

# Math Mistakes

## (<http://mathmistakes.org/>)

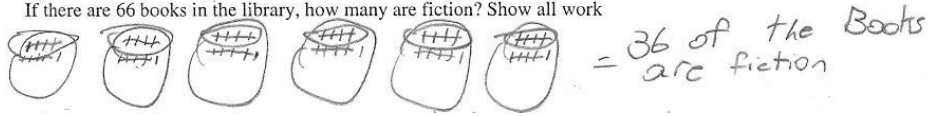
## Category Archives: Ratios and Proportions

### 5 out of 6 Books

## (<http://mathmistakes.org/5-out-of-6-books/>)

Posted on June 17, 2016 (<http://mathmistakes.org/5-out-of-6-books/>) by mpershan (<http://mathmistakes.org/author/mpershan/>) | 2 Comments ([http://mathmistakes.org/5-out-of-6-books/#disqus\\_thread](http://mathmistakes.org/5-out-of-6-books/#disqus_thread))

(2 points) In a class library, 5 out of 6 books are non-fiction.  
If there are 66 books in the library, how many are fiction? Show all work



(<http://mathmistakes.org/5-out-of-6-books/unnamed/>)

At first, this is what I thought the student had done:

- First, the student drew six circles to represent “out of 6 books.”
- Then, they distributed, one-by-one, the 66 books into each of the 6 circles. (If they just put 11 in each, why tally them?)
- Then, the student searched for a way to represent the “5 out of” that are non-fiction.
- It follows that the remaining books are fiction. That makes six sixes, or 36 books.

But then Bridget and Julie came in with a fantastic, different interpretation. Their’s feels like an improvement on my first draft.

## About

This site is about compiling, analyzing and discussing the mathematical errors that students make. The site is edited by **Michael Pershan**, a middle school and high school math teacher from NYC.

## Submit a mistake

To keep the site going we need lots of interesting mistakes. To submit a picture of mathematical work, email [michael@mathmistakes.org](mailto:michael@mathmistakes.org)

## Random Mistake!

Get a random post. (<http://mathmistakes.org/random/>)

# Categories

- ▶ Elementary School (<http://mathmistakes.org/category/elementary-school/>) (113)
- ▶ Geometry (<http://mathmistakes.org/category/geometry/>) (58)
- ▶ Middle School (<http://mathmistakes.org/category/middle-school/>) (33)
- ▼ Algebra 1 (<http://mathmistakes.org/category/9algebra1/>) (173)
  - » exponents (<http://mathmistakes.org/category/9algebra1/exponents/>) (26)
  - » factoring (<http://mathmistakes.org/category/9algebra1/factoring/>) (7)
  - ▶ linear functions (<http://mathmistakes.org/category/9algebra1/linear-functions/>) (18)
  - » Quadratics (<http://mathmistakes.org/category/9algebra1/quadratics/>) (8)
  - » Radicals (<http://mathmistakes.org/category/9algebra1/radicals/>) (5)
  - » Solving Linear Equations (<http://mathmistakes.org/category/9algebra1/solving-linear->



**Michael Pershan** @mpershan

17 Jun

This is as far as I've gotten. Any ideas?

[pic.twitter.com/6xYIFP1ei8](http://pic.twitter.com/6xYIFP1ei8)



**Bridget Dunbar**

@BridgetDunbar

Follow

@mpershan you don't think it's possible that they saw the 5 separate from the 6? As in 5 are fiction and 6 are non-fiction...

8:34 AM - 17 Jun 2016



**Bridget Dunbar** @BridgetDunbar

17 Jun

@mpershan you don't think it's possible that they saw the 5 separate from the 6? As in 5 are fiction and 6 are non-fiction...



**Julie Wright**

@julierwright

Follow

@BridgetDunbar @mpershan Agreed. "There are 5 non=f for every 6 f." In person I'd ask, "Which do you think there are more of, non-f or f?"

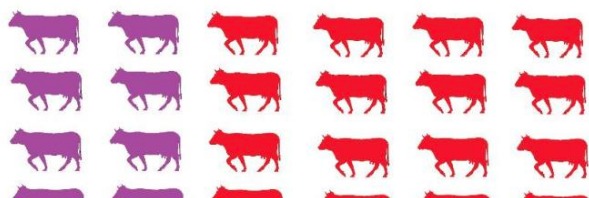
8:56 AM - 17 Jun 2016 · Portland, OR

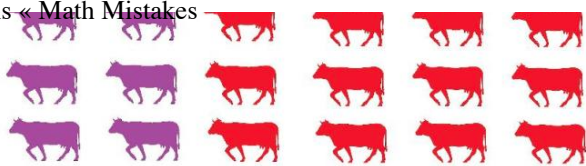
1

We then got to work trying to come up with some activities to address this work. Suppose that your class of 6th Graders try this problem, and a lot of your class has struggles that are similar to the work above. You're planning tomorrow's lesson. What activity would you begin class with?

