

Math Strategies We Use in 4th Grade



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- The Equivalent Ratio Strategy

$$792 \div 8$$

$$792 \div 8 = \frac{792}{8}$$

Number of Tickets	792	396	198	99
Number of Kids	8	4	2	1

- The "Over" Strategy

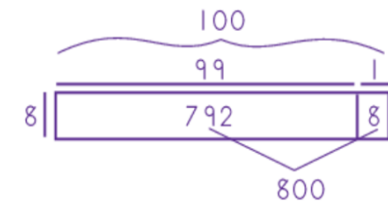
$$792 \div 8$$

$$800 \div 8 = 100$$

$$8 \div 8 = 1$$

$$792 \div 8 = 99$$

8	800	792
1	100	99



Division Strategies

Partial Quotients Strategy

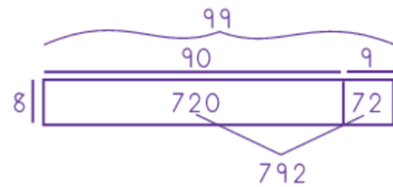
$$792 \div 8$$

$$720 \div 8 = 90$$

$$72 \div 8 = 9$$

$$792 \div 8 = 99$$

8	720	72	792
1	90	9	99



Five is Half of Ten Strategy

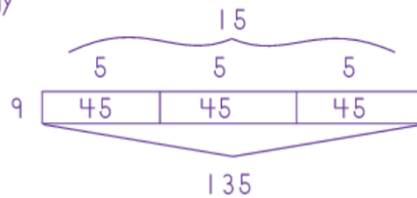
$$135 \div 9$$

$$90 \div 9 = 10$$

$$135 - 90 = 45$$

$$45 \div 9 = 5$$

90	45	135
10	5	15



This booklet will show you some of the strategies I have learned to be more successful at solving problems. As I become a stronger mathematician, I learn how and why problems can be solved in different ways. The more I learn and use these different strategies, the more efficient and accurate I will become.

Addition

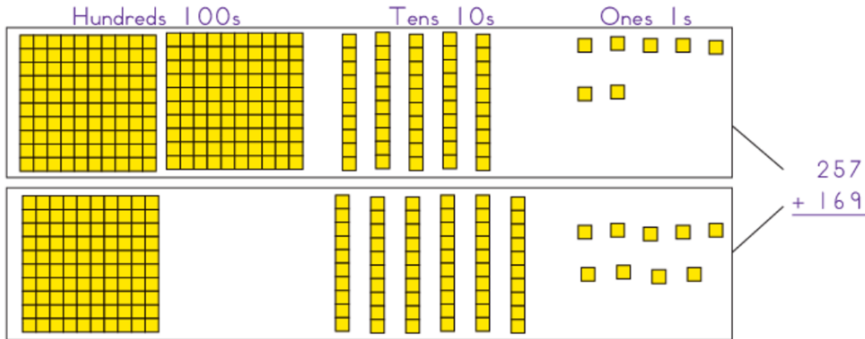
Number line

$$697 + 178$$

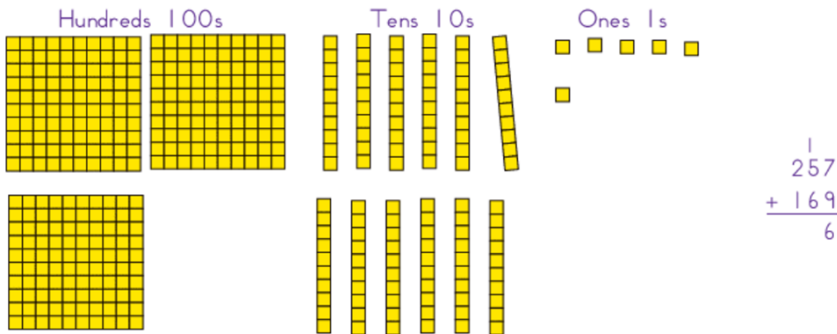


Base Ten Model

Modeling helps me get ready for the standard algorithm because I can line up the digits by place value and see what is needed.



