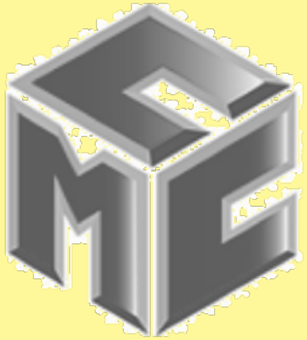
Sticky Math



CMC Central

Annual Mathematics

Symposium

Can You See How Connection & Structure Builds Fluency? All Students Can.

Making Mathematic Accessible to All Students

MATH THAT STICKS

Sticky Math

David Mattoon

District Secondary Math TOSA for Hemet USD in Hemet, CA

MATH THAT STICKS

NCTM's Effective Mathematics Teaching Practices

Establish mathematics goals to focus learning.

Implement tasks that promote reasoning and problem solving.

Use and connect mathematical representations.

Facilitate meaningful mathematical discourse.

Pose purposeful questions.

Build procedural fluency from conceptual understanding.

Support productive struggle in learning mathematics.

Elicit and use evidence of student thinking.

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.

2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

5. Use appropriate tools strategically.

6. Attend to precision.

7. Look for and make use of structure.

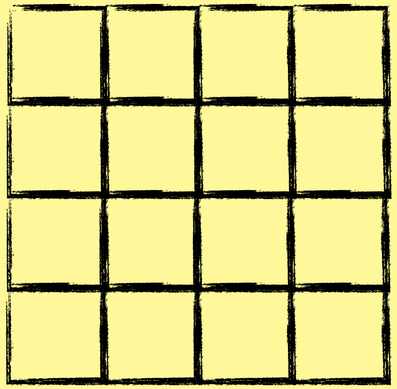
8. Look for and express regularity in repeated reasoning.

Sticky Math

MATH THAT STICKS

Describe every part of the equation on the left sticky using only the image on the right sticky.

$\sqrt{16} = 4$

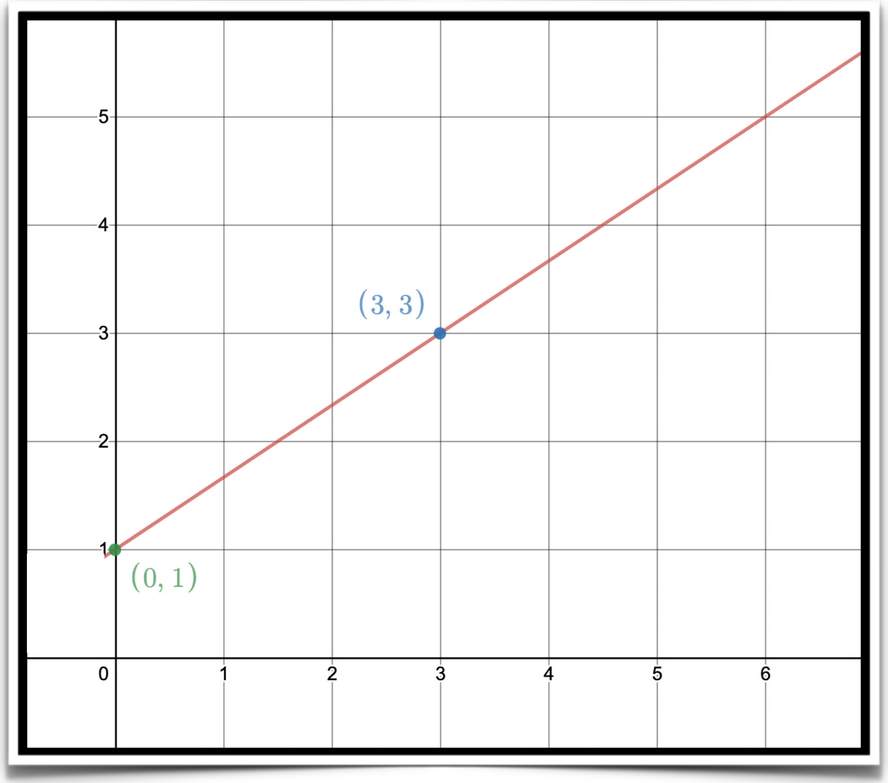


When you finish, create an additional representation.

Find as many connections as you can between the representations; describe the meaning of any symbols.

I found a dollar.

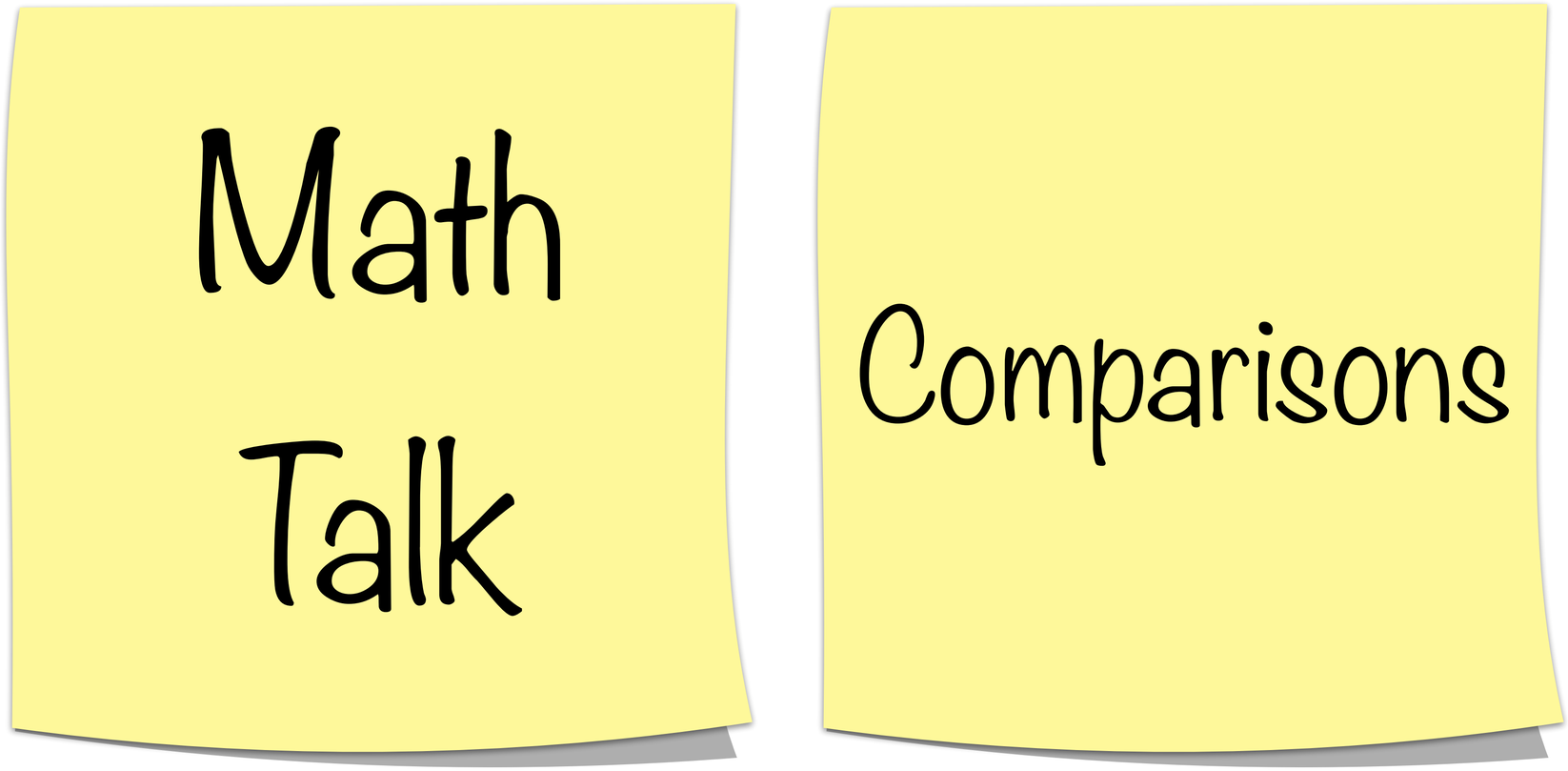
I was given two dollars every three days for lunch money.



$$y = 1 + \frac{2}{3}x$$

When you finish, create an additional representation.

