Oak Park Parent Math Night

Helping Your Child Become a Mathematically Strong Student

Oak Park Elementary School District 97

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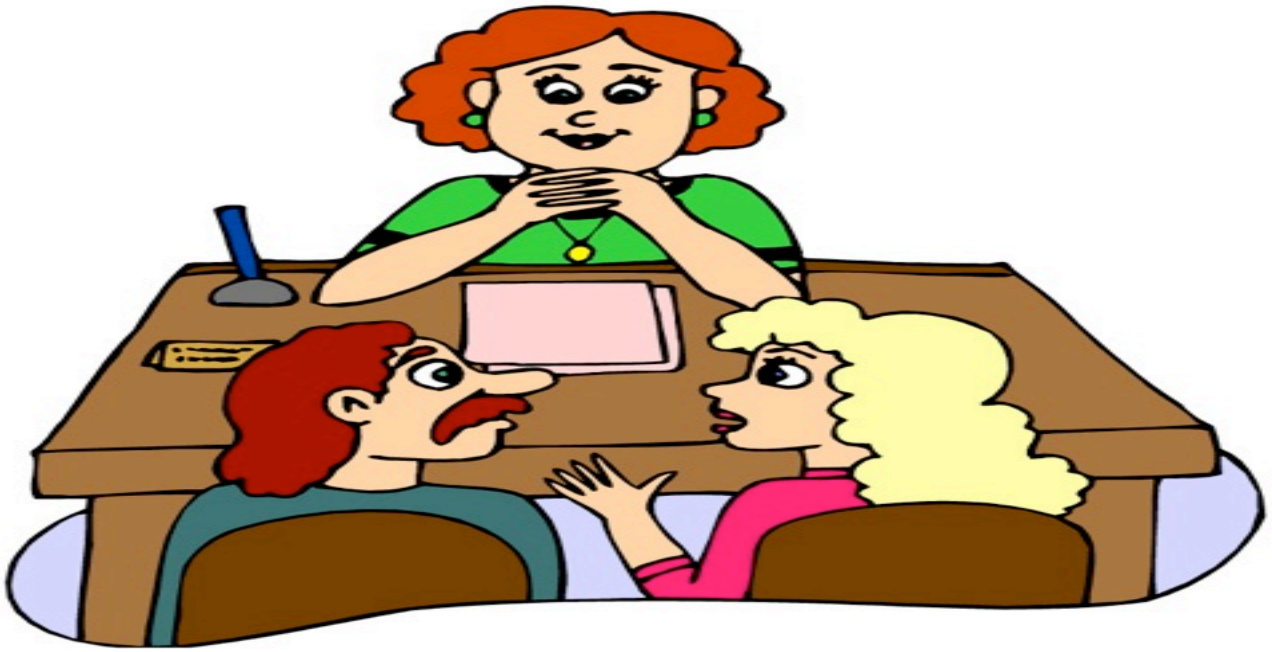
A Mathematically Strong Student:

- Is a persistent problem solver
- Thinks about math
- Can explain his/her math thinking and can challenge the math thinking of others
- Can solve math problems in more than one way
- Is mathematically precise (and understands the level of precision called for)
- Figures out why math works
- Looks for patterns and structures in mathematic

Will be ready for college
or a good career!

Why Should Parents Want Schools to Align Instruction with the CCSS?



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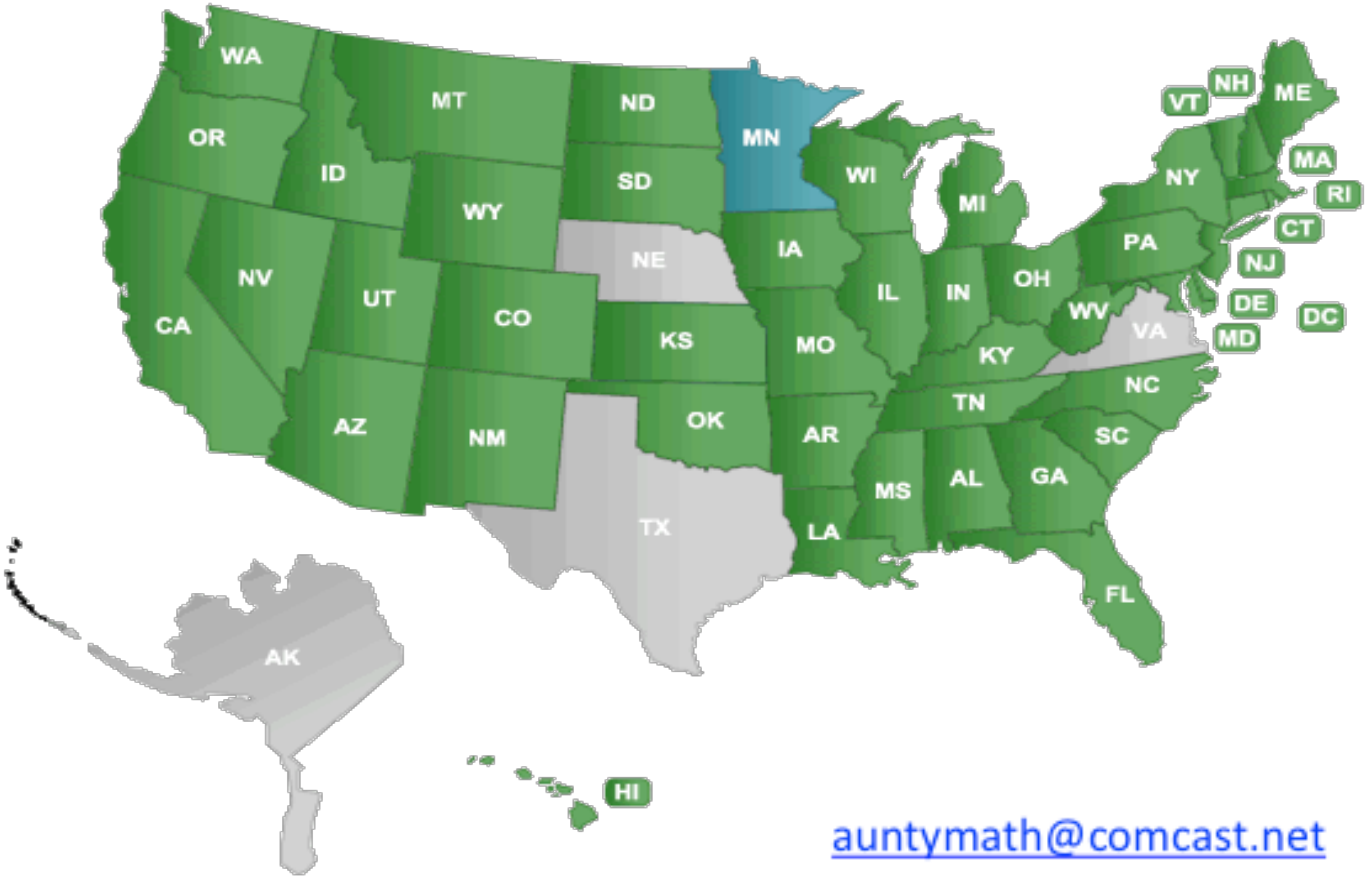
1) The CCSSS is a universal set of standards for mathematics education to be used by all* states



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2) Assessment will be standardized across the United States.