This is what we came up with ([https://docs.google.com/presentation/d/11-8iTYayp4HwAMWyrLS7iNNHGRV0JjGrpu0\\_lveQcCQ/edit#slide=id.g114419e25b\\_0\\_41](https://docs.google.com/presentation/d/11-8iTYayp4HwAMWyrLS7iNNHGRV0JjGrpu0_lveQcCQ/edit#slide=id.g114419e25b_0_41)). Which of these activities do you think would be most helpful? Are there any changes you would make to any of them? Is there a combination and sequence of these activities that you think would work particularly well? (I took a shot at sequencing them below. Some details on activity structures are here (<http://math.newvisions.org/instructional-activities?course=A1&unit=All&type=Contemplate%20then%20Calculate>).

**Activity: Contemplate then Calculate**





\_\_\_ out of \_\_\_ of my cows are purple.

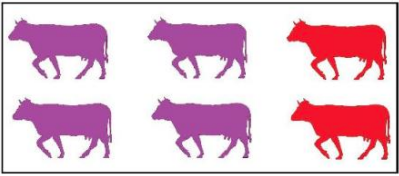
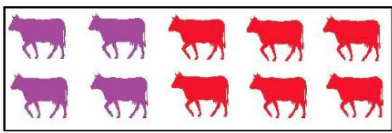
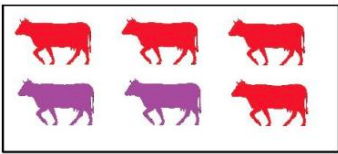
[\(http://mathmistakes.org/5-out-of-6-books/5-out-of-6-mistake-page-005/\)](http://mathmistakes.org/5-out-of-6-books/5-out-of-6-mistake-page-005/)

**Activity: Connecting Representations**

2 out of 3 of my cows are purple.

The purple to red ratio for my cows is 2 to 3.

???



[\(http://mathmistakes.org/5-out-of-6-books/5-out-of-6-mistake-page-001/\)](http://mathmistakes.org/5-out-of-6-books/5-out-of-6-mistake-page-001/)

**Activity: Problem String**

3 out of 4 of my cows are purple.

- If I have 8 cows, how many are purple?
- If I have 40 cows, how many are purple?
- If I have 80 cows, how many are **not** purple?
- If I have 24 cows, how many are purple?

- » Quadratic Functions (<http://mathmistakes.org/category/9algebra1/quadratic-functions/>) (3)
- » Scientific Notation (<http://mathmistakes.org/category/9algebra1/scientific-notation/>) (2)
- » Graphing (<http://mathmistakes.org/category/9algebra1/graphing-9algebra1/>) (9)
- » Simplifying expressions (<http://mathmistakes.org/category/9algebra1/simplifying-expressions/>) (4)
- » Negative Numbers (<http://mathmistakes.org/category/9algebra1/negative-numbers/>) (11)
- » Rational Expressions (<http://mathmistakes.org/category/9algebra1/rational-expressions-9algebra1/>) (7)
- » Solving Linear Inequalities (<http://mathmistakes.org/category/9algebra1/solving-linear-inequalities/>) (2)

**Activity: Analyzing Peer Work (Part 1)**

Julia **did** solve this equation correctly. Here is her work.

- Why did Julia put 10 and 10 in each circle?
- **Your turn:** 2 out of 3 of my cows are purple. I have 96 cows. How many are purple?

[\(http://mathmistakes.org/5-out-of-6-books/5-out-of-6-mistake/\)](http://mathmistakes.org/5-out-of-6-books/5-out-of-6-mistake/)

**Activity: Analyzing Peer Work (Part 2)**

Taby **didn't** solve this problem correctly. Here is her work.

- Is 36 out of 66 the same as 5 out of 6? Show how you know.
- **Your turn:** 3 out of 4 of my cows are purple. I have 80 cows. How many are purple?

