Making Workshop Work in Mathematics

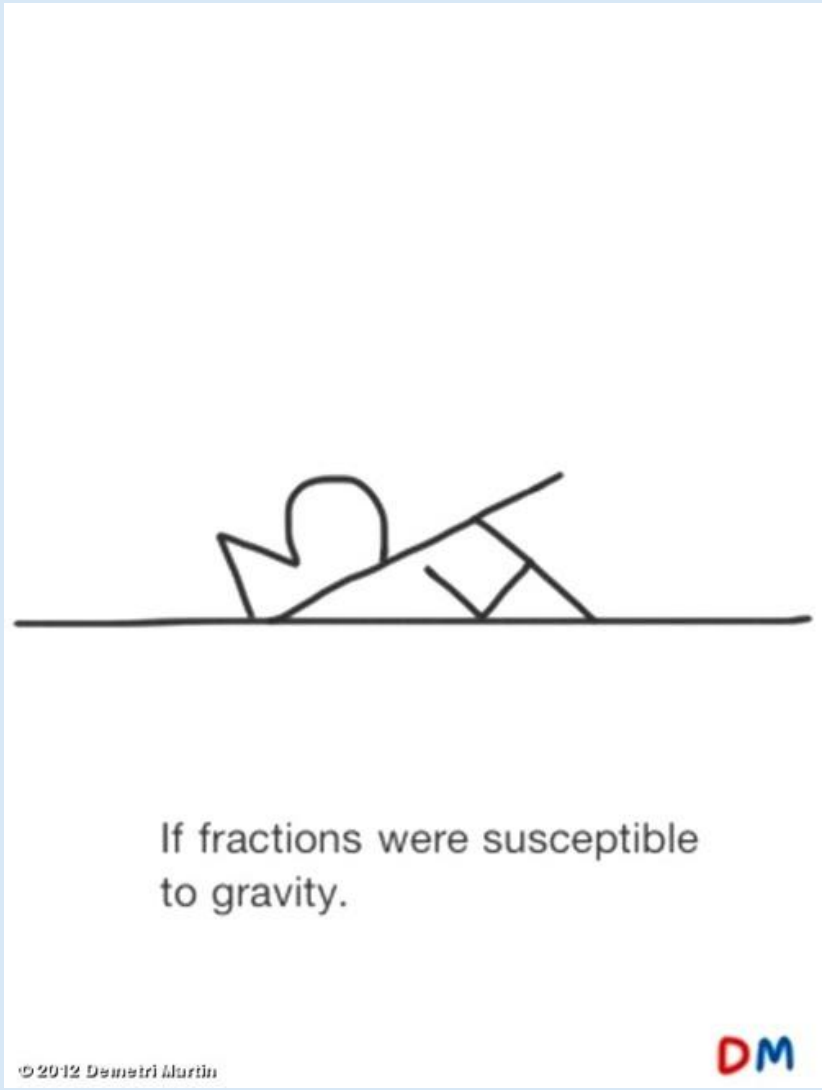
Esther Billings
Dave Coffey
John Golden

This presentation is online
http://bit.ly/MathWorkshopChicago12

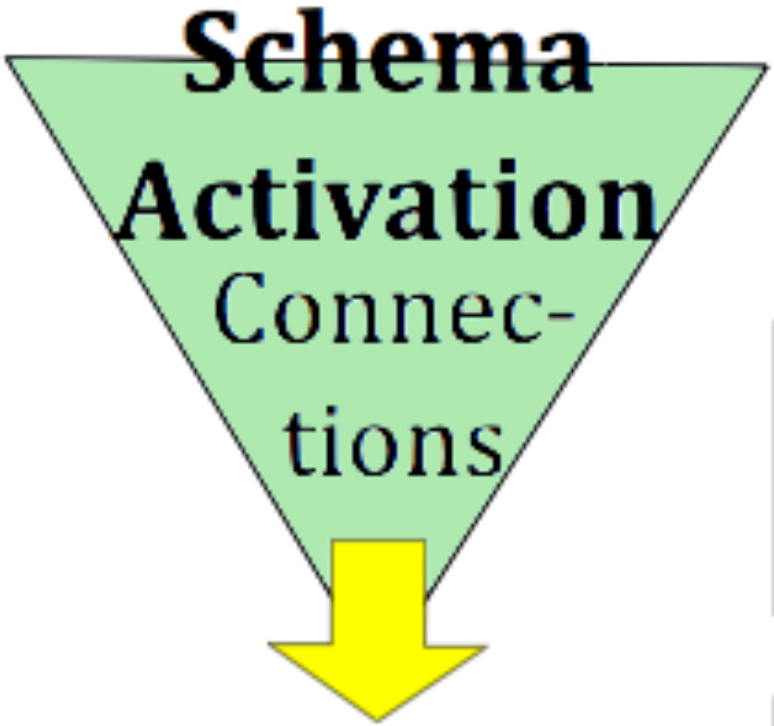
contact information

Warm Up

Jot down the method you would use to find the decimal equivalent of 3/19.



Workshop Model



Connections help students retain information longer and more easily.

Making Connections is a mathematical process.

Workshop Model

Making connections	• Builds from Keene and Zimmerman's work (1997) on schema activation; • Learners recall and reflect on what they currently know and make connections to past experiences and knowledge before beginning a new topic.