Sticky Math



MATH THAT STICKS

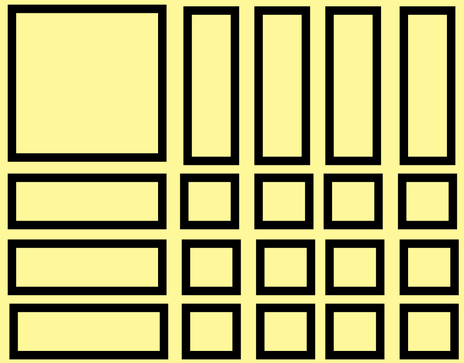
Explain the similarities & differences between these two Sticky Math examples.

Example A

A

$(10 + 4)(10 + 3)$

A

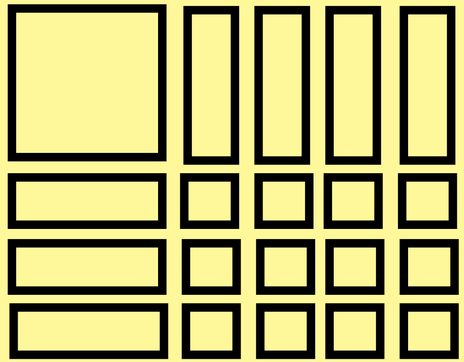


Example B

B

$(x + 4)(x + 3)$

B



Use two other stickies to record the product of each expression.

Math that sticks.

Sticky Math develops students' conceptual understanding and procedural fluency without overwhelming their working memory.

Make connections. Deepen understanding. No "math" required.

AS SIMPLE AS MATH GETS

Sticky Math
MATH THAT STICKS

HOW IT WORKS

1

Provide the math

With Sticky Math, there is often no math to "do." Students examine the procedures they have done or will do to gain the conceptual understanding they need to apply procedures flexibly.

2

Add a representation

Often, too much emphasis is placed on *procedural proficiency* within a single, abstract symbolic representation. Rather than teaching different representations separately like a textbook, put them together so students can make connections.

3

Make connections

Promote equity by explicitly making mathematical connections the task at hand rather than hoping students will implicitly see the connections through some other form of instruction.

Sticky Math
MATH THAT STICKS

STUDENT BENEFITS

Procedural fluency

Students build procedural fluency by *making sense of problems and persevering in solving them* (MP1) as they *attend to precision* (MP6) while *looking for and making use of structure, reasoning abstractly and quantitatively, and looking for and express regularity in repeated reasoning* (MP7, MP2 & MP8).

Retention

The more connections student make the more chance they have to retain that information. Students make connections as they *look for and make use of structure, reason abstractly and quantitatively*, and *look for and express regularity in repeated reasoning* (MP7, MP2 & MP8).

Identity formation

Students build mathematical agency, authority & identity as they find connections for themselves, *construct viable arguments & critique the reasoning of others* (MP3)

Sticky Math
MATH THAT STICKS

TEACHER BENEFITS

Teach better

Employ NCTM's Effective Mathematics Teaching Practices to increase *student engagement* in the Standards for Mathematical Practice.

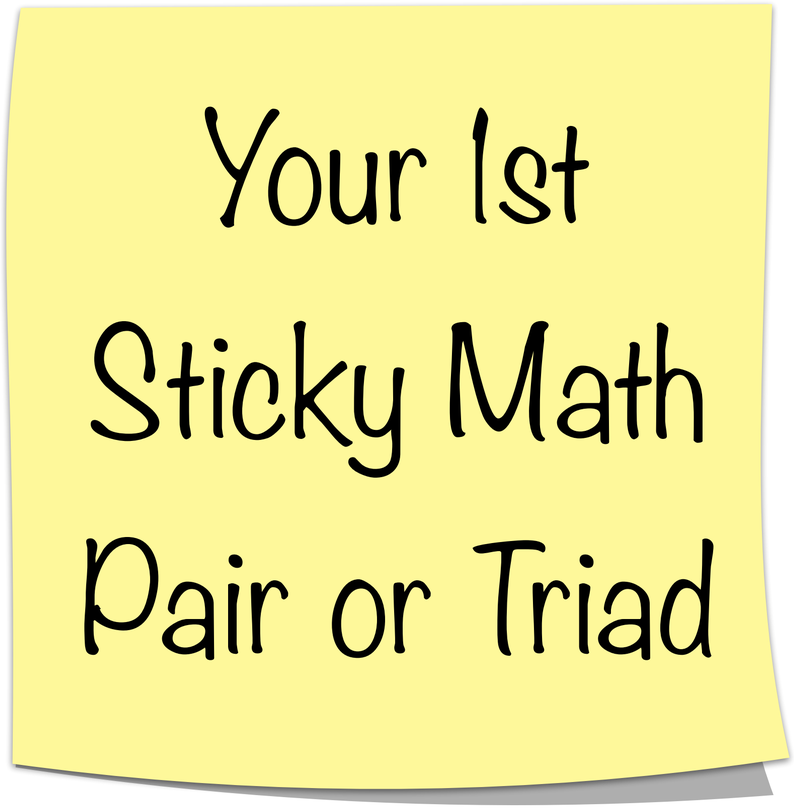
Save time

Choose a domain, browse the gallery, and pick one! Project it and save even more time.

Save money

A pencil. A couple of sticky notes. Great math instruction doesn't get much cheaper than that.

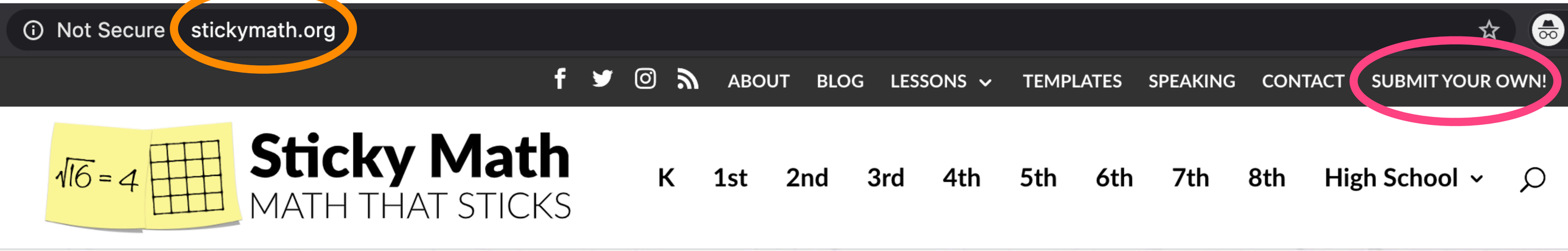
Sticky Math



MATH THAT STICKS

Remember the .org!

Upload pictures, pdfs, docs...