Posted in Fractions (<http://mathmistakes.org/category/middle-school/fractions-middle-school/>), Ratios & Proportional Relationships (<http://mathmistakes.org/category/grade-6/ratios-proportional-relationships/>), Ratios and Proportions (<http://mathmistakes.org/category/9algebra1/ratios-and-proportions/>).

# Bedtime Math Mistakes (<http://mathmistakes.org/bedtime-math-mistakes/>)

Posted on July 9, 2015 (<http://mathmistakes.org/bedtime-math-mistakes/>)  
by mpershan (<http://mathmistakes.org/author/mpershan/>) | 1 Comment  
([http://mathmistakes.org/bedtime-math-mistakes/#disqus\\_thread](http://mathmistakes.org/bedtime-math-mistakes/#disqus_thread))

From Bedtime Math (<http://bedtimemath.org/fun-math-boomerang/>):

*Big kids:* The record distance for a thrown boomerang to travel is 1,401 feet ([http://en.wikipedia.org/wiki/Boomerang#Competitions\\_and\\_records](http://en.wikipedia.org/wiki/Boomerang#Competitions_and_records)). If it traveled exactly 1,401 feet on the return trip too, how many feet did it travel in total? *Bonus:* Meanwhile, the longest Frisbee throw is 1,333 feet ([http://en.wikipedia.org/wiki/Aerobie#World\\_records](http://en.wikipedia.org/wiki/Aerobie#World_records)) – about a quarter of a mile! How much farther from the thrower did the boomerang travel than the Frisbee?

From the submitter, who sends in the thinking of two of his students:

(1) first student, having doubled the boomerang distance in the earlier question, now doubles the frisbee distance and calculates  $(2801 - 2666)$  feet.  
(2) Second student gets an 100 board and spends a short time calculating  $100 - 33 = 67$ . Then thinks for a long time during which I'm sure he is going to say  $67 + 1 = 68$ , but never quite does it. I stay silent until he announces: 667. No clue where the extra 600 came from. He wasn't willing to write down or draw anything to explain his thinking.

Interesting! I'm inclined to put the first student in the "extending the thinking you'd do in one model to a less familiar situation (<http://mathmistakes.org/classifying-math-mistakes/>)" category and the second student in the associational mistake (<http://mathmistakes.org/classifying-math-mistakes/>) (same link) category.

Posted in Numbers & Operations in Base 10 (<http://mathmistakes.org/category/grade-4/numbers-operations-in-base-10-grade-4/>), Numbers & Operations in Base 10 (<http://mathmistakes.org/category/grade-5/numbers-operations-in-base-10-grade-5/>), Ratios and Proportions (<http://mathmistakes.org/category/9algebra1/ratios-and-proportions/>), Subtraction (<http://mathmistakes.org/category/elementary-school/subtraction/>).

(<http://mathmistakes.org/category/9algebra1/naming-coordinates/>) (1)

- ▶ Algebra 2 (<http://mathmistakes.org/category/algebra2/>) (57)
- ▶ Trigonometry (<http://mathmistakes.org/category/trigonometry/>) (29)
- ▶ Calculus (<http://mathmistakes.org/category/0009calculus/>) (16)

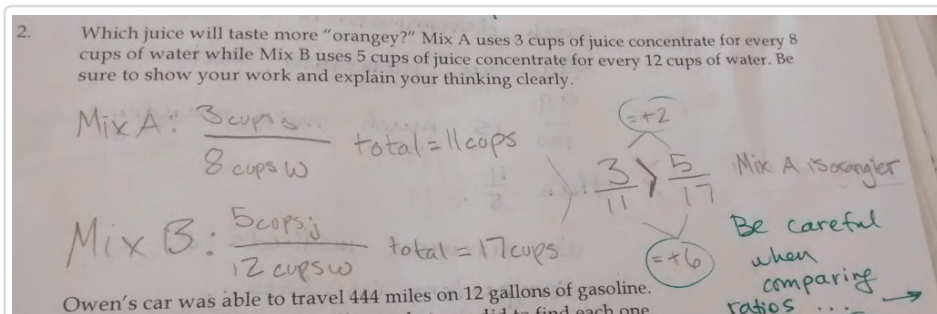
## Common Core Standards

- ▶ Grade 1 (<http://mathmistakes.org/category/grade-1/>) (4)
- ▶ Grade 2 (<http://mathmistakes.org/category/grade-2/>) (5)
- ▶ Grade 3 (<http://mathmistakes.org/category/grade-3/>) (26)
- ▶ Grade 4 (<http://mathmistakes.org/category/grade-4/>) (53)
- ▶ Grade 5 (<http://mathmistakes.org/category/grade-5/>) (27)
- ▶ Grade 6 (<http://mathmistakes.org/category/grade-6/>) (1/20/17, 2:43 PM)

