MATH Expressions Common Core

BUILDING A New Standard OF Success

- EMH Educational Services

Math Models

with Math Expressions

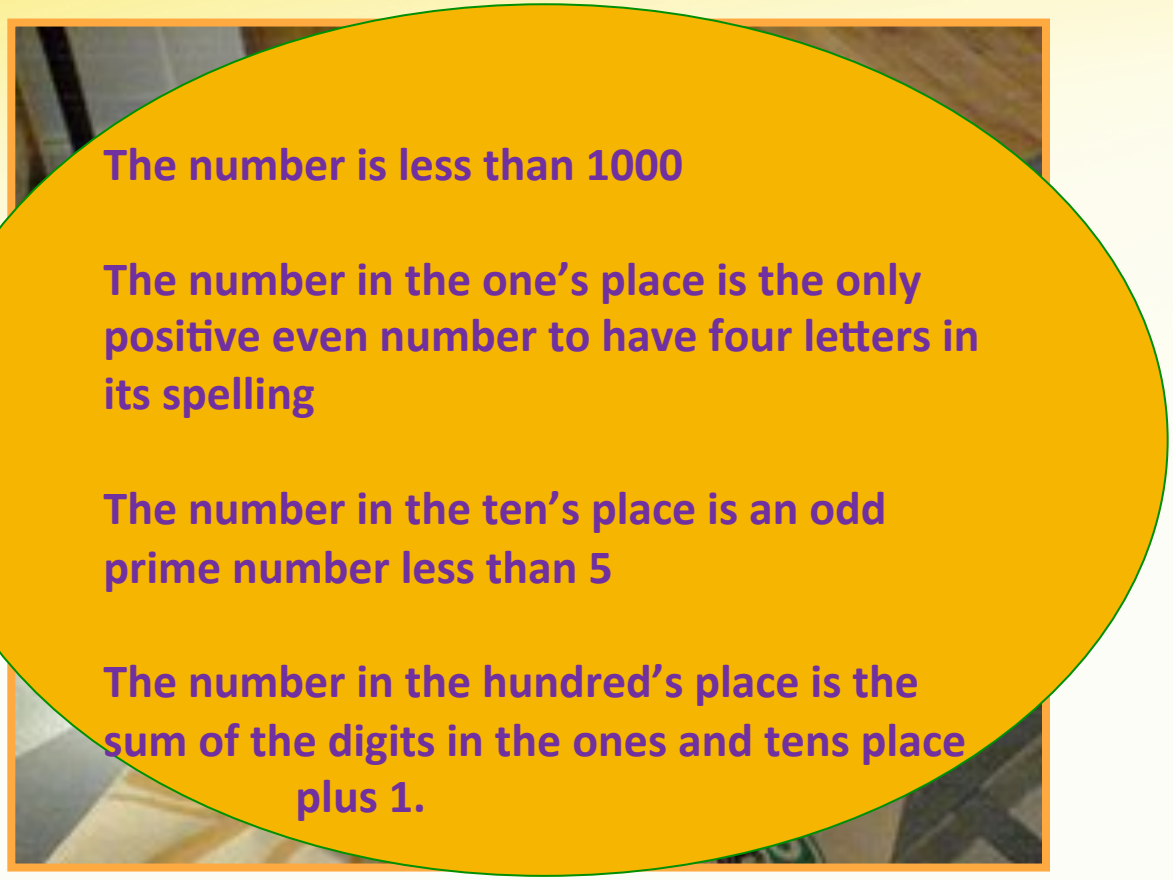
HOUGHTON MIFFLIN HARCOURT

Workshop Objectives

- Teachers will learn how to use unique manipulatives and models to compose and decompose larger numbers.

- Teachers will learn how to use the addition/subtraction/multiplication/division models that support student understanding and acquisition of non-traditional algorithms.

Warm Up



The number is less than 1000

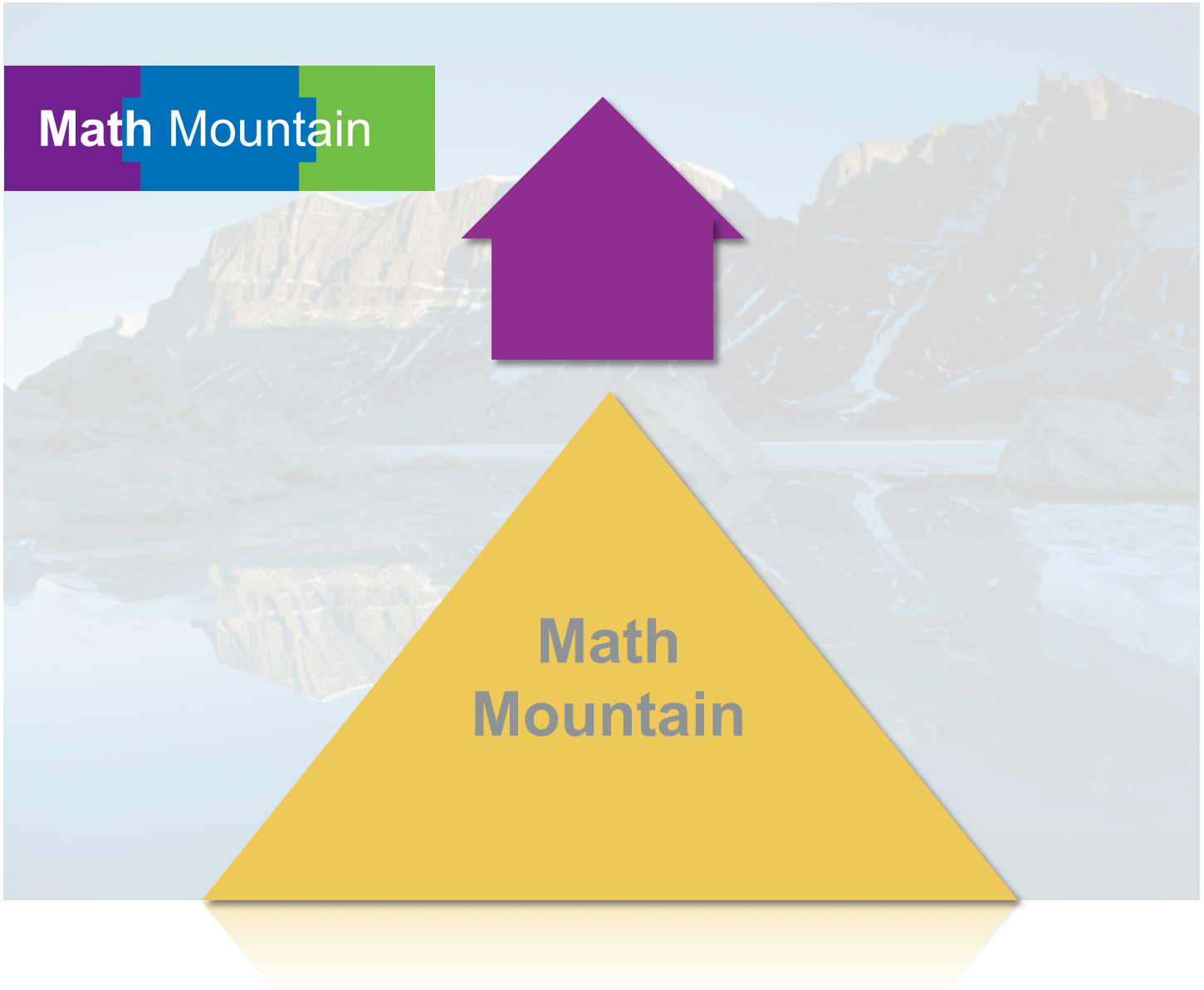
The number in the one's place is the only positive even number to have four letters in its spelling