Sticky Math

stickymath.org
@stickymathorg
#maththatsticks

MATH THAT STICKS

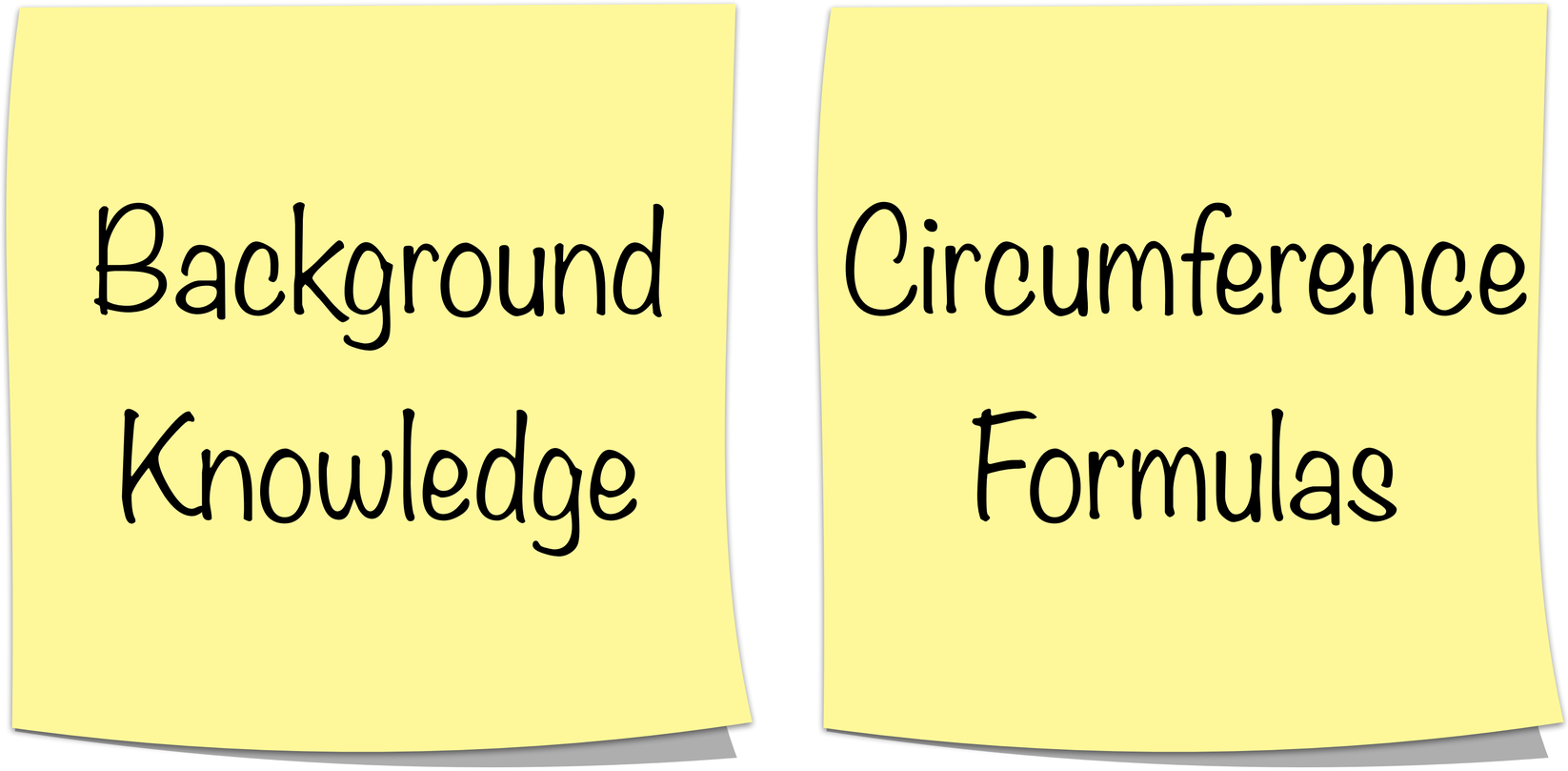
Sticky Math

Full Lesson

How does the area of a circle relate to the area of a rectangle?

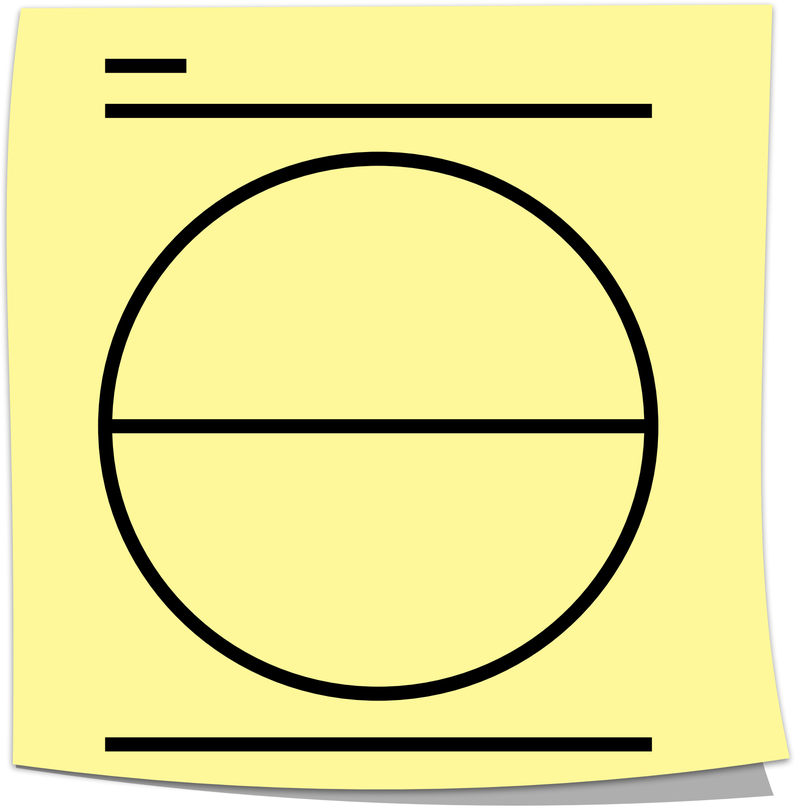
MATH THAT STICKS

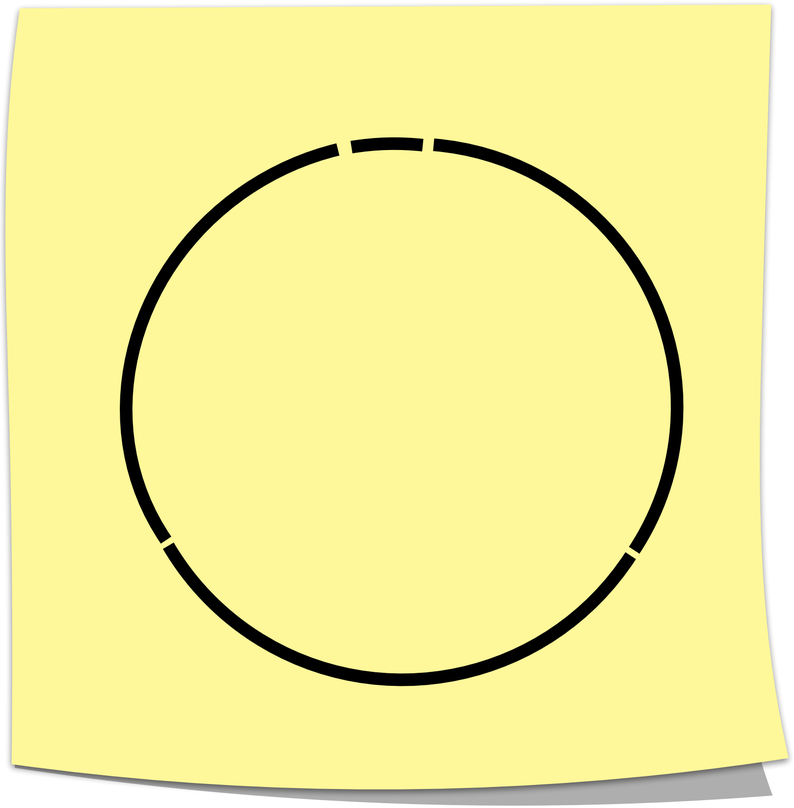
Sticky Math



MATH THAT STICKS

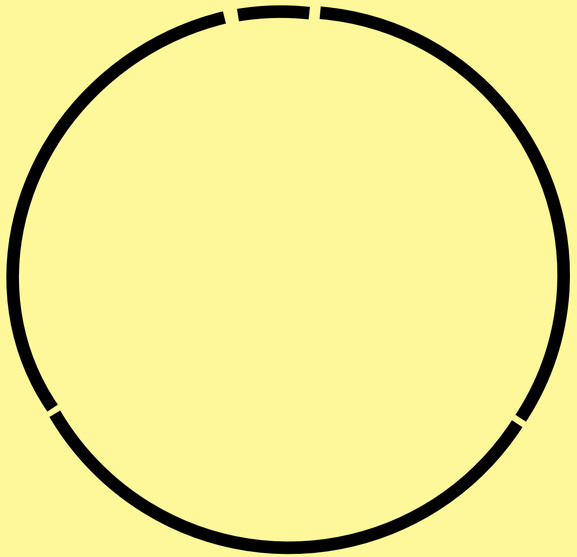
Find as many connections as you can between the two representations; describe the meaning of any symbols.



