How Can I Help My Child With Math When I Don’t Understand How It’s Being Taught?

http://bit.ly/1x73O0L

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Objectives for today:
Strategies and tools used to develop number sense and place value, including:
  • number talks
  • non-algorithmic problem-solving
  • tape diagrams
  • drawing and modeling
  • area models
  • number disks
Ways teachers can enrich and extend math for gifted students
Parent resources
Resources: books and websites
Let’s begin with ourselves

1

I am not good at math.

10

I consider myself good at math!
1. Lisa sold 15 cups of lemonade on Saturday and twice as many on Sunday. Which expression represents the total number of cups of lemonade she sold on both days?

A. $15 + 15$
B. $2 \times 15$
C. $15 + (2 \times 15)$
D. $2 \times (15 + 15)$
Dear Jack,

Don't feel bad, I have a Bachelor of Science degree in Electronics Engineering which included extensive study in differential equations and other higher math applications. Even I cannot explain the Common Core Mathematics approach, nor get the answer correct. In the real world, simplification is valued over complication. Therefore,

\[
\begin{align*}
427 & - 316 \\
& = 111
\end{align*}
\]

The answer is solved in under 5 seconds — 111. The process used is ridiculous and would result in termination if used.

Sincerely,
Frustrated Parent

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**Constructed Response**

Mike saw 17 blue cars and 25 green cars at the toy store. How many cars did he see? Write a number sentence with a \( \square \) for the missing number. Explain how the number sentence shows the problem.

\[
17 + 25 = \square\]

I got the answer by talking in my brain and I agreed of the answer that my brain got.

**Performance Task**

After saw these four signs at the theater.

(Section A, Section B, Section C, Section D)
One of the “Ten Dumbest Common Core Problems”

What is $7 + 8$?

Can you explain what happens mathematically when you add 7 and 8?
big ideas in math
grades k-2

* number and place value
* addition and subtraction
* basic facts
* measurement
big ideas in math
grades 3-5

* number and place value
* multi-digit computation
* fractions
* decimals
* basic facts
* measurement (area, perimeter, volume)
big ideas in math
grades 3-5

* number and place value
* addition and subtraction
* basic facts
* measurement
changes in expectations

Procedural

\[
\frac{2}{7} \bigcirc \frac{3}{5} \\
\frac{14}{18} \bigcirc \frac{14}{20} \\
\frac{13}{14} \bigcirc \frac{15}{16}
\]

Find common denominators

Cross multiply (bow-tie, butterfly, the x)

Conceptual

\[
\frac{2}{7} \bigcirc \frac{3}{5} \quad \text{Compare to 1/2}
\]

\[
\frac{14}{18} \bigcirc \frac{14}{20} \quad \text{Same number of pieces}
\]

\[
\frac{13}{14} \bigcirc \frac{15}{16} \quad \text{Size of pieces}
\]
**Conceptual Understanding**

Using the digits 1, 3, 4, 5, 7, 9, make two three-digit numbers that when added together have a sum between 800 and 1,000.

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**Procedural Knowledge**

<table>
<thead>
<tr>
<th>539</th>
<th>497</th>
</tr>
</thead>
<tbody>
<tr>
<td>+457</td>
<td>+315</td>
</tr>
</tbody>
</table>
“The goal is for children not to be bound to a rigid procedure such as an algorithm...but to look to the numbers to decide which strategy to use.”
Number talks

Goals: Reason, make sense, and construct strategies built upon numerical relationships

What makes a number talk?

* Mental math
* Multiple strategies
* Multiple opportunities to use strategies
Focus: Accuracy, efficiency, flexibility
number talks-books


number talks-websites

Kindergarten number talks  Dot cards, Rekenreks, ten frames
http://schoolwires.henry.kl2.ga.us/Page/37070

1st grade number talks
http://schoolwires.henry.kl2.ga.us/Page/38449

2nd grade number talks
http://schoolwires.henry.kl2.ga.us/Page/38450

3-5 grades number talks
http://schoolwires.henry.kl2.ga.us/Page/37071
http://www.mathperspectives.com/num_talks.html
http://www.svmimac.org/images/2012Cl.NumberStrings4.3-4.pdf
http://www.insidemathematics.org/classroom-videos/number-talks
https://grade2commoncoremath.wikispaces.hcpss.org/Number+Talks
http://www.insidemathematics.org/classroom-videos/number-talks
http://elemath.hallco.org/web/number-talks/
http://duinanddodder.sfinstructionalresources.wikispaces.net/Problem+Solving
enriching and extending math for gifted math students