# Comparing Ratios: What Feedback Would You Give?

## (<http://mathmistakes.org/comparing-ratios-what-feedback-would-you-give/>)

Posted on September 22, 2014 (<http://mathmistakes.org/comparing-ratios-what-feedback-would-you-give/>) by mpershan (<http://mathmistakes.org/author/mpershan/>) | 6 Comments ([http://mathmistakes.org/comparing-ratios-what-feedback-would-you-give/#disqus\\_thread](http://mathmistakes.org/comparing-ratios-what-feedback-would-you-give/#disqus_thread))



([http://i1.wp.com/mathmistakes.org/wp-content/uploads/2014/09/IMG\\_20140922\\_122721158-2.jpg](http://i1.wp.com/mathmistakes.org/wp-content/uploads/2014/09/IMG_20140922_122721158-2.jpg))

What feedback would you give to this student? Some considerations...

- Would you ask a question or make a statement?
- What written feedback would be most helpful?
- If you were able to have a conversation with this student, how would you start it?
- What would the student's job be once you handed the paper back to him/her?

Posted in Feedback (<http://mathmistakes.org/category/feedback/>), Ratios & Proportional Relationships (<http://mathmistakes.org/category/grade-7/ratios-proportional-relationships-grade-7/>), Ratios and Proportions (<http://mathmistakes.org/category/9algebra1/ratios-and-proportions/>).

- ▶ Grade 7 (<http://mathmistakes.org/category/grade-7/>) (21)
- ▶ Grade 8 (<http://mathmistakes.org/category/grade-8/>) (37)
- ▶ High School: Algebra (<http://mathmistakes.org/category/high-school-algebra/>) (47)
- ▶ High School: Functions (<http://mathmistakes.org/category/high-school-functions/>) (72)
- ▶ High School: Geometry (<http://mathmistakes.org/category/high-school-geometry/>) (46)
- ▶ High School: Modeling (<http://mathmistakes.org/category/high-school-modeling/>) (2)
- ▶ High School: Number and Quantity (<http://mathmistakes.org/category/high-school-number-and-quantity/>) (20)
- ▶ High School: Statistics and Probability (<http://mathmistakes.org/category/high-school-statistics-and-probability/>) (12)

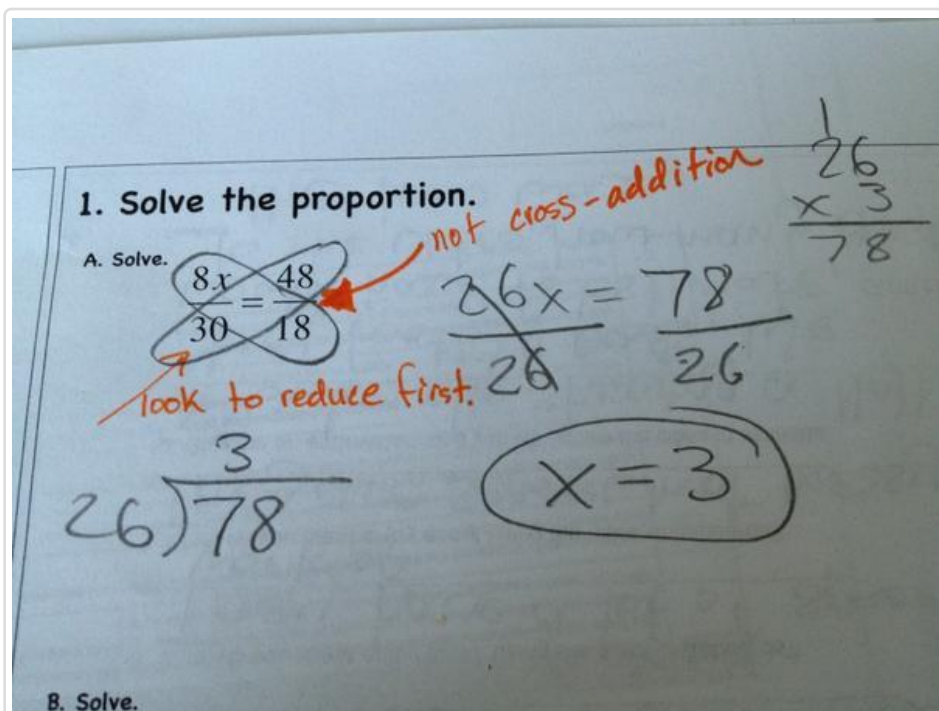
## Archives

Archives

# Cross addition isn't a thing (<http://mathmistakes.org/cross-addition-isnt-a-thing/>)

Posted on August 28, 2013 (<http://mathmistakes.org/cross-addition-isnt-a-thing/>) by mpershan (<http://mathmistakes.org/author/mpershan/>) | 2

