Computation Algorithms

Created by: Allan Gehrisch

Adding Whole Numbers and Decimals

Partial-Sum Method

	ones	tenths	hunredths
	4 .	5	6
+	7 .	8	3

Add the ones.	$4 + 7$	1 1 . 0 0
Add the tenths.	$0.5 + 0.8$	1 . 3 0
Add the hundredths	$.06 + .03$	0 . 0 9
Add the partial sums	$11.00 + 1.30 + .09$	**1 2 . 3 9**

Trade First Method

	1s	0.1s	0.01s
	9 .	4	0
--	4 .	8	5

Look at the 0.01s place.

*You cannot remove 5 hundredths from 0 hundredths.

	1s	0.1s	0.01s
		3	10
	9 .	4̶	0̶
--	4 .	8	5

So trade 1 tenth for 10 hundredths.

*Now look at the 0.01s place. You cannot remove 8 tenths from 3 tenths.

	1s	0.1s	0.01s
	8	13	
		3̶	10
	9̶ .	4̶	0̶
--	4 .	8	5
	4 .	5	5

Trade 1 one for 10 tenths.

Now subtract in each column.

9.4 – 4.85 = 4.55

Partial-Difference Method

> Subtract left to right, one column at a time.

> Sometime when you subtract the larger number is on the bottom and the smaller number is on top. When this happens and you subtract, the difference is a negative number.

$$
\begin{array}{r}
8 \quad 4 \quad 6 \\
-- \ 3 \quad 6 \quad 3 \\
\hline
\end{array}
$$

Subtract the 100s.	800 – 300	5	0	0
Subtract the 10s.	40 – 60	- 2		0
Subtract the 1s.	6 – 3			3
Find the total.	500 – 20 + 3	4	8	3

846 - 363 = 483

Partial Product Algorithm

An algorithm is just a fancy term that means a step-by-step way for solving math problems.

Reminder: A product is the answer to a multiplication problem.

Time to take a look.

```
    2 8        is the same as   2 8
  X     4                        2 8
                                 2 8
                               + 2 8
```

Notice that when 28 is added 4 times each place value is added 4 times.

				Tens place value	ones place value
2	8				
2	8	=			
2	8			20	8
+ 2	8		and	20	8
				20	8
				+ 20	+ 8
				8 0	32

Now add the sums

80

+ 32

112
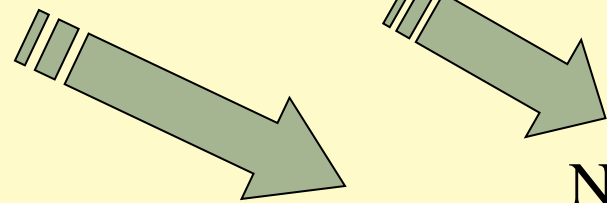
Now let's take what we know and apply it to the partial product algorithm.

The problem

5 7

X   6
—————
3 4 2

Step 1: Multiply 6 by 50

6 x 50 = 300

Step 2: Multiply 6 by 7

6 x 7 = 42

Step 3: Make the place value are lined up and add

```
 3 0 0
+  4 2
———————
 3 4 2
```