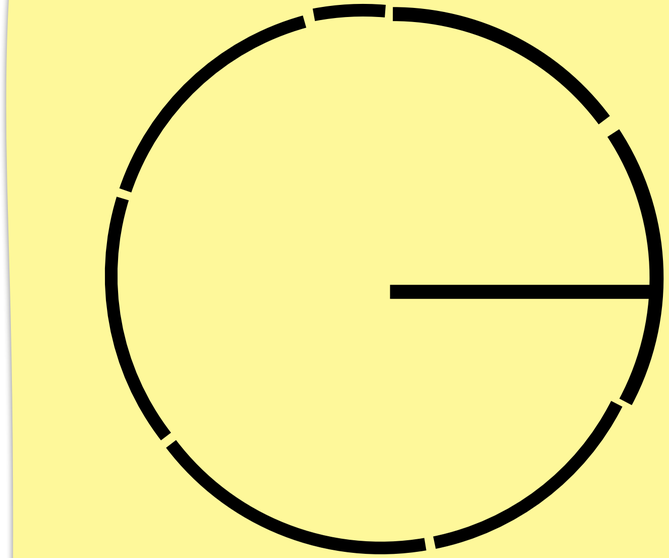


$$C = \pi d$$

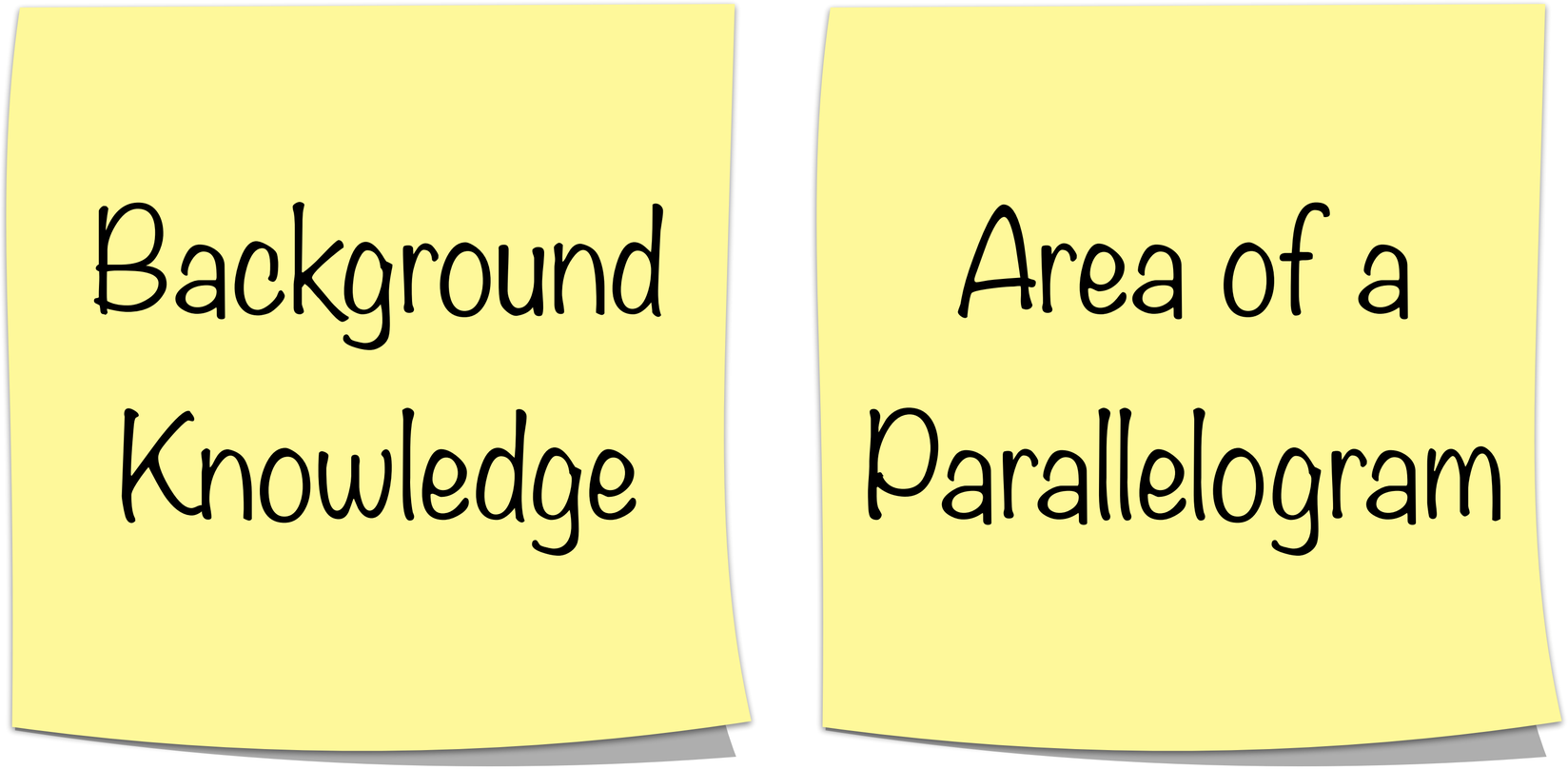
Find as many connections as you can between the two representations; describe the meaning of any symbols.



