Mental Math and Computational Fluency

Deep Run Elementary

A Tale of a Dog & Two Bears

The Importance of Mental Math

- Built on patterns and relationships, not rote procedures

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- Built on patterns and relationships,
  not rote procedures

$$26 + 57$$

$$25 + 58$$

$$24 + 59$$

$$23 + 60$$

The Importance of Mental Math

- Built on patterns and relationships,
  not rote procedures

$$3 + 4 + 7 \longrightarrow (3 + 7) = 10$$
$$10 + 4 = 14$$

$$23 + 17 \longrightarrow 3 + 7 = 10$$
$$10 + 10 + 20 = 40$$

The Importance of Mental Math

- Built on patterns and relationships,
  not rote procedures

17 x 32	6.25 x 400
34 x 16	62.5 x 40
68 x 8	625 x 4
136 x 4	
272 x 2	

The Importance of Mental Math

- Provides a way to evaluate answers for reasonableness

$$78 \times 59 = ?$$

$$
\begin{array}{r}
^{7}\;\;\; \\
78 \\
\times\, 59 \\
\hline
422 \;\longleftarrow
\end{array}
$$

$$
\begin{array}{r}
^{4}\;\;\; \\
^{7}\;\;\; \\
78 \\
\times\, 59 \\
\hline
702 \\
+\, 390 \\
\hline
1{,}092 \;\longleftarrow
\end{array}
$$

$$78 \times 59 = ?$$
$$\downarrow \qquad \downarrow$$
$$\approx 80 \quad \approx 60$$

$$78 \times 59 = ?$$
$$\approx 80 \times 60 = 4{,}800$$
$$78 \times 59 \approx 4{,}800$$

The Importance of Mental Math

- Reflects the kind of math adults do on a daily basis

The Importance of Mental Math

- Can be "the easy way"

Doing Math the Easy Way?

Let's take a look at a couple problems:

1st/2nd grades   **4th/5th grades**

14 – 6 = ____

600 x 100= ____

- How would **you** solve these problems?

- How do you think **a child** would solve these problems?

Traditional Algorithm: The Easy Way?

$$14 - 6 = \underline{\quad}$$

🤔

$$\begin{array}{r} {}^{0}\cancel{1}4 \\ -\quad 6 \\ \hline 0\,8 \end{array}$$

😄 👍

$$14 - 6 = \underline{\quad}$$

$$(14 - 4) - 2 = \underline{\quad}$$

$$10 - 2 = \underline{\mathbf{8}}$$

😄 👍

$$14 - 6 = \underline{\quad}$$

$$6 + \underline{\mathbf{8}} = 14$$

Traditional Algorithm: The Easy Way?

$$600 \times 100 = \underline{}$$

🤔

```
   600
 x 100
 _____
   000
  0000
+ 60000
_____
 60,000
```

😄 👍

$600 \times 100 = \underline{}$

$600 \times 10 = 6,000$
so
$600 \times 100 = \underline{}$
$600 \times 10 \times 10 = \underline{}$
$6,000 \times 10 = \underline{60,000}$