Lattice Multiplication

Lattice multiplication is a method that has been used for hundreds of years and may help your child multiply large numbers.
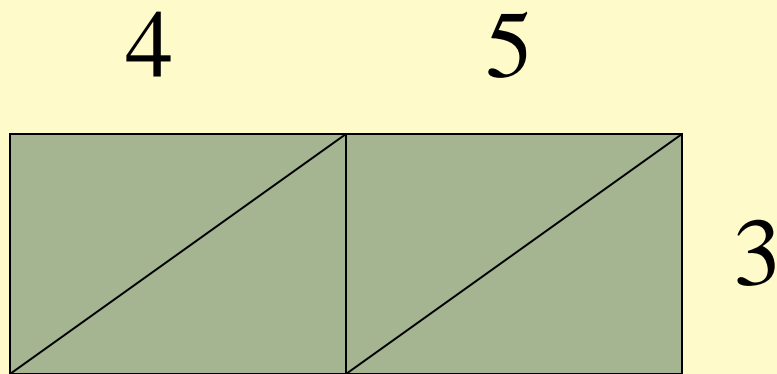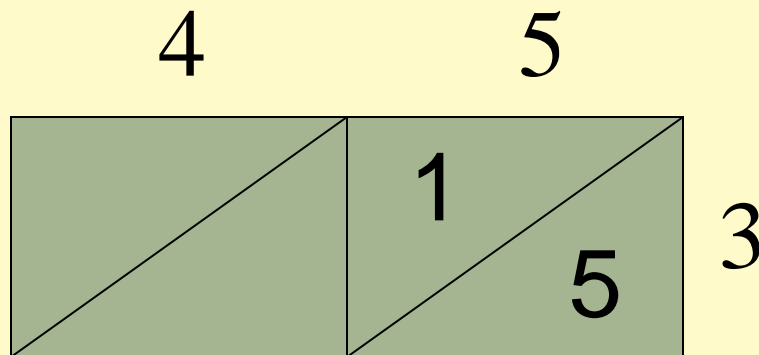
How does it work?
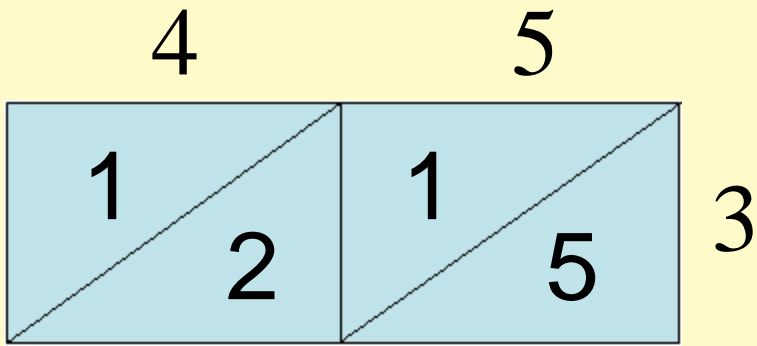
Step1: set up the lattice box.
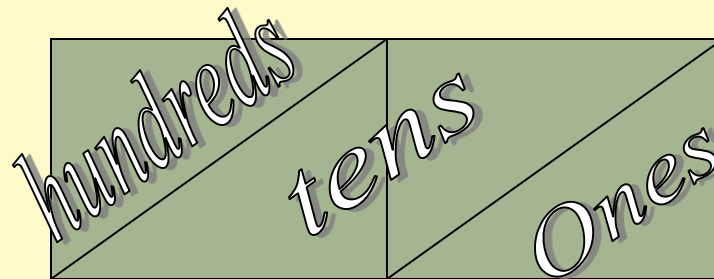
hundreds   tens   Ones

The problem: 45 x 3 = **?**
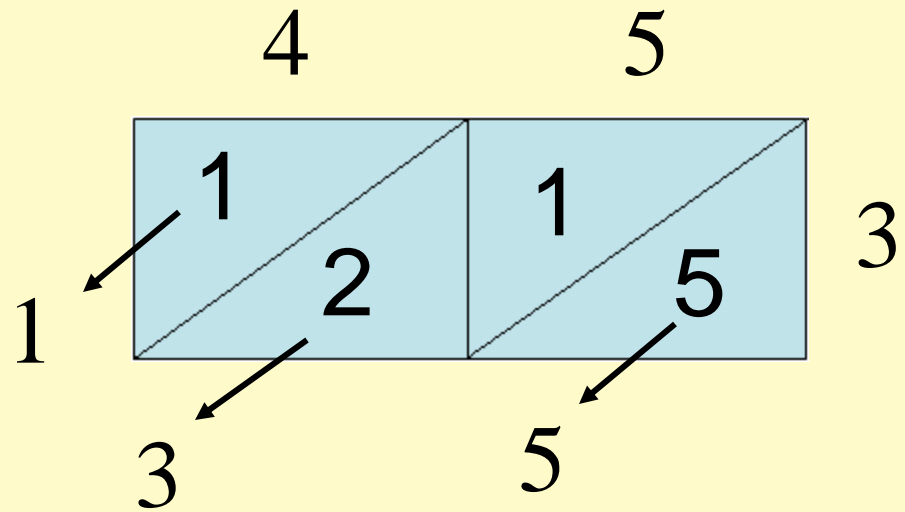
4   5

3

4   5

1

5   3

Step 4: Multiply 3 x 4 (which is really 40). Write the answer in as shown.