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3) Both Sides of the "Math Wars" support the CCSS

Understanding!!

Drill and Practice!!

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4) Informed and Supported by:

National Council of Teachers of Mathematics

American Statistical Association

Association for Women in Mathematics

Association of Mathematics Teacher Educators

Mathematical Association of America

Benjamin Banneker Association (urban)

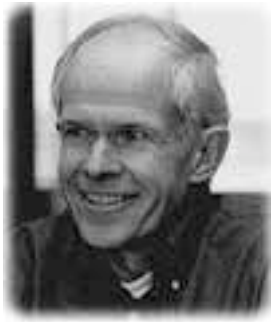
TODOS: Mathematics for All (ELL)

National Association of Supervisors of Mathematics

National Association of Mathematicians

Council for Exceptional Children (Special Needs)

5) Based on Best Available Research



Tom Carpenter

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6) Informed and Supported by the Business Community

7) Informed by the Higher Education Community

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8) Informed by Practices of Countries That Outperform U.S. in Math

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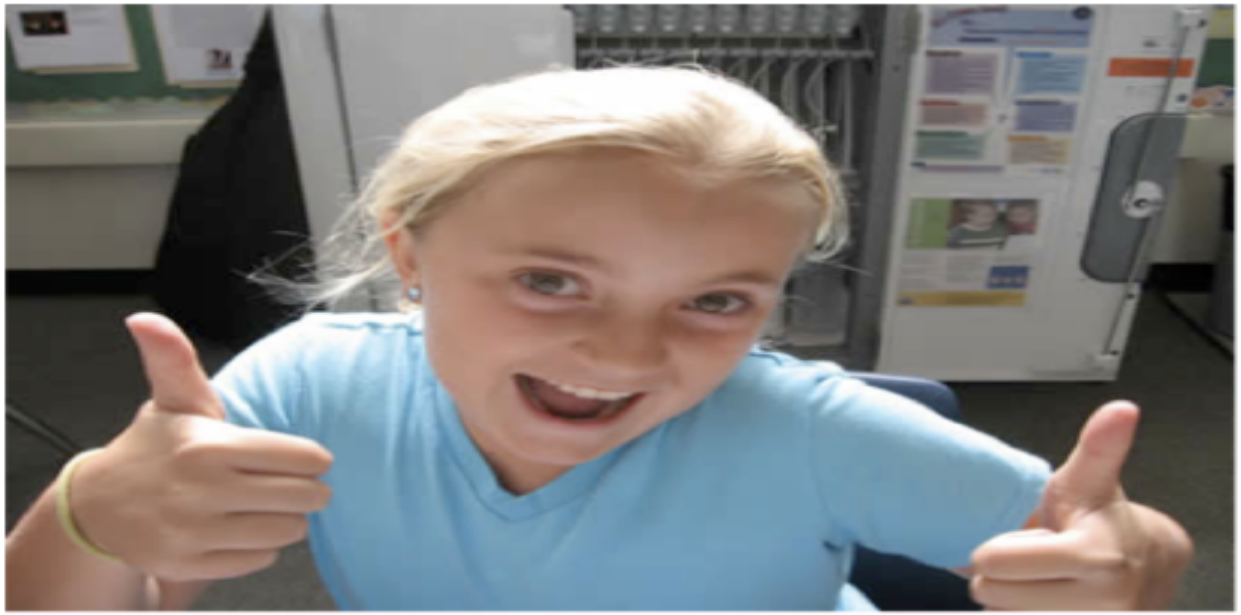
9) Have the potential to offer our students the mathematics we wish we had – the sense-making kind.



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Two Recommendations

Focus

Shed

Focus! If you try to catch two rabbits…

both will escape.

The Importance of 

Of all the concepts presented on the TIMMS test,

U.S. students had covered 83% in their classrooms prior to taking the test.

Highest scoring Hong Kong students had covered only 52% in their classrooms prior to taking the test.

Other high performing countries' students had covered 60% in their classrooms prior to taking the test.

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Why Shed?

Our traditional U.S. mile wide, inch deep math curriculum is like a swamp – too thick to navigate, too thin to plow.

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Parents May Ask:

Why can't we just teach our kids the way we learned?

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Parents May Ask:

Is knowing math facts still important and being taught in school?

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Required Math Fact Fluency According to the CCSS

- +, - Fluency within 5 in kindergarten
- +,- Fluency within 10 in first grade
- Memorization of **sums** to 20 in 2nd grade
- Memorization of ALL **multiplication** facts (up to 10) by end of 3rd grade.

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Not knowing basic math facts is a common and ***conspicuous*** difficulty, an impediment to higher-level math, and a corrosive influence on the self-confidence of students.

The question is not whether students ***should*** know math facts, but ***when*** and ***how*** should they learn them?