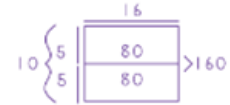
I can regroup the tens and hundreds places.



Multiplication Strategies

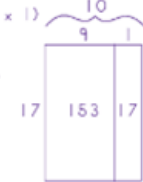
Five is Half of Ten Strategy

$$5 \times 16 = \text{half of } 10 \times 16$$



The "Over" Strategy

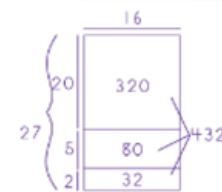
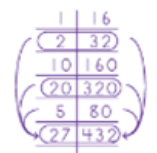
$$17 \times 9 = (17 \times 10) - (17 \times 1)$$



$$\begin{array}{r} 10 \times 17 = 170 \\ - 1 \times 17 = 17 \\ \hline 9 \times 17 = 153 \end{array}$$

Using Smaller Problems to Solve Bigger Problems

$$27 \times 16$$



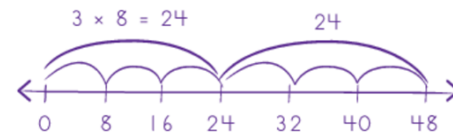
$$\begin{array}{r} 20 \times 16 = 320 \\ + 5 \times 16 = 80 \\ + 2 \times 16 = 32 \\ \hline 27 \times 16 = 432 \end{array}$$

Doubling & Halving

Make an easier combination by doubling 1 factor and cutting the other in half. Sometimes if you do this more than once, you can make an easy combination.

$$\begin{array}{l} 24 \times 25 = 600 \\ 12 \times 50 = 600 \\ 6 \times 100 = 600 \end{array}$$