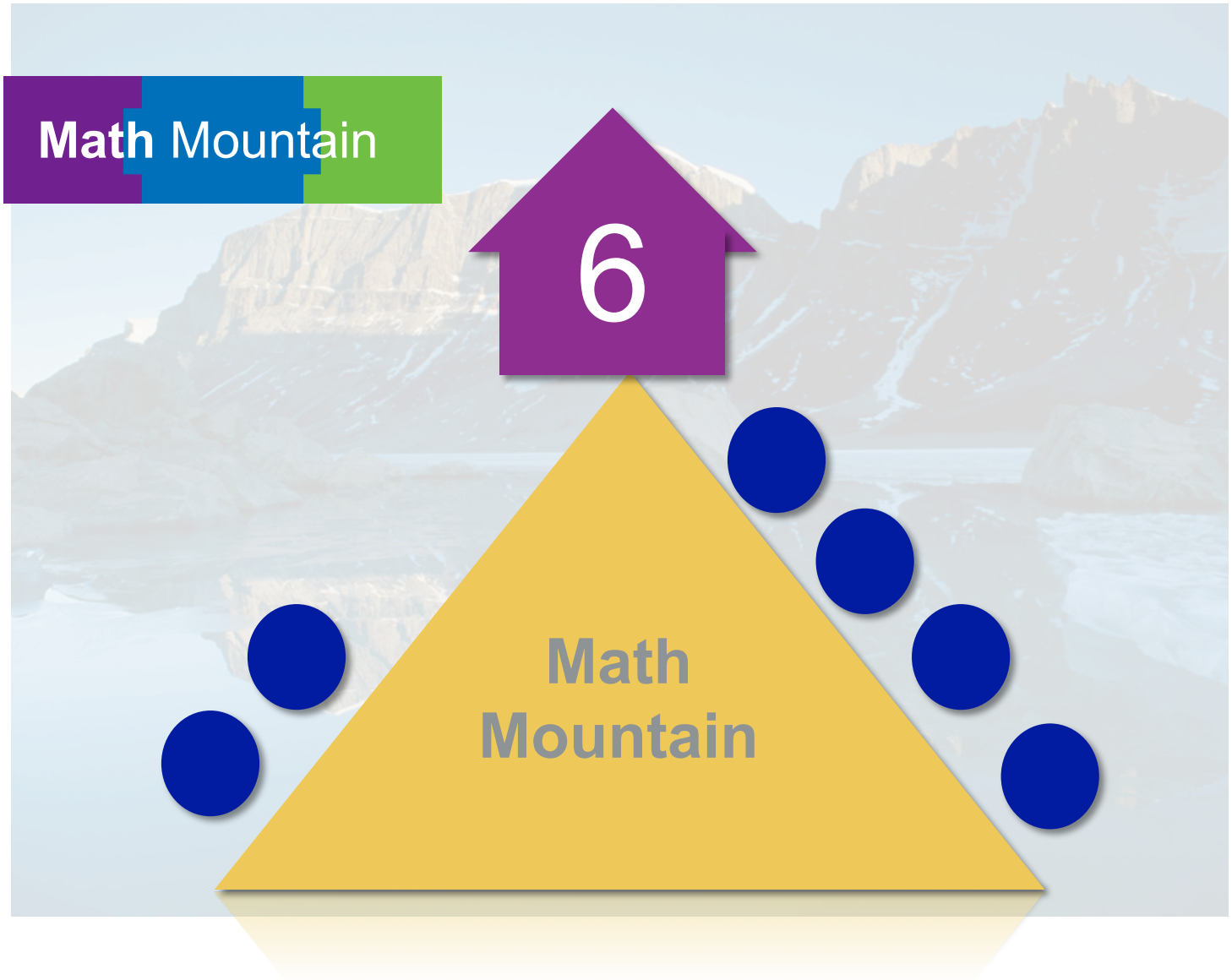
The number in the ten's place is an odd prime number less than 5

The number in the hundred's place is the sum of the digits in the ones and tens place plus 1.