Open-ended questions
Constructivist
Exploration
Problem-solving
Non-algorithmic
Increase complexity of problem
enriching and extending math for gifted students

Common Core Progressions

Mathwire problem-solving

Mathematics Performance Task Bank grades k-2

Mathematics Performance Task Bank grades 3-5

Delaware City Schools 5th Grade Enriched Math (grades 3 and 4 accessible from this page)
Frogs at a frog-jumping contest are given three jumps to reach the finish line. If a frog jumps halfway on its first jump, and one-third of the way to the $\frac{3}{4}$ mark on its second jump, how far must the frog jump on the third jump to reach the finish line?
Puppy fence

Your dad needs your help to put up a fence for your new puppy. You have 48 feet of fencing. The fence will be in the shape of a rectangle, and the fence must go all the way around the rectangle.

1. Find the lengths of the sides of at least 4 different fences that you could make using all 48 feet of fencing.

2. Find the area of your fences in part 1. Are all the areas the same?

3. What do you think is the largest area you can make with this amount of fencing? Explain your answer.
Our class is having a Halloween party, so I need to buy 44 candy bars. Snickers come 8 to a pack, and Hershey bars come 6 to a pack. I need to buy exactly 44, because I don’t want to have any candy bars left over after the party. How many of each kind of candy bar should I get?

Write an addition sentence and a multiplication sentence that match the problem.
Ms. Fiddyment brought 14 little cakes for her students to share. If there are 8 students and they all want the same amount, how much cake can each student have? Draw a picture and explain your thinking.

adapted from Extending Children’s Mathematics, Empson & Levi
Lela made 6 pans of brownies. She wants to give each friend $\frac{3}{8}$ of the pan. How many friends can get some brownie? Draw a picture and write the equation that matches this problem. (MCC5.NF.7)
Landon is sick and needs to take medicine. Each dose of medicine is \(\frac{3}{4}\) tsp. There are 5 \(\frac{1}{2}\) tsp. in the bottle. How many doses of medicine are in the bottle? Draw a model and explain your thinking.
“reasoning” problems

Develops number sense and reasoning about relationships

Opening/Activating strategies:

Multiplying three numbers (3rd grade)
Division comparison (4th grade)
Estimating sums and differences-fractions (5th grade)
Joey multiplied three numbers together and got 24. What three numbers could he have multiplied?

What strategy did you use to figure out the numbers?
MCC4.NBT.6

Which has the greater quotient: 
2686 ÷ 6 or 3612 ÷ 7?
Without solving the problem, explain which quotient is greater and why.
Number your paper 1-6. Write ONLY answers. Estimate! Use whole numbers (or zero), \( \frac{1}{4}, \frac{1}{2}, \text{ or } \frac{3}{4} \). You have 10 seconds per problem. Go!

1. \( 3 \frac{1}{8} + 2 \frac{4}{5} \)
2. \( \frac{9}{10} + 2 \frac{7}{8} \)
3. \( 1 \frac{3}{5} + 5 \frac{3}{4} + 2 \frac{1}{8} \)
4. \( 6 \frac{1}{4} - 2 \frac{1}{3} \)
5. \( \frac{11}{12} - \frac{3}{4} \)
6. \( 3 \frac{1}{2} - 9/10 \)
Some problems are easier to solve by drawing than by using traditional methods!
Mercedes has some eggs in the refrigerator. She takes out \( \frac{3}{5} \) of the eggs to make waffles and scrambled eggs. Mercedes uses \( \frac{2}{3} \) of the eggs she took out to make waffles. What fraction of the total number of eggs does Mercedes use to make waffles?
One-fourth of the fish in a bowl are guppies. The same number of guppies as originally were in the bowl are added. What fraction of the bowl is now guppies?
tape diagrams - resources

http://e2math.weebly.com/tape-diagrams.html

area models

connects multiplication and division
used for whole numbers, mixed numbers, decimals
factors are outside, product is inside
* if you know two of the numbers, you can find the third
area models