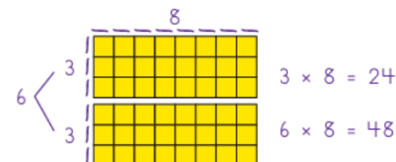
Open Number Line



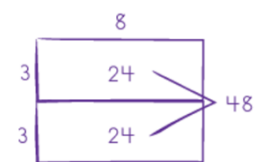
Ratio Table

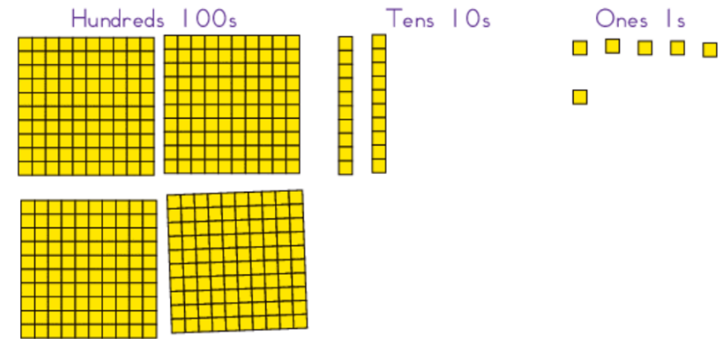
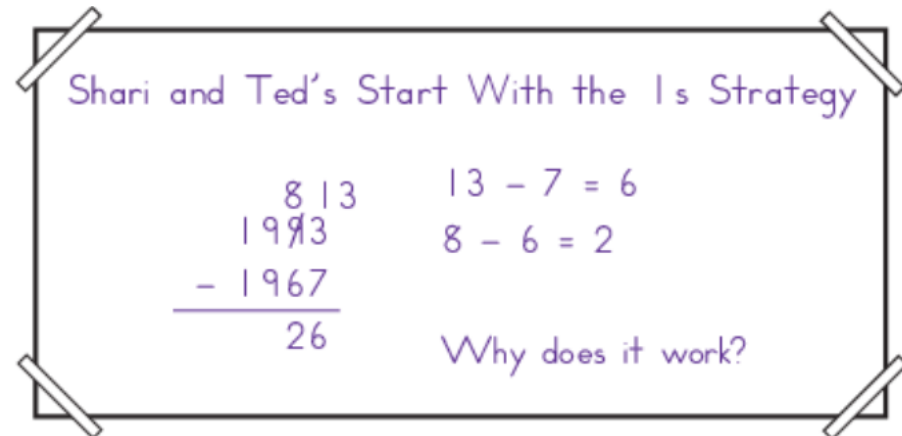
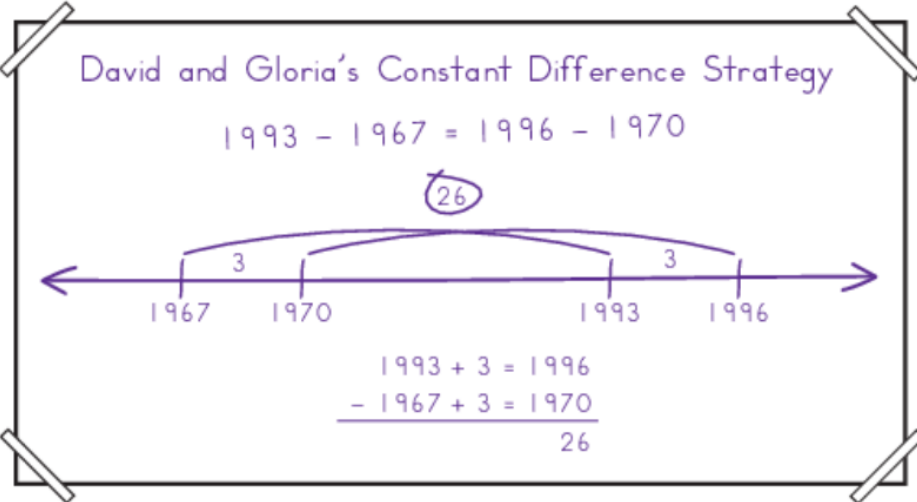
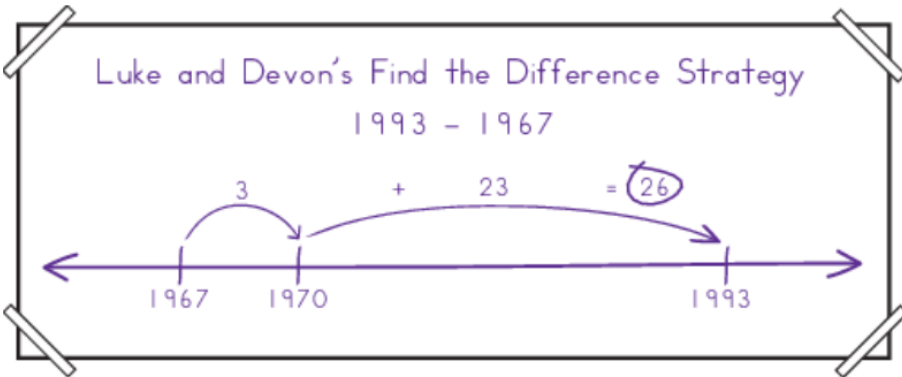
Rows of crayons	Number of crayons
1	8
2	16
$\times 2 \left\{ \begin{array}{l} 3 \\ 6 \end{array} \right.$	$\left. \begin{array}{l} 24 \\ 48 \end{array} \right\} \times 2$

Tile Array



Area Model





$$\begin{array}{r} 11 \\ 257 \\ + 169 \\ \hline 426 \end{array}$$

Place Value Splitting

I can break numbers up by place value without models to see if I need to regroup while adding.

$$\begin{array}{r} 158 = 100 + 50 + 8 \\ + 275 = 200 + 70 + 5 \\ \hline 300 + 120 + 13 = 420 + 13 = 433 \end{array}$$

Algorithm

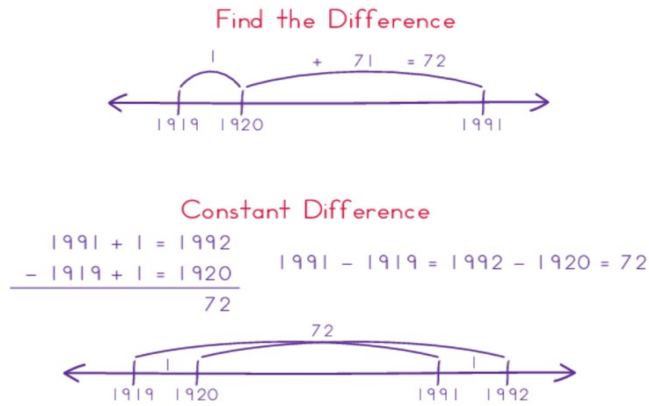
As I become more efficient, I understand and use the standard algorithm to solve addition problems.

