Lesson 11:

Multiply two multi-digit numbers by using the standard algorithm.

CCSS Standard –5.NBT.B.5

FLUENCY (10-min) **Choral Response: Exponential to Standard Form**

When I give the signal, read the number in exponential form..

Exponential Form	Standard Form
10^6	
10^5	
10^4	
10^3	
10^2	
10^1	

Now, half of the room will read the EXPONENTIAL FORM and the other half will say the VALUE in standard form. Ready?

FLUENCY (10-min)

Whiteboard Exchange: Divide by 2, 3, or 4

Write the quotient and the remainder. Show your method.

$264 \div 2 =$ _____

Quotient: ☐

Remainder: ☐

$$
\begin{array}{r}
132 \\
2\overline{)264} \\
-2 \\
\hline
06 \\
-6 \\
\hline
04 \\
-4 \\
\hline
0
\end{array}
$$

FLUENCY (10-min) **Whiteboard Exchange: Divide by 2, 3, or 4**

Write the quotient and the remainder. Show your method.

$368 \div 3 =$ _____

Quotient: ☐

Remainder: ☐

$$
\begin{array}{r}
122 \text{ R2} \\
3\overline{)\,368} \\
-\,3 \\
\hline
06 \\
-\,6 \\
\hline
08 \\
-\,6 \\
\hline
2
\end{array}
$$

FLUENCY (10-min) **Whiteboard Exchange: Divide by 2, 3, or 4**

Write the quotient and the remainder. Show your method.

$162 \div 3 =$ _____

Quotient: ☐

Remainder: ☐

$$
\begin{array}{r}
054 \\
3\overline{)\,162} \\
-\,15\downarrow \\
\hline
12 \\
-\,12 \\
\hline
0
\end{array}
$$

FLUENCY (10-min) **Whiteboard Exchange: Divide by 2, 3, or 4**

Write the quotient and the remainder. Show your method.

$328 \div 4 =$ _____

Quotient: ☐

Remainder: ☐

X 8 2

4) 3 2 8

- 3 2 ↓

0 8

- 8

0

FLUENCY (10-min) **Whiteboard Exchange: Divide by 2, 3, or 4**

Write the quotient and the remainder. Show your method.

$305 \div 4 =$ _____

Quotient: ☐

Remainder: ☐

$$
\begin{array}{r}
\text{X}\,7\,6 \quad \text{R1} \\
4\overline{)\,3\,0\,5} \\
-\,2\,8\downarrow \\
\hline
2\,5 \\
-\,2\,4 \\
\hline
1
\end{array}
$$

LAUNCH (5-min) **Compare partial products with the standard algorithm**

Sample A

$$
\begin{array}{r}
1{,}243 \\
\times \quad 132 \\
\hline
6 \\
80 \\
400 \\
2000 \\
90 \\
1200 \\
6000 \\
30000 \\
300 \\
4000 \\
20000 \\
+\ 100000 \\
\hline
164{,}076
\end{array}
$$

Sample B

$$
\begin{array}{r}
1{,}243 \\
\times \quad 132 \\
\hline
2486 \\
37290 \\
+\ 124300 \\
\hline
164{,}076
\end{array}
$$

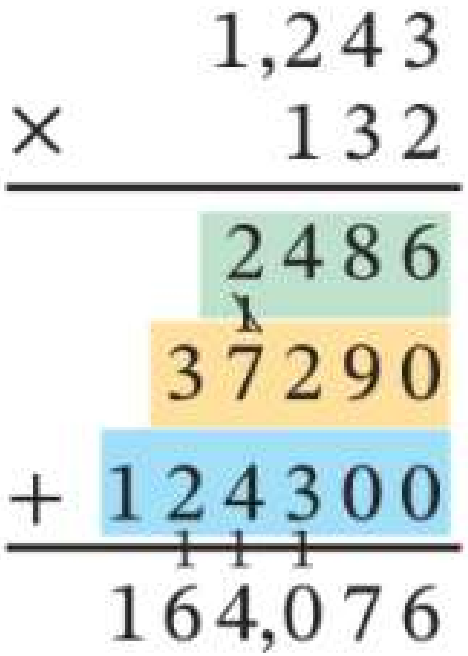
Sample C

	1,000	200	40	3	
2	2,000	400	80	6	2,486
30	30,000	6,000	1,200	90	37,290
100	100,000	20,000	4,000	300	124,300
				+	164,076

In all three methods of multiplication, we see the same three partial products of:

2,486
37,290
124,300

LAUNCH (5-min) **Compare partial products with the standard algorithm**



The standard algorithm is a more efficient method of multiplying especially when you have factors with nonzero digits.