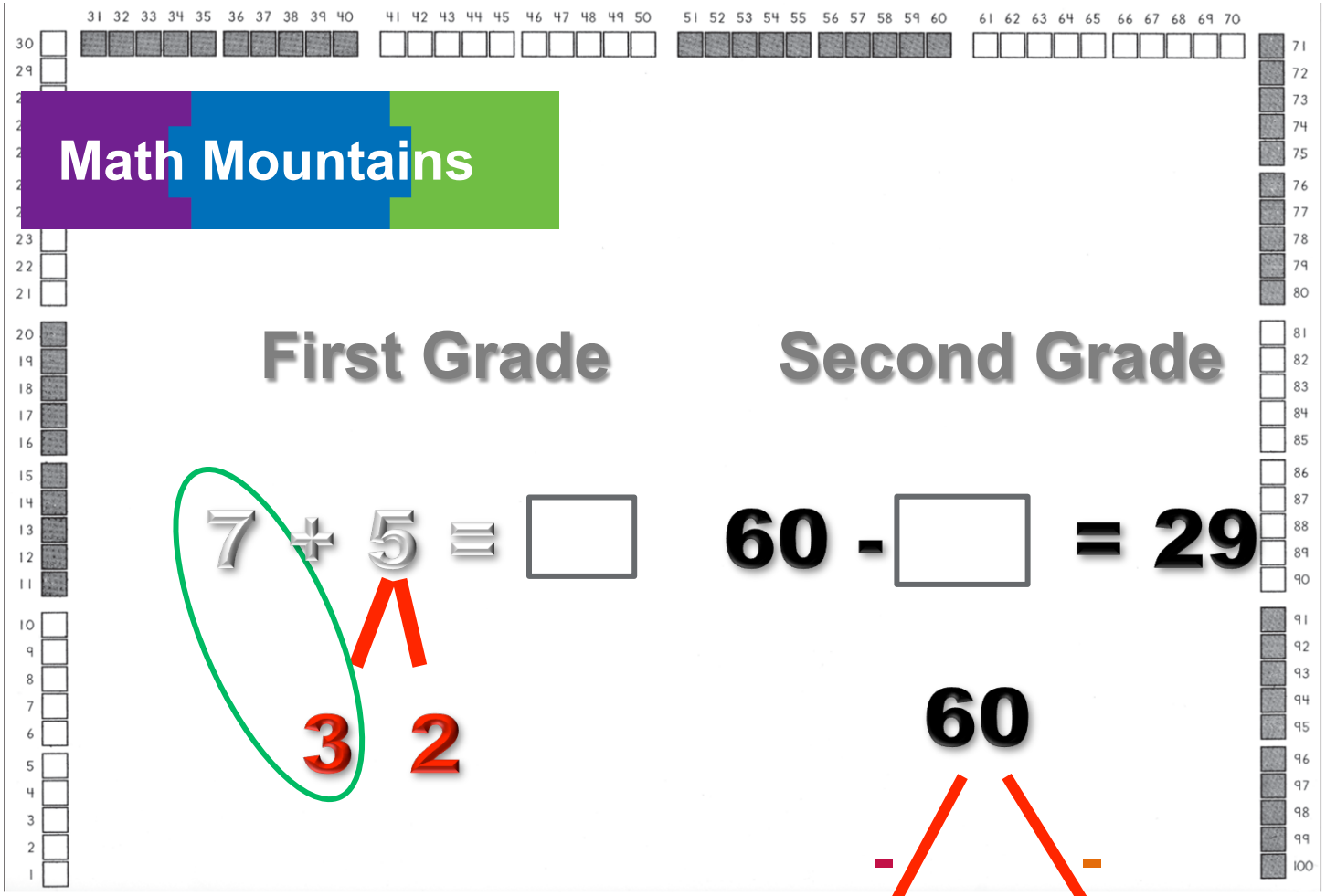
How many calories are in your Grande Honey Spice Latte and Blueberry Muffin?


Let us
Investigate……..
What is a math model?
Turn and talk with your small group about your understanding of math models.