$$\begin{array}{r} 111 \\ 1,947 \\ + 99 \\ \hline 2,046 \end{array}$$

$$\begin{array}{r} 1 \blacksquare 1 \\ 58,379 \\ + 31,850 \\ \hline 9 \blacksquare, 229 \end{array}$$

Subtraction

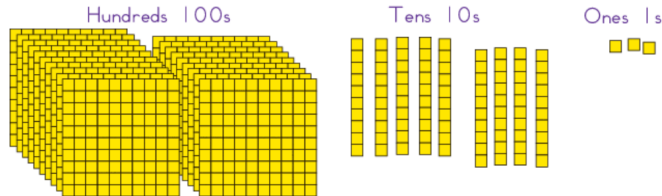
Number Line



Base Ten Model

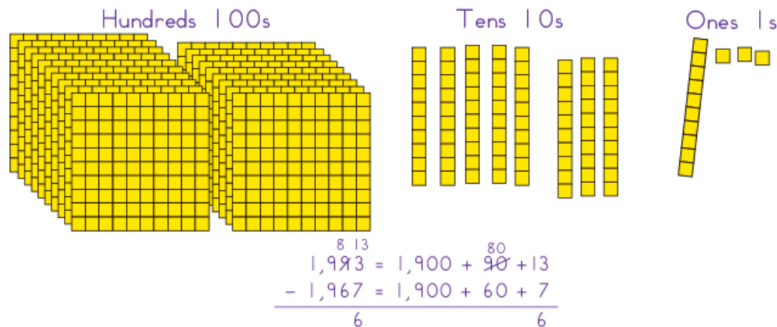
Modeling helps me get ready for the standard algorithm because I can line up the digits by place value and see what is needed.

1993-1967



$$\begin{array}{r} 1,993 = 1,900 + 90 + 3 \\ - 1,967 = 1,900 + 60 + 7 \end{array}$$

I need to move a ten to the ones place to be able to subtract.



Here are some example of students using different strategies:

Jamal and Sabrina's Split Up Everything Method

$$\begin{array}{r} 158 = 100 + 50 + 8 \\ + 275 = 200 + 70 + 5 \\ \hline 300 + 120 + 13 = 420 + 13 = 433 \end{array}$$

Steve and Rosa's Get to a Friendly Number Method

Sarah and Trevor's Give and Take Method

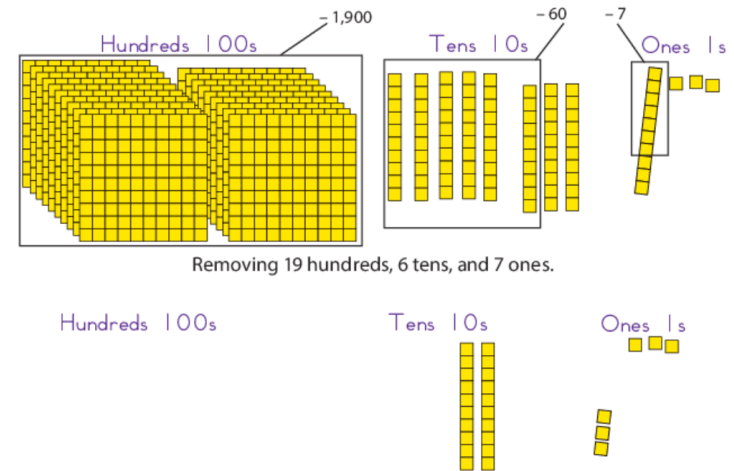
$$\begin{array}{r} 158 - 25 = 133 \\ + 275 + 25 = 300 \\ \hline 433 \end{array}$$

$$158 + 275 = 133 + 300 = 433$$

End of the Year Expectations

- Use the standard algorithm to add and subtract with 1,000,000
- Use strategies to multiply and divide a 4-digit number by 1-digit number
- Use strategies to multiply 2 two-digit number
- Add and subtract fractions with denominators: 2, 3, 4, 6, 8, 10, 12
- Add and subtract mixed fractions
- Multiply a fraction by a whole number
- See relationship between decimals and fractions

I can then subtract 1967.