Comments ([http://mathmistakes.org/cross-addition-isnt-a-thing/#disqus\\_thread](http://mathmistakes.org/cross-addition-isnt-a-thing/#disqus_thread))



(<http://i2.wp.com/mathmistakes.org/wp-content/uploads/2013/08/stadel-proportion.jpg>)

Presented without comment, and with thanks to Andrew.

Posted in Expressions and Equations (<http://mathmistakes.org/category/grade-8/expressions-and-equations/>), Feedback (<http://mathmistakes.org/category/feedback/>), Ratios and Proportions (<http://mathmistakes.org/category/9algebra1/ratios-and-proportions/>), Uncategorized (<http://mathmistakes.org/category/uncategorized/>).

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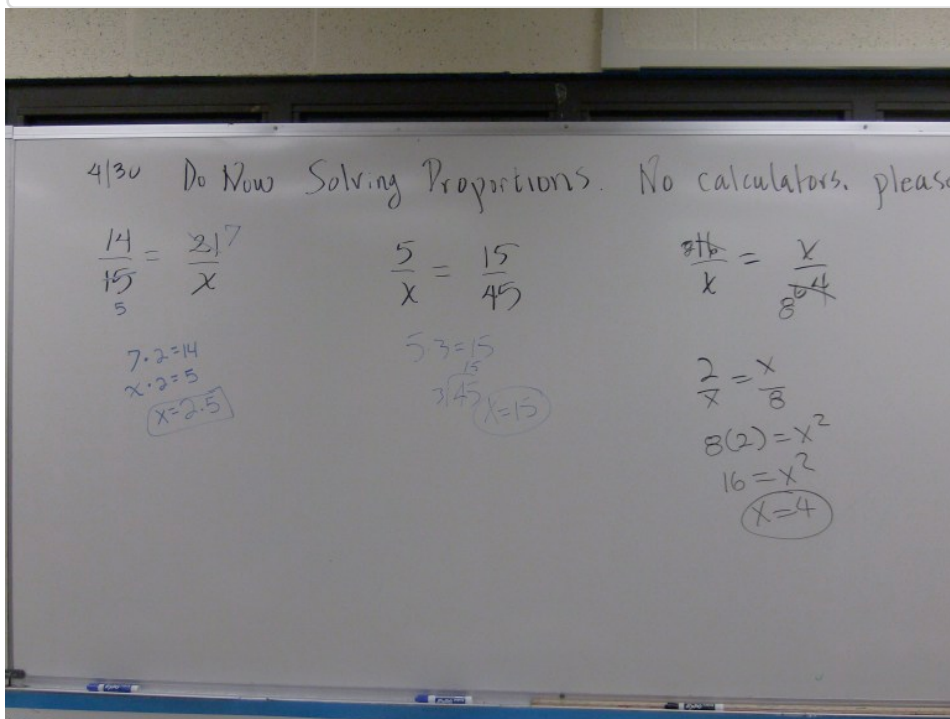



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This work is licensed under a Creative Commons Attribution 3.0 Unported License ([http://creativecommons.org/licenses/by/3.0/deed.en\\_US](http://creativecommons.org/licenses/by/3.0/deed.en_US)).