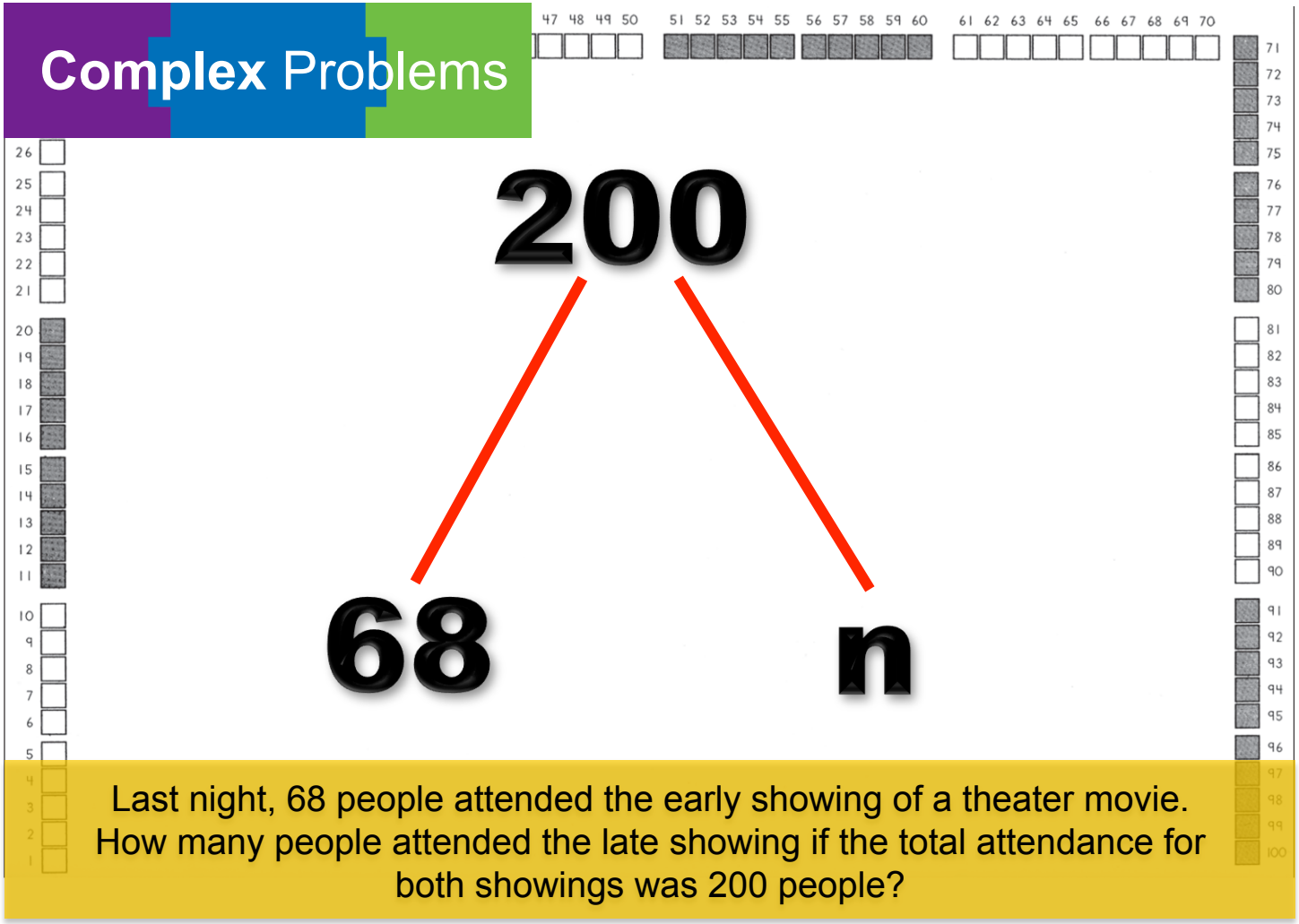
Math Mountains



Complex Problems

Last night, 68 people attended the early showing of a theater movie. How many people attended the late showing if the total attendance for both showings was 200 people?

Complex Problems



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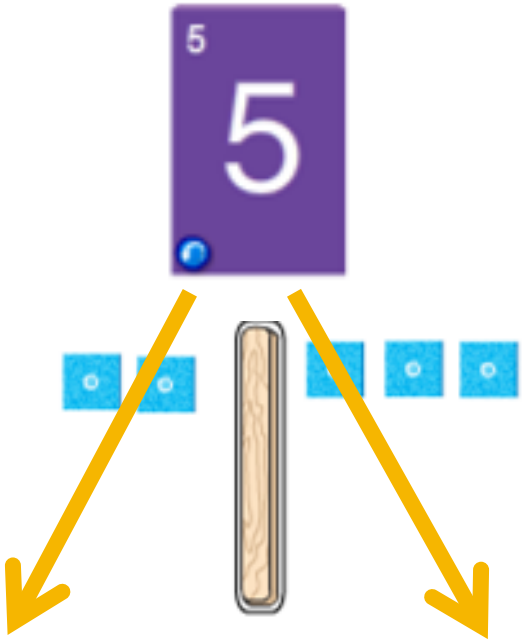
Creating a Math Model



Secret Code Cards

Place Value Concepts

Lessons 1 2 4

Whole Number Secret Code Cards Students explore place value by assembling Secret Code Cards to form multidigit numbers. The cards show place values. To make the number 3,678, students select the cards representing 3 thousands, 6 hundreds, 7 tens, and 8 ones.

3,000 600 70 8

3,678

Using the cards is beneficial for students because the car how the position of the digit in the number determines the digit. For example, with the cards students can more that 3 on the thousands card is 3,000 while a 3 on the te

The uniform use of the cards to show the standard, expa word form of numbers allows students to make connect the different forms.