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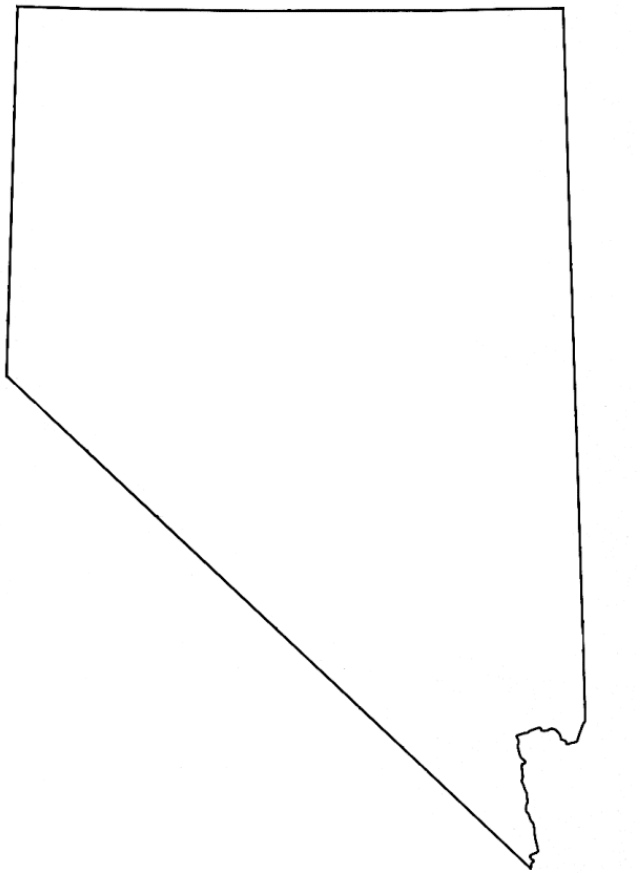
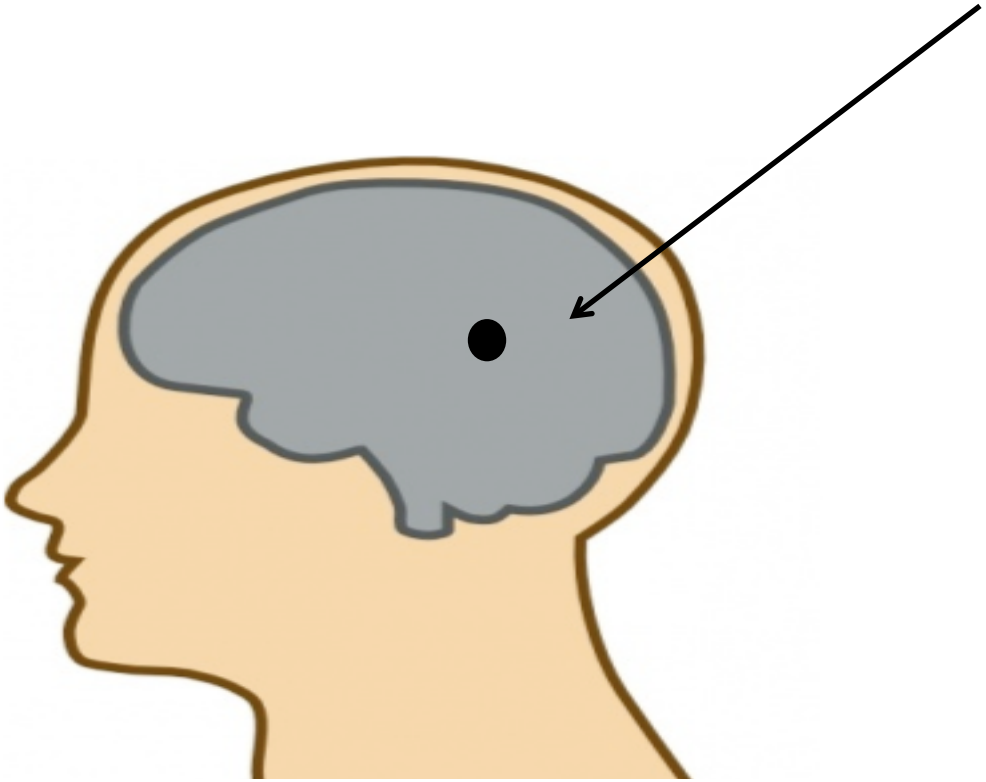
Math Fact Fluency

Accuracy Speed Flexibility

What’s the capital of this state?



What is 8 + 7?



What is 8 + 7?

Split the 7 into 2 and 5. Put 2 with the 8 to make 10. Now add the 10 to the 5 for 15. (partitioning numbers to make a ten – privilege 10)

8+2 is 10 and 5 more is 15.

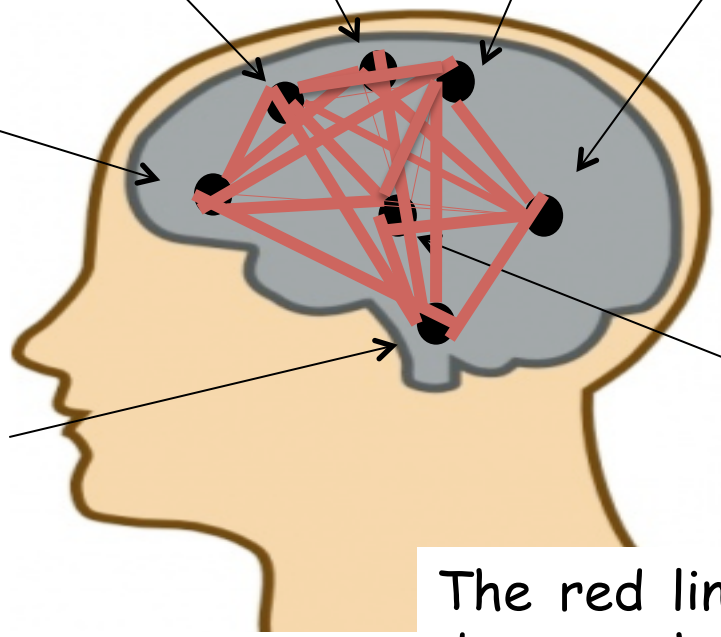
I think of this as 10 and 5.

5 + 5 = 10. 2+3 = 5. 10+5= 15. (partitioning numbers to make 10. Privileging 5.)

I remember 8+6 is 14 so its just 1 more..15.

Double 8 is 16 so its 1 less .. 15

I know 7 +7 is 14 so its 1 more.. 15 (Using doubles)



Its going to be less than 20 because both numbers are less than 10 and 10+10 =20. Its going to be more than 10 because both numbers are bigger than 5 and 5+5 =10. (Estimation / relative position and magnitude of number/ anchoring 5 and 10.)

8 is two rows of 4. 7 is a row of 4 and a row of 3. 3 rows of 4 is 12 and then 3 more is 15.

The red lines are dendrites. The denser the dendrites, the less likely the information will be forgotten.

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CCSS Standards are designed to develop conceptual understanding BEFORE fact mastery is required and facts are taught in tandem with these important understandings.