Focus	• Sets expectations for the workshop; • Learners introduced to the theme of the lesson, a main question to explore, a mathematical strategy or practice, an example of student thinking, or selection to read.
Activity	• The bulk of the workshop; • Learners solve problems, collectively and individually, exploring new ideas and construct new knowledge. • Often, learners choose from activities that match their interest or their ability level.
Reflection	• Making time to consolidate the experience; • Learners may collectively share their reflections, as well as individually record them.

Workshop Model

Brain research shows 10-20 min window for absorbing new information.

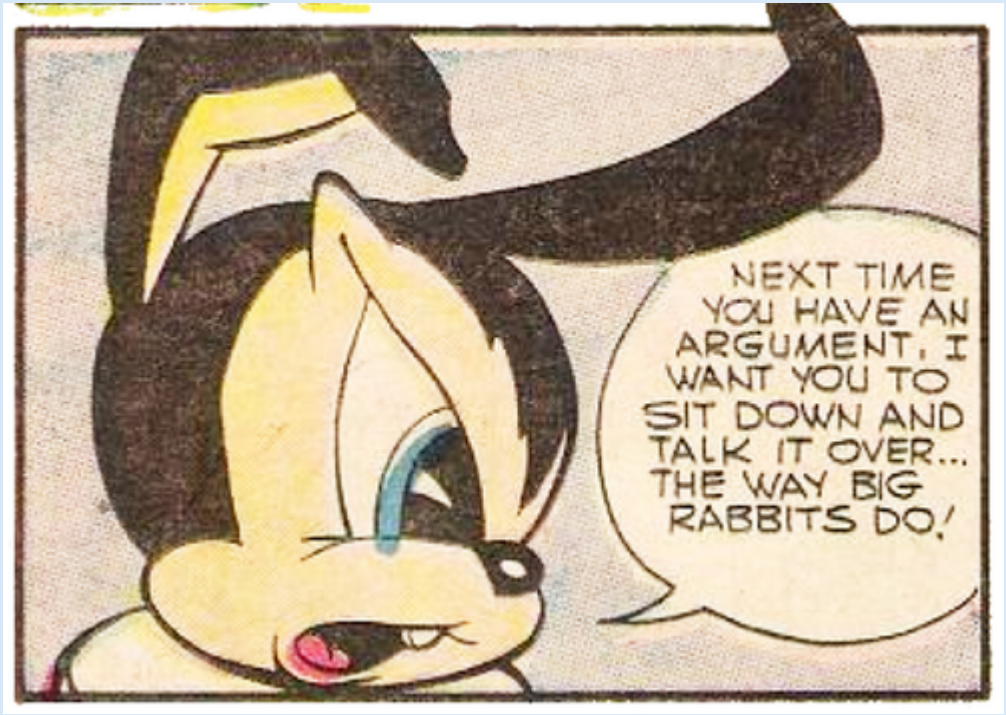
Many students need background, specific information or instructor direction to proceed.