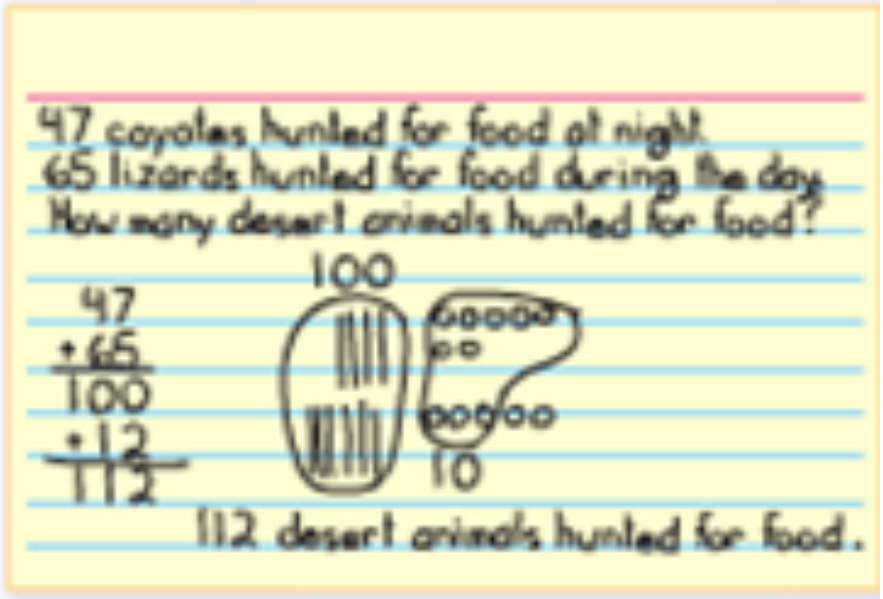
Standard Form **Expanded Form**

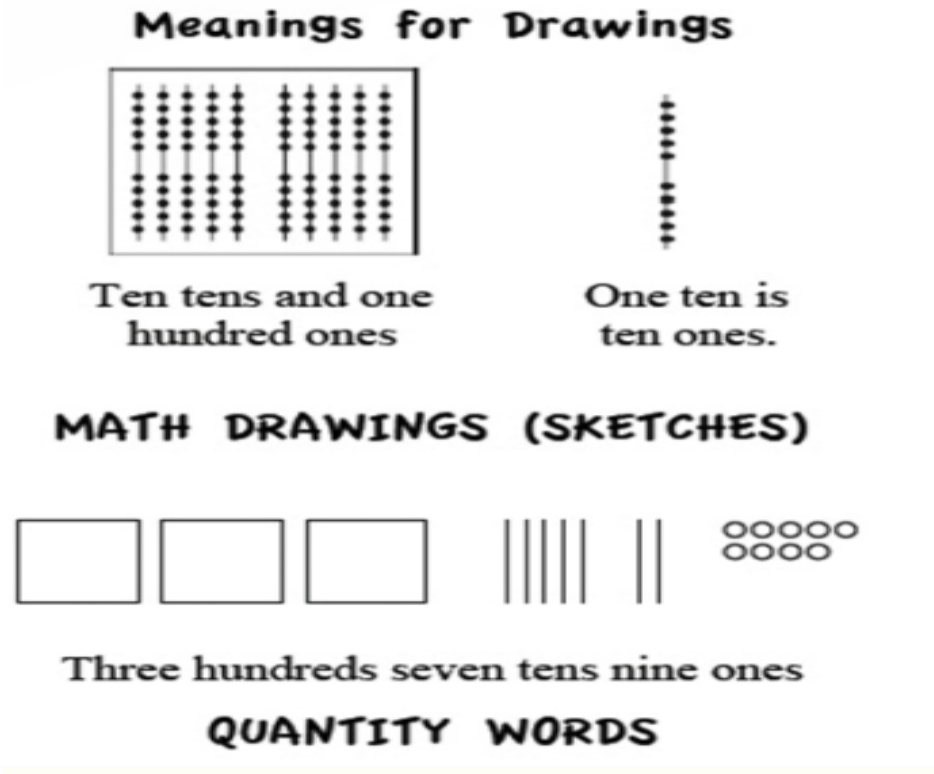
3 6 7 8 3,000 + 600 + 70 + 8

Word Form The backs of the cards show the values in word form.

three thousand	six hundred	seventy (seven tens)	eight

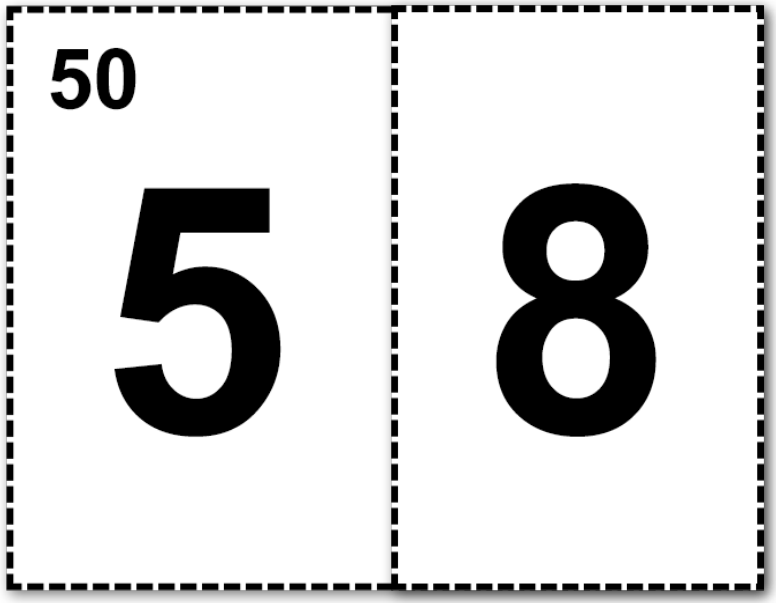
Quick Draws and Proof Pictures

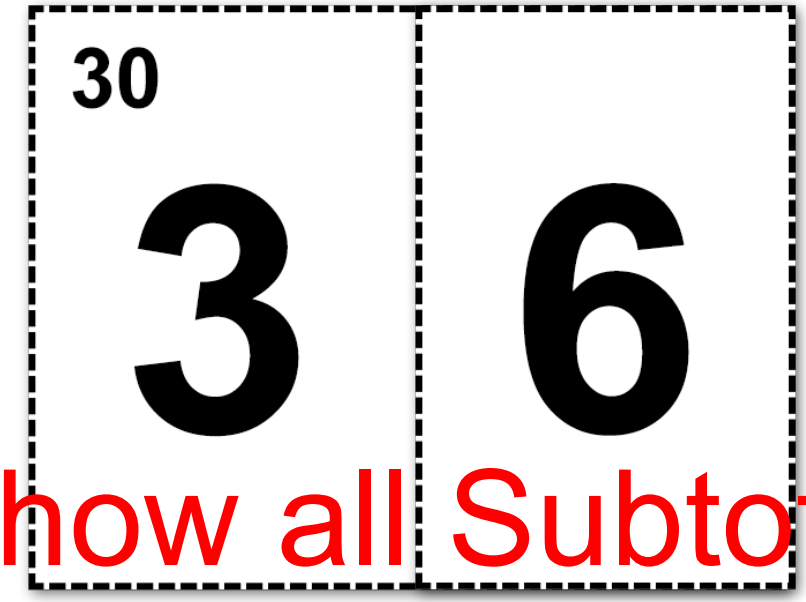




2 Digit Addition

Grade 1: Unit 4 (Sets up for proofing)
Unit 8: Explores 2-Digit Addition
Grade 2: Unit 6
Grade 3: Unit 4
Grade 4: Unit 1
Grade 5: Unit 2 (Decimals)
Grade 6: Unit 3 completes all computation