It makes multi-digit multiplication faster.

When might someone not want to use the standard algorithm?

When the factors have zeros and the multiplication can be done mentally.

LEARN (35-min) **Multiply Two Multi-Digit Numbers**

What number is 111 times as much as 2,222?

Before we use the STANDARD ALGORITHM to solve this problem, let's use our ESTIMATION skills to get a reasonable answer.

111 x 2,222

≈

100 x 2,200

220,000

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

LEARN (35-min) **Multiply Two Multi-Digit Numbers**

4,603 x 507

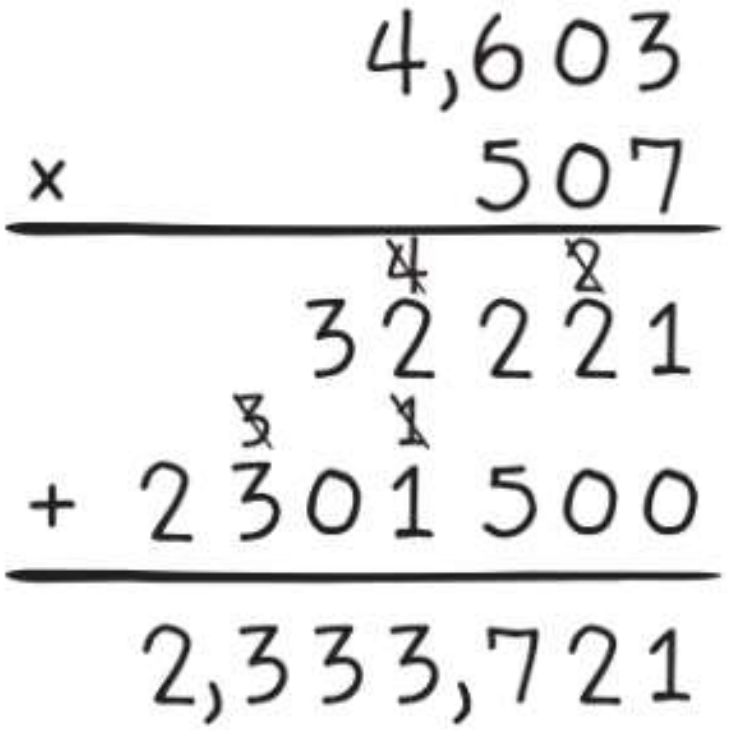
Before we use the STANDARD ALGORITHM to solve this problem, let's use our ESTIMATION skills to get a reasonable answer.

$$4{,}603 \times 507$$

$$\approx$$

$$5{,}000 \times 500$$

$$2{,}500{,}000$$



LEARN (35-min) **Critique a Flawed Response**

A company plans to buy 112 desks that each cost $249.

Julie's estimates and her response is…

$25,000

Toby's tries the standard algorithm, his response is....

$5,478

$$\begin{array}{r} 249 \\ \times\ 112 \\ \hline 498 \\ 2490 \\ +\ 2490 \\ \hline 5,478 \end{array}$$

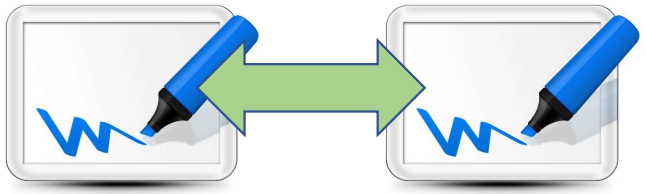
Critique without criticizing.

Who do you agree with?

If an error was made, where was it made?

How can it be corrected?

LEARN (35-min) **Pass the Whiteboard**



Write a **three-digit** by **four-digit** multiplication problem of your board neatly.

Pass your whiteboard to your left.

ESTIMATE the product and write your estimation on the board. (Do not erase the original problem).

Pass the whiteboard your left.

Use the **STANDARD ALGORITHM** to multiply.

Use the estimate to check for **reasonableness.**

LAND (10-min) **Exit Ticket**

11

Multiply.

$768 \times 9{,}307$

Exit Ticket

Small Group Time:
Problem Set Page 93

Homework:
Page 97