Instructor can connect activity with the objective for the class and both to a purpose applicable to the student.

Focus

3 Construct viable arguments and critique the reasoning of others. Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments.

- They make conjectures and build a logical progression of statements to explore the truth of their conjectures.
- They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples.
- They justify their conclusions, communicate them to others, and respond to the arguments of others.
- Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is.
- Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.



Focus

S-C-A framework

- Making Sense
- Making Conjectures
- Making Arguments

The Problem

Find the exact decimal representation for three-nineteenths.

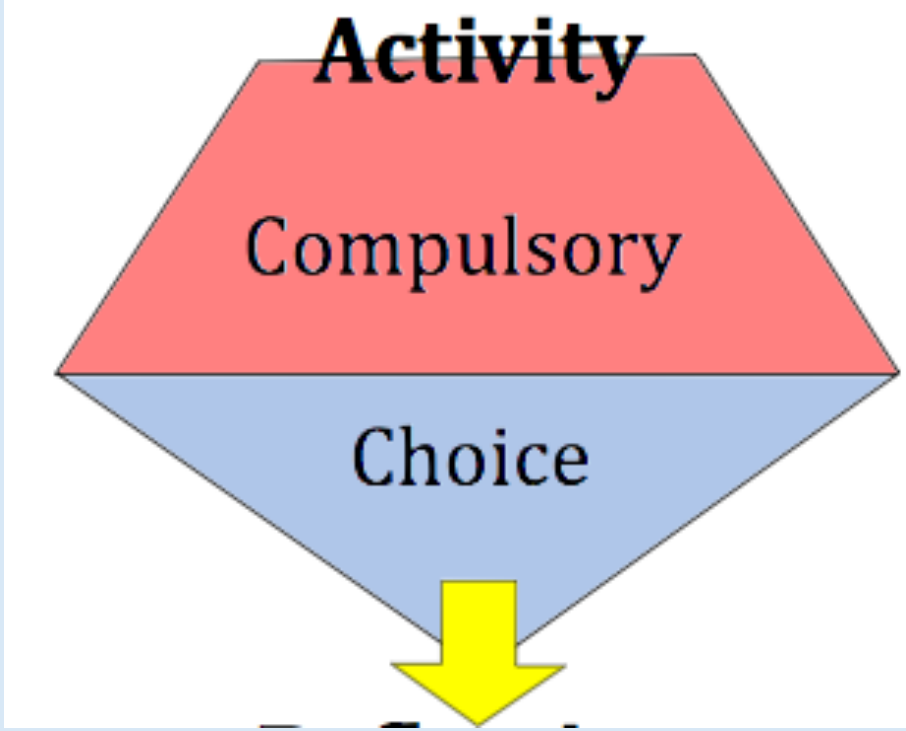
(Does your answer make sense? What's another way to find it? What do you notice about your answer?)

More Problems

Which fractions repeat and which terminate? Why?

Can we predict the period of the decimal representation of a given fraction?

Workshop Model



Students learn most when they are active.

Activity can include instructor demonstrations. Should include sometimes!

Differentiation happens here often by choice and often by varying levels of support.

Research shows effectiveness of cooperative approaches.

Workshop Model

Research shows that active learning without summary is not much more effective than traditional approaches.

Communication helps learners consolidate and organize their thinking.