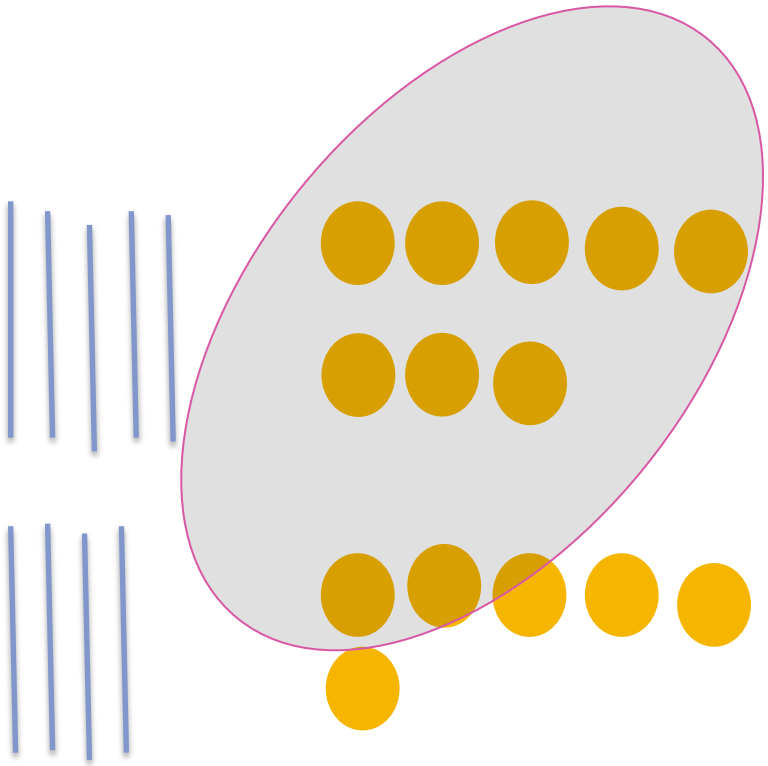


Show all Subtotals

$$\begin{array}{r} 58 \\ +36 \\ \hline 80 \\ 14 \\ \hline 94 \end{array}$$

Proof Drawing

$$\begin{array}{r} 58 \\ +36 \\ \hline \end{array}$$



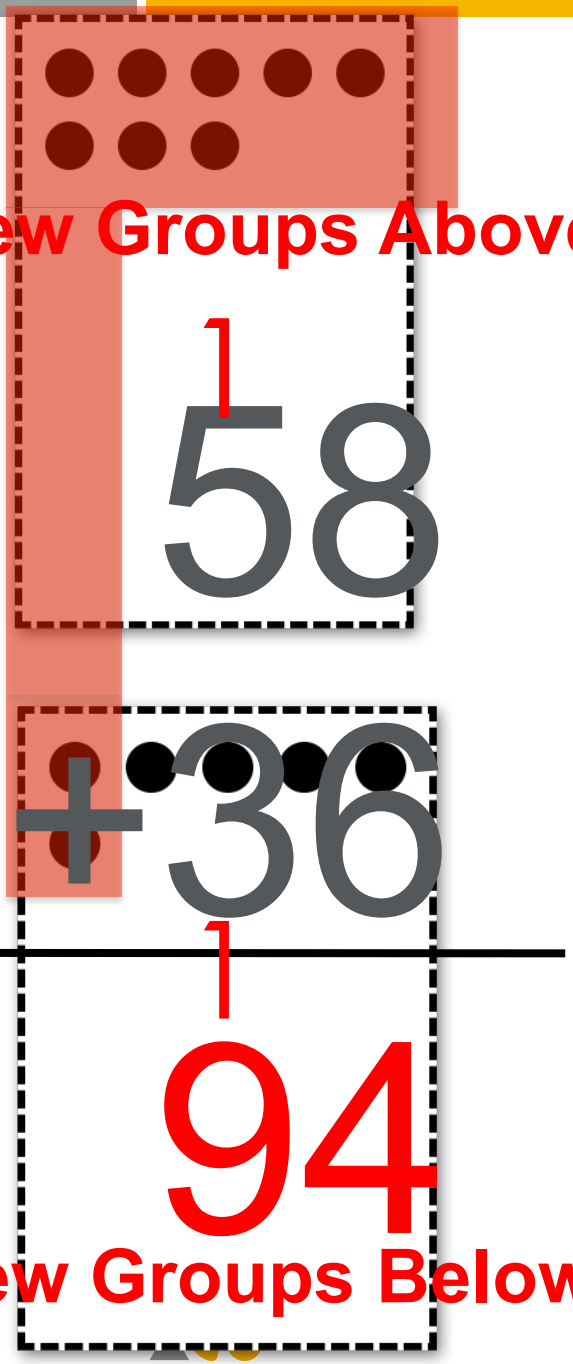
50

5 8

30

3 6

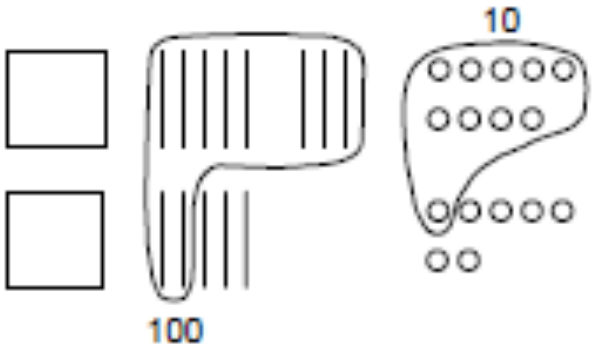
New Groups Above



New Groups Below

69 +25 =

Quantity Model



New Groups Below

$$\begin{array}{r} 189 \\ +\ 157 \\ \hline 346 \end{array}$$

Write All Totals

$$\begin{array}{r} 189 \\ +\ 157 \\ \hline 200 \\ 130 \\ 16 \\ \hline 346 \end{array}$$

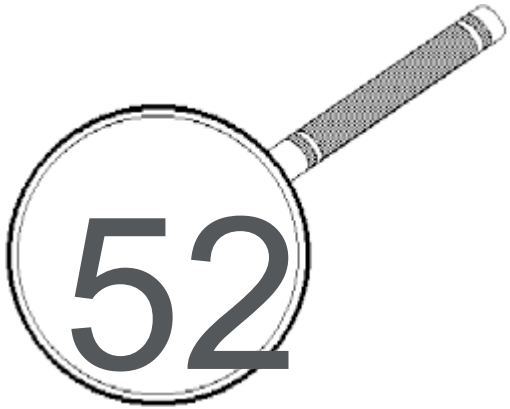
Current Common New Groups Above

$$\begin{array}{r} {\scriptstyle 1\ 1} \\ 189 \\ +\ 157 \\ \hline 346 \end{array}$$