progression: arrays ➔ area models with blocks ➔ area models with numbers

[Diagram of area models with blocks and numbers]
6 \times 14

6 \times (10 + 4) = (6 \times 10) + (6 \times 4) = 60 + 24 = 84
\[
2 ½ \times 5 ²/₃ = 14 1/6
\]

\[
\begin{array}{c|c}
      & \frac{5}{2} & \frac{2}{6} \\
\hline
2   & 10         & \frac{4}{3} \\
½   & \frac{5}{2} & \frac{2}{6} \\
\end{array}
\]

\[
10 + \frac{4}{3} + \frac{5}{2} + \frac{2}{6} = 10 + (1 + \frac{2}{6}) + (2 + \frac{3}{6}) + \frac{2}{6} = 13 \frac{7}{6} = 14 \frac{1}{6}
\]
2,348 ÷ 12 = 195 r 8

100 + 50 + 40 + 5 = 195 r 8
number disks

similar to base ten blocks
size not related to place value
increased flexibility with large numbers and decimals
Step One--Select a division problem. Use place disks to build the dividend.

62 ÷ 4

![Diagram showing division process](http://woods.cmswiki.wikispaces.net/file/view/Pictorial+Division.pdf)
Step Two--Identify the divisor. Draw that number of rows on the place value chart.

\[ 62 \div 4 \]

\[ \text{divisor} \]

\[ \begin{array}{cccccc}
10 & 10 & 10 & 10 & 10 & 1
\end{array} \]

\[ \begin{array}{cccc}
1 & & & 1
\end{array} \]

\[ \begin{array}{cccc}
1) & & & \\
2) & & & \\
3) & & & \\
4) & & &
\end{array} \]
Step Three--Starting with the largest place value distribute the disks equally among the rows.

\[ 62 \div 4 \]

\textit{divisor}

\begin{array}{c|c|c|c}
1) & 10 & & \\
2) & 10 & & \\
3) & 10 & & \\
4) & 10 & & \\
\end{array}

from http://woods.cmswiki.wikispaces.net/file/view/Pictorial+Division.pdf
Step Four--If there are remaining hundreds or ten disks that cannot be distributed equally, trade them in for an equivalent number of lesser-value disks.
Step Five--Divide the lesser-value disks equally among the rows on the chart in the appropriate column. Continue until there are no more disks to distribute.

from http://woods.cmswiki.wikispaces.net/file/view/Pictorial+Division.pdf
Step Six--Count the number of disks in each row to make sure they are equal. Record any remaining disks as a remainder.

$$62 \div 4 = 15 \text{ r}2$$

from [http://woods.cmswiki.wikispaces.net/file/view/Pictorial+Division.pdf](http://woods.cmswiki.wikispaces.net/file/view/Pictorial+Division.pdf)
questions to ask your child

How did you get your answer?
What does this mean?
How do you know that this is correct?
Explain why you did this.
Do you think that always works? Can you find other examples?
What was challenging about this problem/task? Why was it challenging?
What was easy about this problem? Why was it easy?
Are there other ways you could do that?
Feel free to ask teachers for newsletters or request "Family Math Night" to communicate grade level expectations.

Kentucky Family Math Resources
Parent Roadmaps--Supporting Your Child in Mathematics (by grade level)
Cotton Elementary Math Coach, Henry County
Spotlight on Common Core--What do parents need to know?
Eureka math tips for parents
NCTM Educators’ Guide to Parents’ Questions on Math
resources-books


resources-websites

http://www.hcpss.org/academics/mathematics/curriculum/
http://illuminations.nctm.org/
https://www.oercommons.org/
http://www.insidemathematics.org/
http://ccak52012.wikispaces.com/Common+Tasks+and+Materials (grade level tasks)
https://www.georgiastandards.org/Common-Core/Pages/Math-K-5.aspx
http://www.readtennessee.org/math/teachers/k-3_common_core_math_standards/third_grade.aspx (kindergarten-third grade)
http://www.svmimac.org/images/Cristo_Rey_-_Middle_Level_Bank.pdf
http://betterlesson.com/common_core/
https://www.engageny.org/common-core-curriculum