

Louisiana Believes

TL Summit

Math isn't Magic. Math Makes Sense.

Grades 6-HS

Math Isn't Magic...

Math Isn't Magic.

Math Isn't Magic. Math Makes Sense.

Math Isn't Magic.

Math Makes Sense.

Math Isn't Magic. Math Makes Sense.

Isn't Magic.

Makes Sense.

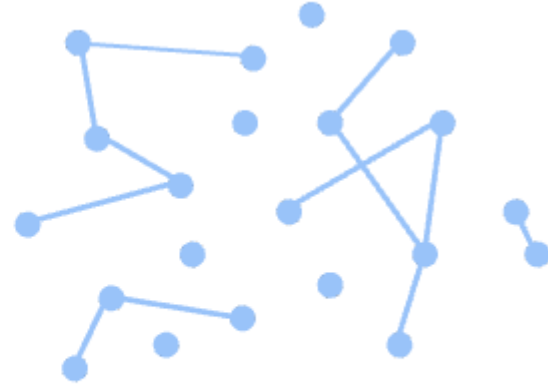
"Mathematics doesn't have a lot of facts...

Mathematics has incredibly dense connection between facts."

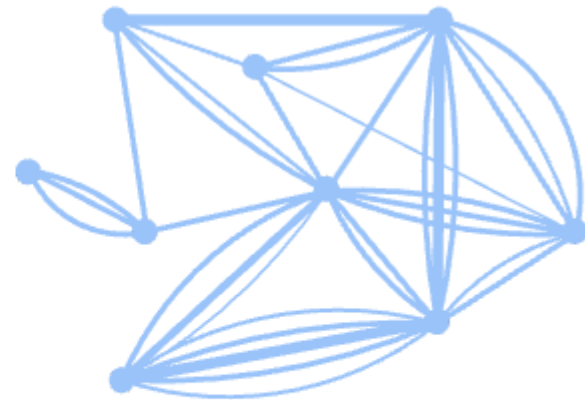
Edmund Harriss
Mathematics Professor, University of Arkansas

Math Isn't Magic. Math Makes Sense.

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Mathematics has incredibly dense connection between facts."



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Shifts in Mathematics

Focus strongly
where the
standards focus.

Focus

Think across grades
and link to major
topics within grades.

Coherence

In major topics pursue: conceptual
understanding, procedural skill and fluency,
and application with equal intensity.

Rigor

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In major topics pursue: conceptual understanding, procedural skill and fluency, and application with equal intensity.

"Students are capable of developing rich conceptual understanding; do not rob them of the opportunity to experience the discovery of new concepts."

Tina Cardone in *Nix the Tricks*

Do you agree with this statement?

Have you ever "robbed" students in an attempt to help students? If so, why?

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Some Kinds of Tricks

Rules that expire

Tricks students misinterpret

Many specific techniques in place of one general technique

Algorithms that circumvent understanding

Magic.

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Rules that expire

"Adding always makes numbers bigger."

"Improper fractions should always be written as mixed numbers."

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Many specific techniques in
place of one general technique

FOIL: First, Outer, Inner, Last

$$(2+x)(3-4x) = (2)(3) + (2)(-4x) + (x)(3) + (x)(-4x)$$

F O I L

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Tricks students misinterpret

"Two negatives make a positive."

$$(-2)(-5) = + 10$$

What about $(-2) + (-8)$?

What about $(-5) - (-3)$?

"Cross Multiply"

$$\frac{1}{2} + \frac{2}{3} \quad \frac{1}{2} \times \frac{2}{3} \quad \frac{1}{2} = \frac{c}{3}$$

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Algorithms that circumvent understanding

Synthetic Division

"Move" the decimal

Math Isn't Magic. Math Makes Sense.

Magic.

A few more examples...

-x

Multiplying signed numbers:

$(-3)(4)$

$(-2)(1)(-3)(5)(-1)(-2)(2)$

Solving equations

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Sense.

Make Math Make Sense

Connect new content to students' prior understanding.

Help students discover the connections between what they know and what they are learning.

Math Isn't Magic. Math Makes Sense.

In your groups...

PEMDAS

Using the word "cancel" (in any context)

"Keep-Change-Flip" or "Keep-Change-Change"

"When solving equations 'move' a term to the other side."

"Absolute value makes a number positive."

1. How could this seem like "magic"?
2. How could this undermine understanding?
3. How could this be reworked to promote understand and connections?

Math Isn't Magic. Math Makes Sense.

presentation by Britton Kilpatrick
 britton.kilpatrick@la.gov

Questions?

$$\frac{2x+10}{2} - x = \frac{2x}{2} + \frac{10}{2} - x$$

$$= x + 5 - x$$

$$= 5$$

Math Isn't Magic.

Shifts in Mathematics

- Focus
- Coherence
- Rigor

Math Makes Sense.

Make Math Make Sense

In your groups...

review

Using the word "never" (in any context)

"Keep Change Flip" or "Keep Change Change"

"When solving equations 'move' a term to the other side."

"Absolute never makes a number positive."

- How could this seem like "magic"?
- How could this undermine understanding?
- How could this be reworked to promote understand and connections?

Some Kinds of Tricks

Rules that explain

Tricks students misinterpret

Many specific techniques in place of one general technique

Algorithms that circumvent understanding

FOIL

Symbol Manipulation

Solving equations

Symbol Manipulation

Multiplying signed numbers

Symbol Manipulation

A few more examples...

Symbol Manipulation

Multiplying signed numbers

Symbol Manipulation

Solving equations

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"Mathematics doesn't have a lot of facts..."



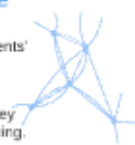
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Resources:

Nix the Tricks (free to download):

<http://nixthetricks.com/>

NCTM 12 Rules that Expire (free):

<http://www.nctm.org/Publications/Mathematics-Teaching-in-Middle-School/2015/Vol21/Issue4/12-Math-Rules-That-Expire-in-the-Middle-Grades/>

NCTM 13 Rules that Expire (purchase only):

<http://www.nctm.org/Publications/teaching-children-mathematics/2014/Vol21/Issue1/13-Rules-That-Expire/>