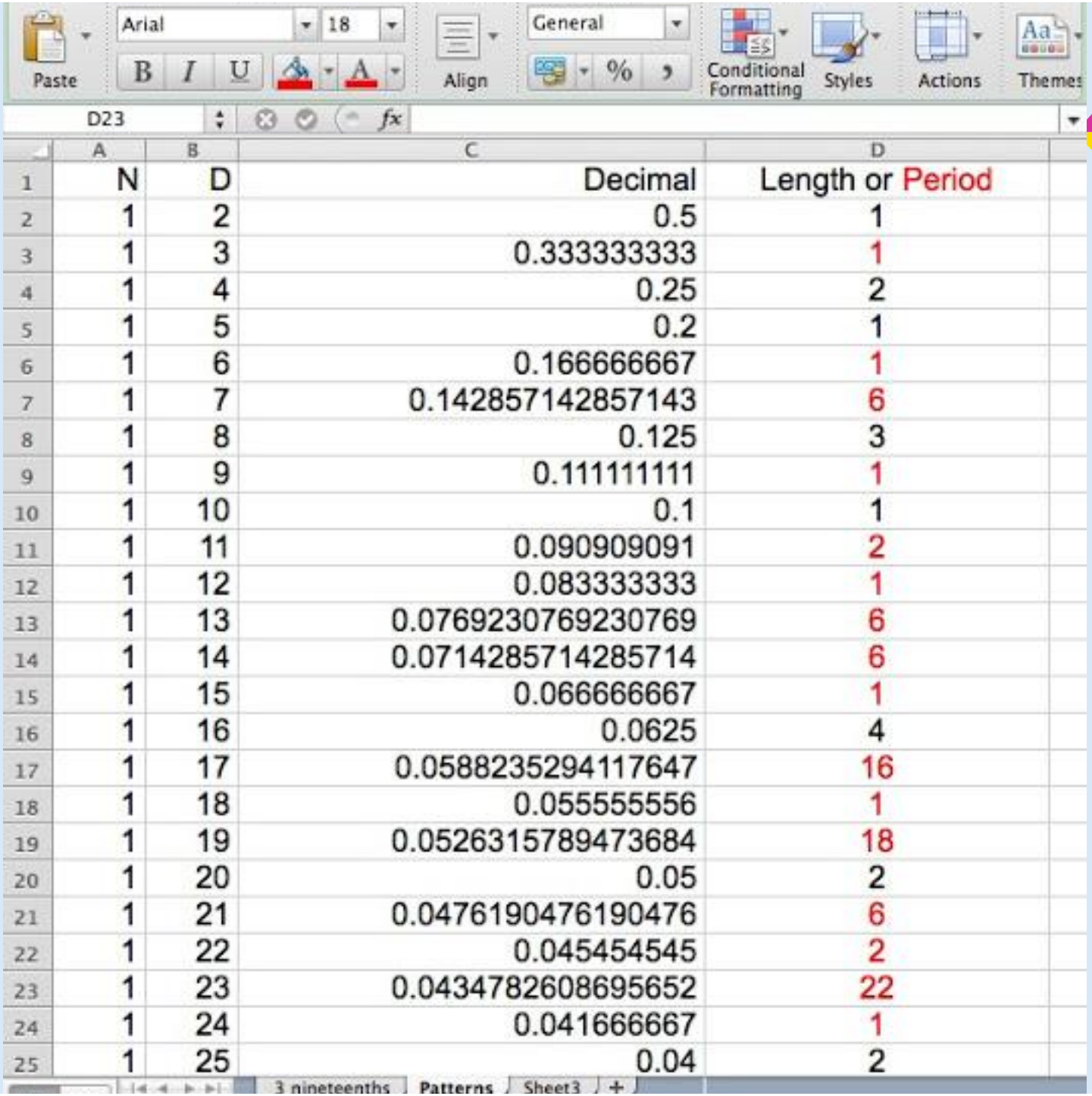
Vygotsky thought students construct understanding best in dialogue with other learners.

Hearing student thinking is valuable assessment for both evaluation of students and further planning.

Reflection

What new mathematical knowledge did you build?

Where did you construct or evaluate arguments? How did that help you better your understanding?

