}
\]
Solving Problems with the Standard Algorithm  page 1 of 2

\[ \begin{array}{c}
402 \\
\times 63 \\
\hline \\
1206 \\
+ 24120 \\
\hline \\
25320 \\
\end{array} \]

\[ \begin{array}{c}
3 \times 2 = 6 \\
3 \times 0 = 0 \\
3 \times 400 = 1200 \\
60 \times 2 = 120 \\
60 \times 0 = 0 \\
60 \times 400 = 24000 \\
\hline \\
\text{Total} = 25320 \\
\end{array} \]

\[ \begin{array}{c}
306 \\
\times 48 \\
\hline \\
248 \\
+ 240 \\
\hline \\
14688 \\
\end{array} \]

\[ \begin{array}{c}
6 \frac{5}{9} \\
99 \\
\times 76 \\
\hline \\
94 \\
+ 630 \\
\hline \\
7524 \\
\end{array} \]

2 \textbf{Challenger} Choose one combination from problem 1 that you could solve more efficiently with a strategy other than the standard algorithm or listing and adding the partial products. How would you solve it? Show your work on a separate sheet.
Alex & the Algorithm

1. Alex is practicing solving problems using the standard algorithm for multiplication. He knows the first step, but then he gets stuck. Finish these problems Alex started.

\[
\begin{array}{c}
5 \\
28 \\
\times 67 \\
6 \\
\end{array} \quad \begin{array}{c}
2 \\
93 \\
\times 87 \\
1 \\
\end{array} \quad \begin{array}{c}
4 \\
56 \\
\times 48 \\
\end{array}
\]

2. When using the algorithm, Alex doesn’t understand why he needs to write a zero in the ones place of the second partial product.
   a. Explain to Alex why he needs to do this.
   b. What would happen if Alex did not place a zero there?

\[
\begin{array}{c}
\frac{1}{4} \\
37 \\
\times 26 \\
222 \\
+ 740 \\
962
\end{array}
\]

3. Fill in the boxes to complete the problems.

\[
\begin{array}{c}
1 \underline{\ 2 \ 3} \\
\times \underline{\ 5 \ 6} \\
\underline{\ 7 \underline{\ 3} \ 8} \\
\underline{\ + \ 0,150} \\
\underline{\underline{\ 0,78\delta}}
\end{array} \quad \begin{array}{c}
1 \underline{\ 7 \ 8 \ 9} \\
\times \underline{\ 1 \ 2} \\
\underline{1,5 \ 7 \ 8} \\
\underline{+ 7,8 \ 9 \ 0} \\
\underline{9,4 \ 6 \ 8}
\end{array}
\]
25 × 64

Use each of the strategies below to solve 25 × 64.

1. **Area Model & Four Partial Products**

   - **A** = __________ = ________
   - **B** = __________ = ________
   - **C** = __________ = ________
   - **D** = __________ = ________
   - **Total** = ________

2. **Doubling & Halving**

   \[ 25 \times 64 = \underline{\quad} \times \underline{\quad} = \underline{\quad} \times \underline{\quad} = \underline{\quad} \]

3. **Ratio Table**

   | 64 | 1 |
   ---|---|---|
   ---|---|---|

4. **Using Quarters**

   a. \[ 64 \times \frac{1}{4} = \underline{\quad} \]
   b. \[ 64 \times 0.25 = \underline{\quad} \]
   c. How can you use these results to find 25 × 64?

5. **The Standard Multiplication Algorithm**

   a. Solve the problem.

   b. Which strategy do you think is best for this combination? Why?
**Story Problems** page 1 of 3

Solve each problem. Use the standard multiplication algorithm for two problems and any strategy you choose for the rest. Show your work. Explain your choice of strategy.

1. Connor is trying to drive his car less frequently. He started by figuring out how much he drives in a typical year. If Connor drives about 98 miles each week, how much does he drive in one year (52 weeks)?

   Solve the problem:

   What strategy did you use? Why?

2. Taylor has a cupcake business. She packages cupcakes in cartons that hold 25 cupcakes. The Wildwood School ordered 184 cartons of Taylor’s cupcakes. How many cupcakes did the Wildwood School order?

   Solve the problem:

   What strategy did you use? Why?

(continued on next page)
Story Problems page 2 of 3

3 Victoria signed up for a two-year cell phone plan. She will pay $37.50 a month for 24 months. How much will Victoria have paid at the end of her two-year plan?

Solve the problem:

What strategy did you use? Why?

4 Aaron wants to visit Australia. He found a plane ticket for $2,150. If Aaron saves $86 a week, how many weeks will it take him to save enough money to go to Australia?

Solve the problem:

What strategy did you use? Why?

5 Tina’s family drinks about 128 ounces of milk in one week. How many ounces of milk do they drink in 36 weeks?

Solve the problem:

What strategy did you use? Why?
Water Use Facts

Have you ever thought about how much water you use each day? You might be surprised to find out how many gallons it takes to do even the simplest things.

1. If you leave the tap running while you’re brushing your teeth, you use about 80 cups of water. How many gallons is that?

2. If you wash your hands 4 times a day and leave the tap running while you wash, you use about 128 cups of water. How many gallons is that?

3. If you leave the faucet running while you take a 5-minute shower, you use about 400 cups of water. How many gallons is that?

<table>
<thead>
<tr>
<th>Ratio Table</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallons</td>
</tr>
<tr>
<td>Cups</td>
</tr>
</tbody>
</table>