# Cross-multiplying or Cross-cancelling? (<http://mathmistakes.org/cross-multiplying-or-cross-cancelling/>)

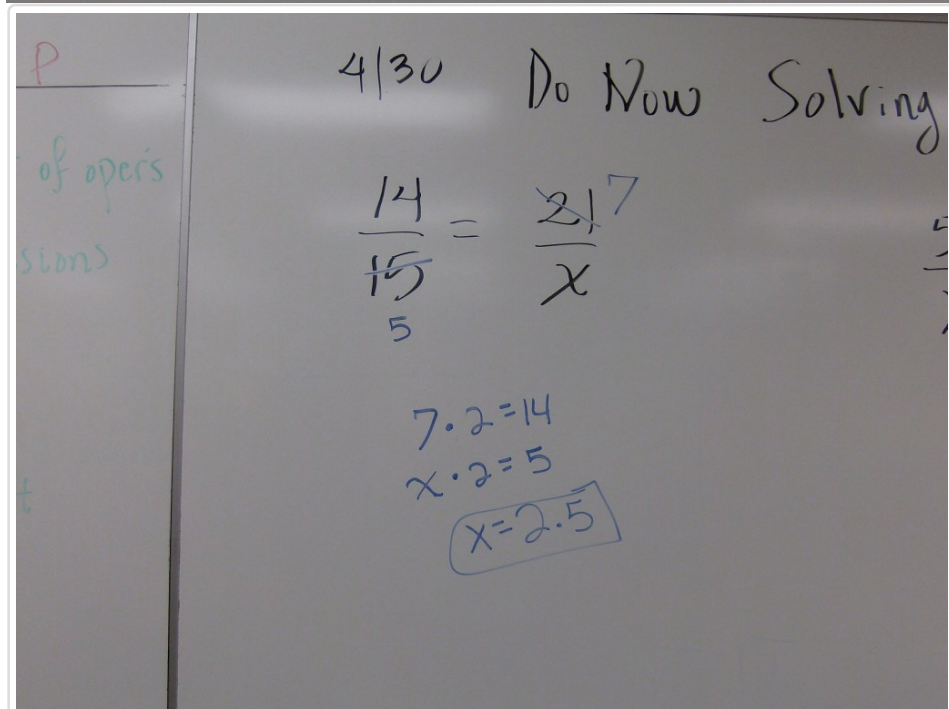
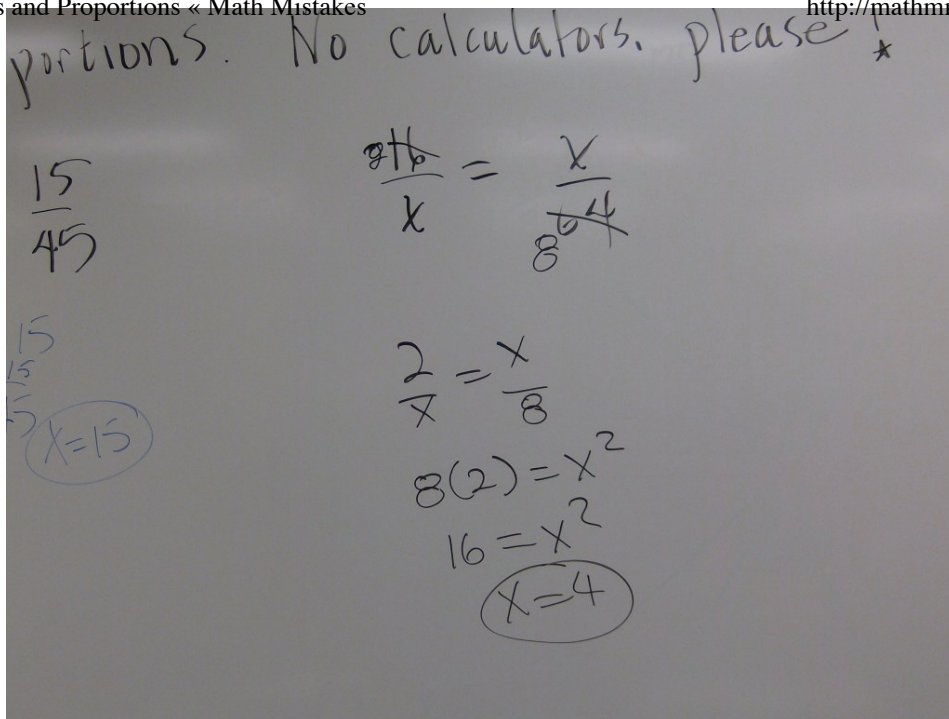
Posted on May 13, 2013 (<http://mathmistakes.org/cross-multiplying-or-cross-cancelling/>) by mpershan (<http://mathmistakes.org/author/mpershan/>) | 10 Comments ([http://mathmistakes.org/cross-multiplying-or-cross-cancelling/#disqus\\_thread](http://mathmistakes.org/cross-multiplying-or-cross-cancelling/#disqus_thread))

(<http://mathmistakes.org/wp-content/uploads/2013/05/CrossCancelError1.jpg>)



(<http://i1.wp.com/mathmistakes.org/wp-content/uploads/2013/05/SolvingProportionsStudentMistakes.jpg>)





(<http://i0.wp.com/mathmistakes.org/wp-content/uploads/2013/05/CrossCancelError2.jpg>)

The submitter reports that this happened with several different students who went up to the board to solve proportions problems. This was the “Warm Up” exercise.

