

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

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# Agenda

[tinyurl.com/  
Wilmington2014](http://tinyurl.com/Wilmington2014)

1. Introduction
2. A 5<sup>th</sup>/6<sup>th</sup> grade fractions writing prompt
3. MARS formative assessment tasks (you choose your grade level and task)
4. 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

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.

~~$$\begin{array}{r} 93 \\ + 45 \\ \hline 138 \end{array}$$~~

$$\begin{array}{r} 93. \\ + .45 \\ \hline 93.45 \end{array}$$

You have to line up the decimal point because if you don't, you could mess up your problem. You could accidentally think that .45 is 45, and then you can't get your problem correct.

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

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## Anna

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.

~~$$\begin{array}{r} 5.67 \\ + 1.23 \\ \hline 6.90 \end{array}$$~~

wrong

$$\begin{array}{r} 5.67 \\ + 1.23 \\ \hline 5.793 \end{array}$$

right

You must line up the decimal points because tenths and hundredths don't have the same value, so when you add or subtract them, you don't know what to call the outcome. So, you can't add 1 tenth to 1 because 1 tenth is just a fraction of the 1 whole.

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

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## Caitlin

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.

~~$$\begin{array}{r} 0.090 \\ + 1.000 \\ \hline 1.090 \end{array}$$~~

wrong

$$\begin{array}{r} 0.090 \\ + 1.000 \\ \hline 1.090 \end{array}$$

right

When adding and subtracting decimals, you must line up the decimals because of place value. You can't add 5 hundredths and 9 tenths, that would be like going to a bank and exchanging 9 pennies and a ten dollar bill for a hundred dollar bill.

- 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*

$a/b = a \div b$

- $1 \div n$  is correct
- What happens when it becomes  $2 \div n$  ?

Think logically to answer each question below. Use manipulatives as cookies if you need to.

1. You have 1 cookie and are dividing it up among 3 people. How much of a cookie does each person get? Draw a picture to prove you are correct.  $\frac{1}{3}$
2. You have 1 cookie and are dividing it up among 4 people. How much of a cookie does each person get? Draw a picture to prove you are correct.  $\frac{1}{4}$
3. You have 1 cookie and are dividing it up among 5 people. How much of a cookie does each person get? Draw a picture to prove you are correct.  $\frac{1}{5}$
4. You have 1 cookie and are dividing it up among 25 people. How much of a cookie does each person get?  $\frac{1}{25}$
5. Now you have 2 cookies and are dividing them among 3 people. How many cookies does each person get? Draw a picture to prove you are correct.  $\frac{2}{3}$
6. You have 2 cookies and are dividing them among 4 people. How many cookies does each person get? Draw a picture to prove you are correct.  $\frac{2}{4} = \frac{1}{2}$
7. You have 3 cookies and are dividing them among 5 people. How many cookies does each person get?

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## Student Thinking

- Jennifer has a misconception. What is it?
- Jennifer is confused about the whole. Is one cookie the whole or is the group of cookies the whole?
- Student thinking tells us about student understandings and student misconceptions.

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## A Fractions Writing Prompt

Explain why  $5 \times \frac{5}{6}$  equals  $4 \frac{1}{6}$ .  
 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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## 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](http://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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13

## Resources

- The MARS Assessment Tasks used in this workshop are free to download from the Inside Mathematics website: **[www.insidemathematics.org](http://www.insidemathematics.org)**
- Today's presentation handout: **[tinyurl.com/Wilmington2014](http://tinyurl.com/Wilmington2014)**
- Email me: Ann Gaffney at **[gaffneyedcons@gmail.com](mailto:gaffneyedcons@gmail.com)**

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14



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15