Place Value Splitting

I can break numbers up without models to see if I need to regroup while subtracting.

$$\begin{array}{r}
 9\cancel{9}3 = 1,900 + \cancel{90} + 13 \\
 - 1,967 = 1,900 + 60 + 7 \\
 \hline
 26 \qquad \qquad 20 + 6
 \end{array}$$

Algorithm

As I become more efficient, I understand and use the standard algorithm to solve subtraction problems.

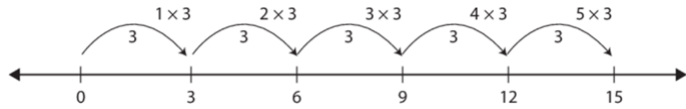
$$\begin{array}{r}
 9\cancel{9}1 \\
 - 1,919 \\
 \hline
 72
 \end{array}$$

$$\begin{array}{r}
 961 \\
 - 1934 \\
 \hline
 0033
 \end{array}$$

Multiplication

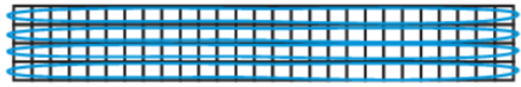
I build on my multiplication reasoning from 3rd grade to do more complex multiplication problems

Number Line/Skip Counting



$$4 \times 27$$

$$27, 54, 81, 108$$



Skip-Counting

Doubling & Halving

$$4 \times 27$$

$$27, 54, 108$$



Doubling

$$4 \times 27 = 2 \times 54$$

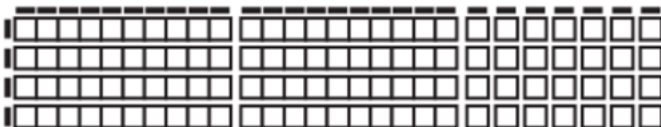


Doubling/Halving

Tile Array Partial Product

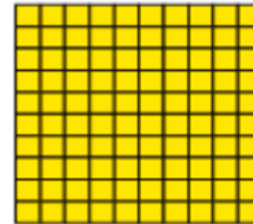
I start by using arrays like I did in 3rd grade, but move on to the area model.

$$4 \times 27 = (4 \times 10) + (4 \times 10) + (4 \times 7)$$



Decimals

I can recognize decimals using base ten pieces as decimals or fractions.



one
1
1.00
mat



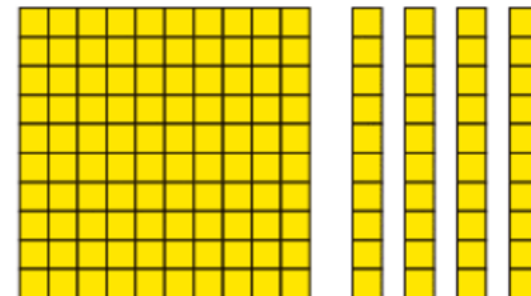
tenth
 $\frac{1}{10}$
0.10
strip



hundredth
 $\frac{1}{100}$
0.01
unit

I could name this model one and four-tenths and write it as a fraction number $1 \frac{4}{10}$ or as a decimal number 1.4

I could see that it can be named one and forty-hundredths and be written as $\frac{140}{100}$ or 1.40.



Fractions

Only denominators 2, 3, 4, 5, 6, 8, 10, 12, 100 are used in 4th grade.