😄 👍

$600 \times 100 = \underline{}$

```
   600
  6,000
 60,000
```

Talking Numbers: Subtraction

3rd Grade- Math
Number Talk

Jeremiah Curtin
Leadership Academy

Talking Numbers: Division
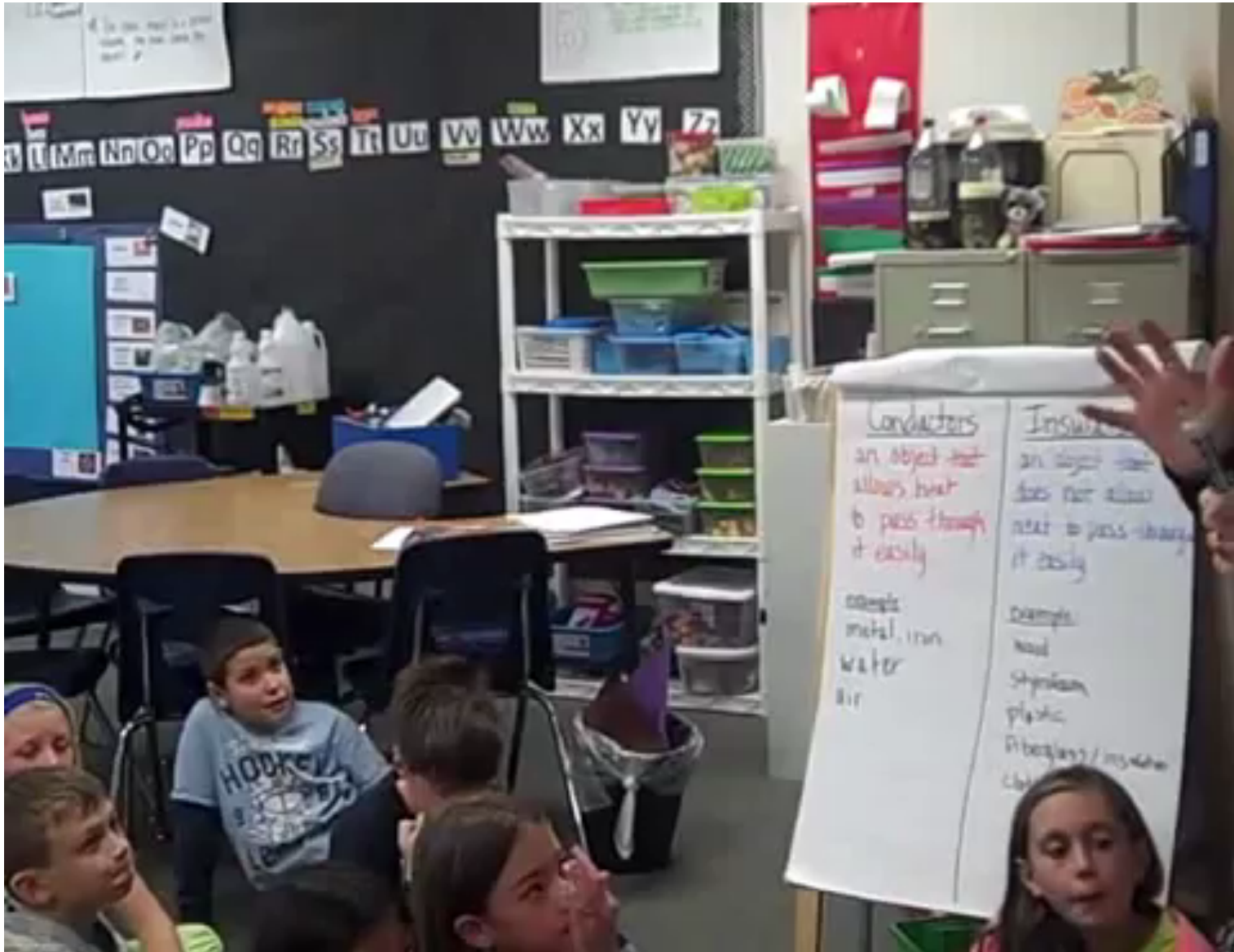
Mental Math and Fluency Expectations

GRADE	END-OF-YEAR EXPECTATION	EXAMPLES		
K	fluently + and – within 5	4 + 1	5 – 2	3 + 2

Mental Math and Fluency Expectations

GRADE	END-OF-YEAR EXPECTATION	EXAMPLES		
K	fluently + and − within 5	4 + 1	5 − 2	3 + 2
1	fluently + and − within 10	7 − 5	4 + 3	9 − 6
	± 10 for any two-digit number	26 + 10	84 − 10	

Mental Math and Fluency Expectations

GRADE	END-OF-YEAR EXPECTATION	EXAMPLES
K	fluently + and – within 5	4 + 1 5 – 2 3 + 2
1	fluently + and – within 10	7 – 5 4 + 3 9 – 6
	± 10 for any two-digit number	26 + 10 84 – 10
2	know from memory all sums of two one-digit addends	6 + 7 8 + 3 7 + 8 2 + 7 9 + 5 4 + 9
	± 10 and ± 100 for any three-digit number	473 – 10 816 + 10 352 – 100 709 + 100

Mental Math and Fluency Expectations

GRADE	END-OF-YEAR EXPECTATION	EXAMPLES
K	fluently + and – within 5	4 + 1 5 – 2 3 + 2
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1	± 10 for any two-digit number	26 + 10 84 – 10
2	know from memory all sums of two one-digit addends	6 + 7 8 + 3 7 + 8 2 + 7 9 + 5 4 + 9
2	± 10 and ± 100 for any three-digit number	473 – 10 816 + 10 352 – 100 709 + 100
3	know from memory all products of one-digit factors	4 x 9 8 x 6 5 x 7 7 x 3 2 x 9 4 x 8