$$C_o = \pi d$$
$$C_o = \pi(2r)$$
$$C_o = 2\pi r$$

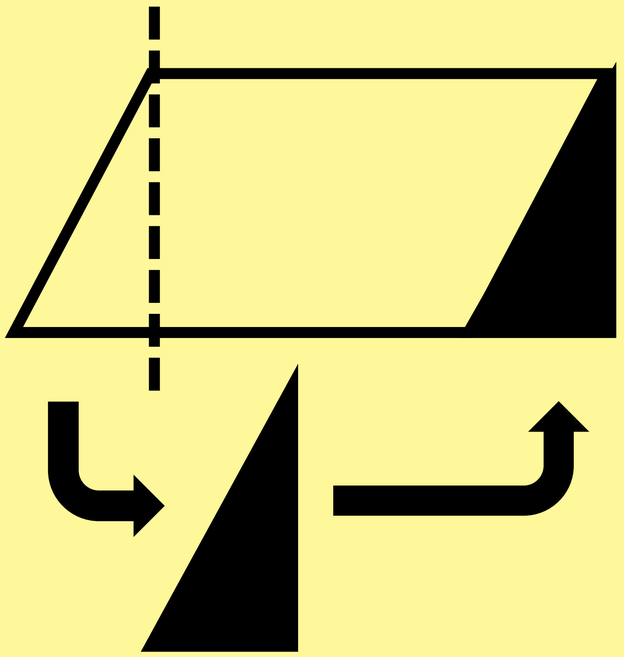


Sticky Math



MATH THAT STICKS

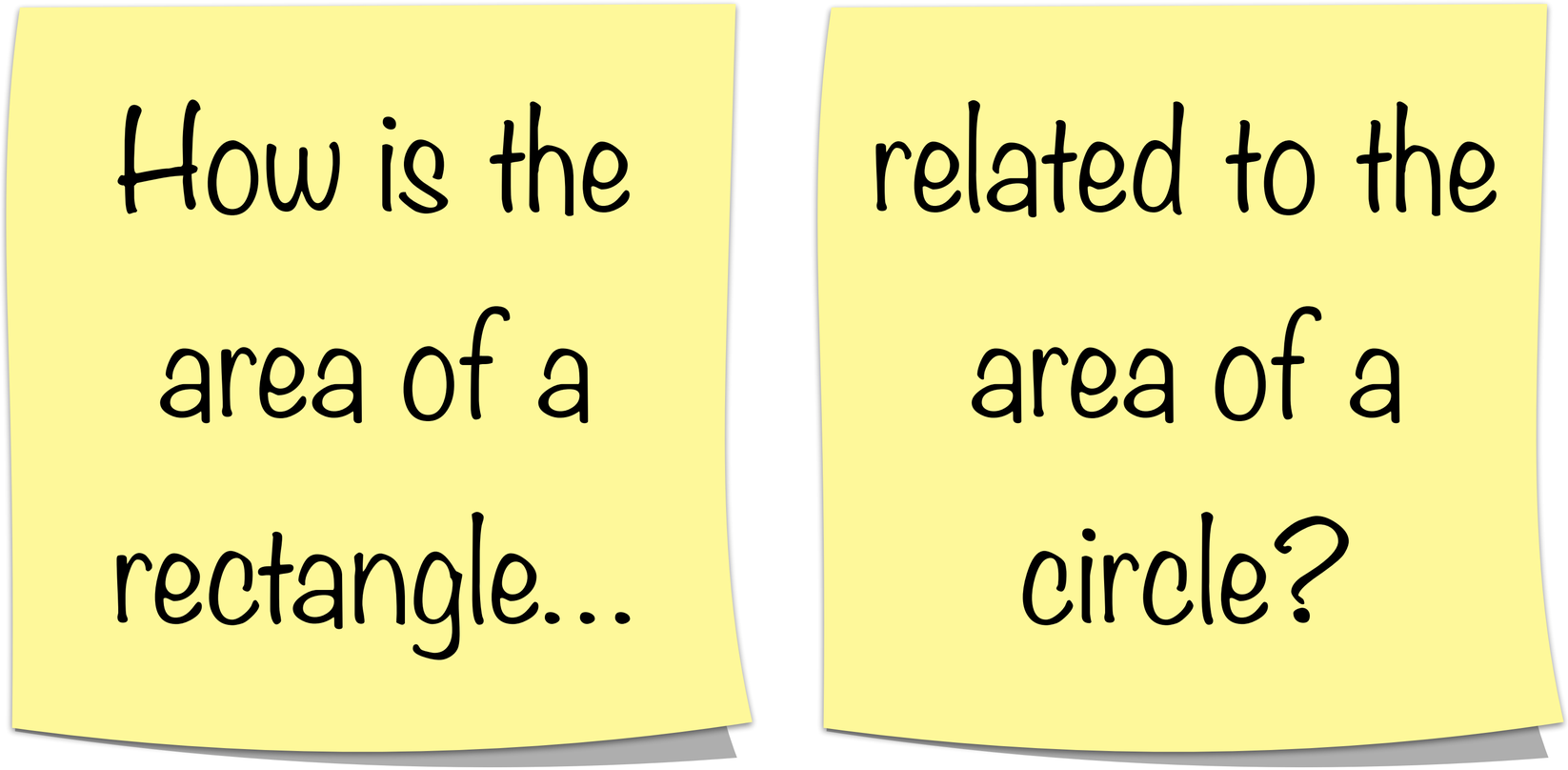
Find as many connections as you can between the two representations; describe the meaning of any symbols.



$$A_{\blacksquare} = (l)(w)$$

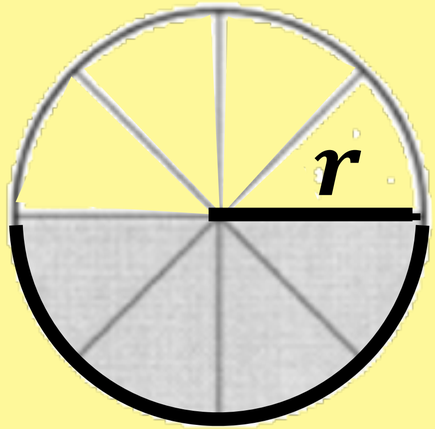
$$A_{\blacksquare} = (l)(w)$$

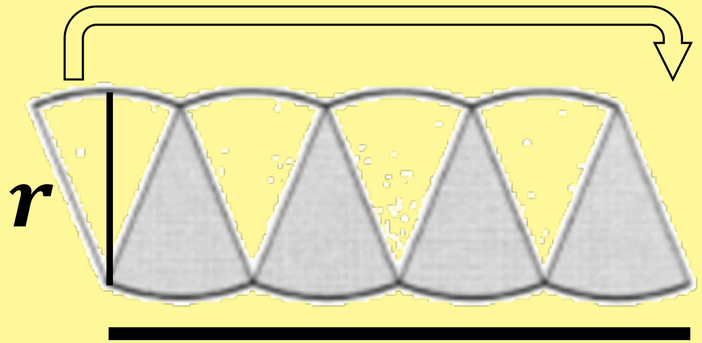
Sticky Math



MATH THAT STICKS

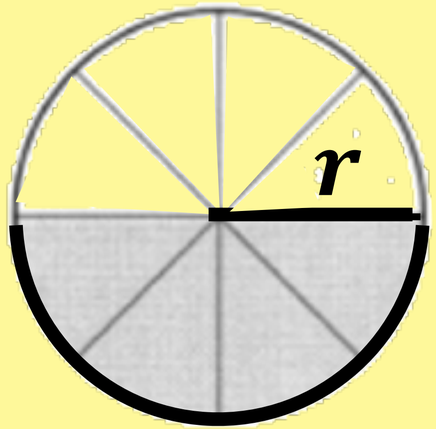
Find as many connections as you can between the two representations; describe the meaning of any symbols.

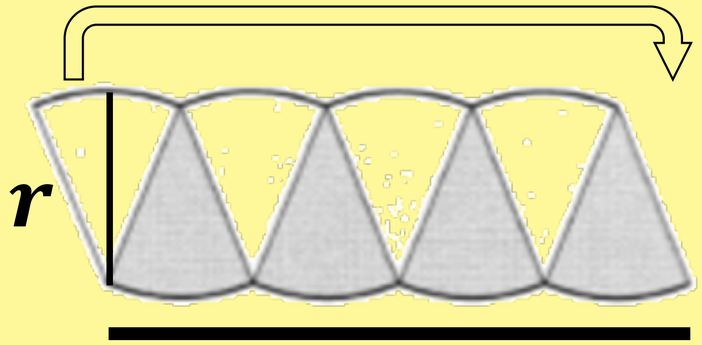




Describe what you notice on a third sticky.

Find as many connections as you can between the two representations; describe the meaning of any symbols.



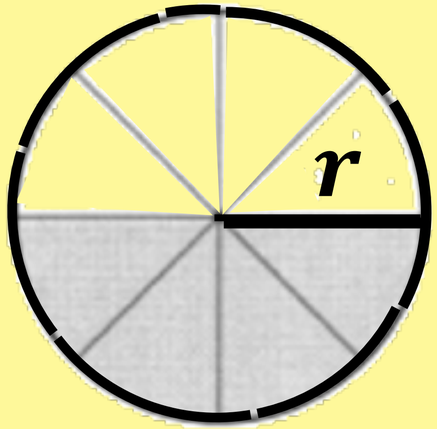


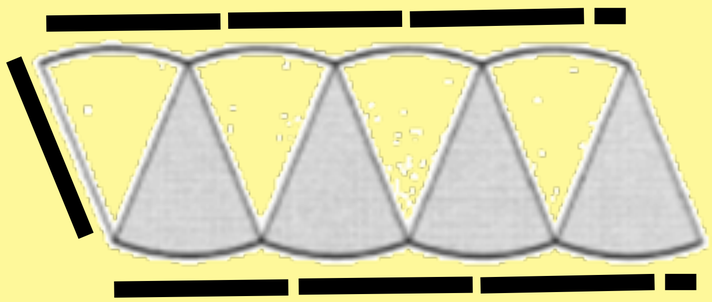
$$A_{\blacksquare} = (l)(w)$$

$$A_{\bullet} = (r)(\frac{1}{2}C)$$

Describe what you notice on a fourth sticky.