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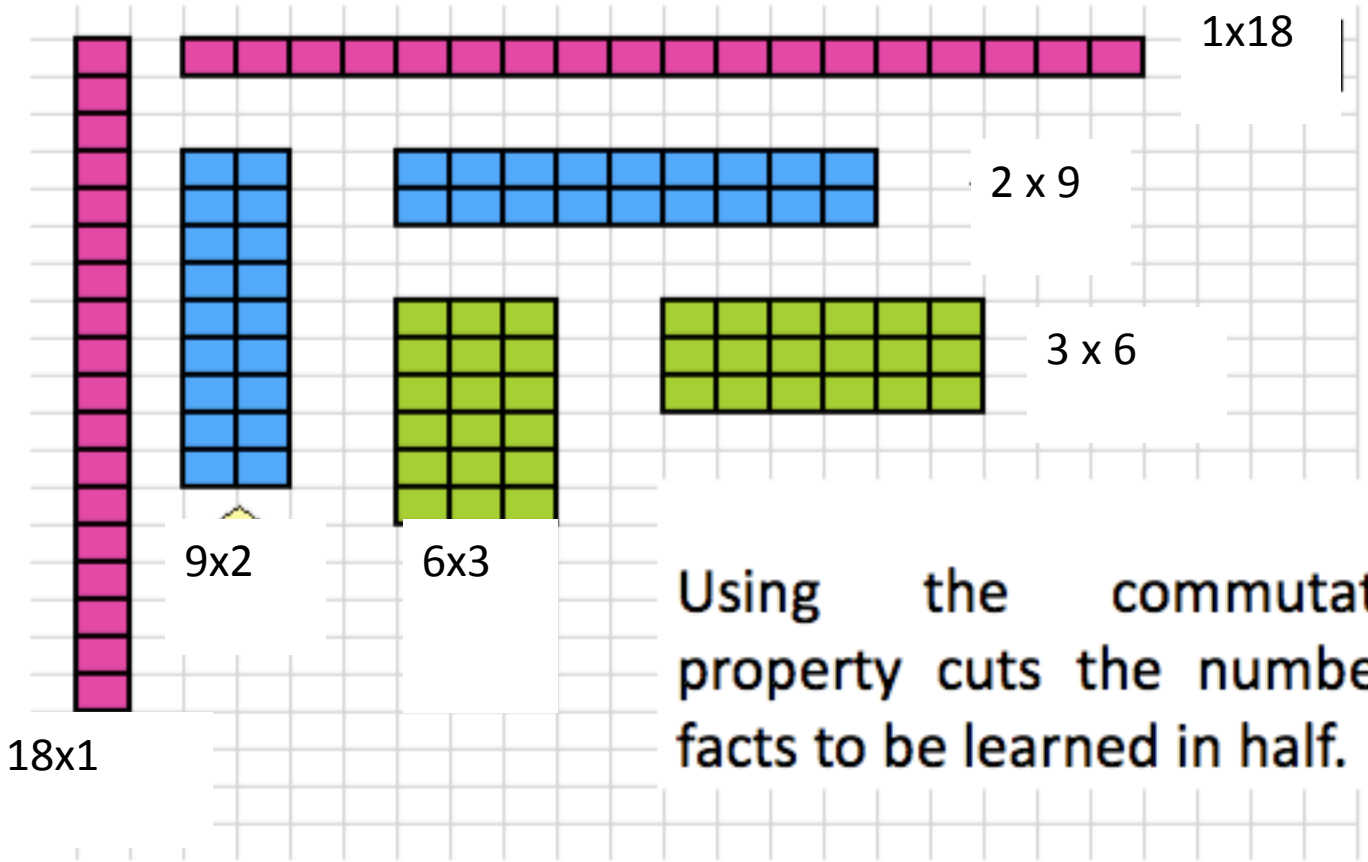
CCSS emphasize big conceptual ideas, such as commutativity, associativity, distributivity, identity and inverse properties, equality, structure, patterns and relationships in order to develop math fact fluency.

Children need to understand that multiplication is commutative



Using the commutativity property cuts the number of facts to be learned in half.

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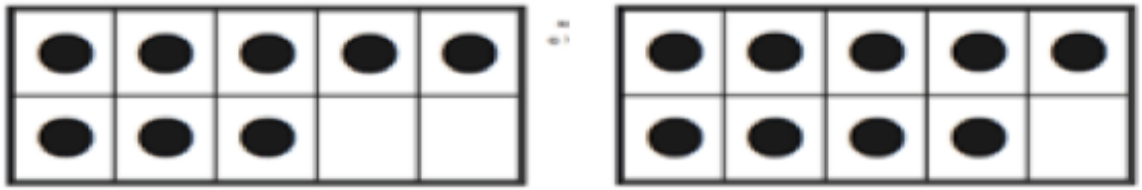
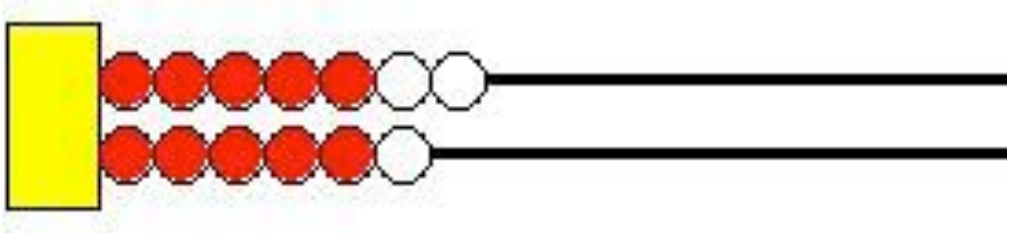
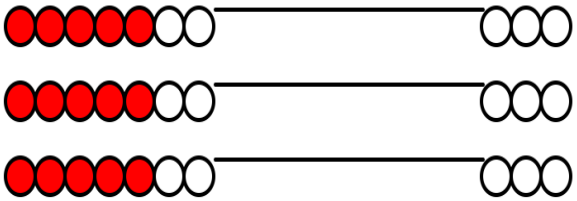
At every grade level, the CCSS calls for the use of drawings and visual models that support sequentially impaired* students in learning math facts.