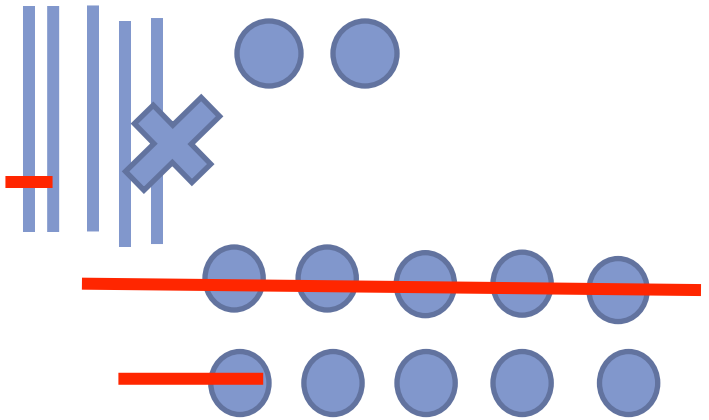
Subtraction

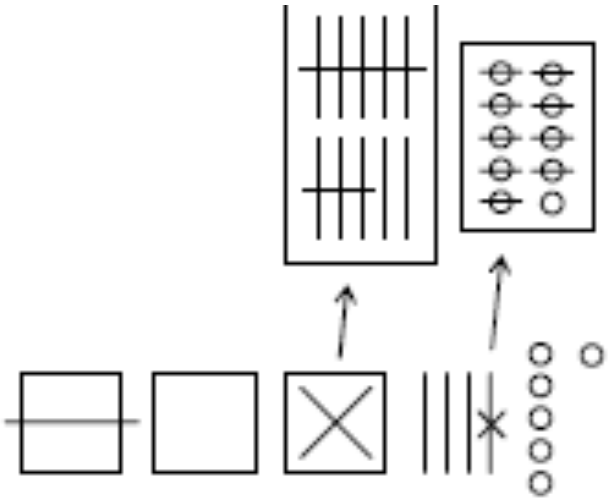
Grade 2: Unit 4
Grade 3: Unit 4
Grade 4: Unit 1
Grade 5: Unit 2 (Decimals)
Grade 6: Unit 3 (Decimals)

Subtraction



$$\begin{array}{r} 52 \\ -16 \\ \hline \end{array}$$





Ungroup Everywhere First, Then Subtract Everywhere

Left → Right

$$\begin{array}{r} 13 \\ 2\,\cancel{14}\,16 \\ \cancel{3\,4\,6} \\ -\ 1\,8\,9 \\ \hline 1\,5\,7 \end{array}$$

Right → Left

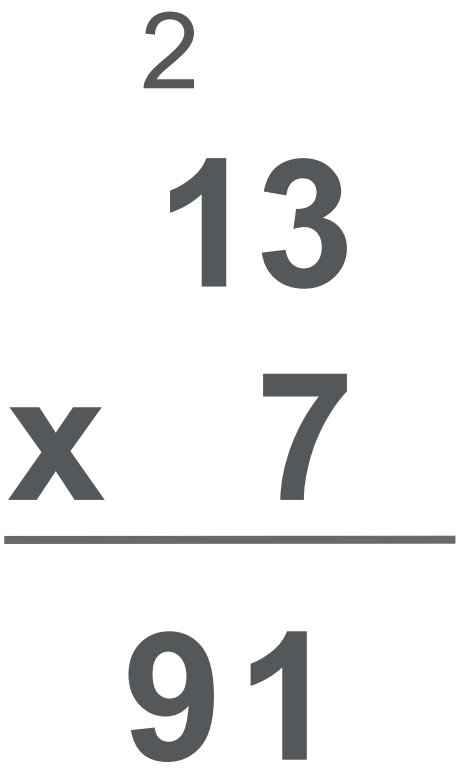
$$\begin{array}{r} 13 \\ 2\,\cancel{3}\,16 \\ \cancel{3\,4\,6} \\ -\ 1\,8\,9 \\ \hline 1\,5\,7 \end{array}$$

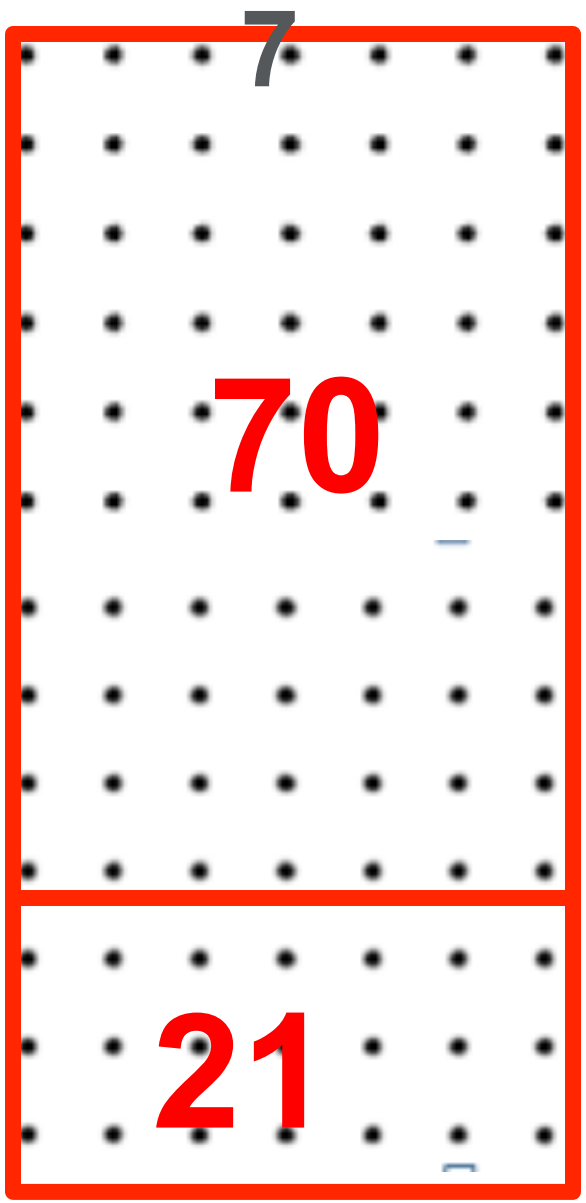
R → L Ungroup, Then Subtract, Ungroup, Then Subtract

$$\begin{array}{r} 13 \\ 2\,\cancel{3}\,16 \\ \cancel{3\,4\,6} \\ -\ 1\,8\,9 \\ \hline 1\,5\,7 \end{array}$$