Find as many connections as you can between the two representations; describe the meaning of any symbols.





$$A_{\bullet} = (r)(\frac{1}{2}C)$$

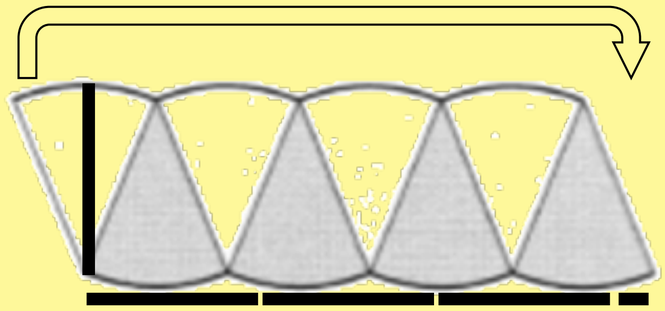
$$A_{\bullet} = (r)[\frac{1}{2}(2\pi r)]$$

Describe what you notice on a fourth sticky.

Find as many connections as you can between the two representations; describe the meaning of any symbols.

$$A_{\bullet} = (r)[\frac{1}{2}(2\pi r)]$$

$$A_{\bullet} = (r)(\pi r)$$

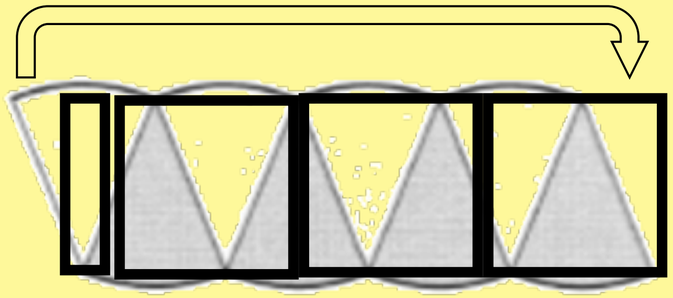


Describe what you notice on a third sticky.

Find as many connections as you can between the two representations; describe the meaning of any symbols.

$$A_{\bullet} = (r)(\pi r)$$

$$A_{\bullet} = \pi r^2$$



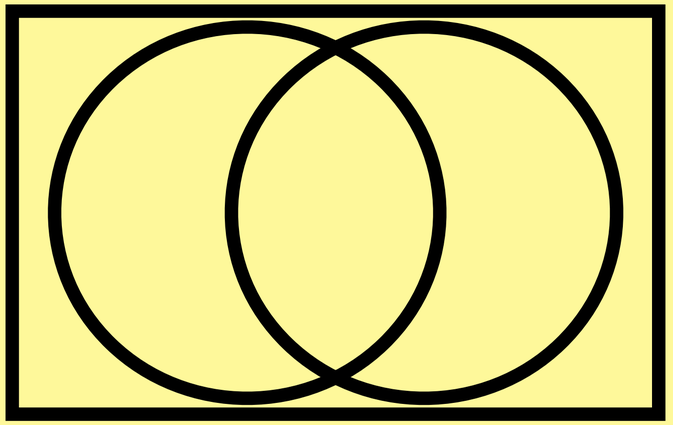
Describe what you notice on a third sticky.