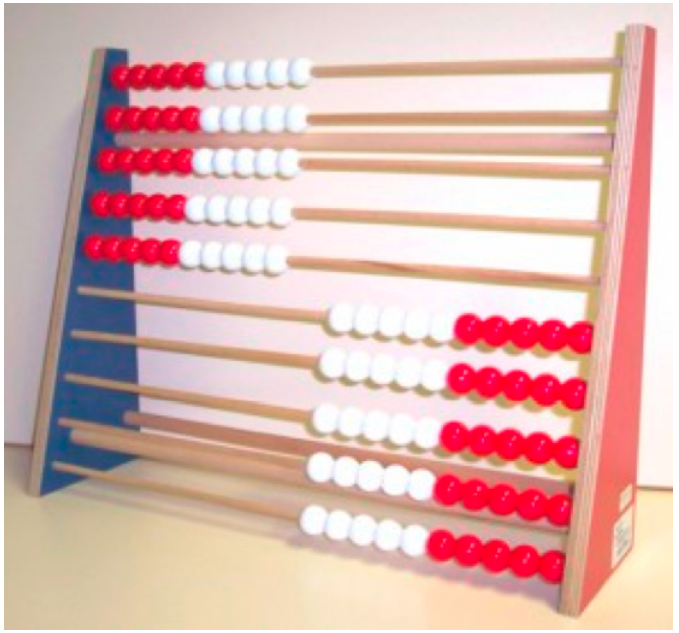




100 Bead Frame As a Visual Model for Multiplication



3 x 7 = 3 x 5 + 3 x 2



Doubles and Halves

- Do you agree that:
- 4 x 2is the same as 8 x 1?
- 4 x 4 is the same as 8 x 2?
- 4 x 6 is the same as 8 x 3?

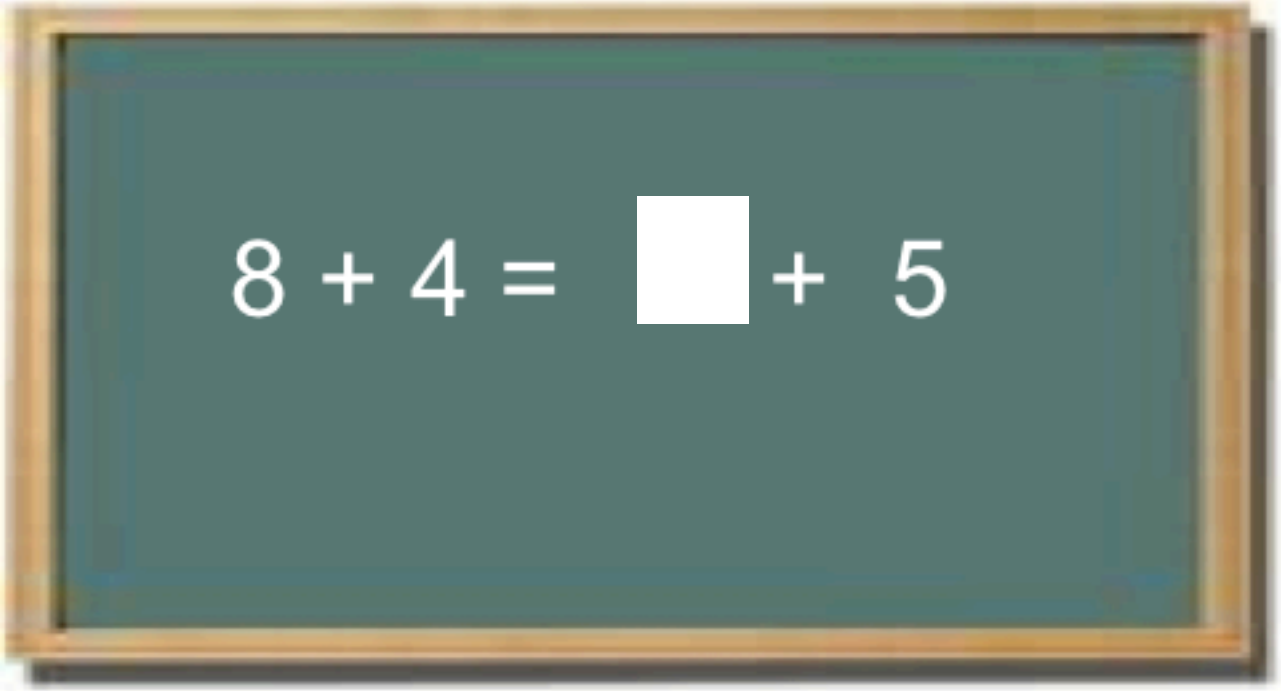
- 7 x 2 is the same as 14 x 1?
- 7 x 4 is the same as 14 x 2?
- 7 x 6 is the same as 14 x 3?

- 8 x 2 is the same as 16 x 1?

- 5 x 4 is the same as 10 x 2?
- 7 x 4 is the same as 14 x 2?

Do you see a pattern?
What is happening to the first factor? What is happening to the 2nd factor?
Would you see this pattern in any two factors?
What about 5 x 8? 15 x 8?

A 6th grade teacher presented this equation to her students.



“What number goes in the box?”

Parents May Ask:

Why aren't children learning to add/subtract/ multiply and divide the way we did? (Carrying, Borrowing, Regrouping, etc.)

Why are Traditional Algorithms Taught?

Algorithms have been the traditional method for many years.

Algorithms are useful, particularly when the computation involves many numbers and where memory may be overloaded by mental strategies.

Algorithms are automatic, easily carried out without having to analyze the underlying basis of the algorithm. *

Algorithms are fast, with a direct route to the answer.

Algorithms are easy to manage and assess. They put the teacher and student on the "same page". **

The question is not if, but *how* and *when* to teach traditional algorithms.

According the the CCSS, Traditional Algorithms are Taught at These Grade Levels:

Addition and Subtraction – 4th Grade

Multiplication – 5th Grade

Division – 6th Grade

1) Countries that outperform us in math delay the teaching of traditional algorithms until children have developed strong mental math and estimation skills.

2) Research shows that delaying the teaching of traditional algorithms helps ensure that children develop place value understanding and operational relationships which will be necessary to understand in higher math.

3) Research indicates that when traditional algorithms are delayed, children make fewer errors in computation and do better at problem solving and reasoning.

Business will not allow paper and pencil computation anymore.

Try an experiment. Calculate

3,996 + 4,246

How did you solve it?

1000 - 279 = ?

$$\begin{array}{r} 1000 \\ -279 \end{array}$$

279 +1 = 280 + 20 = 300 +700 = 1000

Parents May Ask:

How do the alternate strategies we are teaching work?

- The Split Strategy (Partial Sums)
- The Jump Strategy
- The Compensation Strategy
- The Partial Products Strategy
- The Partial Quotients Strategy

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Split Strategy

5 8

+ 3 5

I split the 58 into 50 and 8.
I split the 35 into 30 and 5.

I add the 50 and 30 to get 80.
I add the 8 and 5 to get 13.

I know that 80 + 13 is 93.

