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EDUCATIONAL CONSULTING
Supporting Educators
Improving Teaching and Learning

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Examining Student Work for Student Thinking (grades 3-8)

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ATMNE Conference, Killington, VT
October 25, 2013

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Agenda

1. Why examine student work?
2. A 5th/6th grade fractions writing prompt
3. Student-generated calculation methods
4. MARS formative assessment tasks
   (you choose your grade level and task)
5. Wrap-up

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Examining Student Work

Why, when adding and subtracting decimals, must you line up the decimal points? You may use pictures to help you explain, but you must also explain in words.

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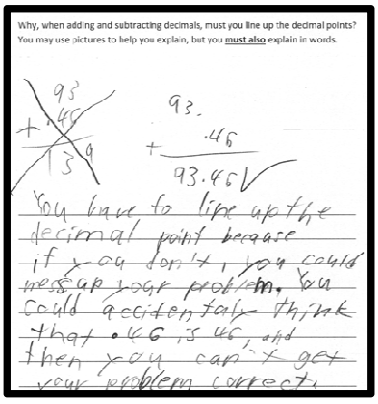
Steven

- **Procedural only**
- **Focused on the answer**
- **Example shows procedure**



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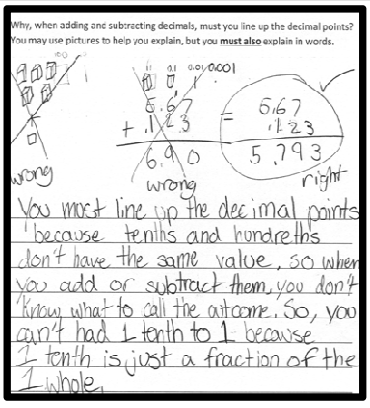
Anna

- **Conceptual**
- **Focused on place value**
- **Uses base ten blocks in picture but doesn't explain them**



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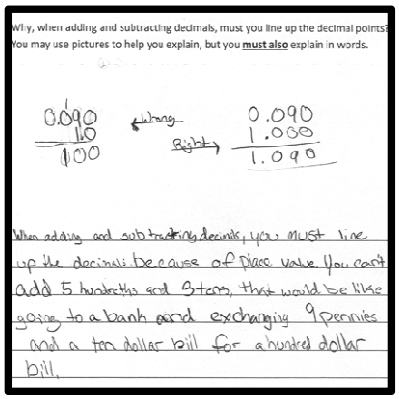
Caitlin

- **Conceptual**
- **Focused on place value**
- **Money example in the text matches her calculation example**



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Student Thinking

- All 3 students could add decimals correctly.
- The differences were in their level of thinking about the problem conceptually.
- Student thinking tells us about student understandings and student misconceptions.

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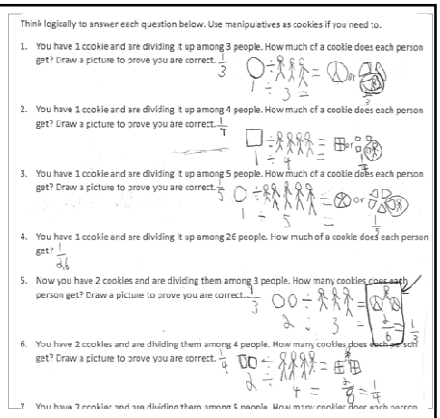
Jennifer

a/b = a ÷ b

- **1 ÷ n is correct**
- **What happens when it becomes 2 ÷ n ?**



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A Fractions Writing Prompt

Explain why 5 x 5/6 equals 4 1/6.
You may not use the algorithm to explain.
You must explain why the answer actually makes sense.

In groups of 2-3, examine the index cards and discuss the questions on the back.

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Discussion Questions:

- What does the student understand?
- What does the student misunderstand?
- What would you do to correct any misunderstandings?
- If you could ask the student one question about their work/response, what would it be? What information would you hope to gain by asking that question?
- How might you improve the prompt/problem/question in order to get better information about student thinking?

When looking at multiple pieces of work together:

- What trends do you see in these work samples? How might those trends impact your decisions about what to do next in your classroom?

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Student-generated Calculation Methods

- Posted around the room are student-generated calculation methods. **All of these methods DO work.**
- **Begin anywhere.** Look at each method and try to figure out what the student was thinking.
- **Can you figure out why each method works?**

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A

$$\begin{array}{r} 276 \\ +\ 89 \\ \hline 15 \\ 15 \\ 2 \\ \hline 365 \end{array}$$

B

$$\begin{array}{r} 276 \\ +\ {}^{1}{}^{1}89 \\ \hline 365 \end{array}$$

C

$$\begin{array}{r} 276 \rightarrow 265 \\ +\ 89 \rightarrow 100 \\ \hline 365 \end{array}$$

D

$$\begin{array}{r} 29 \\ \cancel{30}\ {}^{1}07 \\ -\ 284 \\ \hline 2723 \end{array}$$

E

$$\begin{array}{r} 3007 \\ -\ 284 \\ \hline 16 \\ +\ 700 \\ +\ 2000 \\ +\ 7 \\ \hline 2723 \end{array}$$

F

$$\begin{array}{r} 3007 \rightarrow 3023 \\ -\ 284 \rightarrow 300 \\ \hline 2723 \end{array}$$

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G

$$\begin{array}{r} 3\ {}^{1}0\ {}^{1}0\ 7 \\ -\ {}_{1}\ 2_{1}\ 8\ 4 \\ \hline 2\ 7\ 2\ 3 \end{array}$$

H

126 x 48

= 252 x 24

= 504 x 12

= 1008 x 6

= 6,048

I

13 x 14

= 144 + 24 + 14

= 182

J

$$\begin{array}{r} 5\ 7 \\ \times\ 2\ 6 \\ \hline 4\ 2 \\ 3\ 0\ 0 \\ 1\ 4\ 0 \\ +\ 1\ 0\ 0\ 0 \\ \hline 1\ 4\ 8\ 2 \end{array}$$

K

57 x 26 =

(50 + 7)(20 + 6) =

1000 + 300 + 140 + 42 =

1482

L

2/3 ÷ 4/5 =

10/15 ÷ 12/15 =

10/12 =

5/6

Why did we do this?

- Allowing students to create and explain their own calculation methods allows us to see their thinking.
- Sometimes their algorithms are equally efficient as the traditional ones.
  - **Always teach the traditional algorithms to mastery also!**

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Examine a MARS Task

(MARS – Mathematics Assessment Resource Service)

These analyses of student work and resources for teachers available on the Inside Mathematics website:

www.insidemathematics.org

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Examine a MARS Task

1. Find a group of 3-4 from the same grade level.
2. Send a representative to choose a task.
3. Peruse the packet to see what is inside.
4. **Discuss the student work.**
   What do you notice about student understandings and misunderstandings?

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The Take-Home Message

- We can "see" students' thinking in their written work and calculation methods
- Examining student work for student thinking allows us to see:
  - student understandings
  - hidden misconceptions

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Resources

- The MARS Assessment Tasks used in this workshop are free to download from the Inside Mathematics website: **www.insidemathematics.org**
- Today's presentation handout: **tinyurl.com/ATMNE2013studentwork**
- Email me: Ann Gaffney at **gaffneyedcons@gmail.com**

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