Sticky Math

MATH THAT STICKS

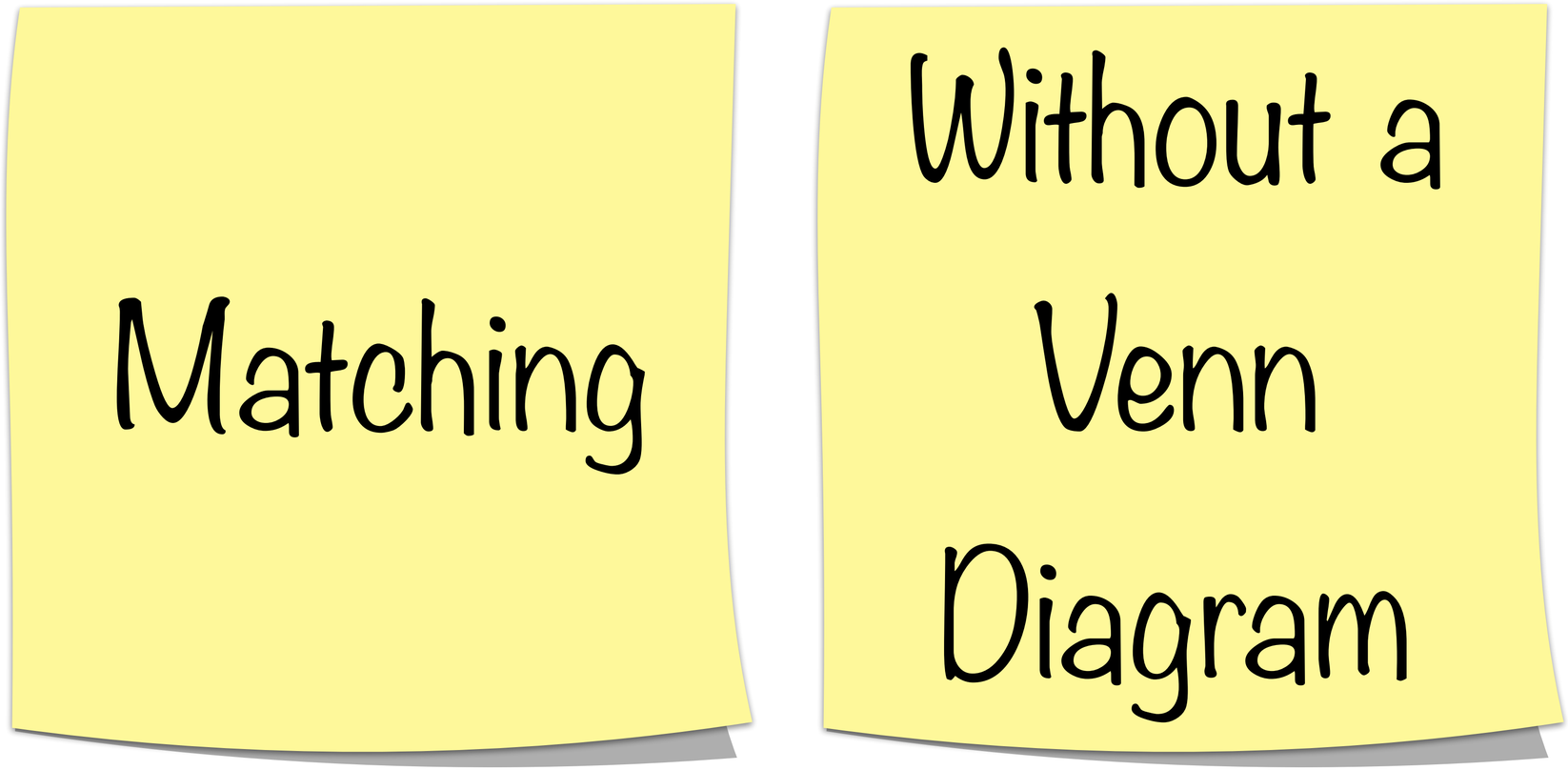
Sticky Math

Matching with a Venn diagram



MATH THAT STICKS

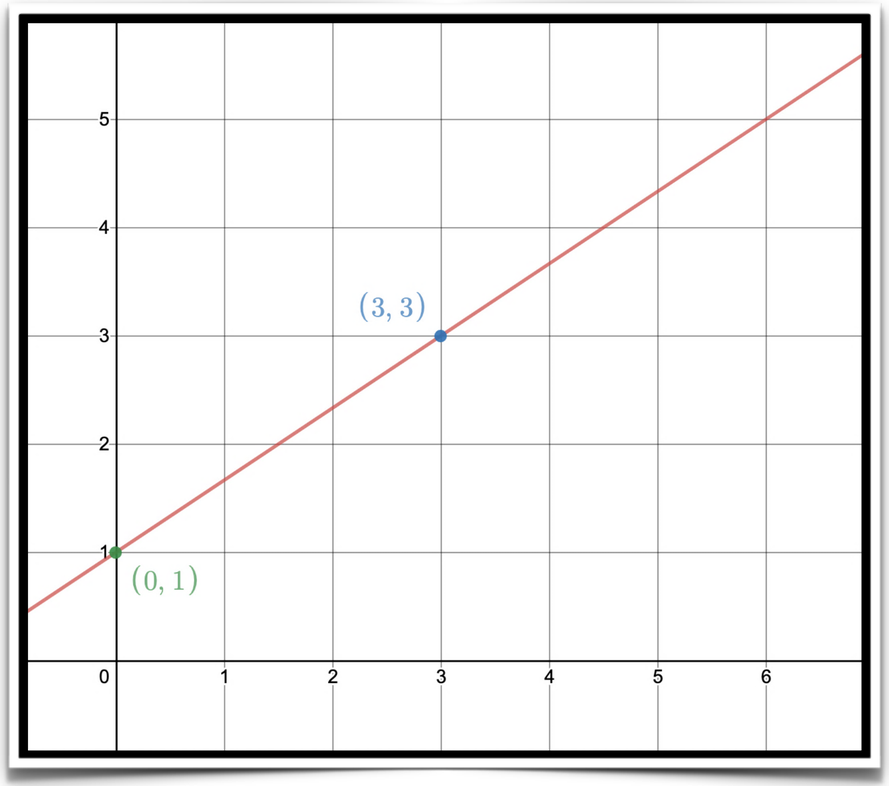
Sticky Math



MATH THAT STICKS

Sticky Math

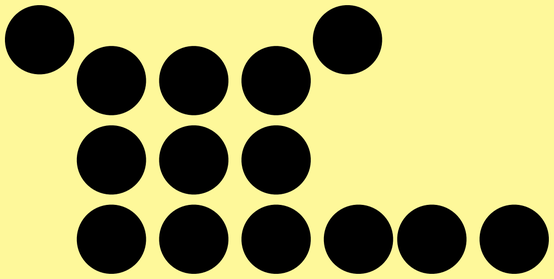
Graphing & Matching



MATH THAT STICKS

Sticky Math

Dots



MATH THAT STICKS

Sticky Math

Effective Mathematics Teaching Practices

For Teachers

MATH THAT STICKS

NCTM's Effective Mathematics Teaching Practices

Establish mathematics goals to focus learning.

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Sticky Math

Standards for Mathematical Practice

For Students

MATH THAT STICKS

Standards for Mathematical Practice

1. Make sense of problems and persevere in solving them.

2. Reason abstractly and quantitatively.

3. Construct viable arguments and critique the reasoning of others.

4. Model with mathematics.

5. Use appropriate tools strategically.

6. Attend to precision.

7. Look for and make use of structure.

8. Look for and express regularity in repeated reasoning.

Sticky Math

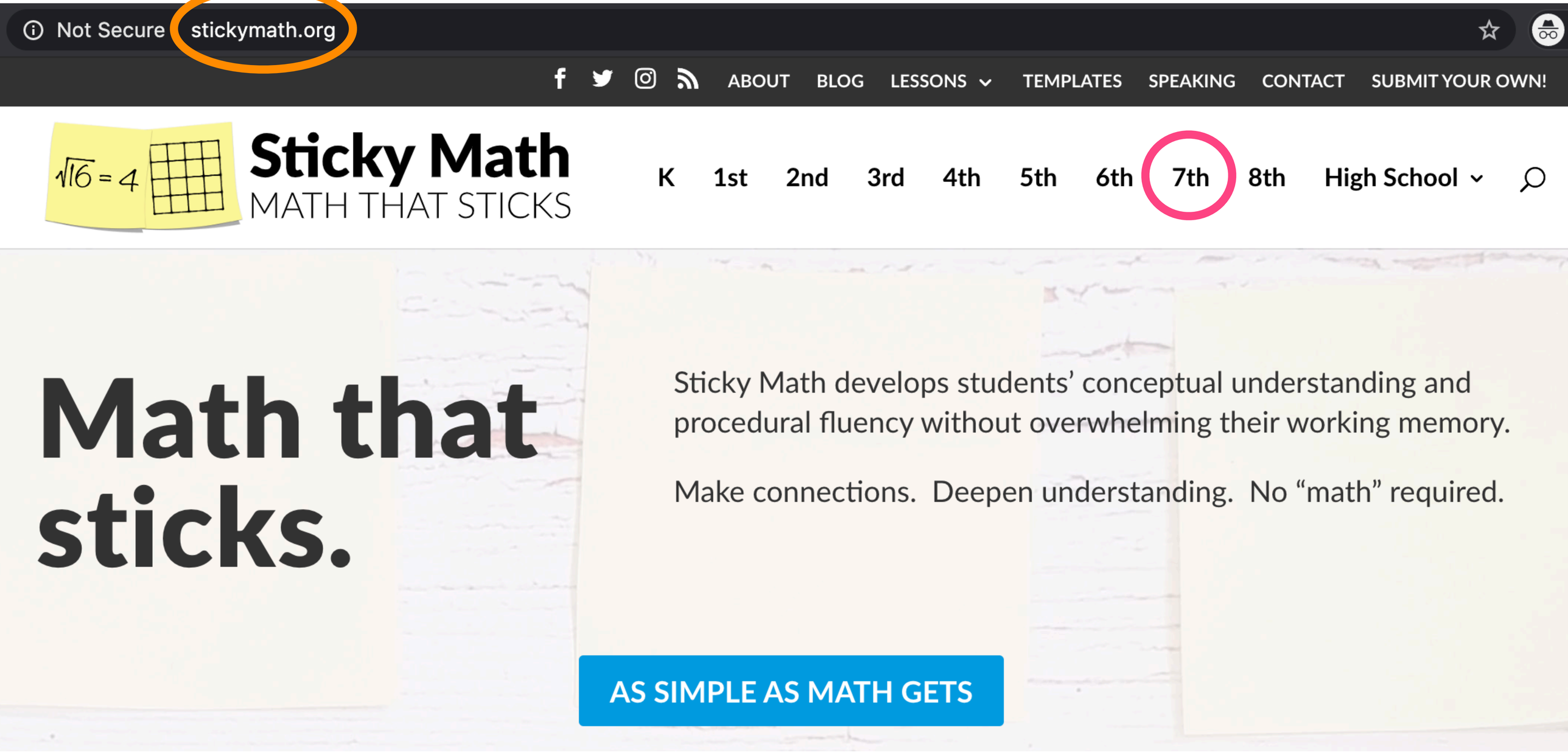
stickymath.org

Navigating the Website

MATH THAT STICKS

Remember the .org!

Choose a grade level...



Choose a domain...

Seventh Grade

RATIOS & PROPORTIONAL RELATIONSHIPS

THE NUMBER SYSTEM

EXPRESSIONS AND EQUATIONS

SEVENTH GRADE GEOMETRY

STATISTICS AND PROBABILITY

Ratios & Proportional Relationships

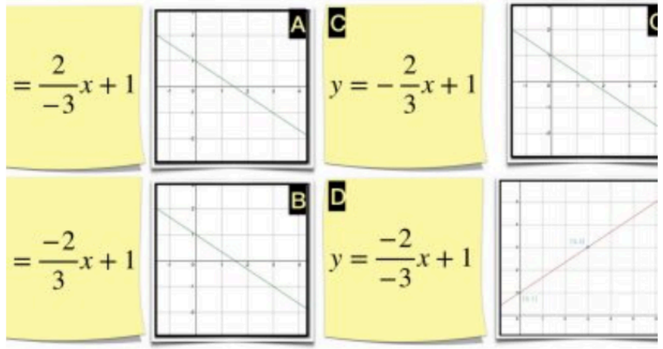
Functions

Blogposts elaborate on how to implement Sticky Math and group sets of stickies into possible full lesson formats.

Which One & Why?

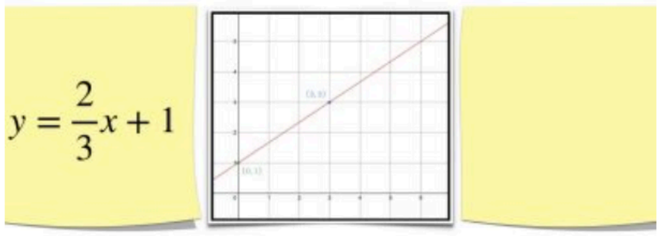
by David Mattoon | Feb 16, 2020 | 6th Expressions & Equations, 7th Expressions & Equations, 8th Functions, HS Functions, HS Structure

Another way to use Sticky Math, which emphasizes constructing a viable argument and provides an opportunity to critique the reasoning of others (MP3).