4   5

1   1   3
   2   5

Step 5: Add each place in the direction of the arrows.

4   5

1   1   3
   2   5

1

3   5

Number model: 45 x 3 = 135

Multiplying Larger Numbers

Partial Product Algorithm

$$
\begin{array}{r}
3\ 2 \\
\times\ 2\ 6 \\
\hline
\end{array}
\qquad
\begin{array}{r}
30\ +\ 2 \\
20\ +\ 6 \\
\hline
\end{array}
$$

20 x 30 =	6 0 0
20 x 2 =	4 0
6 x 30 =	1 8 0
6 x 2 =	+ 1 2
	8 3 2

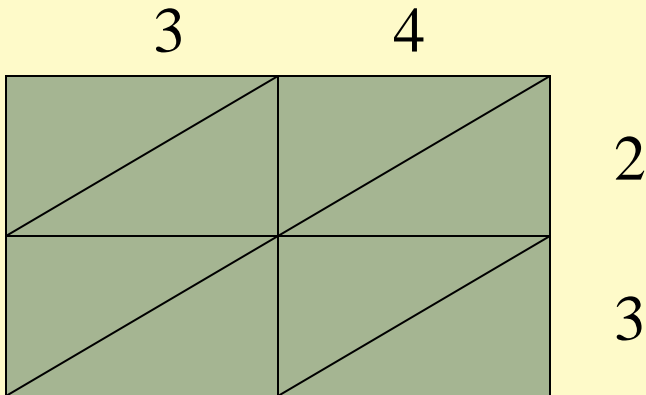Number model: 32 x 26 = 832

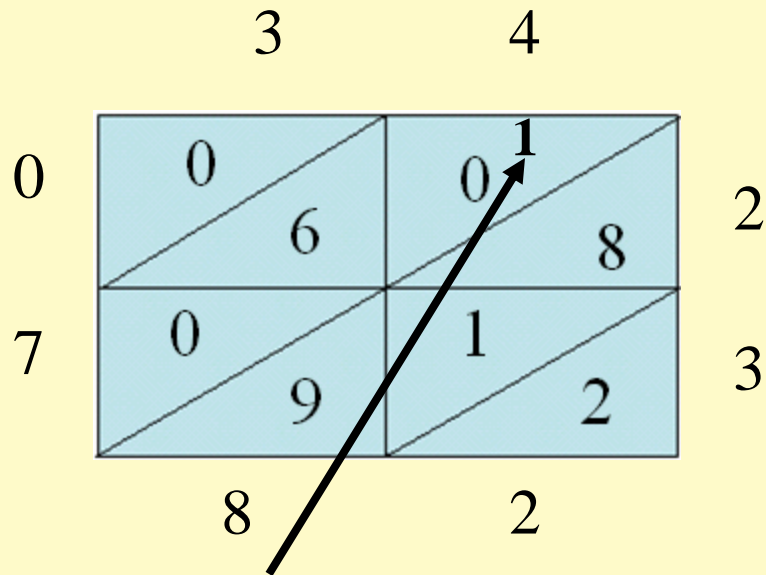# Lattice Multiplication

The problem: 3 4

                x 2 3

Step 2: Multiply each place value.

Step 1: Make the lattice box then add 34 and 23
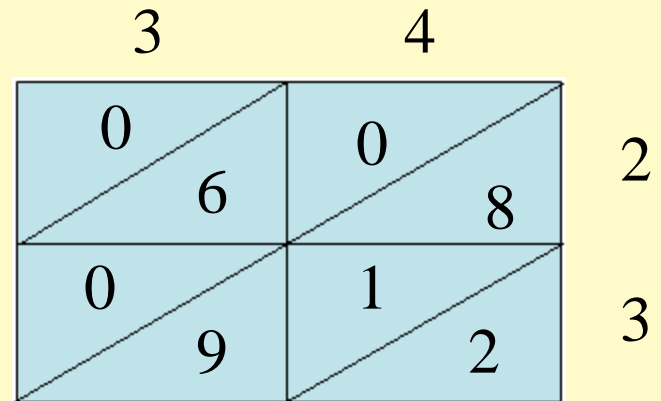
Step 3: Add

Carry the one to the next place value

Number model: 34 x 23 = 782