50 and 8

+ 30 and 5

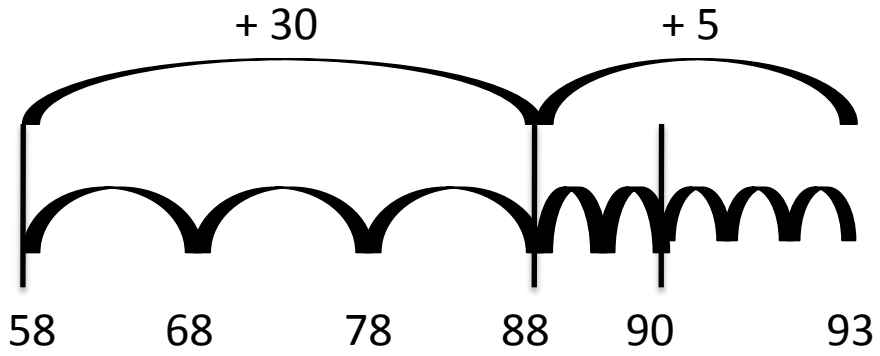
80 and 13

9 3

Jump Strategy

$$\begin{array}{r} 58 \\ +\ 35 \\ \hline \end{array}$$

Start at 58 and add 30. That's 88. You have 5 more to add. Add 2 to get to 90, then 3 more to get to 93.



Compensation Strategy

$$\begin{array}{r} 58 \\ +\ 35 \\ \hline \end{array}$$

I add 2 to 58 to make 60, an easy number. Then I must subtract that 2 from 35. That gives 33. I know that 60 and 33 is 93.

$$\begin{array}{rl} 58 & (+\ 2) \quad 60 \\ +\ 35 & (-\ 2) \quad 33 \\ \hline & \quad 93 \end{array}$$

net gain zero

Split Strategy for Subtraction

$$\begin{array}{r} 63 \\ -27 \\ \hline \end{array}$$

First I split 27 into 20 and 7.
I subtract 20 from 63, which is 43. I have 7 left to subtract.
I split 7 into 3 and 4.
I subtract the 3 from 43, which 40.
Finally I subtract 4 from 40, which is 36.

63
- 20 and 7

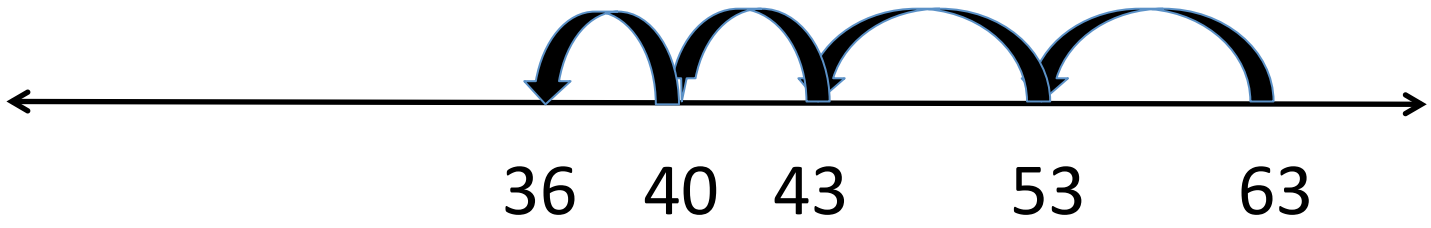
43 - 3 - 4 = 36
40 – 4 = 36
36 = 36

Jump Stratey for Subtraction

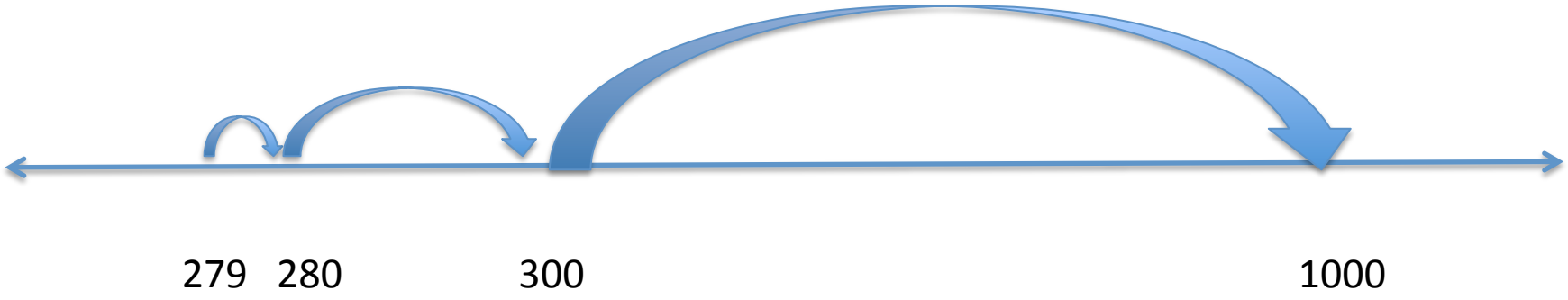
I start at 63 and jump back 10 to 53, another 10 to 43. Then I jump back 3 to get me to 40, and finally another 4 to get to 36.

63

-27



1000 - 279 = ?