Multiplication

Grade 2: Unit 4 (sets up equal groups)
Grade 3: Units 1 and 2
Grade 4: Unit 2
Grade 5: Unit 4 (decimals)
Grade 6: Unit 3

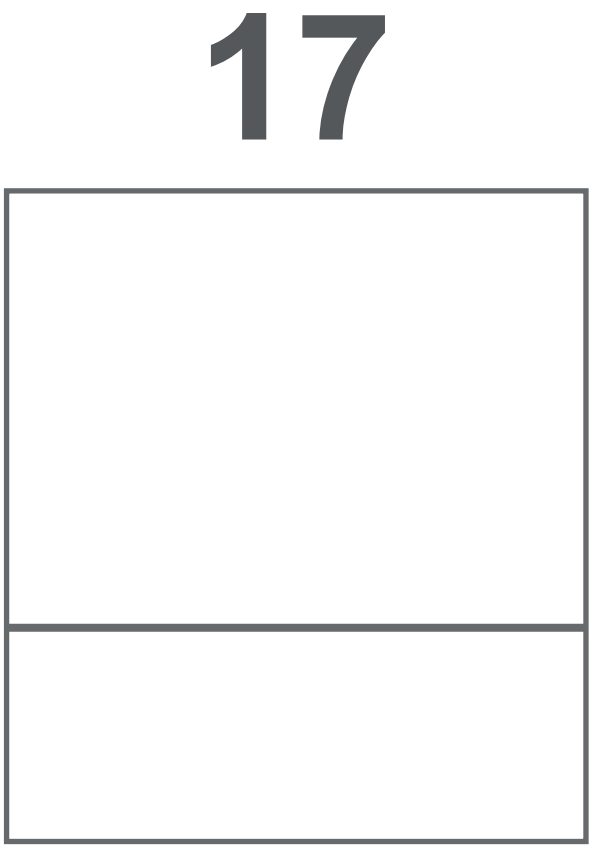




$$\begin{array}{r} 70 \\ +21 \\ \hline 91 \end{array}$$

$$
\begin{array}{r}
{\scriptstyle 2}\\
17\\
\times\ 14\\
\hline
68\\
170\\
\hline
238
\end{array}
$$

$$
\begin{array}{r}
17 \\
\times\ 14 \\
\hline
68 \\
170 \\
\hline
238
\end{array}
$$



$$
\begin{array}{r}
17 \\
\times\ 14 \\
\hline
68 \\
170 \\
\hline
238
\end{array}
$$

	17
10	170
4	68
	238

Area Model

	40	+ 3
60	2400	180
+ 7	280	21

Rectangle Sections

2400
180
280
\+ 21
1
2881

Expanded Notation

43 = 40 + 3
x 67 = 60 + 7

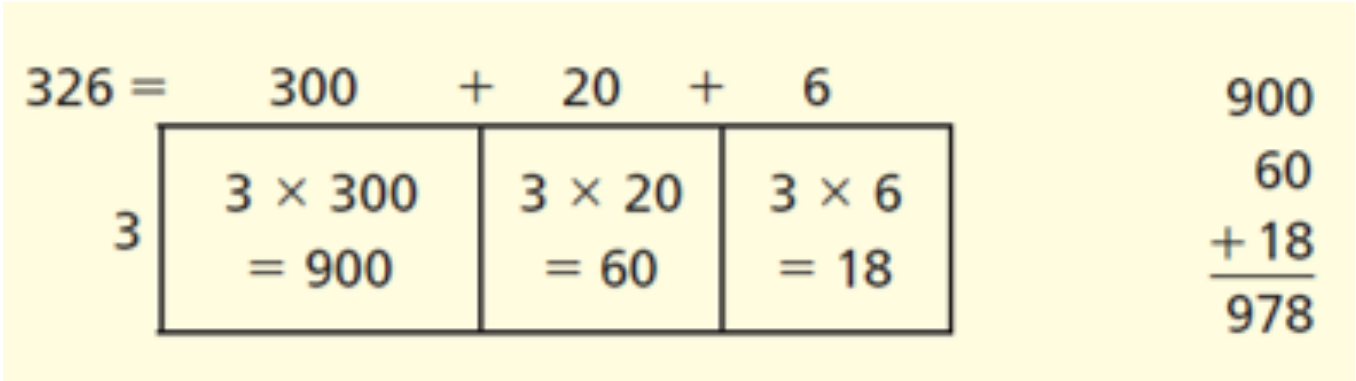
60 x 40 = 2400
60 x 3 = 180
7 x 40 = 280
7 x 3 = 21
1
2881

Short-Cut

1
2
43
x 67
301
258
2881

Division

Grade 3: Related to Multiplication Unit 2
Grade 4: Unit 3, Lessons 2 and 3
Grade 5: Unit 4 (Decimals)

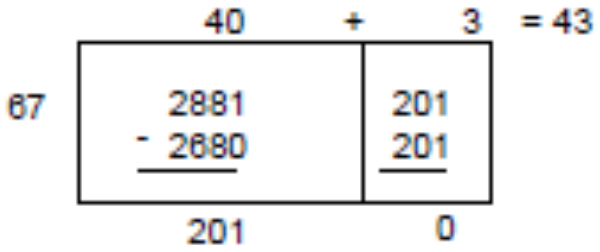


300 + 20 + 6 = 326

3

978	78	18
-900	-60	18
78	18	0

Rectangle Sections



Expanded Notation

```
      3 | 43
     40 |
67 ) 2881
   - 2680
     201
   - 201
```

Digit by Digit

```
      43
67 ) 2881
   - 268
     201
   - 201
```

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