Number Line

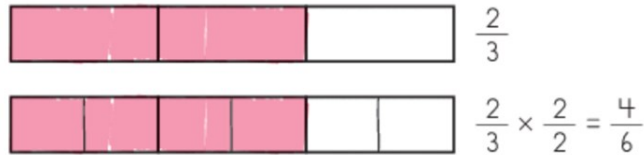
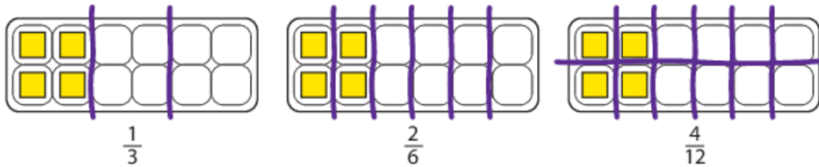
I can order fractions and decimals on a number line to compare



value and equivalence.

Models

I can use models to see if fractions are equivalent.



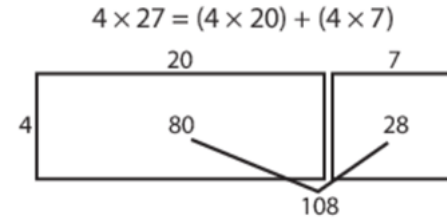
Equations

I can use addition and multiplication strategies.

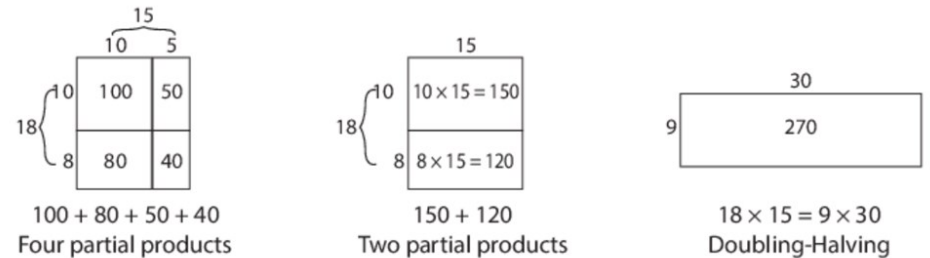
Equivalent Fractions

$\frac{1}{2} = \frac{1}{4} + \frac{1}{4} = \frac{2}{4}$	$\frac{1}{2} = \frac{1}{8} + \frac{1}{8} + \frac{1}{8} + \frac{1}{8} = \frac{4}{8}$
$\frac{1}{2} + \frac{1}{2} = \frac{2}{2} = 1$	$\frac{1}{4} = \frac{1}{8} + \frac{1}{8} = \frac{2}{8}$
$\frac{1}{4} + \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{4}{4} = 1$	$\frac{1}{4} = \frac{1}{16} + \frac{1}{16} + \frac{1}{16} + \frac{1}{16} = \frac{4}{16}$
$8 \times \frac{1}{8} = \frac{8}{8} = 1$	$\frac{3}{4} = \frac{1}{4} + \frac{1}{4} + \frac{1}{4} = \frac{1}{2} + \frac{1}{4}$
$16 \times \frac{1}{16} = \frac{16}{16} = 1$	

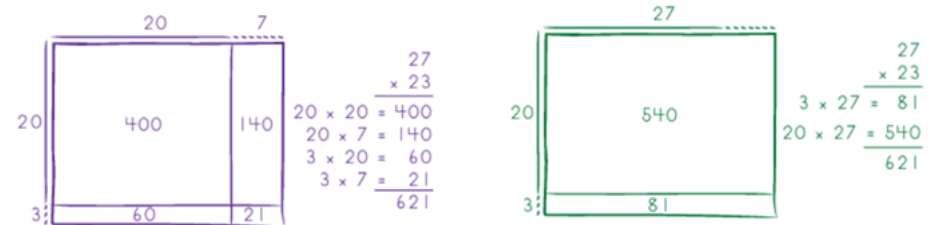
Area Model



I can break down problems using the area model to help me make sense of the task using a variety of different strategies.



As I build my understanding, I move towards using an algorithm to become more efficient.



Ratio Table

I can see the pattern in a ratio table to help me solve problems.

18s	Total
1	18
2	36
3	54
4	72
5	90
6	108
7	126

18s	Total
1	18
10	180
2	36
12	216

Annotations: $\times 2$ (from 1 to 2), $\times 10$ (from 1 to 10), $\times 10$ (from 18 to 180), $\times 2$ (from 2 to 12).