How would you react to these mistakes in class?

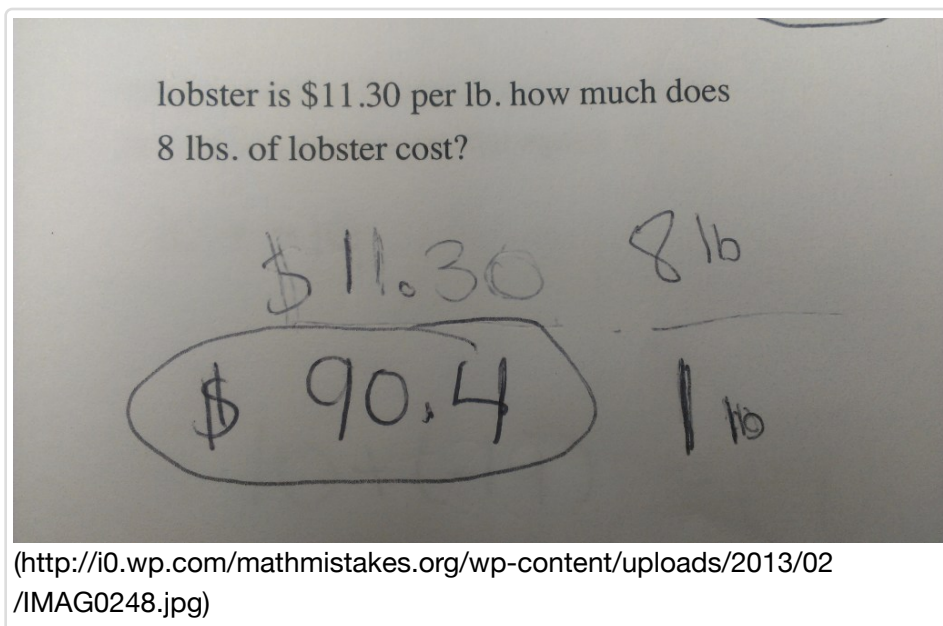
Thanks to Victoria for the submission!

Posted in Expressions and Equations (<http://mathmistakes.org/category/9grade-8/expressions-and-equations/>), Ratios and Proportions (<http://mathmistakes.org/category/9algebra1/ratios-and-proportions/>).

# Money

## (<http://mathmistakes.org/money/>)

Posted on February 19, 2013 (<http://mathmistakes.org/money/>) by mpershan (<http://mathmistakes.org/author/mpershan/>) | 3 Comments ([http://mathmistakes.org/money/#disqus\\_thread](http://mathmistakes.org/money/#disqus_thread))



Let's not even call this a mistake quite yet. What does this answer reveal about what the kid knows?

Posted in Operations & Algebraic Thinking (<http://mathmistakes.org/category/grade-5/operations-algebraic-thinking-grade-5/>), Ratios and Proportions (<http://mathmistakes.org/category/9algebra1/ratios-and-proportions/>).

# Proportions

## (<http://mathmistakes.org/proportions/>)

Posted on November 9, 2012 (<http://mathmistakes.org/proportions/>) by mpershan (<http://mathmistakes.org/author/mpershan/>) | 5 Comments ([http://mathmistakes.org/proportions/#disqus\\_thread](http://mathmistakes.org/proportions/#disqus_thread))

Reconstructed example 2

**Question:** A car averages 27 miles per gallon. If gas costs \$4.04 per gallon, which of the following is closest to how much the gas would cost for this car to travel 2,727 typical miles?

- a. \$44.44
- b. \$109.08
- c. \$118.80
- d. \$408.04
- e. \$444.40

**Student Work:**

$$\frac{27}{1} \quad \frac{2727}{101} \quad \frac{\$4.04}{1} \quad \frac{\$408.04}{101}$$

**Student Answer:** \$118.80

(<http://i1.wp.com/mathmistakes.org/wp-content/uploads/2012/11/proportion-jlouise.png>)

What's the mistake? Why this mistake in particular?

Thanks again to Louise Wilson (<http://crazedmummy.wordpress.com/>) for the submission.