Computation Expectations by Grade

GRADE	END-OF-YEAR EXPECTATION
K	• add and subtract within 10
1	• add and subtract within 20 • add within 100 • subtract two-digit multiples of 10
2	• add and subtract within 1,000
3	• add and subtract within 1,000 • multiply two one-digit factors • multiply one-digit factors by a multiple of 10
4	• add and subtract within 1,000,000 • multiply: 1 by 4 and 2 by 2 • divide: up 4 by 1
5	• multiply multi-digit numbers • divide: up to 4 by 2 • perform all operations on decimals

Working Together to Build Mathematical Thinkers

The school's role...

- offer rich, purposeful mathematical experiences

- provide number strategy instruction & practice

The families' role...

- ask your child to show you what he or she has learned

- look for ways to apply the learning in real-life situations

Our shared role...

- highlight and build on the students' strengths
- celebrate questions, mistakes, growth, effort, and struggle

Websites

http://gregtangmath.com/games.html

http://www.topmarks.co.uk/maths-games/hit-the-button

Greg Tang Books

K-2 Primary
- Math-terpieces
- Math Fables
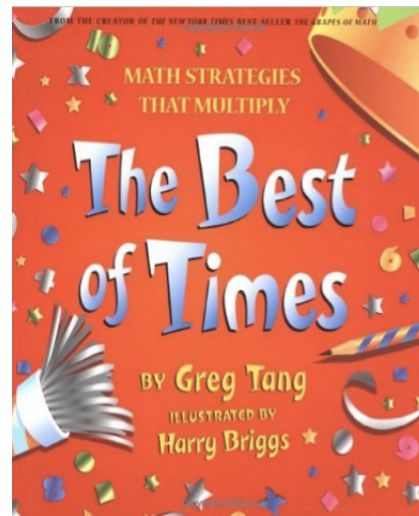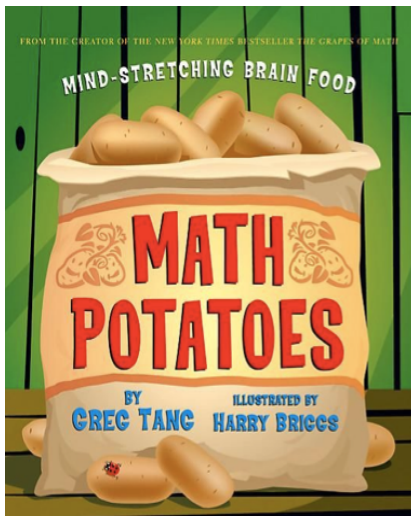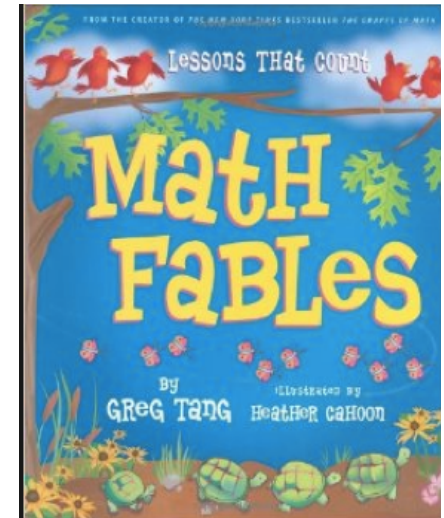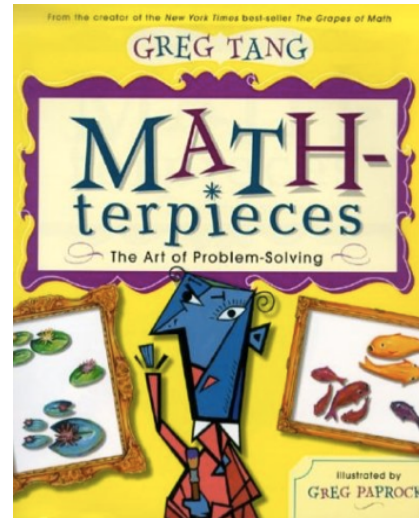
3-5 Intermediate
- Math Potatoes
- The Best of Times

Greg Tang Books

Peruse the books.

Choose one for your family.

Fill out one of the book labels.

Put it in the container.

This book belongs to

the _____ family
(family's last name)

children in grade(s) _____