279 +1 is 280 + 20 is 300 +700 = 1000

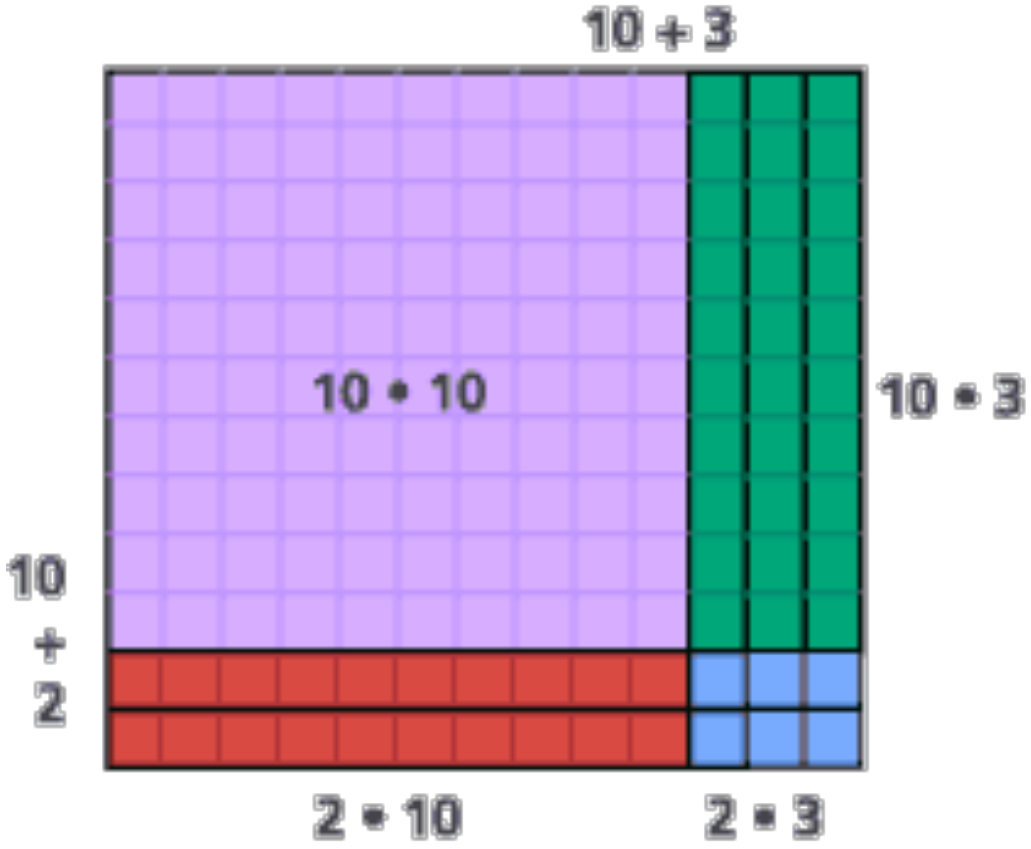
Compensation Strategy for Subtraction

I want to find an easy number to subtract, so I add 3 to both numbers. That changes the problem to 66 – 30. I subtract 30 from 66 for an answer of 36. Easy!

$$\begin{array}{r} 63 \\ -27 \\ \hline \end{array}$$

$$\begin{array}{r} 66 \\ -30 \\ \hline \end{array}$$

The Area Model of Multiplication



The Partial Products Strategy

70 and 5

<u>X 10 and 2</u>

	7	5	
x	1	2	
7	0	0	70 x 10 = 700
1	4	0	70 x 2 = 140
	5	0	5 x 10 = 50
	1	0	5 x 2 = 10
9	0	0	

Grid Multiplication

1).

	30	6
20		
3		

2).

	10	7
40		
1		

3).

	40	3
20		
7		

4).

	30	4
50		
3		

5).

	20	6
30		
4		

6).

	10	8
20		
4		

7).

	30	3
40		
2		

8).

	20	4
60		
2		

9).

	70	4
40		
1		

10).

	40	5
30		
8		

11).

	20	9
50		
7		

12).

	70	8
40		
3		

13).

	80	3
20		
6		

14).

	60	8
40		
3		

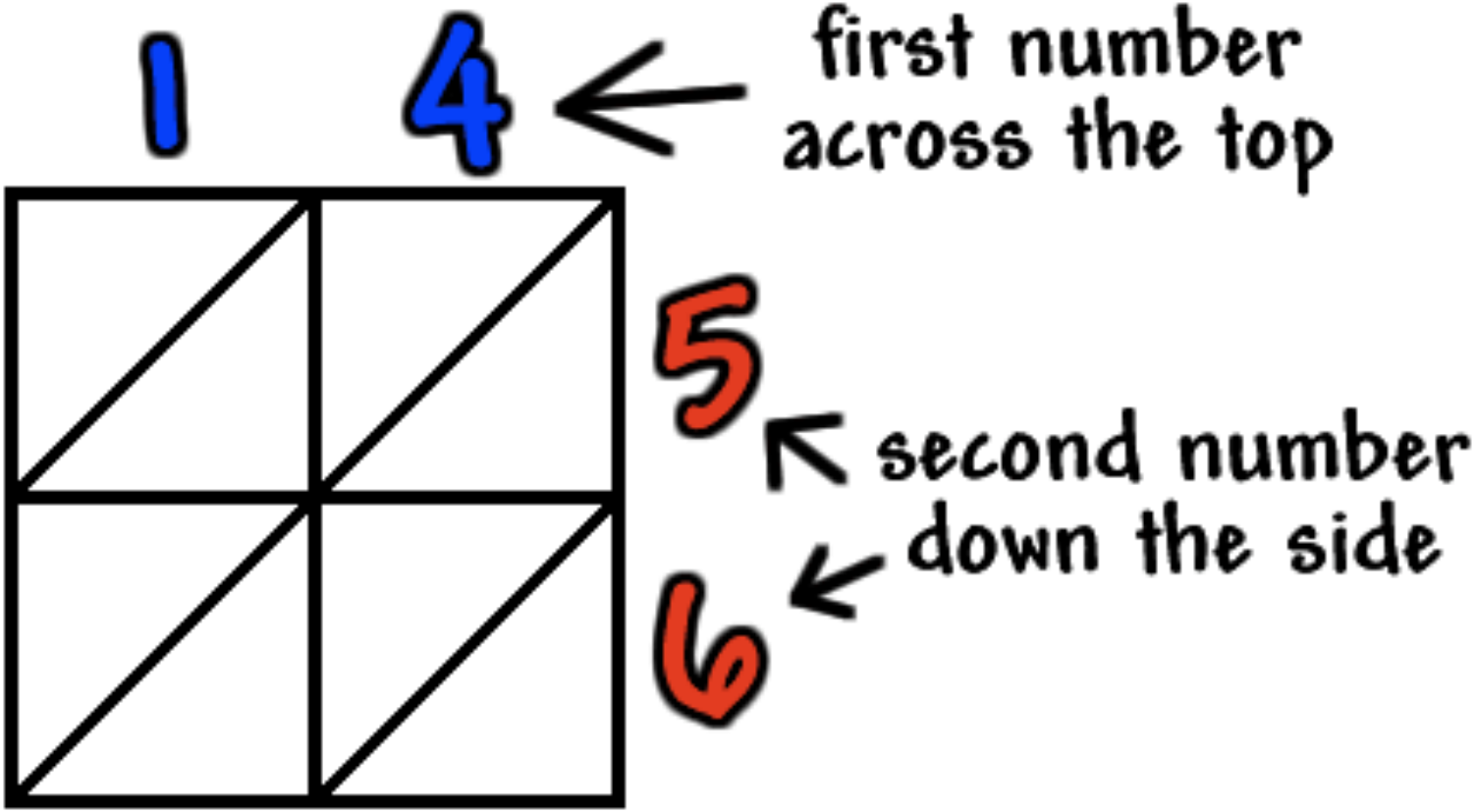
15).

	70	2
30		
7		

16).