Negatives in a Slope Fraction

by David Mattoon | Jan 12, 2020 | 8th Functions

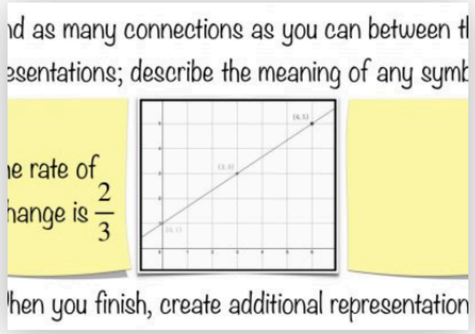


Slope Intercept Form

by David Mattoon | Jan 11, 2020 | 8th Functions

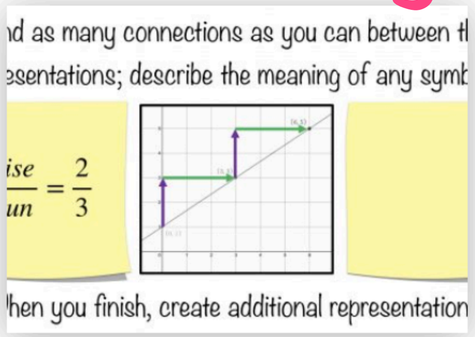
Expressions & Equations

Click on any image in the gallery to see it full screen or present it digitally to students.



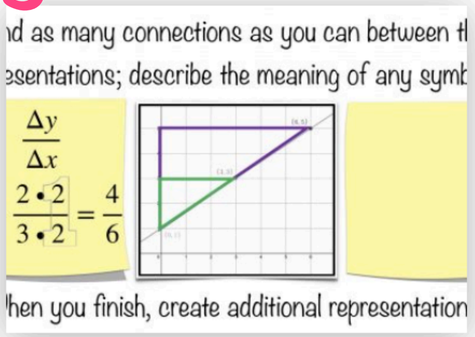
Rate of Change

David Mattoon



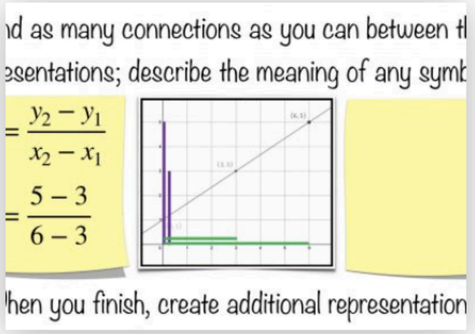
Rise over Run

David Mattoon



Change in y over Change in x

David Mattoon



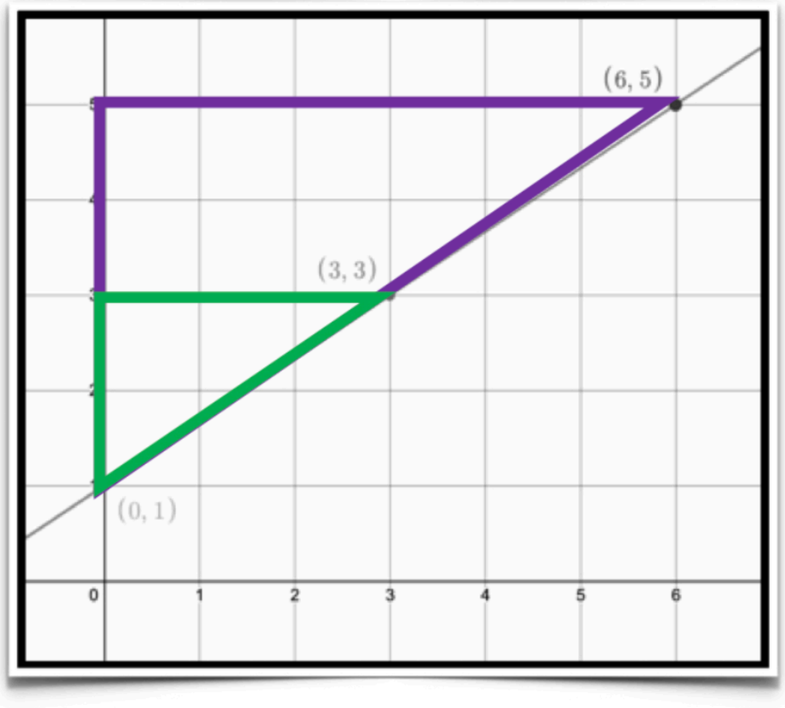
Slope Formula

David Mattoon

Find as many connections as you can between the representations; describe the meaning of any symbols.

$$\frac{\Delta y}{\Delta x}$$

$$\frac{2}{3} = \frac{2 \cdot 2}{3 \cdot 2} = \frac{4}{6}$$



Move back & forth between full screen activities.

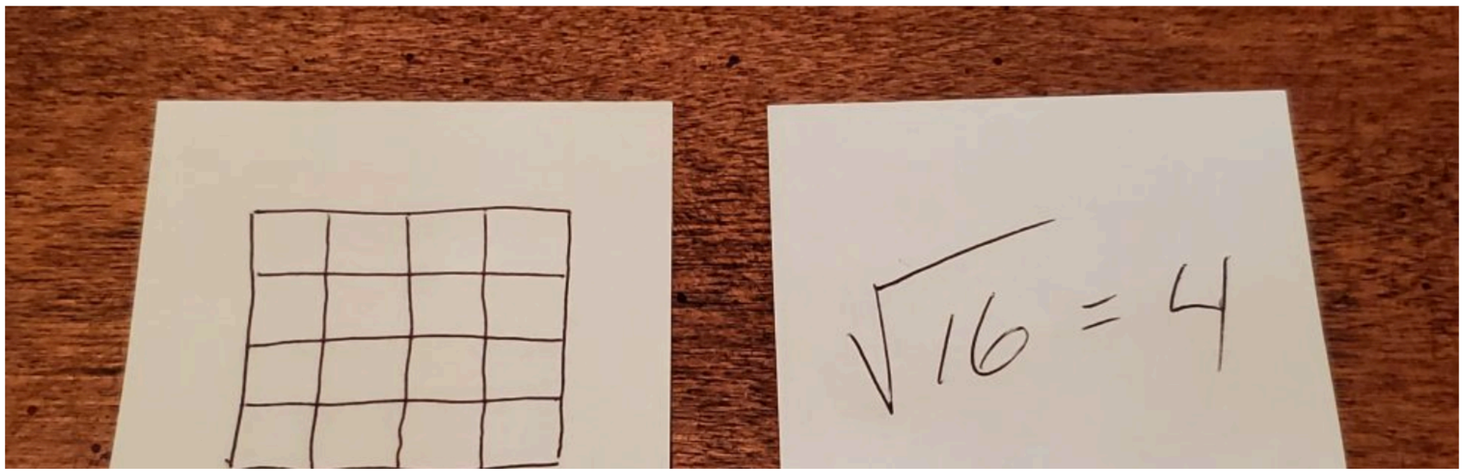
When you finish, create additional representations.

Find the newest lessons.

Which One & Why?

by David Mattoon | Feb 16, 2020 | 6th Expressions & Equations, 7th Expressions & Equations, 8th Functions, HS Functions, HS Structure

Common Core Standards (different examples support different standards): 6.EE.A.2, 7.EE.A.1, 8.F.A.2, 8.F.A.3, HSA.SSE.A.1.A, HSF.IF.B.4 Besides using Sticky Math to compare two different representations or match representations, you could provide two nonequivalent...



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Sticky Math
MATH THAT STICKS

K 1st 2nd 3rd 4th 5th 6th 7th 8th High School

Pairs / Triads Weekly Warmup Recording Sheet

Comparison Recording Sheet (2 Days + Compare)

Sticky Math

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Mattoon's MEANING 4 MEMORY

Context & Connection 4 Comprehension

David Mattoon

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Temecula, CA 92589

Want Meaning-Full Tips? Scan me!

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Meaning4Memory.com