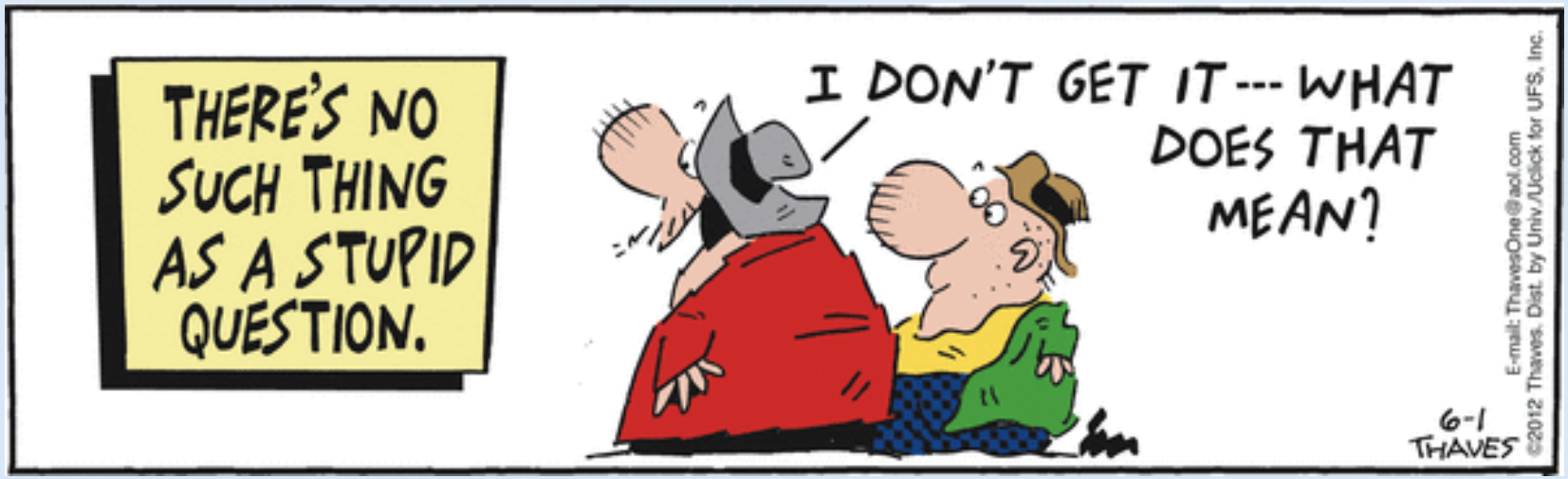


	A	B	C	D
1	N	D	Decimal	Length or Period
2	1	2	0.5	1
3	1	3	0.333333333	1
4	1	4	0.25	2
5	1	5	0.2	1
6	1	6	0.166666667	1
7	1	7	0.142857142857143	6
8	1	8	0.125	3
9	1	9	0.111111111	1
10	1	10	0.1	1
11	1	11	0.090909091	2
12	1	12	0.083333333	1
13	1	13	0.076923076923076	6
14	1	14	0.071428571428571	6
15	1	15	0.066666667	1
16	1	16	0.0625	4
17	1	17	0.058823529411764	16
18	1	18	0.055555556	1
19	1	19	0.052631578947368	18
20	1	20	0.05	2
21	1	21	0.047619047619047	6
22	1	22	0.045454545	2
23	1	23	0.043478260869565	22
24	1	24	0.041666667	1
25	1	25	0.04	2

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.

Discussion


THERE'S NO SUCH THING AS A STUPID QUESTION.
I DON'T GET IT --- WHAT DOES THAT MEAN?
6-1
THAVES
E-mail: ThavesOne@aol.com
©2012 Thaves. Dist. by Univ./Uclick for UFS, Inc.

References/Resources

- Esther - billingse@gvsu.edu
- Dave - coffeyd@gvsu.edu, @delta_dc, deltascape.blogspot.com
- John - goldenj@gvsu.edu, @mathhombre, mathhombre.blogspot.com
- Pam Wells - our colleague with whom we've done much of this work.

References/Resources

- Dave's 3/19 lesson: When Will It End?
- Dave's workshop intro: How do you use the workshop model?
- John's post on the model: Right to Workshop

- Our handout for this session: Google doc
- Flowchart Workshop diagram

References/Resources

- *The Whole Story*, Brian Cambourne, 1988.
- CCSS for Math
- *Reworking the Workshop*, Daniel Heuser, 2002.
- *Mosaic of Thought*, Keene & Zimmerman, 2nd ed., 2007.