	90	4
50		
1		

Lattice Multiplication



Decomposing and “Chunking”

$169 \div 14 = \square$

$140 + 29$

$140 \div 14 = 10$

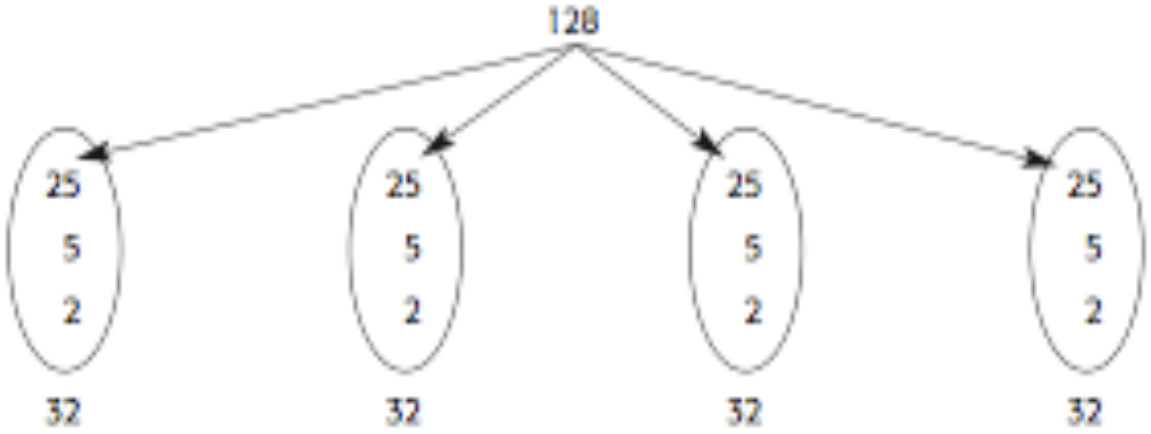
$29 \div 14 = 2\ R1$

$10 + 2 = 12$

$169 \div 14 = 12\ R1$

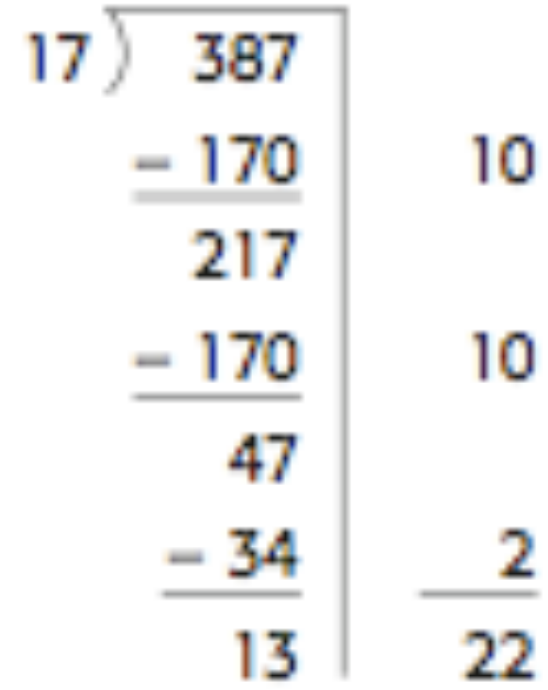
Division Using the Distributive Property

"Jamie's grandmother brought home 128 shells from her beach vacation. She wants to divide the shells equally among her 4 grandchildren. How many shells will each grandchild receive?"

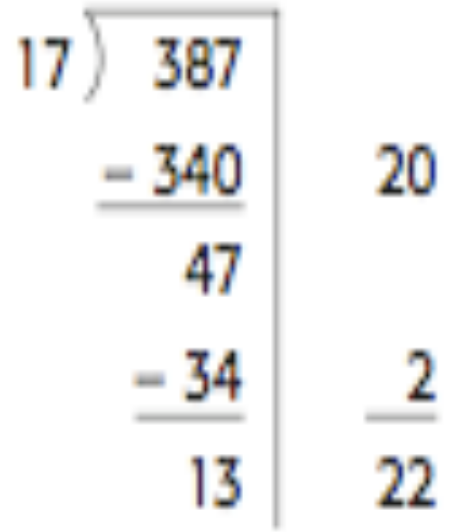


128 ÷ 4 = 100 ÷ 4 + 20÷4 + 8 ÷4

Partial Quotients



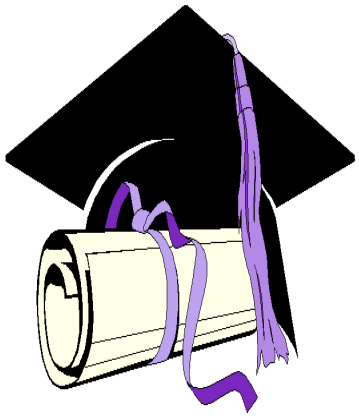
387 ÷ 17 = 22 R13



387 ÷ 17 = 22 R13

Parents May Ask:

Why all this problem solving?



CCSS are not a magic “elixir”

The CCSS will not change student achievement.

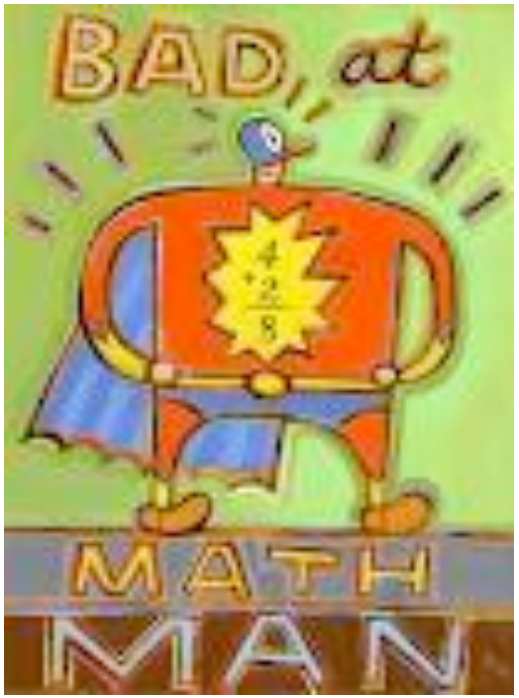
Changing instruction will raise achievement.

A Final Recommendation -

Never say:

"I don't like math"

"I'm not good at math" etc.



Tell the truth instead. Say

"I was taught math poorly"

and

"math is a challenge for me."

Teaching *ALL* our children to be mathematically literate is the obligation of <u>every</u> educator and every parent.

<u>ALL</u> children do not have the same mathematical talent…

But <u>ALL</u> children should have an equal opportunity to fully develop their mathematical talent.

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Q&A