Posted in Ratios & Proportional Relationships (<http://mathmistakes.org/category/grade-7/ratios-proportional-relationships-grade-7/>), Ratios and Proportions (<http://mathmistakes.org/category/9algebra1/ratios-and-proportions/>).

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# Exponents

This is a series of activities that can help deepen student understanding of exponents. What exactly is exponents? Which grade levels would these materials pertain to?

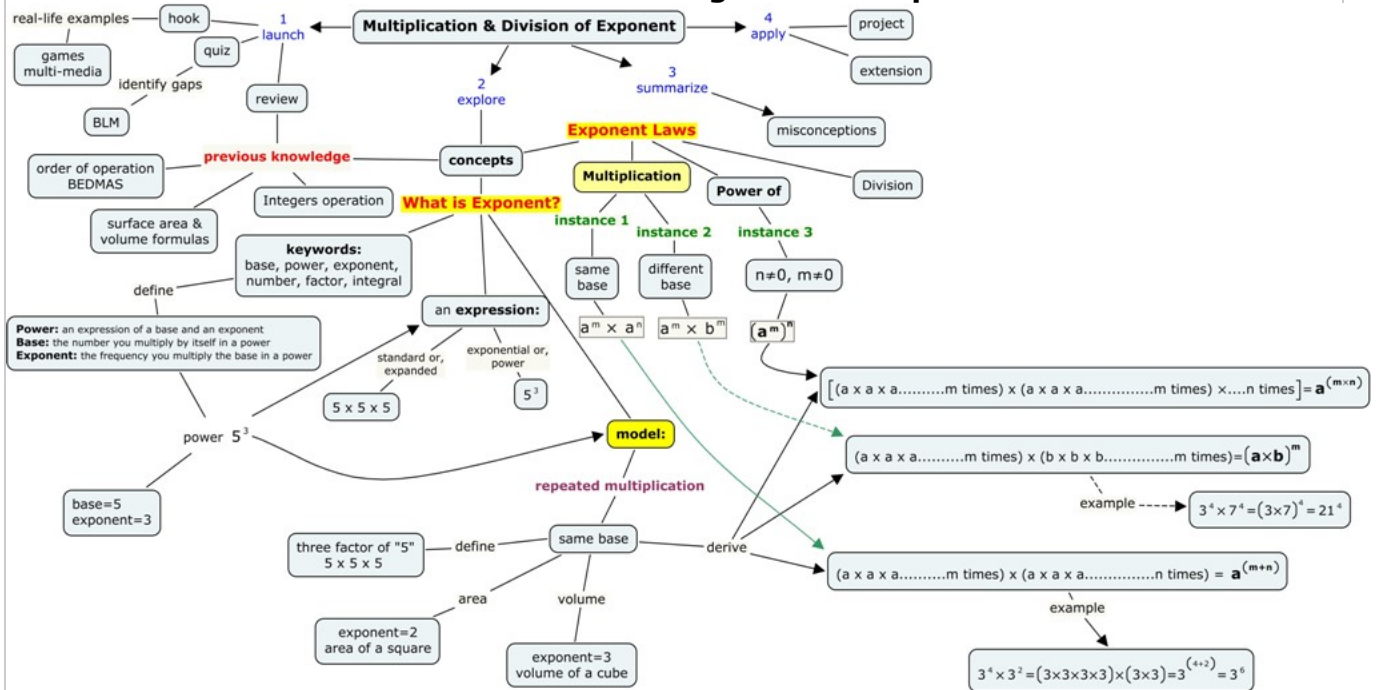
## Our Goal

### "Understanding Multiplication of Exponents"

To create an instructional sequence (a.k.a. lesson plan) featuring:

- different models to present the concept
- select problems to facilitate student understanding
- explanations to bring about student understanding
  - common student misconceptions
  - ways to address misconceptions
- connections to real world experiences
- connections among mathematical ideas

## Lesson Plan for Junior-High School Exponents



A concept-map of multiplication of exponents

[START and GO DEEP!](#)   [The Alberta Math Program of Studies](#)   [Instances and Non-Instances](#)   [Basic of Exponent Multiplication](#)

[Student Misconceptions](#)   [Math Proficiencies](#)   [Real World Application of Exponents](#)   [Sample Questions & Inquiry](#)

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## About this Blog

We are student teachers at the University of Calgary, Alberta, Canada. As future educators majoring in secondary Math, we are posting this blog to share our views on how we would attempt to