Division

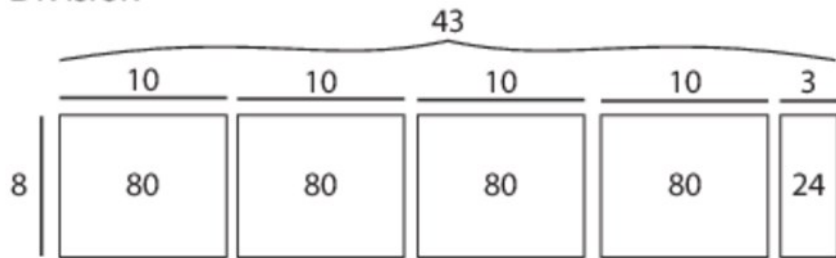
I use my understanding of the relationship between multiplication and division to help me solve problems.

Area Model

I can break down numbers to find the answer. This is similar to the equal groups I made in 3rd grade.

$$344 \div 8 = 43$$

I made each group of 10×8 and continued until I couldn't make a complete group of 80. I grouped total of 320. I had 24 more to reach



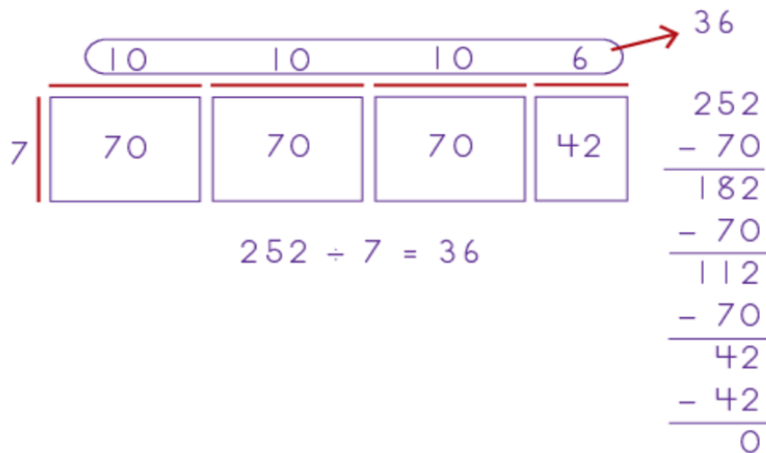
$$80 + 80 + 80 + 80 = 320$$

$$320 + 24 = 344$$

$$8 \times 43 = 344$$

so

$$344 \div 8 = 43$$



$$252 \div 7 = 36$$

$$\begin{array}{r} 252 \\ - 70 \\ \hline 182 \\ - 70 \\ \hline 112 \\ - 70 \\ \hline 42 \\ - 42 \\ \hline 0 \end{array}$$



$$252 \div 7 = 36$$

$$140 + 70 = 210$$

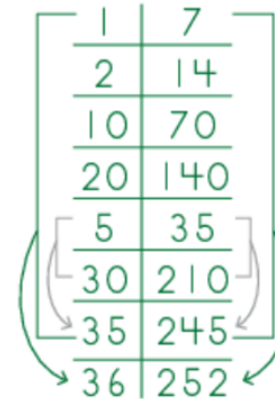
$$252 - 210 = 42$$

$$42 \div 7 = 6$$

Ratio Table

I can use a ratio table to see patterns and multiplicative relationships between numbers to create partial products to find the final product.

$$252 \div 7 = ?$$



$$35 + 210 = 245$$

$$245 + 7 = 252$$

so $252 \div 7 = 36$

Strategy for solving $243 \div 9$

Number of Groups	1	10	20	5	2	27
Total	9	90	180	45	18	243

Arrows indicate: $20 + 5 + 2 = 27$ and $180 + 45 + 18 = 243$

Another strategy for solving $243 \div 9$

Groups	Total	
1	9	$1 \times 9 = 9$
10	90	$10 \times 9 = 90$
20	180	$20 \times 9 = 180$
5	45	$5 \times 9 = 45$
2	18	$2 \times 9 = 18$
27	243	

$$243 \div 9 = 27$$